

Wood and Wellness

Dr Ed Suttie, BRE, United Kingdom

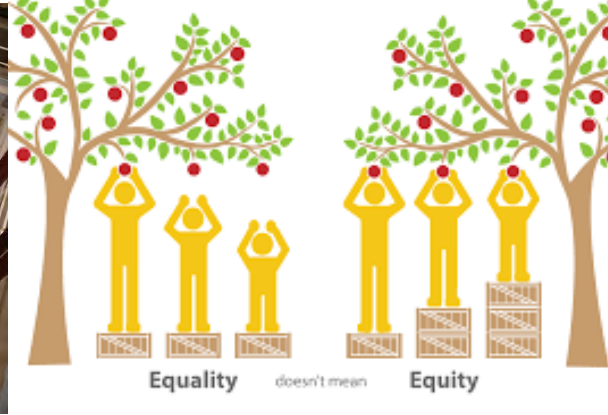
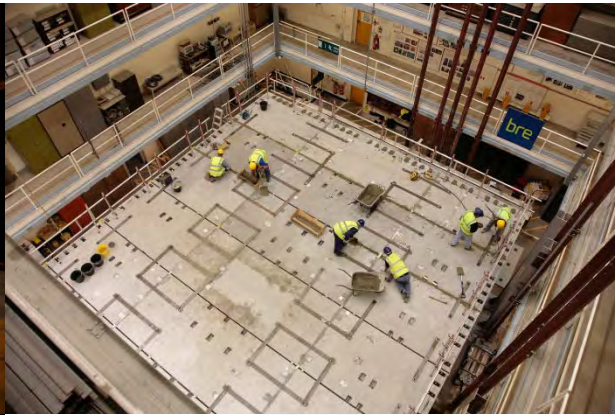


**TIMBER - A HEALTHY FUTURE
FOR SUSTAINABLE BUILDINGS**

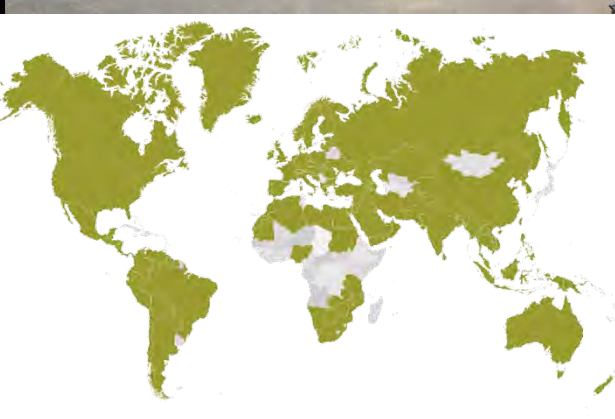
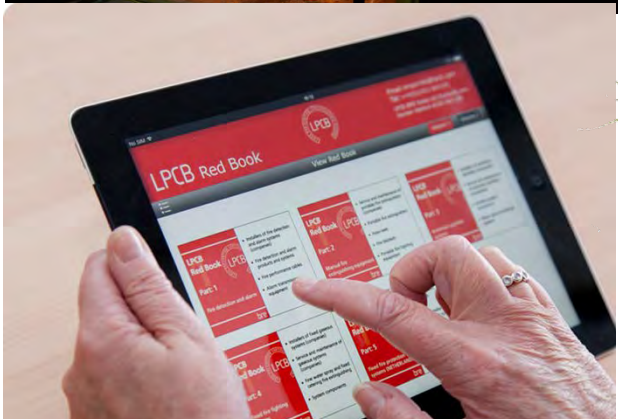
March 7th | Koper, Slovenia



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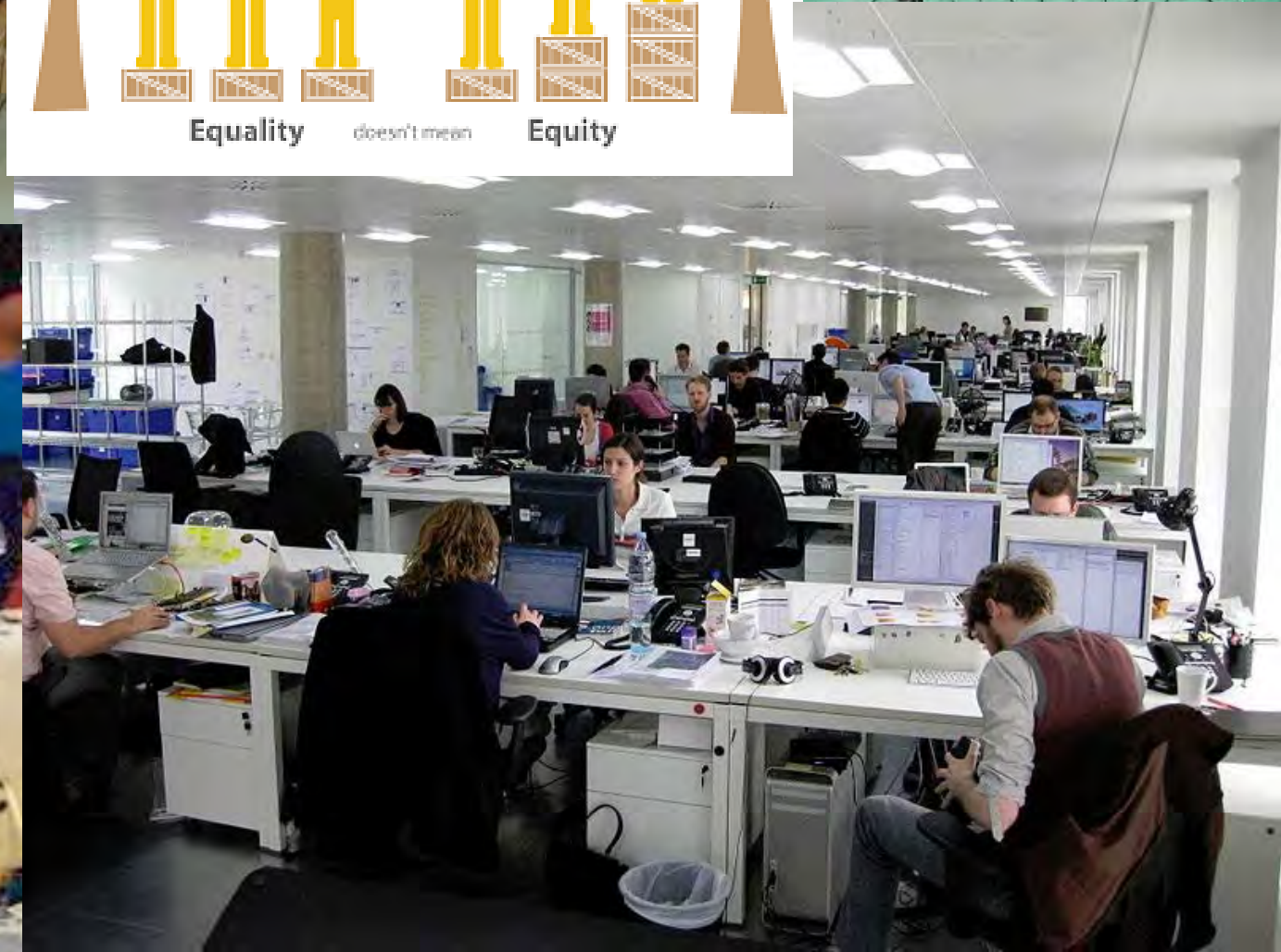
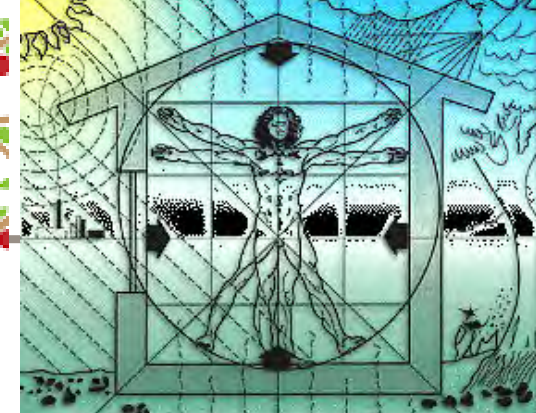
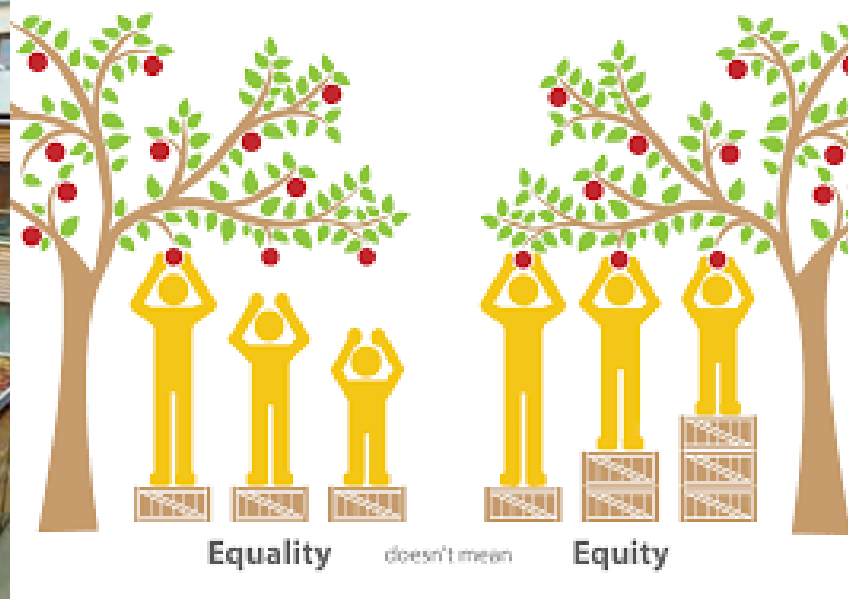
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CHARACTERISTICS LINKED TO COMFORT

Temperature
Humidity
Acoustics
Light
VOC's
Colours
Surfaces





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Wellness

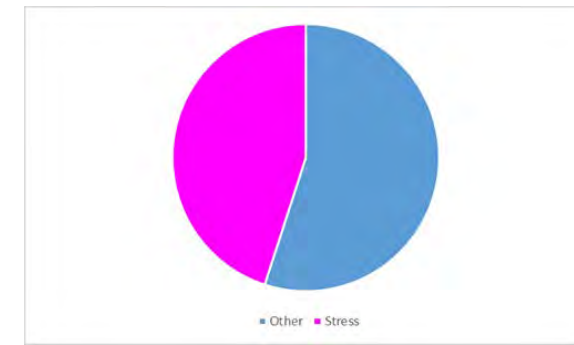
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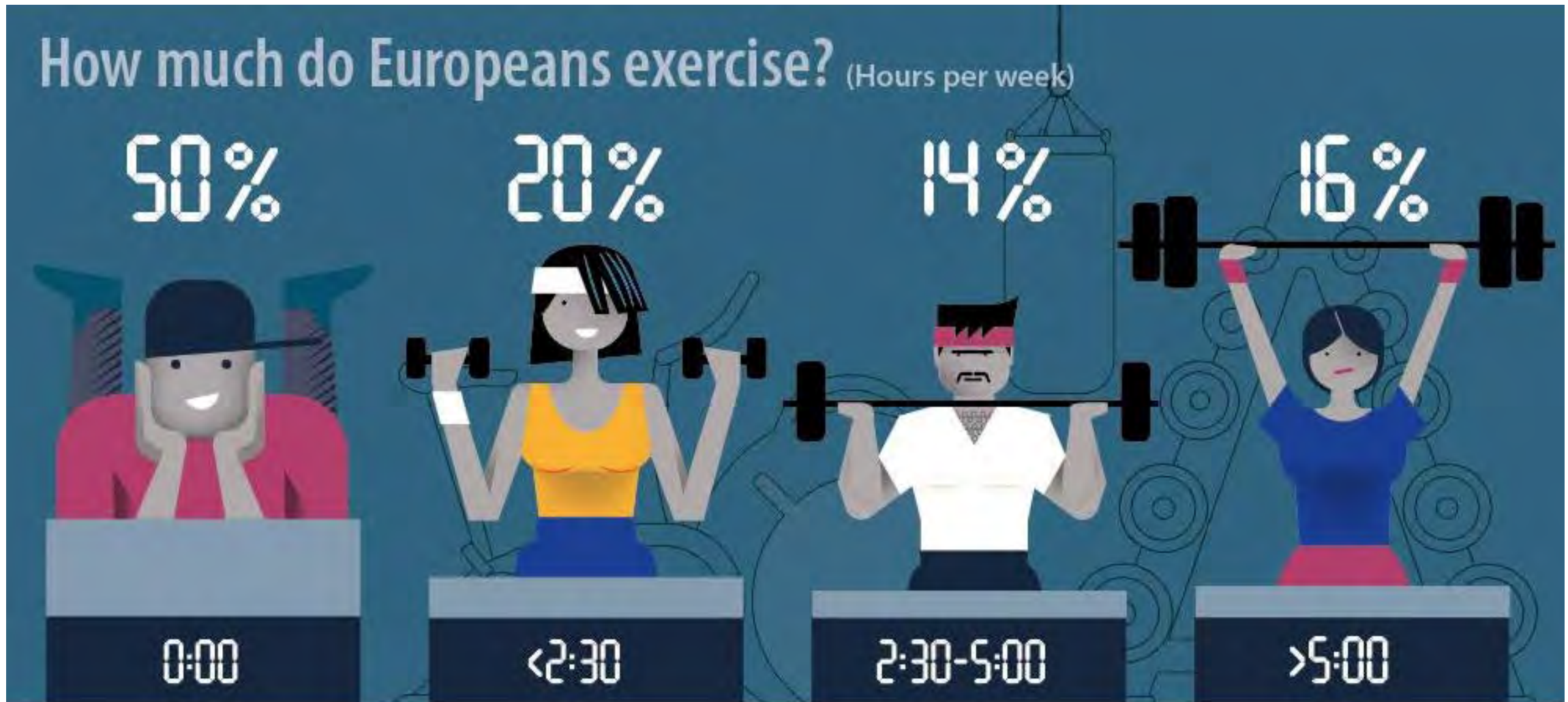
Health & Wellbeing

- Mental Health – how we think, feel and cope with daily life
- Physical Health – absence of disease and optimal function of body
- Social Health – how we react to other individuals and groups and how they react to us

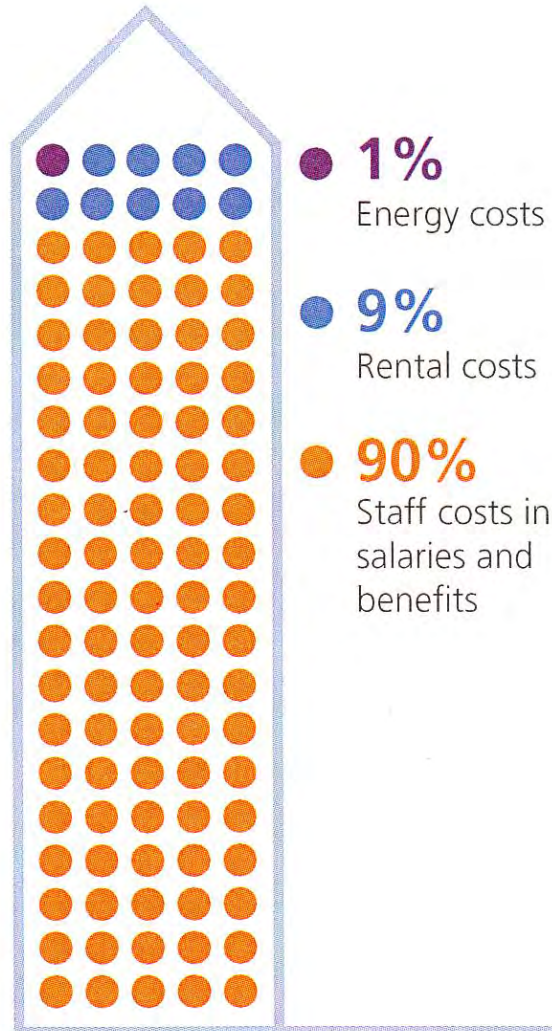


- WHO forecast stress related illness primary cause of sickness by 2020
- In 2015/16 stress accounted for 37% of all work related ill health cases and 45% of all working days lost due to ill health.
- WHO Common mental conditions such as depressive and anxiety disorders in the working population accounts in the European Region for costs of €140 billion pa.
- Urbanisation in Europe 74% 2018 – up from 51% in 1950
- Technology impacts 93% of UK adults have smart technology and over 30% admit to checking smart phones in the middle of the night
- 13% of households within the EU-28 in 2013 are composed of a single person aged 65 or over
- We spend 90% of our time indoors - losing our connection to nature
- **Think of a place where you feel relaxed and inspired?**





Typical business operating costs¹



10% Variation

A 10% variation applied equally to each cost has a far from equal impact

+/- 0.1%

Energy costs

+/- 0.9%

Rental costs

+/- 9.0%

Staff costs

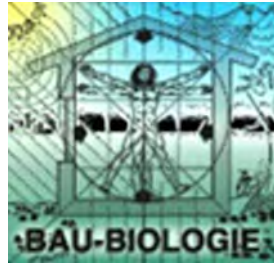
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Briefing Paper

Assessing Health and Wellbeing in Buildings

Alignment between BREEAM
and the WELL Building Standard™

Chris Ward & Alan Yates - BRE
Jaclyn Whitaker, Shalini Ramesh & Nathan Stodola - IWBI



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森林浴

the Department of
Hygiene and
Public Health

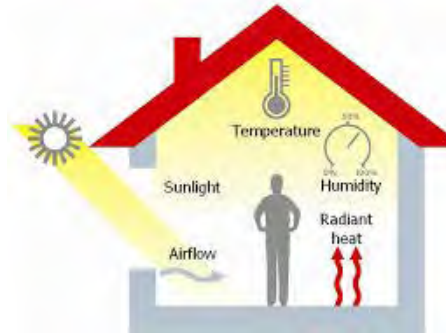
**Forest
Medicine**

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The Biophilic Office project

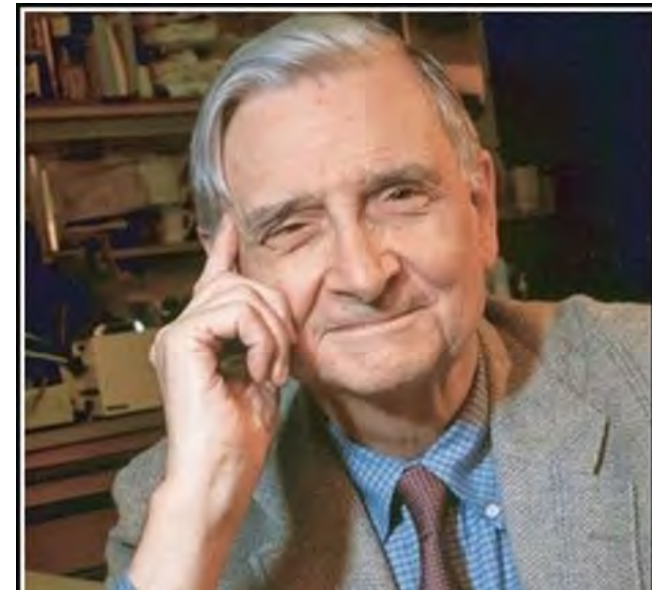
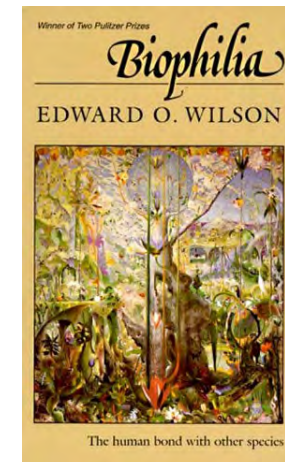
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What defines a great indoor environment?



- Biophilia hypothesis, idea that humans possess an innate tendency to seek connections with nature and other forms of life.
- The psychoanalyst **Erich Fromm** in *The Anatomy of Human Destructiveness* (1973)
- Harvard Professor of Biology **Edward O. Wilson** in his work *Biophilia* (1984), proposed

Our genetic connection to nature



Key constructs of Biophilic design

Contact with nature

Water, trees, plants, light



Natural analogues

Evoking a sense of nature



Human spatial response

Energising, relaxing, restorative



14 Patterns of Biophilic Design

Direct Connection

1. Visual Connection with Nature
2. Non-Visual Connection with Nature
3. Non-Rhythmic Sensory Stimuli
4. Thermal & Airflow Variability
5. Presence of Water
6. Dynamic & Diffuse Light
7. Connection with Natural Systems

Indirect – natural analogues

8. Biomorphic forms & patterns
9. Material connection with nature
10. Complexity and order

Human Spatial response

11. Prospect
12. Refuge
13. Mystery
14. Peril



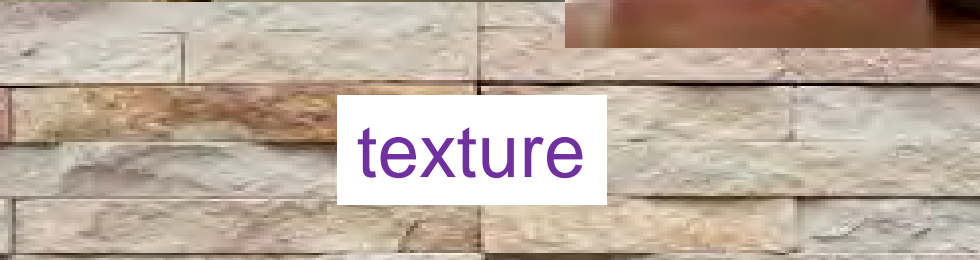
sound



nature



aesthetic



texture



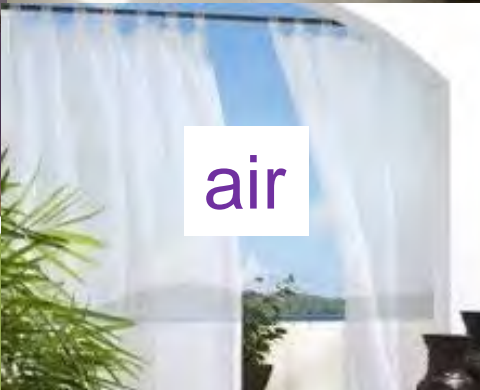
light



view



colour



air



diversity



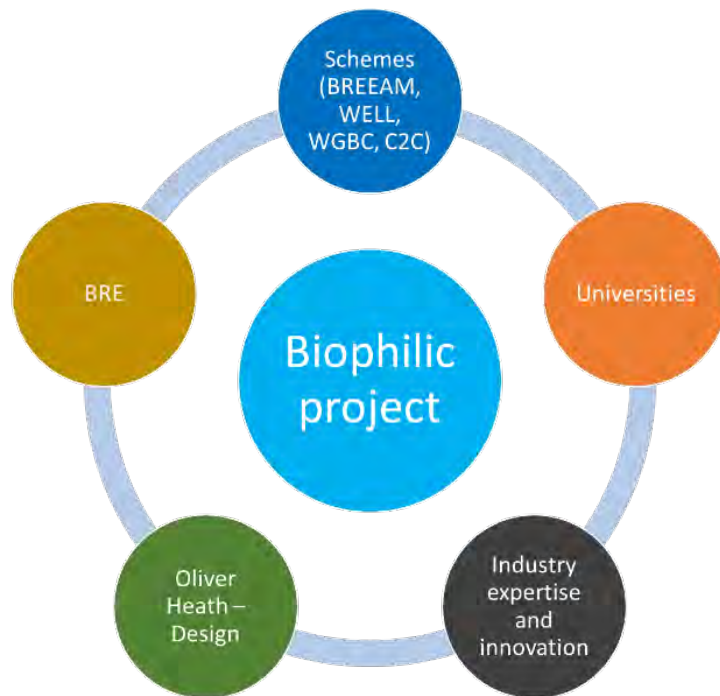
- Noise reduction
- Interest
- Promote health and creativity



The workplace of the future?

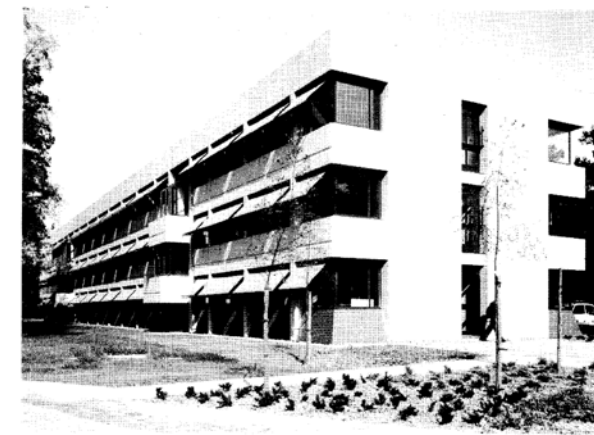
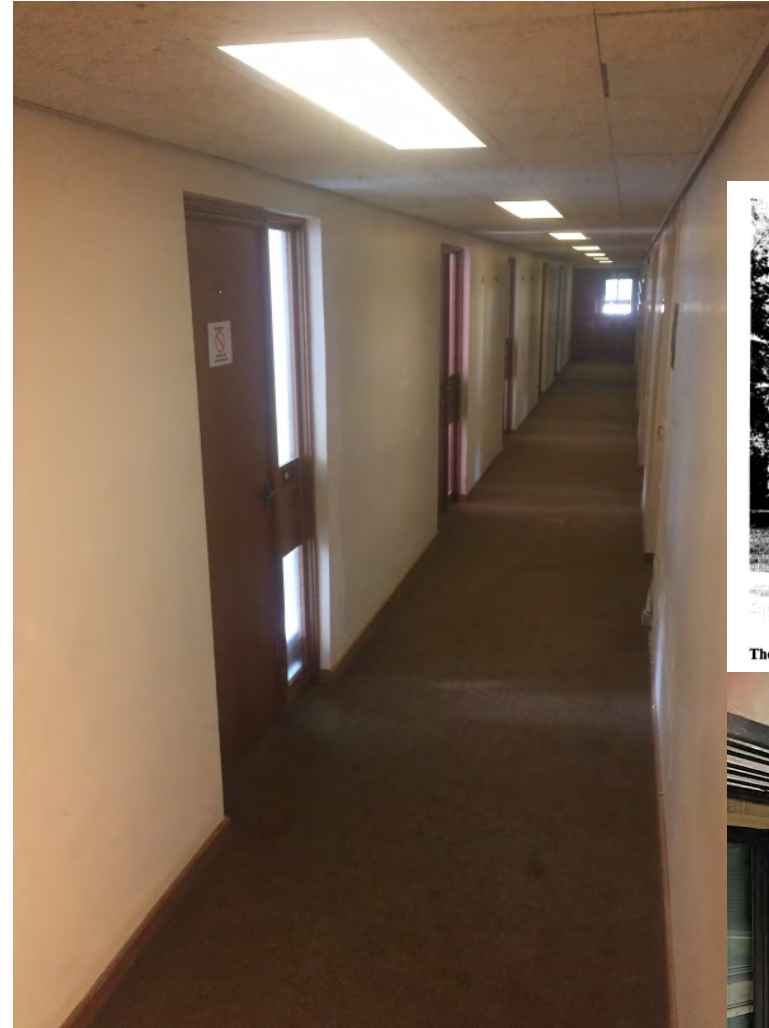
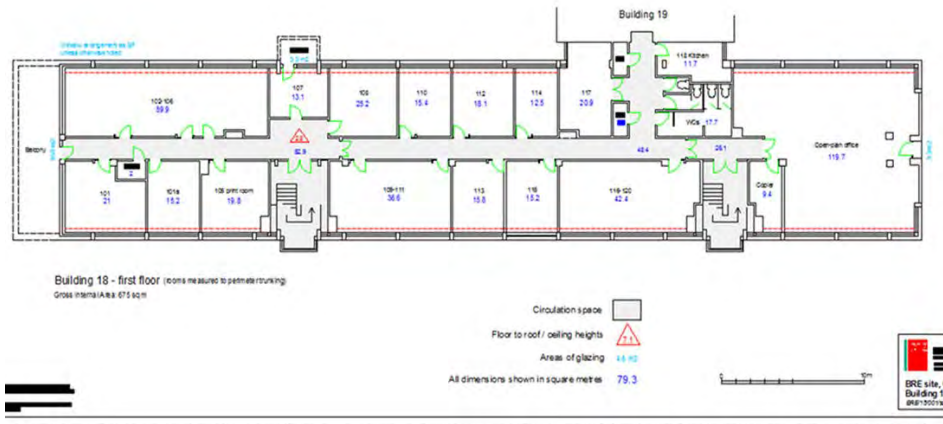


- Grow and deepen the evidence base for health, wellbeing and productivity impacts of restorative office refurbishment



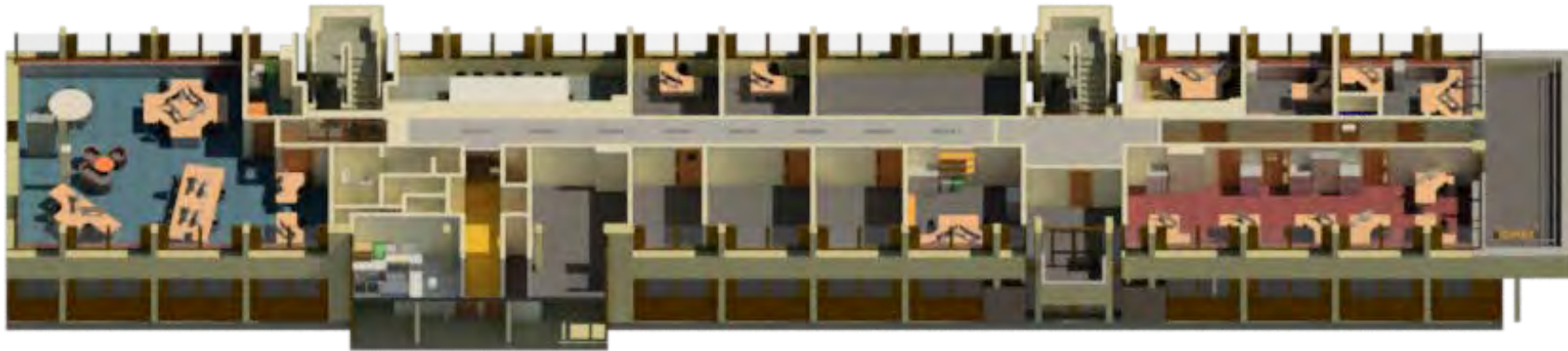
- What **practical interventions** can office owners implement to improve health and wellbeing?
- Can these be **quantified** as part of the decision making process?
- Measures of **better business outcomes** - occupant productivity?
- Provision of practical **guidance** to engage refurbishment contractors, real estate owners and designers

- 1980s concrete framed office
- Civil service cellular offices
- ‘Standard’ refurbishment heating, lighting and ventilation strategy and controls



The low-energy office at the Building Research Establishment



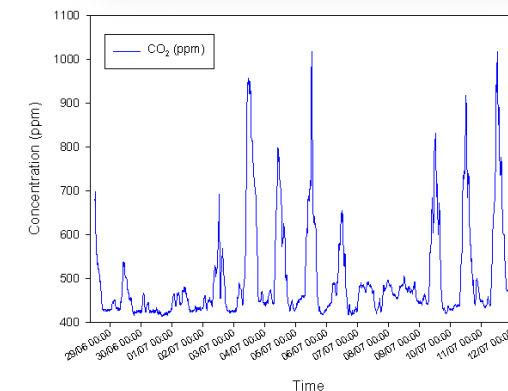
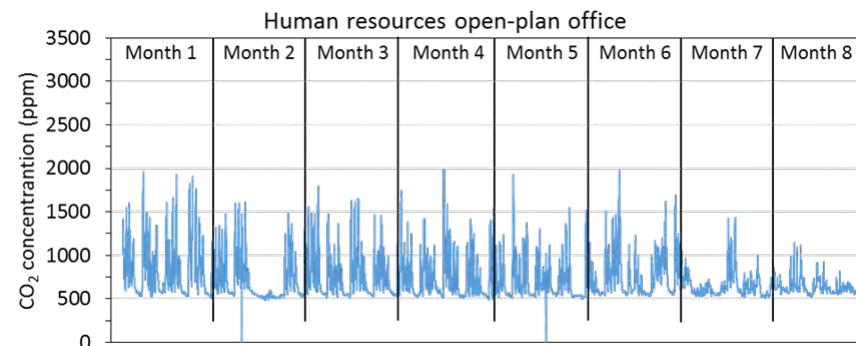
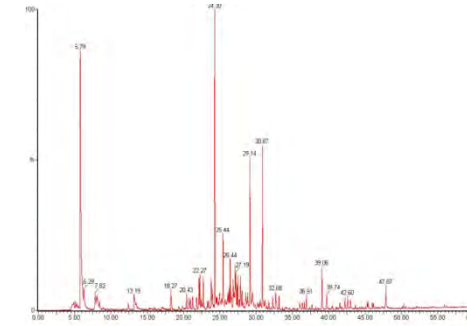


Continuous monitoring using Tinytag loggers

- Temperature and RH
- CO₂ level

Periodic monitoring

- Ventilation rate (ACH - using tracer gas)
- VOC (total and individual compounds by ISO 16000 & 16017 methods)



Computer modelling of daylight:

- Daylight distribution across office space
- Annual profiles of daylight illuminance at eye level, working plane level and window level

Daylight monitoring:

- Outdoor level of daylight – roof-mounted light sensor plus internally mounted power supply and data logger
- Indoor level of daylight



Modelling of acoustic environment:

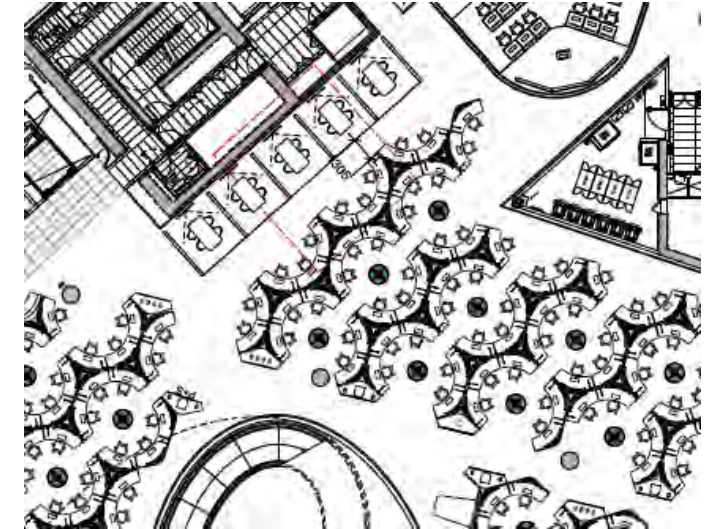
- Reverberation time

Characterising acoustic environment

- Walk through survey

Noise monitoring:

- Decibels in office
- Background
- External



Biophilic office project: Occupant monitoring

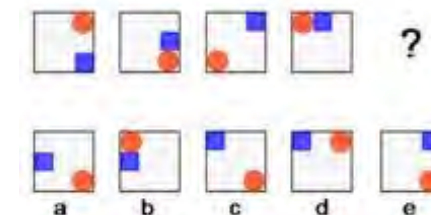
Psychology: Questionnaires, tools, cognitive tasks, interviews

Physiology: Biomarkers, wearables

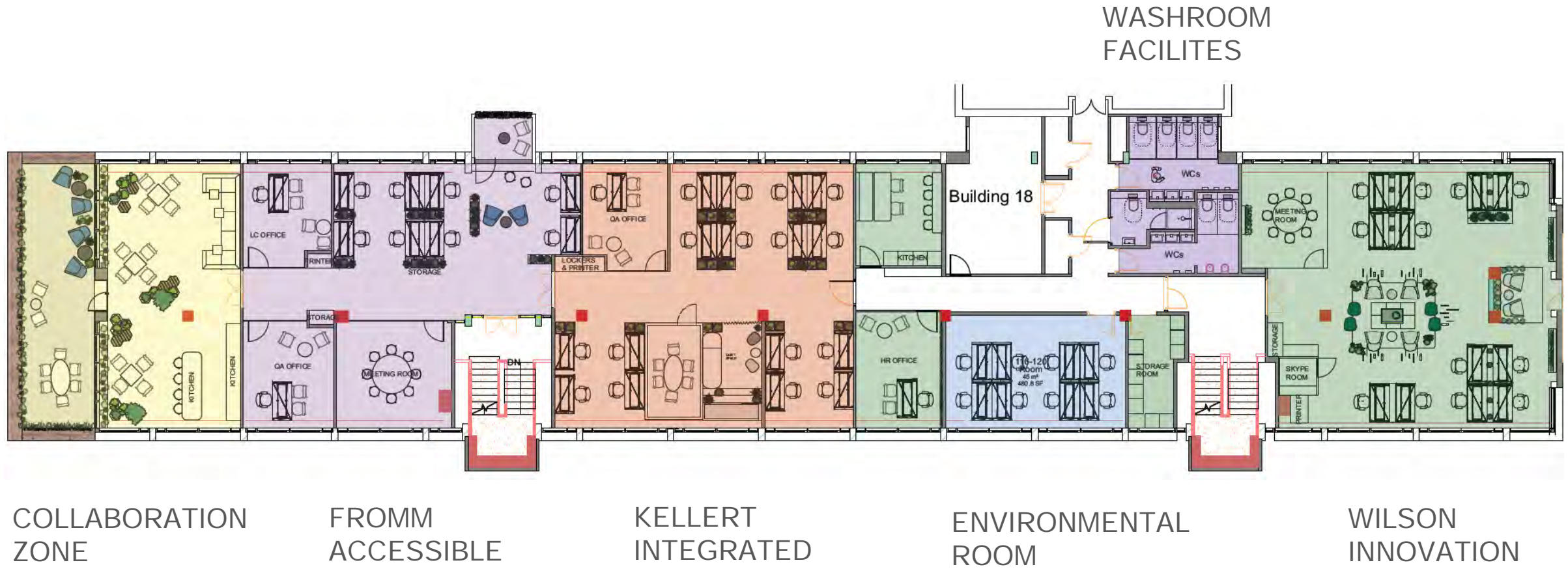
Business “productivity” measures



Choose the figure that completes the series.



Proposed Plan Developed with Occupants



Kellert Area – Integrated Design

Creating An Integrated Biophilic Strategy



In the Kellert area we are focusing on Biophilic design solutions which could be easily adopted and integrated in the beginning of any refurbishment project.

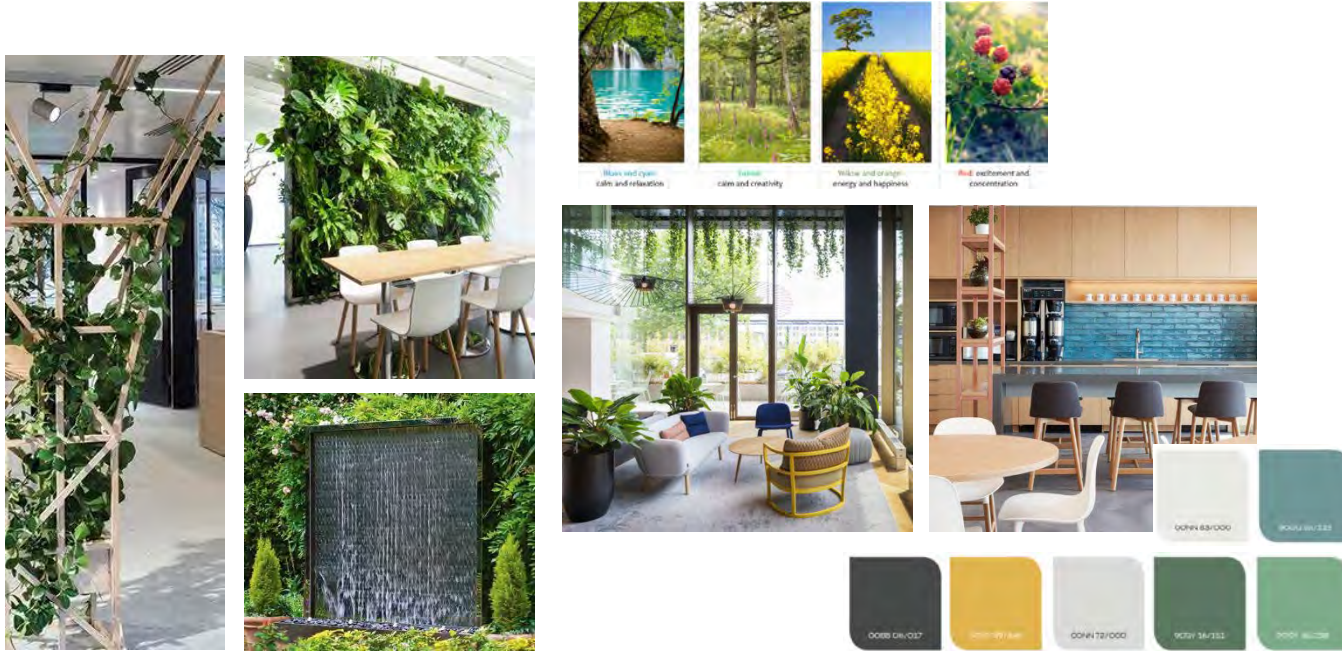
Example Features:

Timber clad walls with integrated planting, a “quiet” zone with window seat for recuperation and new flooring design which mimics patterns found in nature.



Wilson Area – Innovative Design

Creating An Innovative Biophilic Strategy



The **Wilson** area is being developed with a high level of Biophilic design intervention and innovation. This space is an opportunity to showcase new products, new systems and innovative design ideas for the ideal workspace.

Example Features:

Living green walls, timber biomorphic screening, a complete sound scaping system and water wall, intelligent furniture with integrated heating and cooling.



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Project Team





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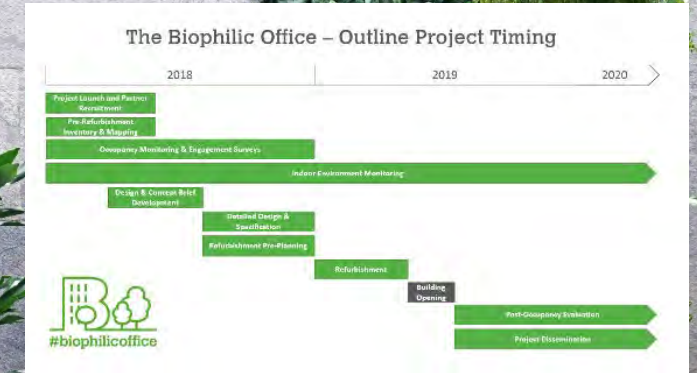
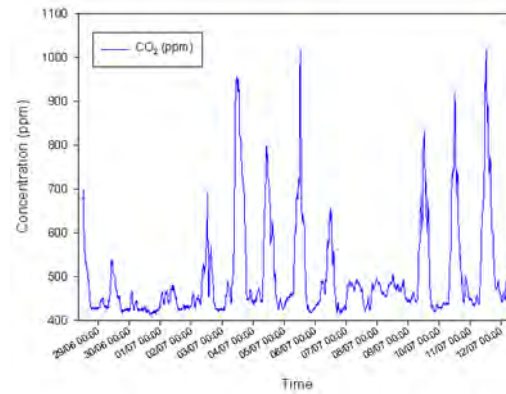


The Guild of
 Human Resource
 Professionals

plants@work



- www.bregroup.com/biophilic
- LinkedIn Group Biophilic Design: Realising our Need for Nature at Work
- 6-7 June 2019 @BRE, Watford UK *Wellness and Biophilia Symposium - Using Nature-Inspired Design to Foster Workplace Wellness*



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Wood

3

TRADA Briefing



The role of timber in healthy buildings

1: Introduction

The impact our buildings have on how we work, heal, learn and rest is highly significant, whether it is patient recovery, student performance, productivity in offices, or our own comfort at home – all are influenced by the indoor environment and the design, products and systems used to create and furnish our buildings.

But what do we mean by the term *healthy buildings*? Hal Levin defined a healthy building as 'one that adversely affects neither the health of its occupants nor the larger environment'. It is a complex field, with claims of exciting improvements to productivity based on changes to interiors in workplaces, but studying people and measuring people's feelings can be qualitative and study-specific. The idea of a solution that fits all is misleading, but there are principles in common that work towards improvements in indoor environments and the creation of healthier buildings. Empirical studies have documented that both active and passive experiences of nature may be beneficial for human health and wellbeing. The use of natural materials such as wood is expected to improve the user experience and provide connection to nature.



Figure 1 Sunbeams Music Centre utilises several timber species in order to provide a warm interior that is predominantly naturally ventilated and lit.
Photograph © Simon Kennedy

The theme of healthy buildings is woven into environmental assessment, circular economy, design economics, project budgets and material selection. Modern construction has seen a rise in the use of natural materials, including timber products. Cost-effective, efficient, lightweight and environmentally responsible features are evident, not least by the rise of timber in medium to tall buildings, as are softer aesthetic and comfort choices. This briefing document looks at the increasing evidence base that underpins this, expanding and supporting the use of timber in construction, especially in interiors, where humans will interact with materials either directly by visual or haptic senses, or indirectly through smell, air quality, humidity buffering and thermal comfort.

2: What makes a building healthy?

Our personal health and wellbeing are conventionally framed around our physical health (the absence of disease and optimal function of the body), mental health (how we think, feel and cope with daily life) and social health (how we react to other individuals and groups and how they react to us).

Our interactions with our surroundings and the influence our surroundings have on our health and wellbeing are subject to much debate, analysis and discussion in the construction industry. Fundamentally, a building should go beyond eliminating negative impacts on our health to be a building that has positive impacts on our physical health (through layout, use of stairs, air purification), mental health (function, places to rest and restore, aesthetic, stimulation) and social health (places to meet, promote collaboration, learn). There is much to learn in the field of healthy building science, which has a diverse scope – from the impacts of poor buildings on us to the potential for the use of wood in interiors to have a positive impact on us.

2.1. Types of healthy building

Healthy buildings should support the physical, psychological and social health and wellbeing of people, recognising the fact that buildings – how they are designed, built and operated – are key promoters of health and wellbeing. Healthy building

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Bias

Judgement

Data

EVIDENCE

Anecdotal

Empirical

Instinct

Building environment	Wood	Occupant
Indoor air quality Acoustic quality Daylight and lighting Hygrothermal mass Thermal comfort Humidity Views of nature	Indirect contact with nature Visual variety Haptic qualities Colour Aesthetic	Design, layout and ergonomics Choice Engagement Comfort Occupancy level

The background of the slide is a close-up photograph of many stacked logs, showing the circular cross-sections of the wood. The logs are of various sizes and are piled together, creating a dense, textured pattern of brown and tan circles.

Research

1. Perceptions of wooden surfaces and 'wood preference'
2. Physiological and psychological benefits of wood
3. Evidence in practice from around the world

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Perceptions of wooden surfaces and 'wood preference'

4

People have positive attitudes towards wood in interiors. Wood is commonly perceived as natural, warm and healthy, and is often preferred over other materials.

- Johnsson (2008) Between wood product study for solid wood, wood-based panels and composites. The solid wood samples were most liked by consumers - preferred core categories were naturalness, smoothness and living impression.
- Nyrud and Bringslimark (2010) noted that attributes that can influence aesthetic preference correspond with some of the preferred physical properties of wood, namely complexity, coherence and naturalness.



Nyrud, A. Q., & Bringslimark, T. (2010). Is interior wood use psychologically beneficial? A review of psychological responses toward wood. *Wood and Fiber Science*, 42(2), 202–218.

Jonsson, O., Lindberg, S., Roos, A., Hugosson, M. and Lindström, M., Consumer perceptions and preferences on solid wood, wood-based panels, and composites: a repertory grid study. *Wood and Fiber Science* 2008; 40(4): 663–678.

- Explores the use of wood in the interior of a building as having clear physiological and psychological benefits that mimic the effect of spending time outside in nature.
- Feelings of natural warmth and comfort that wood elicits in people have the effect of lowering blood pressure and heart rates, reducing stress and anxiety, increasing positive social interactions and improving corporate image.
- Important for environments in which it is difficult to incorporate nature indoors, such as hospitals where strict health and safety guidelines may prevent the presence of plants



Planet Ark, Wood housing health humanity report, 2015, at www.makeitwood.org/documents/doc-1253-wood--housing--health--humanity-report-2015-03-00-final.pdf.

Planet Ark, Wood nature inspired design: an update of the Wood: housing, health, humanity report, 2016, at www.makeitwood.org/documents/doc-1501-wood---nature-inspired-design-report-final.pdf.

Material		Perception				
	Creates a natural look and feel	Creates a warm and cosy environment	Visually appealing	Feels nice to touch	Environmentally friendly	Relatively cheap
Wood	93	92	88	87	68	31
Brick	61	62	58	30	47	30
Concrete	25	23	24	20	27	35
Steel	20	16	36	36	28	20
Aluminium	17	15	33	34	30	36
Plastic	14	18	24	36	14	71

Results of the Planet Ark survey asking how participants perceive different material types (score out of 100)

- Usually wood is compared to carpets, glass, leather, stone or plastic, but is not compared to a visually similar material such as laminate.
- Jiménez (2016) analysed and compared the psychological characteristics related to wooden and laminate materials in interiors . Their results show that wooden floors were evaluated as significantly better than laminate floors regarding ‘atmosphere’ and ‘values’ and ‘function’. For the criterion ‘health’, a tendency to favour solid wood was found.



- Nyrud et al. (2014) investigated preferences for wood in patient rooms
- Patients and clinical staff were asked to evaluate computer-manipulated images of rooms with different amounts of wood on surfaces - a room that had no wood present, some wood present and a lot of wood present.
- The room with some wood present was preferred, then the room without any wood and then the room with a lot of wood was liked least.
- Suggests a limit to how much wood is preferred.



Nyrud, A. Q., Bringslimark, T. and Bysheim, K., Benefits from wood interior in a hospital room: a preference study. *Architectural Science Review* 2014; 57(2): 125–131, at www.westernforesteconomists.org/wp-content/uploads/2014/12/Nyrud-et.al.-Health-benefits-from-wood-interiors-in-hospitals.pdf.

- Rice (2006) demonstrated that the colours and texture of wood elicit feelings of ‘warmth’, ‘comfort’ and ‘relaxation’ in people.
- People’s responses to wood are, for the most part, extremely positive, with subjects generally showing a strong preference for rooms containing many wood details.
- Appears to be a strong belief that the use of wood can help create healthful environments, and commonly evoked descriptors for wood rooms include ‘warm’, ‘comfortable’, ‘relaxing’, ‘natural’ and ‘inviting’.



- Sakuragawa (2006) quantified the impact of visual stimulation from interior wood finishes on the impression of room interiors, and user feelings
- Four types of room interiors with interior wood finishes used in different proportions were simulated
- In an evaluation of ‘living’, the photograph of a room interior without wooden materials was evaluated as a place that test subjects did not feel like living in.
- The photograph showing wood materials used only as flooring was evaluated as the place that test subjects most felt like living in and considered most suitable as a living space. This points to there being a balance of amount of wood products in interiors.

Sakuragawa, S., Change in the impression of rooms with interior wood finishes arranged differently: questionnaire survey with the use of photographs for the analysis of impressions of rooms concerning living activities. *Journal of Wood Science* 2006; 52(4): 290–294.

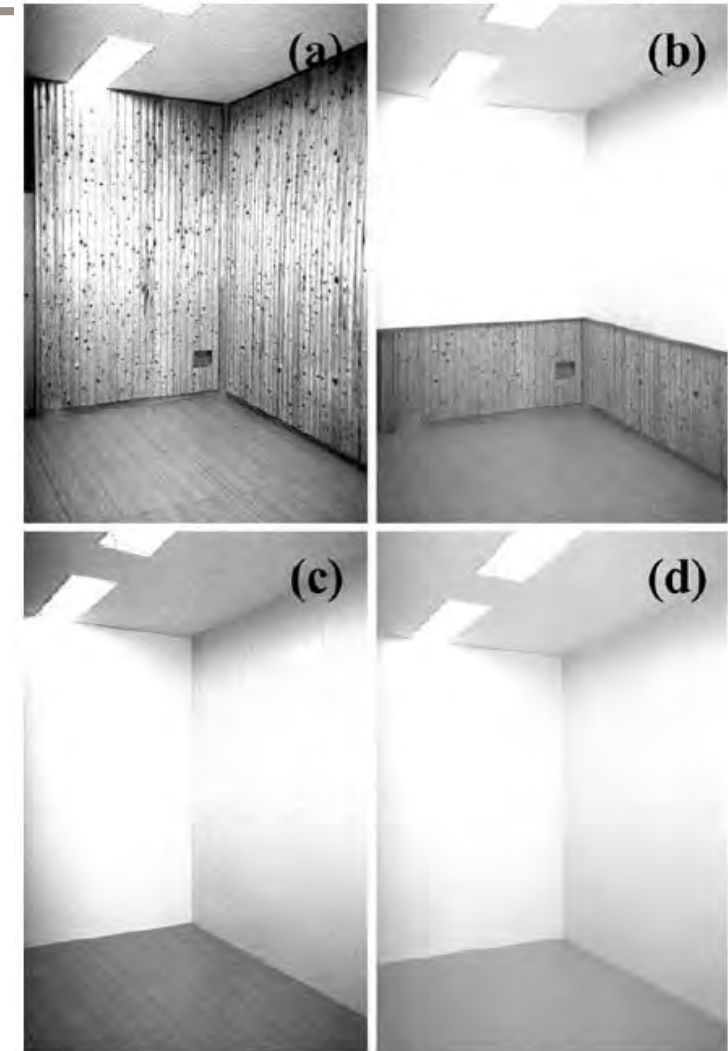
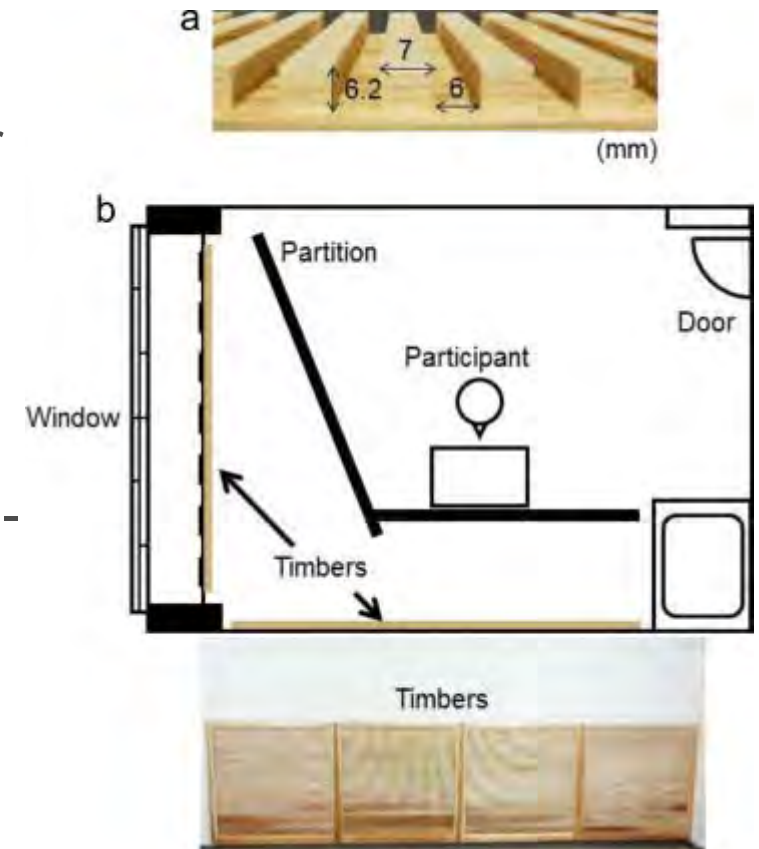


Fig. 1a–d. Photographs of the rooms for research. **a** Room with wood materials used for the floor and walls, **b** room with wood materials used for the floor and wainscots, **c** room with wood materials used only for the floor, **d** room with a grey floor and white walls, without wood materials

- Matsubara (2014) assessed subjective differences in wellbeing in a room equipped with walls of Japanese cedar wood compared to a control room with no wood.
- The timber was screened from view and crenelated to maximise VOC release
- Responses of the panellists were significantly different between the two conditions, with a preference for the wood-walled room.



Matsubara, E. and Kawai, S., VOCs emitted from Japanese cedar (*Cryptomeria japonica*) interior walls induce physiological relaxation. *Building and Environment* 2014; 72: 125–130.

People have positive attitudes towards wood in interiors.

YES	The material wood is natural, warm, healthy, smooth,
YES	Wood materials are often preferred over other materials with test groups in global studies
YES	Wood products in buildings are preferred with limits on the amount in one room

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Physiological and psychological benefits of wood

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Wood has a positive impact on human psychology
and physiology.

- Ulrich (1984) demonstrated benefits to patients recovering from gall bladder surgery in rooms with views onto nature:
 - patients recovered 8.5% faster
 - the required 22% less medication
 - patients felt less pain



Ulrich R.S. (1984) View through a window may influence recovery from surgery. science. 1984 Apr 27;224(4647):420-1.

- Anme (2012) concluded that wood products improve the quality of life of elderly people in assisted living accommodation (44 elderly people and 30 health and social care professionals).
- The results indicate that regular use of wood products (tables, chairs, tableware) significantly increased social interactions and harmonious relations, activity levels and mental energy in elderly people.
- Thus, wood products appeared to improve the quality of life of elderly people by stimulating emotional relationships through improved cognitive function. Social interactions that lead to opportunities for self-expression in old people reduce the risk of dementia, a disease that currently affects over 50M people worldwide.

Anme, T., Watanabe, T., Tokutake, K., et al., Behavior changes in older persons caused by using wood products in assisted living. *Public Health Research* 2012; 2(4): 106–109.



- Augustin and Fell (2015) considered the impacts of nature views, plants, natural light and soundscapes on healthcare environments. Part of the report looks at wood in healthcare environments and provides a comprehensive summary, including self-reported studies by Japanese researchers who are actively engaged in the field.
- In healthcare environments, natural materials and views are associated with better patient outcomes with respect to recovery times, lower pain perception, and positive dispositions.

Augustin, S. and Fell, D., Wood as a restorative material in healthcare environments, version 1.2, FP Innovations, 2015, at www.ekkist.co/wp-content/uploads/2018/05/Wood-as-a-Restorative-Material-in-Healthcare-Environments.pdf.



- In the Hauptschule Haus im Ennstal, Austria students were taught in either a classroom furnished with floors, ceilings, cupboards and wall panels made of solid wood or a classroom fitted with a linoleum floor, plasterboard walls and chipboard cupboards.
- Kelz (2011) studied this use of wood in classrooms and found that over the course of a school year pupils' heart rates significantly decreased in the solid wood classroom but increased in the control classroom.
- Perceived stress from interactions with teachers (e.g. being shouted at, being ignored) decreased significantly over the school year in the solid wood classroom, while it did not change for pupils in the control classroom.
- This study did not find significant differences or changes over time in pupils' concentration.

Kelz, C., Grote, V. and Moser, M. Interior wood use in classrooms reduces pupils' stress levels, 2011, at www.proceedings.envpsych2011.eu/files/doc/342.pdf.



- The psychophysiological response to wood was studied by Fell (2010), specifically the autonomic responses of 119 subjects in wood and non-wood offices before, during and after a stressful mental task
- A 2014 study by the University of British Columbia refitted similar offices with different materials and measured health aspects of occupants
- As visual wood surfaces in a room increased it lowered sympathetic nervous system activation, which is responsible for physiological stress response. Fell confirmed that this sensation of relaxation in the presence of nature is due to a reduction in stress reactivity, which is both psychologically and physiologically beneficial.



Wood has a positive impact on human psychology and physiology.

SOME	Education - promising results from Austria should be replicated with more subjects and different age groups to build upon this exciting finding.
SOME	Healthcare – research in its relative infancy, long-term studies are scarce and inclusion of wider demographics is required
SOME	Office - exciting results from Canada should be replicated with more subjects and different age groups
LIMITED	Homes – little evidence for housing

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Evidence in practice from around the world

6

Wood is specified for its health and wellbeing qualities.



Wood in Healthcare

One Kids Place children's treatment center, North Bay, ON

Critical Care Tower at Surrey Memorial Hospital, Surrey, BC

Thunder Bay Regional Health Sciences Centre, Thunder Bay, ON

Tseshiht Tribal Multiplex & Health Centre, Port Alberni, BC

Gateway Lodge Complex Care & Assisted Living, Prince George, BC

www.structurlam.com/wp-content/uploads/2016/12/Wood-in-Healthcare-Case-Study.pdf.



Wood Housing Health Humanity

Dandenong Mental Health Centre

Marist College Bendigo, Montagne Centre

Melbourne School of Design

The Village Centre, National Arboretum, Canberra

Tempe House, Tempe, NSW

The Library at the Dock, Victoria Harbour, Melbourne

[Planet Ark, Wood housing health humanity report \(2015\)](#)



Thinkwood cases studies

The Herrington Recovery Center, Milwaukee
Ankrom Moisan Architects at 38 Davis,
Portland

www.woodworks.org/wp-content/uploads/Herrington.pdf

www.thinkwood.com/news/office-spaces





Inside and out

Osteopathie Praktijk Roosendaal,
Roosendaal

www.architizer.com/projects/osteopathie-praktijk-roosendaal.



Calm

Timber Dentistry, Minoo

www.architizer.com/projects/timber-dentistry





Care

Healthcare Centre for Cancer Patients,
Copenhagen

www.architizer.com/projects/healthcare-center-for-cancer-patients.



Natural

Skandion Clinic, Uppsala

[www.architizer.com/projects/skandion-clinic.](http://www.architizer.com/projects/skandion-clinic)



Warm

The Onni Wellbeing Centre, Pukkila

www.woodarchitecture.fi/articles/positive-health-effects-wood-building-material.



Stress free

Schule Ohne Stress, Hauptschule Haus im Ennstal

www.holzfachberater.at/seiten/news.php?m=12&id=2



Focus

Knowledge Centre, St. Olavs Hospital,
Trondheim

www.architizer.com/projects/knowledge-centre-st-olavs-hospital.



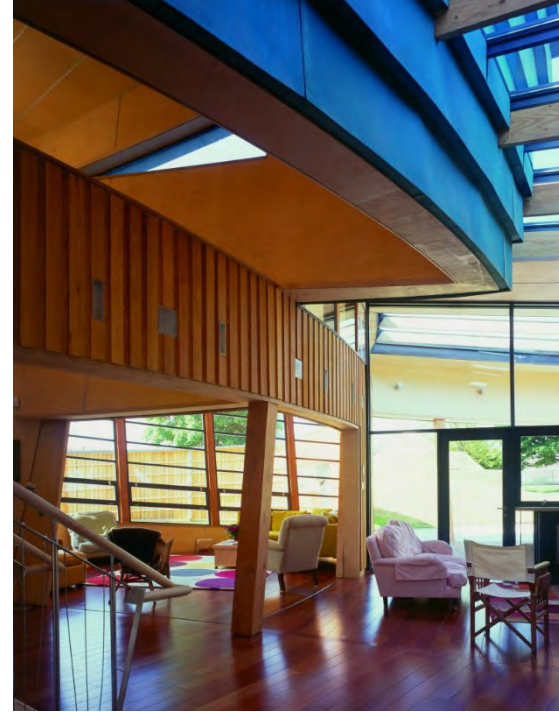


Air

Medical Care Centre Limay, Limay

www.architizer.com/projects/medical-care-center-limay





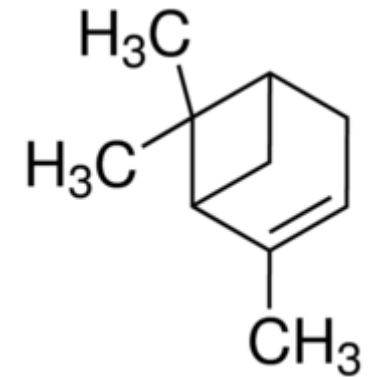
Sunbeams Music Centre, Penrith
Dyson Centre for Neonatal Care, Bath
Maggie's Inverness
The Living Planet, Woking
The Enterprise Centre, Norwich
Maggie's Oldham



Wood is specified for its health and wellbeing qualities.

YES	Wood is specified as a versatile, natural, beautiful material
LIMITED	Wood is specified for its health and wellbeing qualities.

- Nyrud (2012) the use of wooden wall panels in hospital rooms had no effect on the amount of VOCs in the indoor environment.
- Zylkowski and Frihart (2017) recorded α -pinenes as one of those VOCs that are part of the naturally present compounds in softwoods like pine, which give it the familiar pine smell could be a significant source of natural antioxidant compounds that have beneficial health effects.
- Naturally occurring VOCs can have positive impacts on humans. Song (2017) found volatile compounds from *Himalayan cedar* increased blood oxygen saturation while blood pressure and heart rate all reduced.



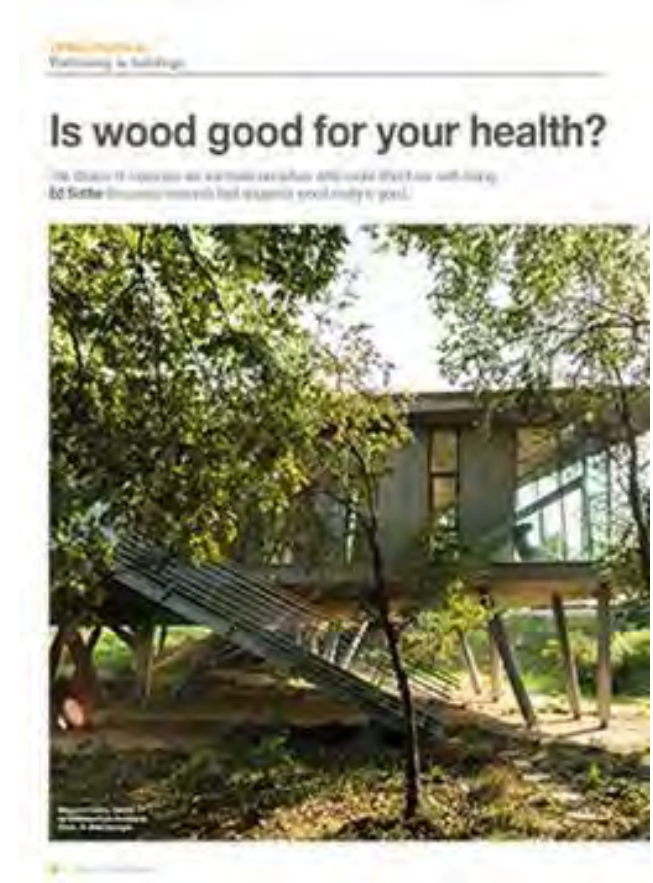
Nyrud, A. Q., Bringslimark, T. and Englund, F. Wood use in a hospital environment: VOC emissions and air quality. *Euro. Journal of Wood Products* 2012; 70: 541.

Zylkowski, S. and Frihart, C., Volatile organic compound emissions from engineered wood products, Research note FPL-RN-0350, USDA, Forest Service, Forest Products Laboratory, 2017.

Song, X., Li, H., Li, C., Xu, J. and Hu, D., Effects of VOCs from leaves of *Acer truncatum* Bunge and *Cedrus deodara* on human physiology and psychology. *Urban Forestry & Urban Greening* 2016; 19: 29–34.

- We need to:
 - understand the cultural and individual differences that influence preferences for wood in indoor settings
 - conduct more studies outside the laboratory
 - conduct more longitudinal studies, to get a better picture of how benefits persist or dissipate
- Address limitations? Existing studies cover only short time periods – long-term data over days, weeks and months are needed. Many studies focus on men and women in their twenties and generalise the findings, so further studies based on a larger sample, including various age groups, are required.
- The measure of wellness? It is necessary to comprehensively evaluate the parameters that are used as indicators of health and wellbeing, brain activity, nervous activity, endocrine activity, heart rate, sleep pattern, blood pressure etc.

- Do less bad
 - Low emission
- Do more good
 - Preference
 - ‘Good’ emissions
 - Hygrothermal mass
 - High aesthetic
 - Biophilic qualities
 - Improve noise comfort
 - Reduce glare



TRADA Briefing



The role of timber in healthy buildings

1: Introduction

The impact our buildings have on how we work, heal, learn and rest is highly significant, whether it is patient recovery, student performance, productivity in offices, or our own comfort at home – all are influenced by the indoor environment and the design, products and systems used to create and furnish our buildings.

But what do we mean by the term *healthy buildings*? Hal Levin defined a healthy building as ‘one that adversely affects neither the health of its occupants nor the larger environment’. It is a complex field, with claims of exerting improvements to productivity based on changes to interiors in workplaces, but studying people and measuring people’s feelings can be qualitative and study-specific. The idea of a solution that fits all is misleading, but there are principles in common that work towards improvements in indoor environments and the creation of healthier buildings. Empirical studies have documented that both active and passive experiences of nature may be beneficial for human health and wellbeing. The use of natural materials such as wood is expected to improve the user experience and provide connection to nature.



Figure 1 Sunbeam Music Centre utilises several timber species in order to provide a warm interior that is predominantly naturally ventilated and lit

Photography: © Simon Kennedy

The theme of healthy buildings is woven into environmental assessment, circular economy, design economics, project budgets and material selection. Modern construction has seen a rise in the use of natural materials, including timber products. Cost-effective, efficient, lightweight and environmentally responsible features are evident, not least by the rise of timber in medium to tall buildings, as are softer aesthetic and comfort choices. This briefing document looks at the increasing evidence base that underpins this, expanding and supporting the use of timber in construction, especially in interiors, where humans will interact with materials either directly by visual or taptic senses, or indirectly through smell, air quality, humidity buffering and thermal comfort.

2: What makes a building healthy?

Our personal health and wellbeing are conventionally framed around our physical health (the absence of disease and optimal function of the body), mental health (how we think, feel and cope with daily life) and social health (how we react to other individuals and groups and how they react to us).

Our interactions with our surroundings and the influence our surroundings have on our health and wellbeing are subject to much debate, analysis and discussion in the construction industry. Fundamentally, a building should go beyond eliminating negative impacts on our health to be a building that has positive impacts on our physical health (through layout, use of stairs, air purification), mental health (function, places to rest and restore, aesthetic, stimulation) and social health (places to meet, promote collaboration, learn). There is much to learn in the field of healthy building science, which has a diverse scope – from the impacts of poor buildings on us to the potential for the use of wood in interiors to have a positive impact on us.

2.1. Types of healthy building

Healthy buildings should support the physical, psychological and social health and wellbeing of people, recognising the fact that buildings – how they are designed, built and operated – are key promoters of health and wellbeing. Healthy building

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Thank you

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