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The role of wood in the comfort of occupants

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Wood

- Material used for:
 - construction purposes
 - manufacture of furniture and
 - interior design
- Excellent properties, including:
 - physical (thermal, acoustic,...)
 - mechanical (stiffness, strength,...)
 - chemical (resistance to fire,...)
 - aesthetic (texture, colour,...)



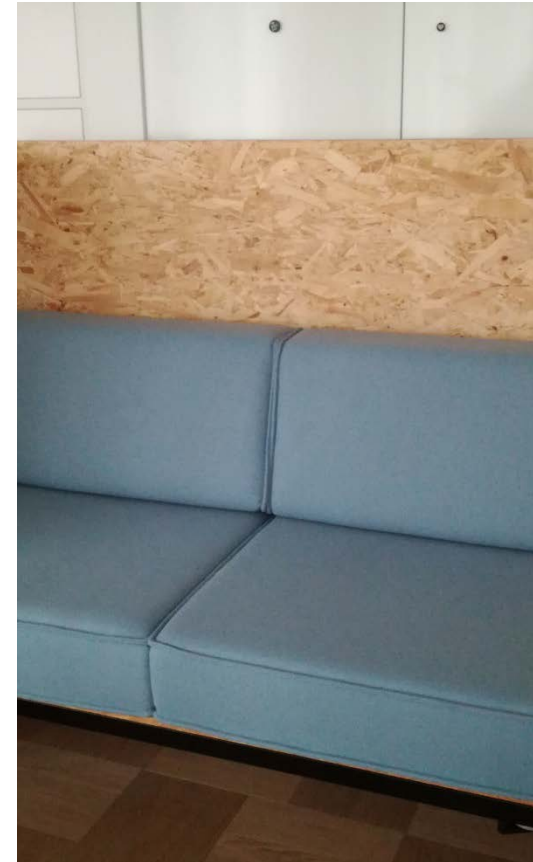
Use of wood

- Wood:
 - carries emotional and aesthetic values
 - has strong identity
 - is traditional and modern material
 - contributes to sustainable footprint
 - is popular and used to a great extent
 - used also in processed form (particle board, plywood, glued wood, modified wood)



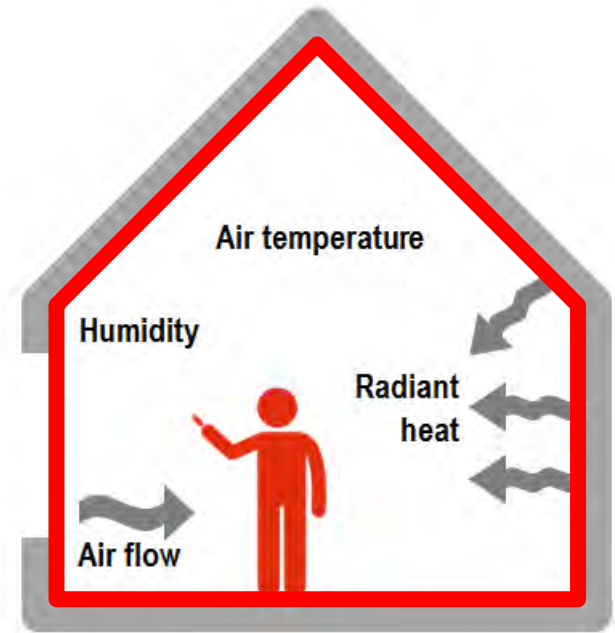
Human comfort and wood

- „Comfort is a sense of physical or psychological ease, often characterized as a lack of hardship“
(Wikipedia)
- Affected by psychological and physical comfort
- Factors of physical comfort:
 - thermal comfort
 - acoustic comfort
 - olfactory comfort
 - visual comfort



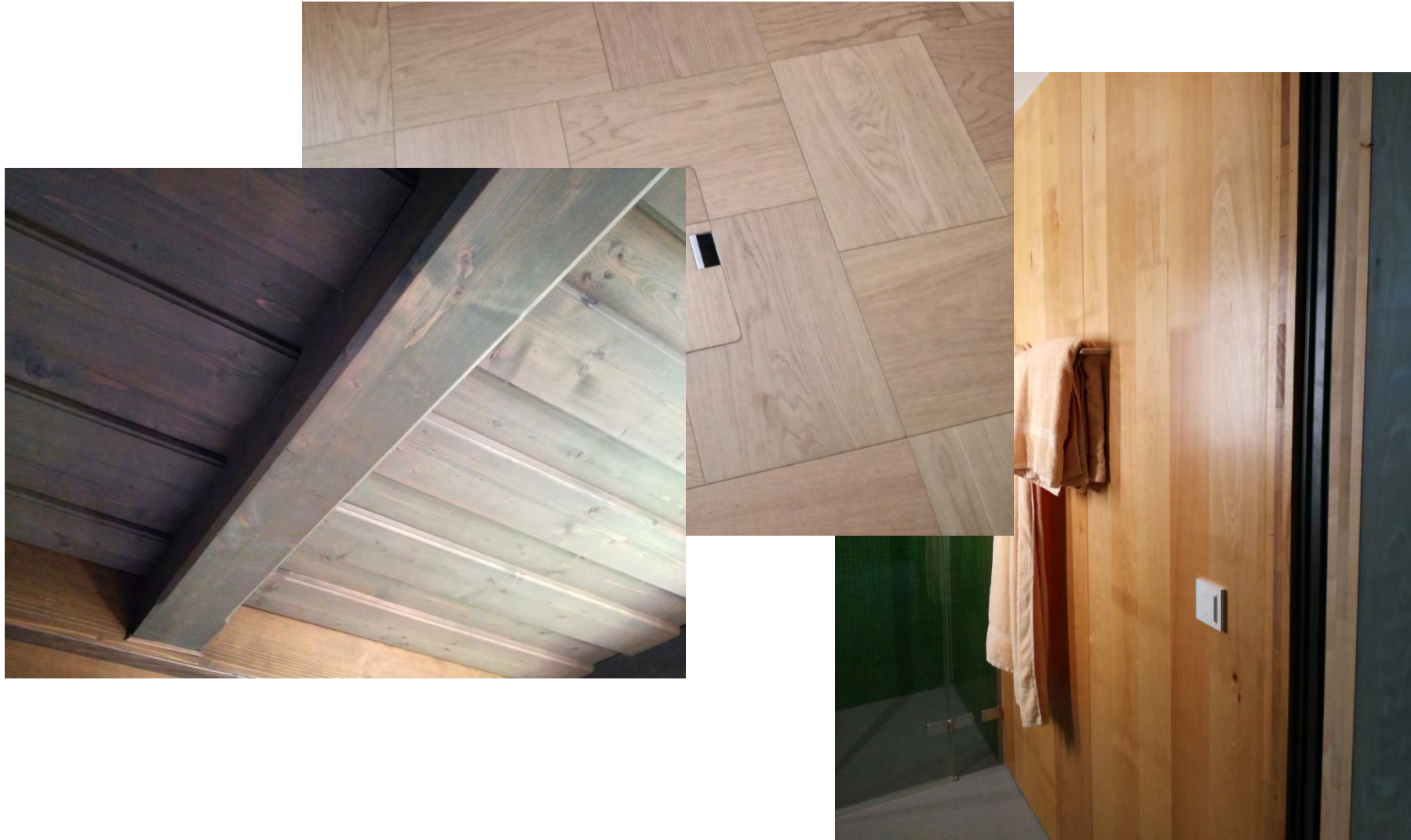
Thermal comfort and use of wood

- Parameters of thermal comfort:
 - air temperature
 - humidity
 - air movement
 - **mean radiant temperature**
 - metabolic rate
 - clothing insulation
- Thermal conductivity of wood:
 - relatively low: 0.11 – 0.21 W/(mK)



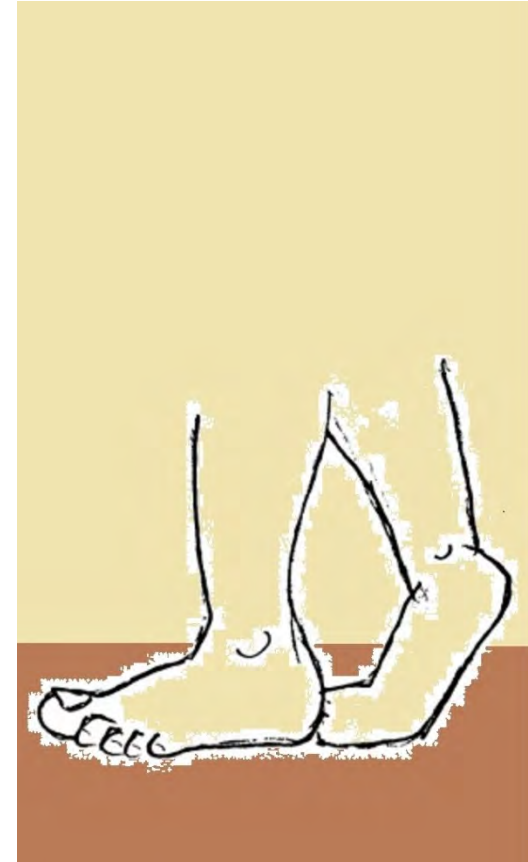
MRT - measure of average temperature of the surfaces that surround a particular point, with which it will exchange thermal radiation

Wood as cladding material



Wood in contact with the body

- Thermal effusivity:
 - is a measure of its ability to exchange thermal energy with its surroundings
 - is used to describe heat transition behavior between two objects when they are in contact with each other
- Thermal effusivity depends on:
 - thermal conductivity, λ *relatively low*
 - density, ρ *relatively low*
 - specific heat capacity, c_p *high*

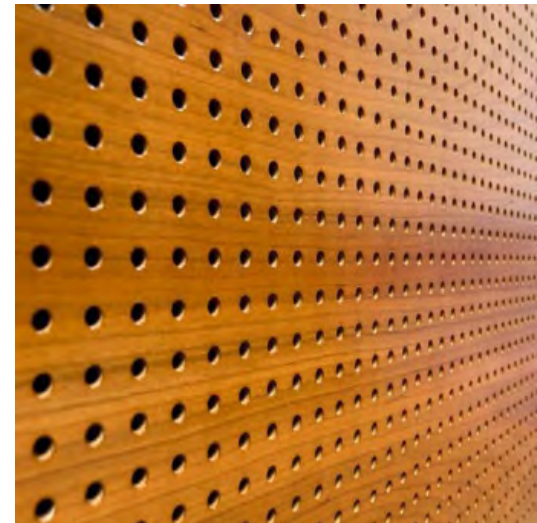
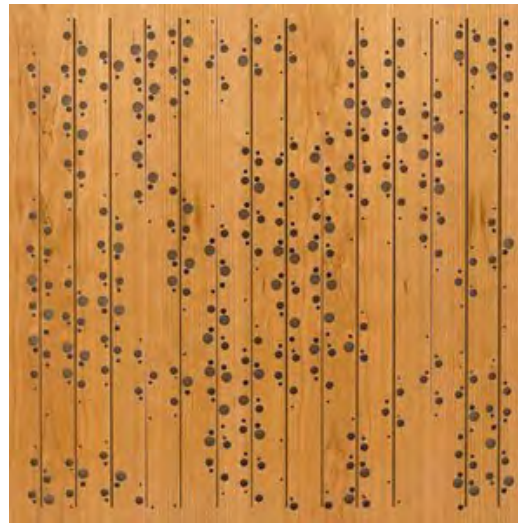
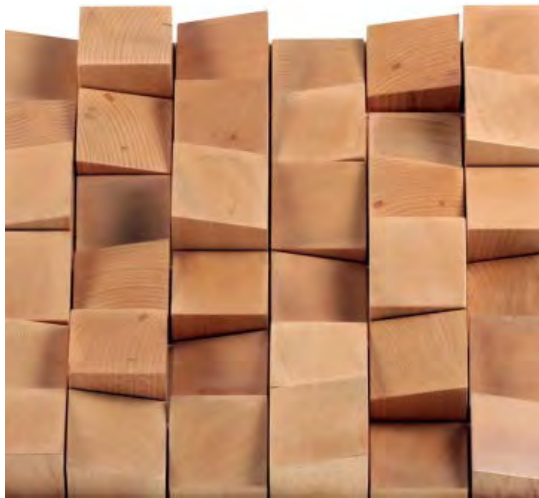


Wood for floor coverings, stairs,...



Acoustic comfort and wood

- Acoustic comfort acquires significance
- Wood, as a light material:
 - NO, as a sound insulation material
 - YES, as a sound absorption material



Olfactory comfort and wood

- Disruption of comfort by excessively strong or distinct odors
- Limiting the odors by assuring the air quality, which is affected by:
 - air ventilation rate
 - indoor activities
 - installed materials/products
- Wood - pleasant scent
- Wooden products – can emit substances (additives and finishing)



Visual comfort and wood

- 90% of human information is collected with visual perception
- Visual comfort is related to:
 - daylight and artificial light
 - view to outside
 - glare prevention
 - provision to sunlight
 - wood: gives emotional and aesthetic pleasure



Does the indoor use of wood influence the satisfaction of occupants?

- Wood definitively positively impact the individual perception of occupants in relation to physical comfort factors
- Wooden finishes do increase the psychological well-being of occupants - they often describe the room with wooden finishes with positive words
- Designers should consider this subjectively assessed quality when designing buildings

Watchman, M.; Potvin, A.; Demers, C. M. H.: A Post-occupancy Evaluation of the Influence of Wood on Environmental Comfort, Bioresources, October 2017

THANK YOU

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