

Functional properties of wooden surfaces in real indoor environments

COST ACTION FP1303 : A technical workshop on “Design, Application and Aesthetics of biobased building materials”,
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Wood2New

*Competitive wood based interior materials
and systems for modern wood construction*

WoodWisdom ERANET+

1-3/2014-**28.2.2017**

FINLAND Aalto University,

Finnish Log House Industry Association,
Finnish Wood Research Oy, Stora Enso

AUSTRIA Holzforschung Austria,
Technisches Büro für Chemie - Dr. Karl Dobianer

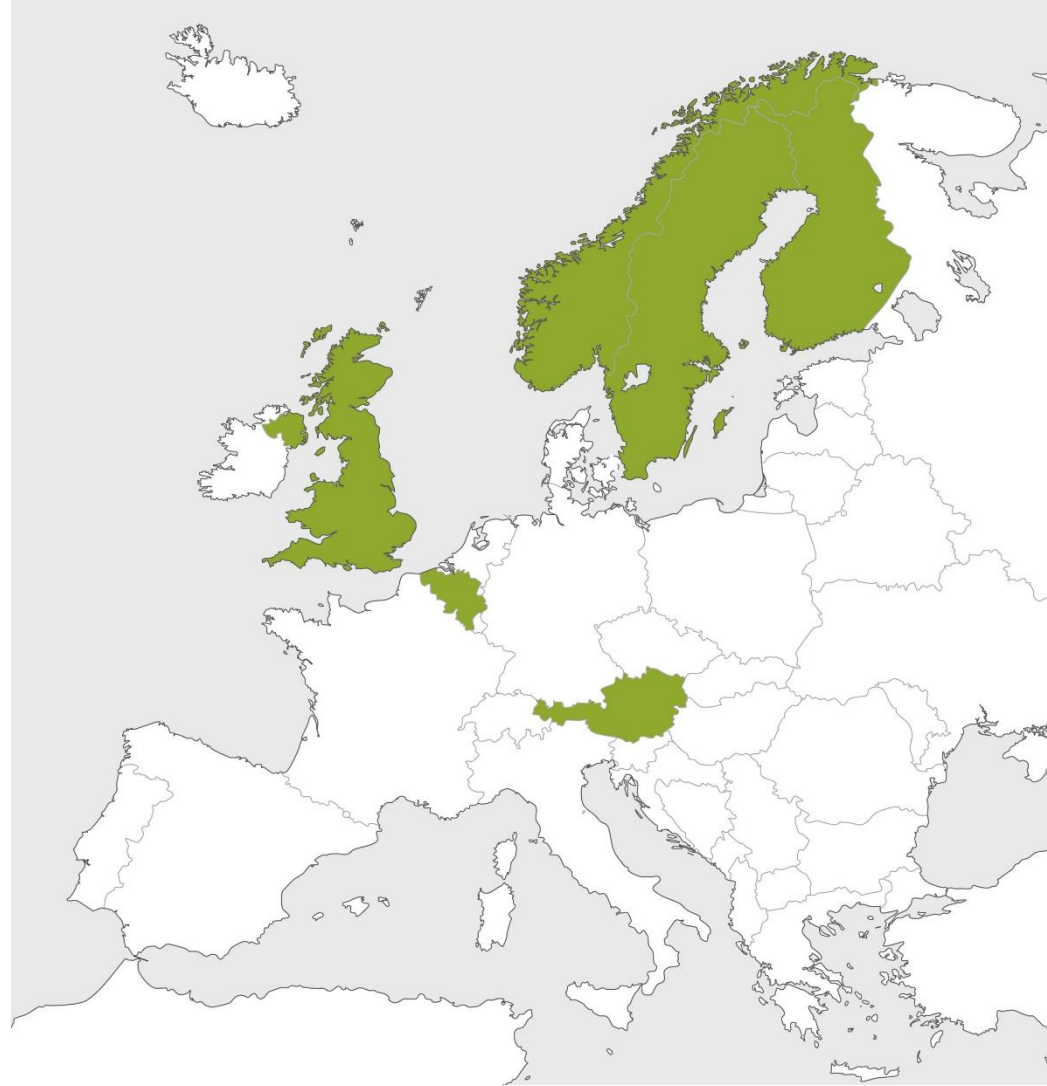
BELGIUM European Confederation of
Woodworking Industries aisbl

NORWAY Norsk Treteknisk Institutt,
Massiv Lust AS, Mini Prosjekt Norge

SWEDEN Linköping University,
AB Gustaf Kähr, Moelven Wood AB

UNITED KINGDOM

Building Research Establishment Ltd,
Willmott Dixon



The project Wood2New

Wood2New will study, develop and demonstrate **energy efficient and human solutions using wood in living and working spaces**

The aim of **Wood2New** is to **reinforce, stimulate and improve** the competitiveness of **wood based interior products and systems** based on environmentally, socially and economically sound values



Wooden surfaces with functions

- Material-moisture interaction
 - Moisture buffering
 - Heat of sorption
- Material-human interaction
 - Haptic properties
 - Antibacterial properties

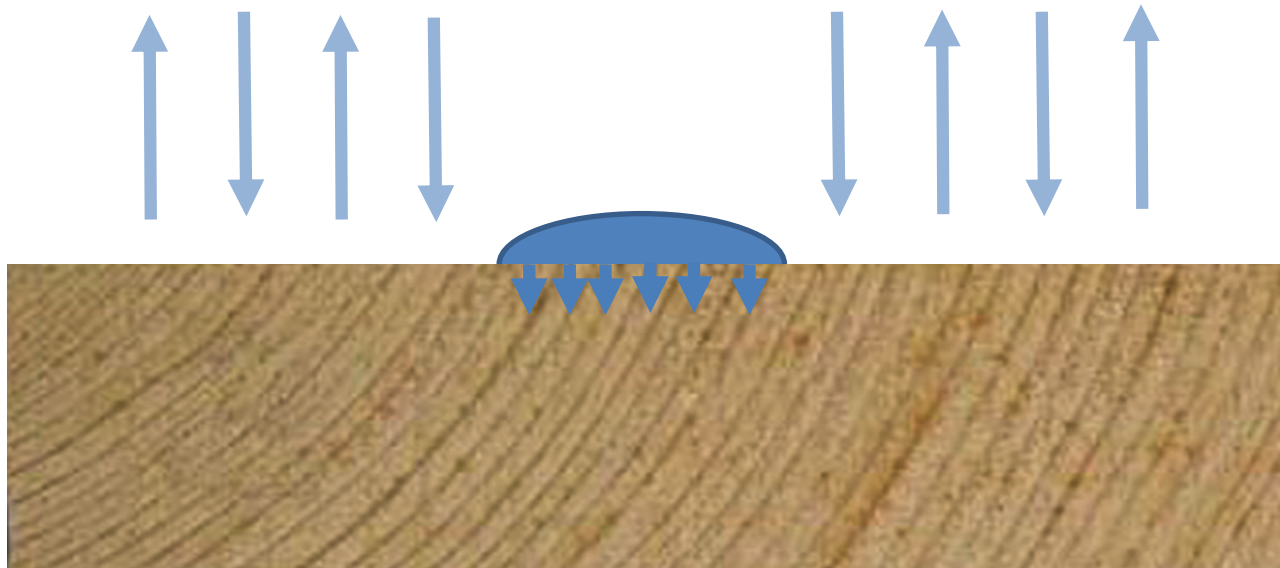


Photo: Katja Vahtikari

Moisture is a natural part of wood

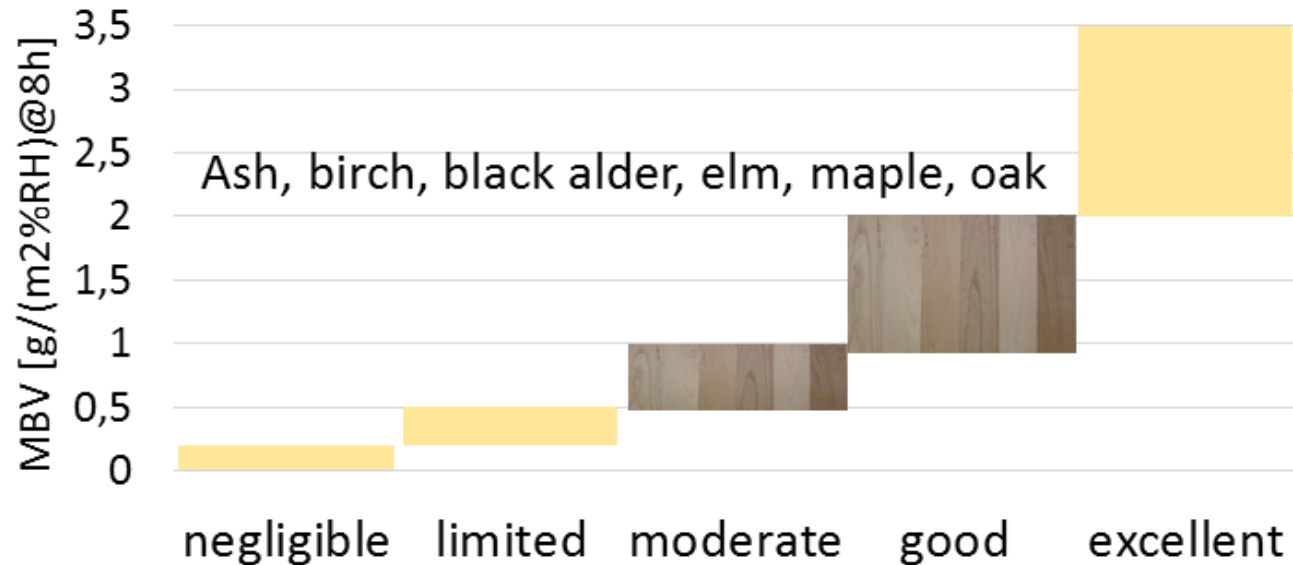
- Wood takes up moisture, both liquid water and water vapor and releases water vapor

→ natural interaction between the material and indoor environment



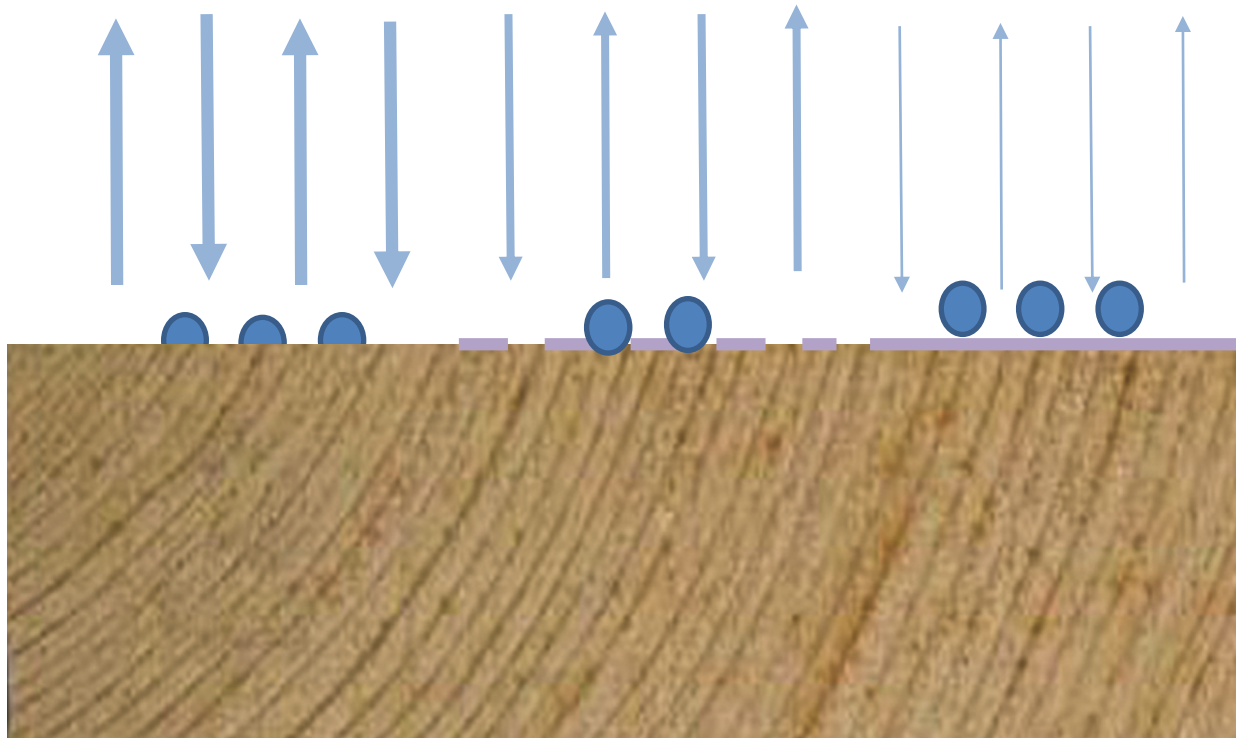
Practical Moisture Buffering Value MBV

MBV classification for various
hardwood species



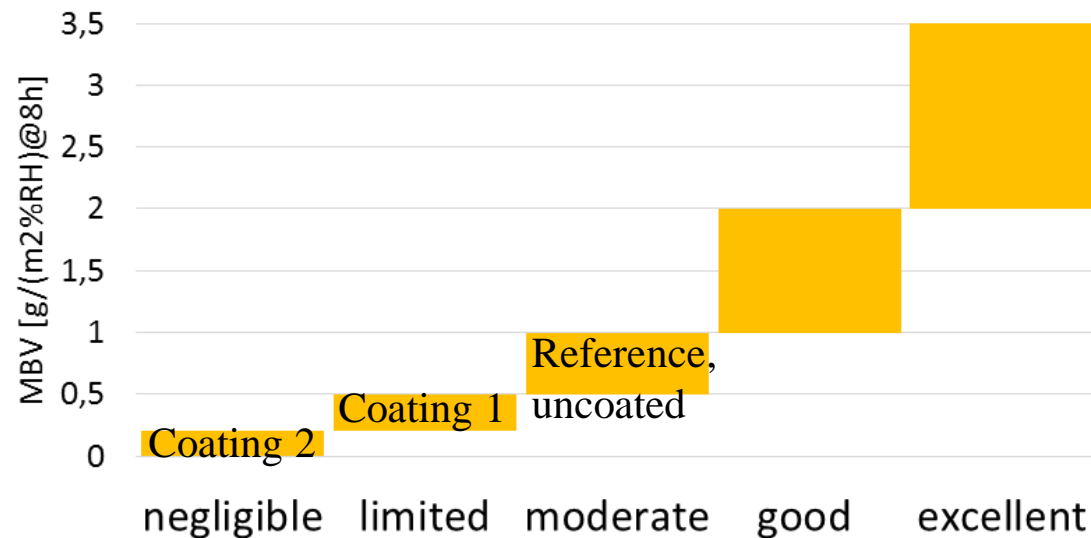
Untreated/coated/modified wood

- All the treatments and modifications change the interaction between wood and indoor environment



MBV of coated wooden surfaces

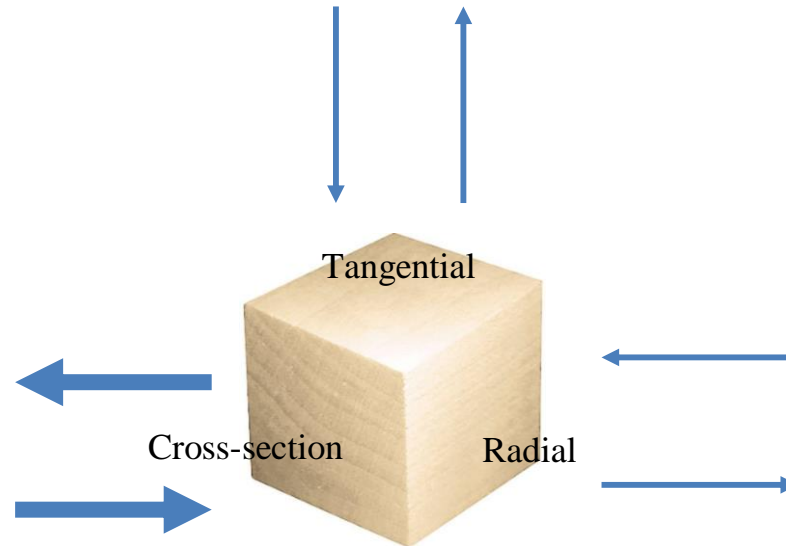
Moisture buffering value (MBV) classification for coated wood



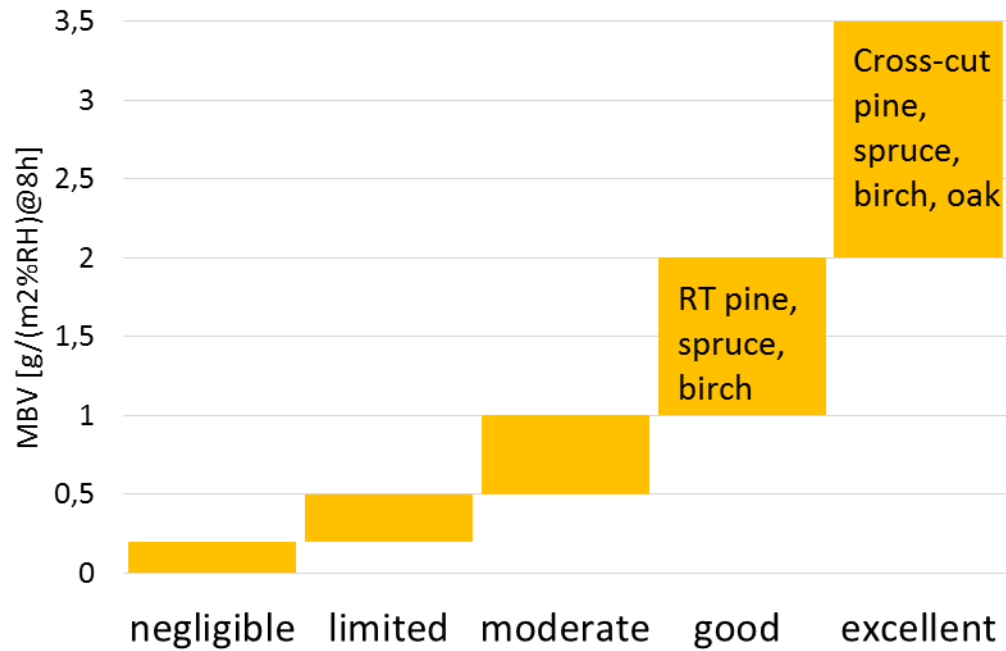
Coating 1/diffusion-open: Application rate of 55 +/- 5 g /m²

Coating 2/diffusion-closed: Application rate of 110 +/- 10 g /m²

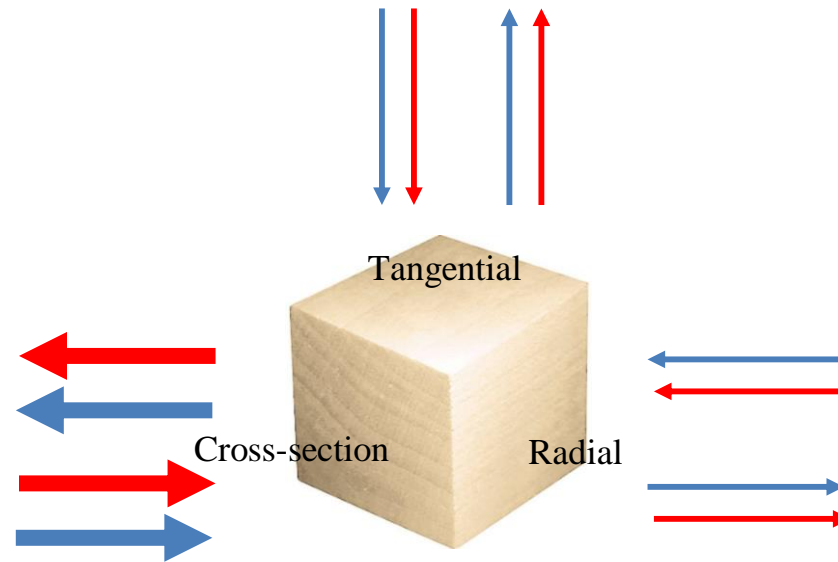
Wood has character



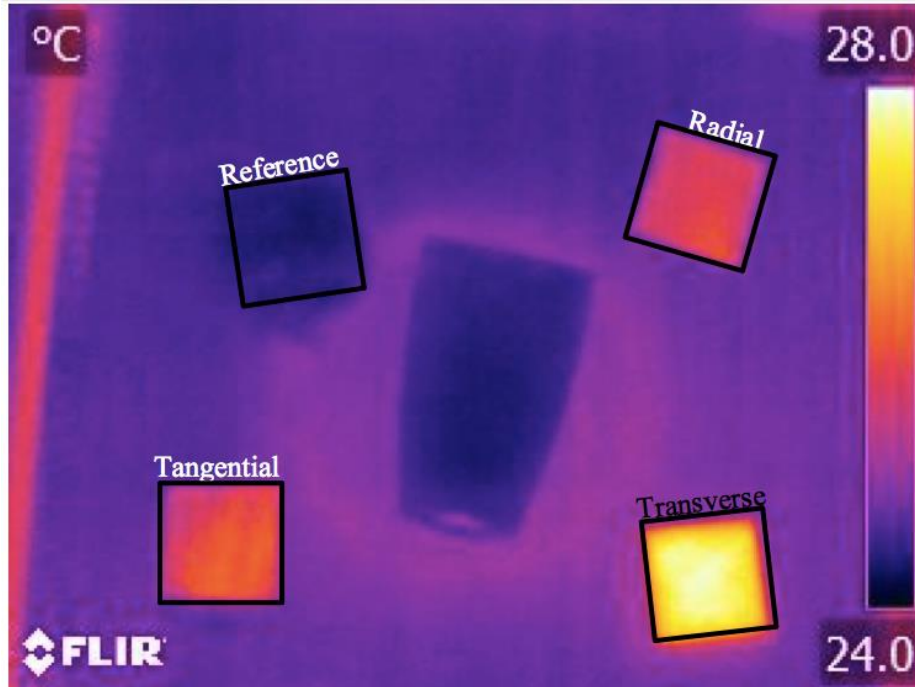
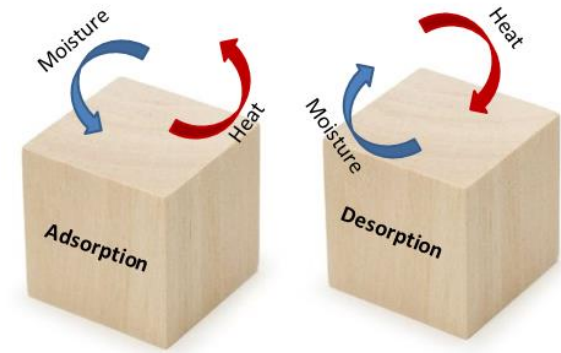
MBV in different orientations



Wood is warm



Heat of sorption



Wood feels good!



18°C

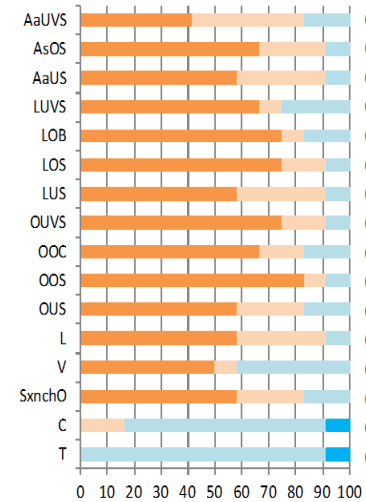
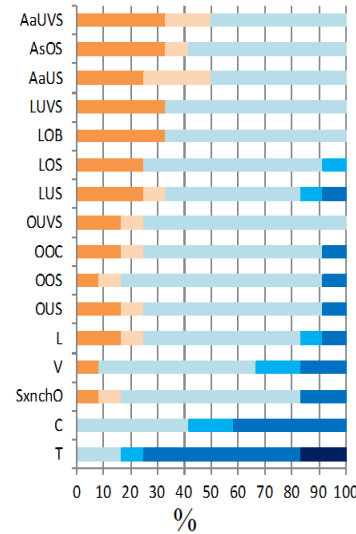
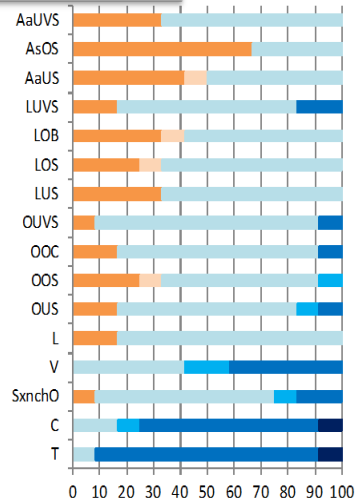
23°C

28°C

comfortable

warm ≤1 1,5 2 2,5 3 3,5 4 4,5 cold

Non wooden material ●
wooden material ●



Holzforschung Austria/ Michael Truskaller

Case examples



Photos: Ira Verma, Tomi Tulamo, Laura Zubillaga and Janne Pihlajaniemi



5% wood on the walls, 50% wood in furniture



0% wood on the walls, 50% wood in furniture



5% wood on the walls, 75% wood in furniture



17% wood on the walls, 0% wood in furniture

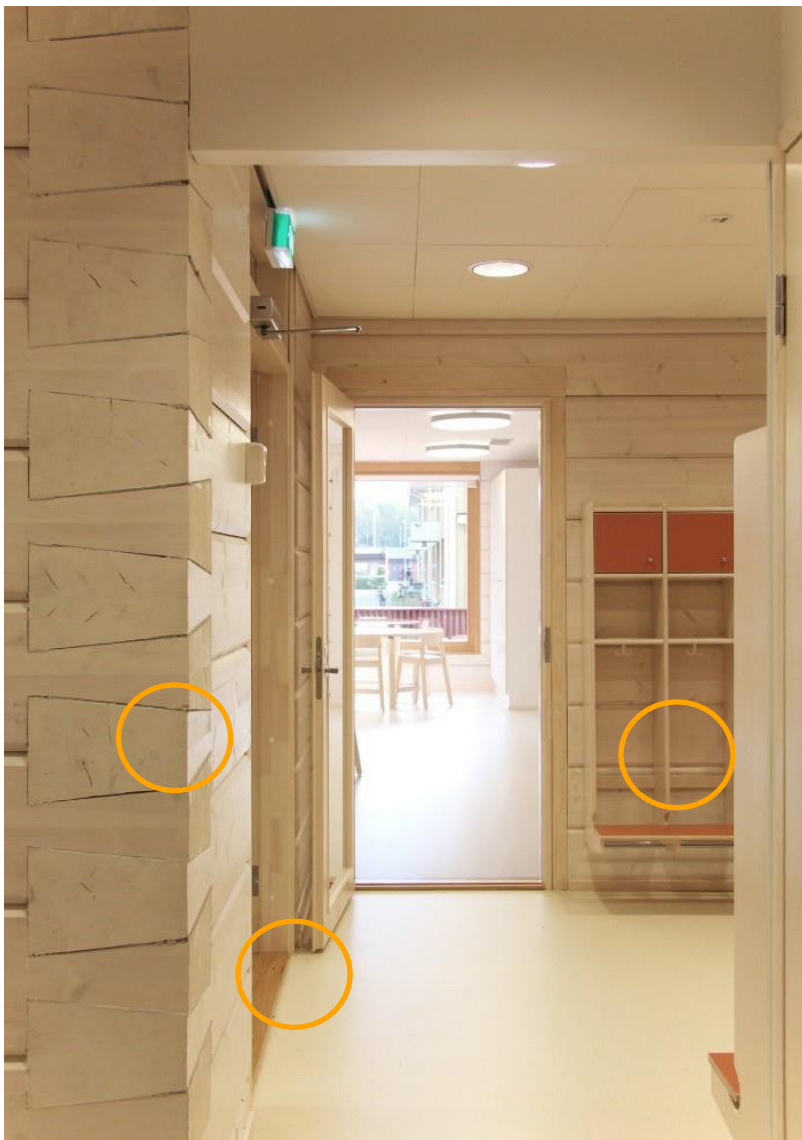


Photo: Janne Pihlajaniemi

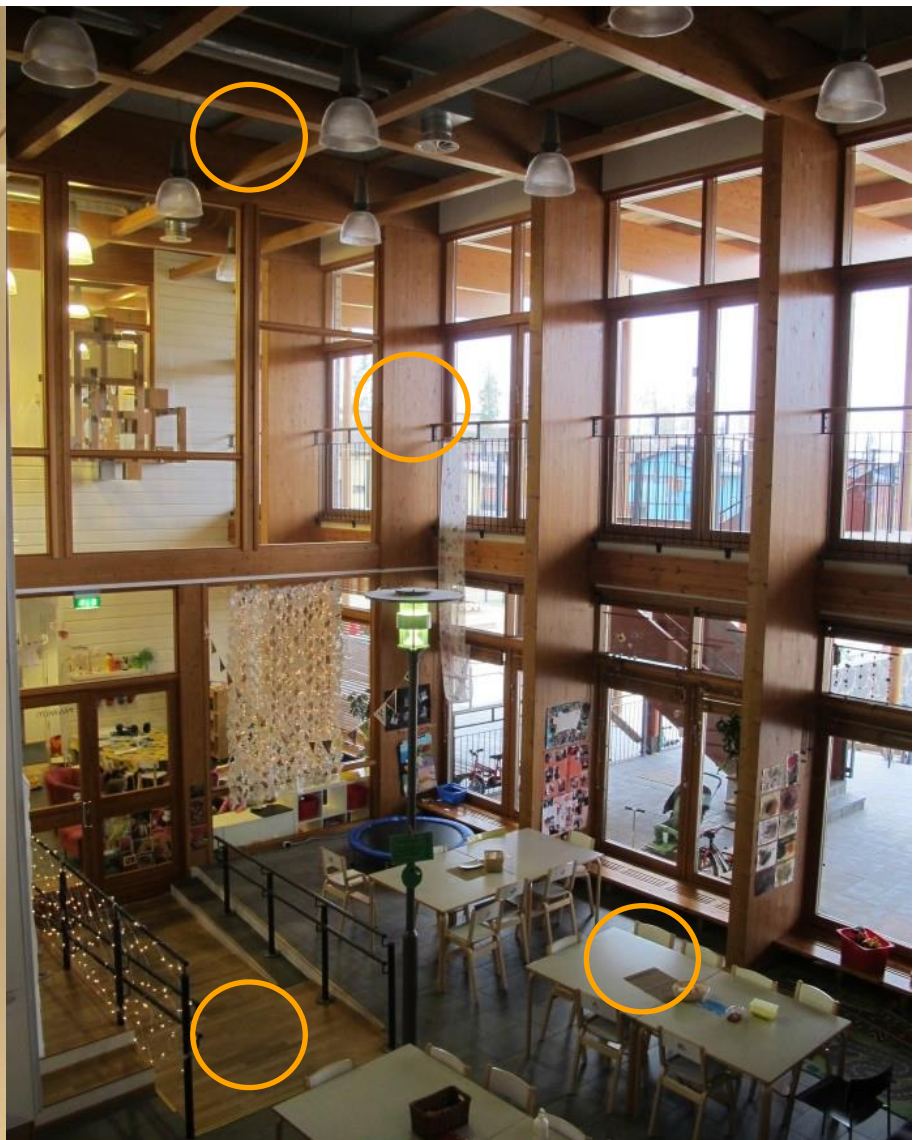
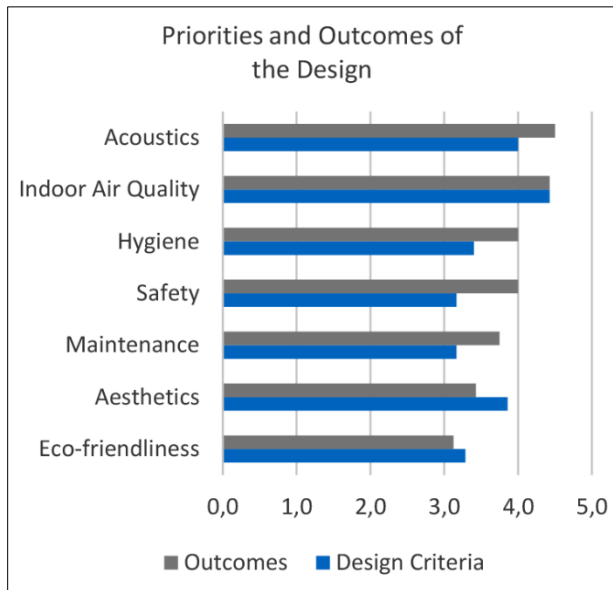


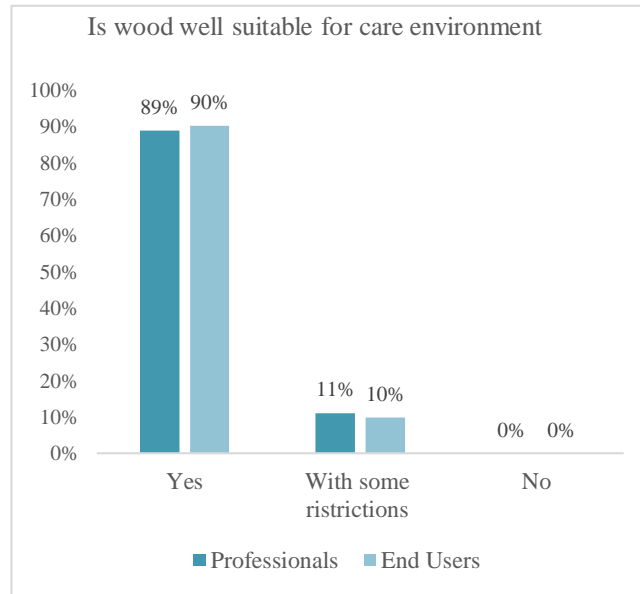
Photo: Ira Verma

Care environments



Results of a survey for professionals working in the field of construction.

Blue bar describes the criteria for choosing wood in the planning phase and grey the perceived quality (outcomes) of the built environment. Ranking from 1 (worst) to 5 (best).



Views on using wood in care environments.

89% of the professionals (N=7) and 90% of the end-users (N=58) would recommend the use wood in interiors.

11% of the professionals and 10% of the end-users would recommend the use wood with certain restrictions, for example fire regulations and maintenance (wooden shades in the windows and edges of horizontal logs difficult to clean).

Arguments for wood!

User experience studies might be a useful tool when arguments for wood are needed in the planning phase → European wide co-operation?



University lecture hall in Sofia

Publications

- Kraniotis D, Nore K, Brückner C, Nyrud A. Q. (2016). Thermography measurements and latent heat documentation of Norwegian spruce (*Picea abies*) exposed to dynamic indoor climate. *J Wood Sci* (2016) 62: 203-209.
- Fürhapper C., Habla E., Weigl M., Stratev D. Forthcoming. Long-term behaviour of VOC-emissions in prefabricated timber houses (preliminary title) – holztechnologie, to be submitted in spring 2017
- Nyrud, A.Q., Bysheim, K., Bringslimark, T. Forthcoming. Does elements of nature have a healing effect? The impact of wooden materials and landscape pictures in patient rooms. Accepted for publication in *Arkitektur N*.
- Strobel, K., Nyrud, A.Q., Bysheim, K. Forthcoming. Interior wood use: Linking user perceptions to physical properties. Accepted for publication in *Scandinavian Journal of Forest Research*
- Bysheim K, Nyrud A Q, Strobel K (2016). Building materials and well-being in indoor environments A focus group study Byggematerialer och velvære I innendørs miljø. Norsk Treteknisk Institutt. Rapport, 88, 2016. Project report. Available through: www.wood2new.org
- Cronhjort Y., Hughes M., Paakkanen M., Sahi K., Tukiainen P., Tulamo T., Vahtikari K. (eds.) (2016). *Functional Wood*. Aalto University publication series CROSSOVER 3/2016. Project report. Available through: www.wood2new.org
- Cronhjort Y., Tulamo T., Verma I., Zubillaga L. (2017). *INTERIOR DESIGN AND CARE ENVIRONMENTS* End-user Perceptions of Wood Material. Technical project report. 70 pages. Available at: www.wood2new.org



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