



FP7 Coordination and supporting action “Support for standardisation needs” Grant agreement no: 319132

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Performance standards for wood in construction - delivering customer service life needs

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WEI Spring Meeting 2014 - 2 & 3 April - WEI Offices Brussels

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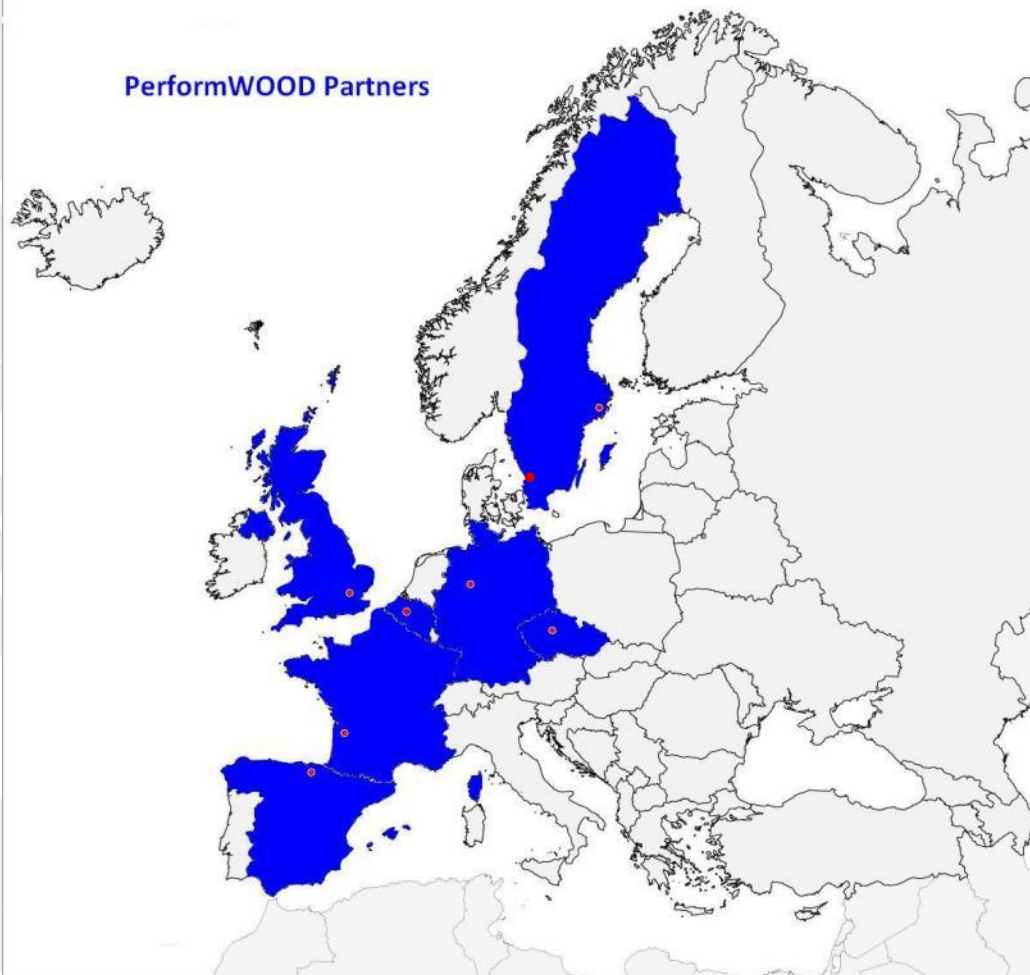
Leibniz
Universität
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tecnalia
Corporación Tecnológica



Dřevarařský ústav
Timber Institute

PerformWOOD Partners



 **PerformWOOD**

Performance standards for wood in construction - delivering customer service life needs

www.performwood.eu

Assessing performance: why ?

- Construction Product Regulations

- The construction sector is under pressure to improve its cost effectiveness, quality, energy efficiency, environmental performance and to reduce the use of non-renewable resources.
- A key issue for the competitiveness of wood is the delivery of reliable components of controlled durability with minimum maintenance needs and life-cycle costs
- The importance of service-life issues is reflected in the CPR with its seven essential requirements, which should be fulfilled by construction products during a 'reasonable service life'

- End users

- I need to know how long! Service Life Planning, asset management
- Health and safety
- Need to create a meaningful user interface (simplify the existing standards !)

Assessing performance: why ?

- Warranty providers
 - Housing standards, mortgage lenders, risk management
- LCA and Environmental Product Declarations
 - Critical in-use phase for products
 - Need to reduce impacts of the construction industry
 - Reduce the embodied impacts of the materials and processes and ensure that they deliver reliable, meaningful function and service lives.

Assessing performance: why ?

In their present form, CEN/TC 38 standards almost exclusively consider the material and not the final products



PerformWOOD focuses on the consolidation of the technical background for standardization to deliver a new standardization document on the service life performance of wood in construction

Project PerformWOOD

- WP1 Strategic roadmap
- WP2 Data handling and analysis
- WP3 Reference materials
- WP4 Moisture risk in wooden components
- WP5 Service life expectations
- WP6 Draft standard (revision of EN460)

Strategic roadmap for transformation of TC38 standards to meet user requirements

2012-2014
Transformation of TC38 standards

Enable processes for transformation of TC38 standards to provide user friendly and customer focussed outcomes.

2015-2018
Completion of TC38 user interface

Provide a confident and clear platform for underpinning appropriate wood and wood-based material specifications against service life ambitions.

2018 and beyond
Expand markets for wood and wood-based products in construction
Utilise the structure established for TC38 to play a pivotal role in the fostering innovation and increasing specification of wood.

To develop a material resistance parameter
Data handling and variability
Reference materials and reference products

Develop a means of presenting material resistance data based on reliability and confidence limits
Select reference materials that enable a robust test outcome and give us and users confidence and connection to the world of wood in construction

Implement 2014 recommendations and modified/revise standards
Work on new standards – permeability?
Actively work with other TCs to deliver effectively for construction sector
Secure EU research and development resource

Contribute to a European durability database for standards support

To develop a moisture risk parameter
Moisture risk and time of wetness

Enable models of moisture dynamics in wood products to understand time of wetness issues for wood products

Actively work with other TCs to deliver effectively for construction sector
Secure EU research and development resource
Data gather

Contribute to a European moisture risk knowledge hub for standards support

To provide a user interface for performance classification of wood and wood-based materials for construction products
Service life expectations
User interface (EN460)

Conclude on appropriate/meaningful service lives

Implement and evaluate
Secure EU research and development resource

Evaluate and improve

**Strategic roadmap for
transformation of TC38
standards to meet user
requirements**

2012-2014

**Transformation of TC38
standards**

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established for TC38 to play a
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innovation and increasing
specification of wood.

The PerformWOOD project concentrated on an accelerated program of activity to tackle:

MATERIAL RESISTANCE: combination between biological durability and permeability/wettability



Increase the resistance of the material

EXPOSURE DOSE (climate, moisture risk, design of the product)



Minimise the risk of moisture being present in the product

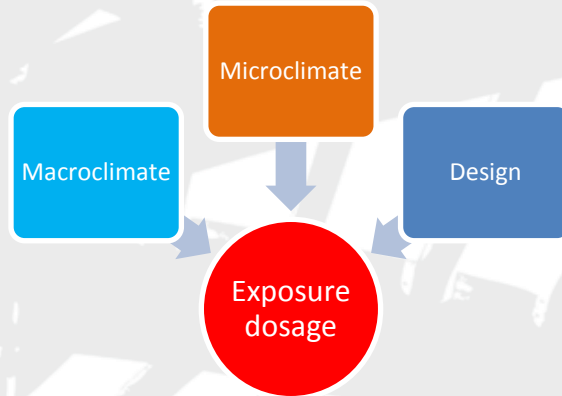


PERFORMANCE CLASSIFICATION

Service life

Service-life prediction or planning is a process for ensuring that, as far as possible, the service life of a building will equal or exceed its design life, while taking into account (and preferably optimizing) its life-cycle costs.

• Exposure dosage



• Material resistance

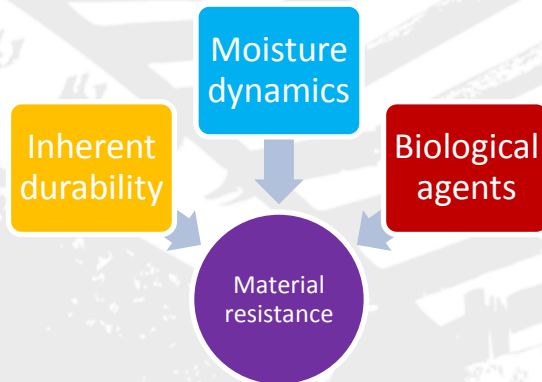


Table 1 — Wood-destroying fungi — Guidance on the durability classes of wood species for use in hazard classes

Hazard class	Durability class				
	1	2	3	4	5
1	o	o	o	o	o
2	o	o	o	(o)	(o)
3	o	o	(o)	(o) — (x)	(o) — (x)
4	o	(o)	(x)	x	x
5	o	(x)	(x)	x	x

Key

- o natural durability sufficient.
- (o) natural durability is normally sufficient, but for certain end uses treatment may be advisable (see Annex A).
- (o) — (x) natural durability may be sufficient, but depending on the wood species, its permeability (see 6.1), and end use (see Annex A), preservative treatment may be necessary.
- (x) preservative treatment is normally advisable, but for certain end uses natural durability may be sufficient (see Annex A).
- x preservative treatment necessary.

NOTE Sapwood of all wood species should be regarded as durability class 5.

New shape for EN460

- Consequence of failure
- Material resistance
- Exposure dose
- Critical biological hazards
- Performance classification

EN460 is where the biological hazard class (now use class) is brought alongside durability class and an indication of whether preservative treatment was necessary or not to achieve a reasonable service life.

1. Determine consequence of failure

- Input criteria – what is the product? where is it being used?
- If COF are unacceptable then higher material resistance or techniques to reduce dose need to be selected.

The consequences of failure of a cladding board are low to medium, water ingress into the building, poor aesthetic and easily replaced.

The consequences of failure of a structural beam are very high, building collapse, resulting in death or injury and very difficult to replace.

2. Determine Material Resistance parameter

- Input criteria for user – what is the material?

e.g. Western red cedar (no sapwood, N American origin), or wood preservative treated timber treated to national requirement for UC3, or modified wood product X

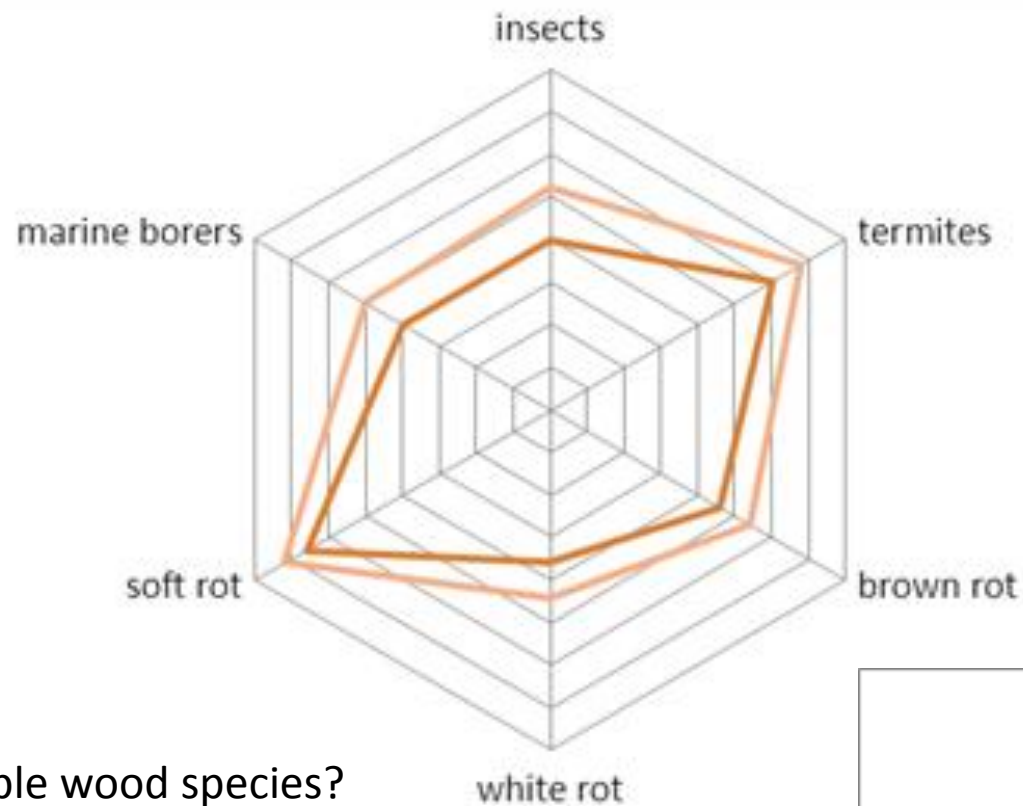
- Inherent durability and wetting ability ➡ MR class
- Data handling and variability
- Present MR in based on reliability and confidence limits

Build in a 95% confidence interval for the MR to acknowledge variability in data as an engineer would understand

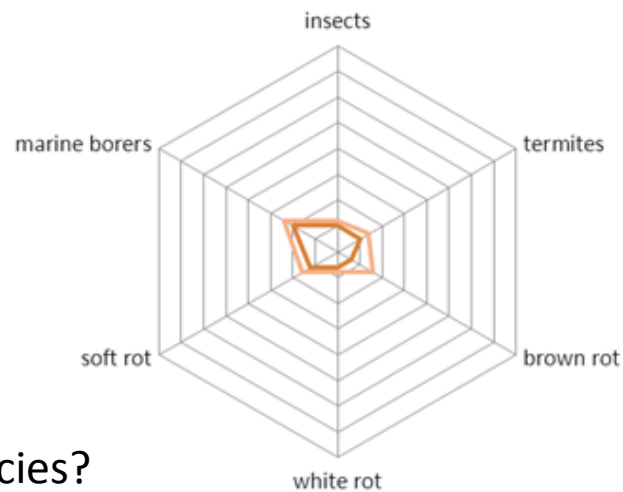
- Improvements to standards

Material resistance

- We have EN599 EN350 EN113 ...
- We need
 - Durability class linked to reliability of the classification plus statistical confidence intervals
 - Wetting ability
 - MR link to use class (biological hazard)
 - Means of selecting confidence limit based on consequence of failure or tolerance of failure
 - UC3 aesthetic performance?
 - Hazard specific durability information
 - Keep it simple to start with!



A durable wood species?



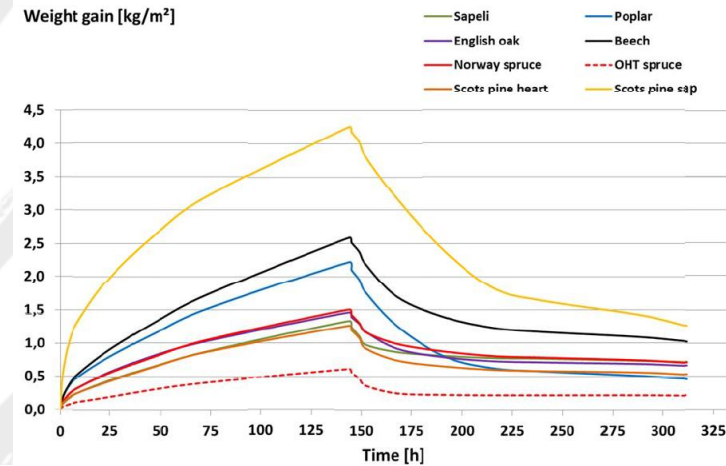
A non-durable wood species?

3. Determine Exposure Dose parameter

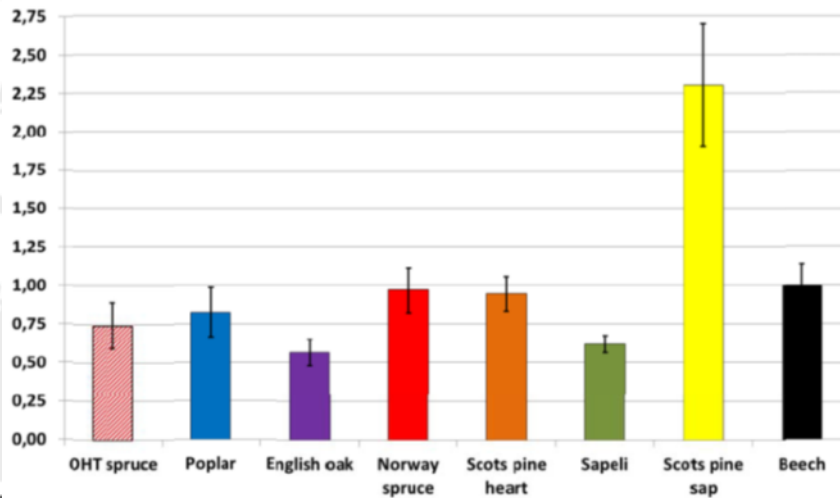
- Input criteria for user – what is the product?, where is it being used?, design, maintenance
- Gather experience of moisture risk models and data
- Translate into moisture risk rules
- Prediction of moisture content development in wood based on climate, size, uptake properties and design

Moisture risk

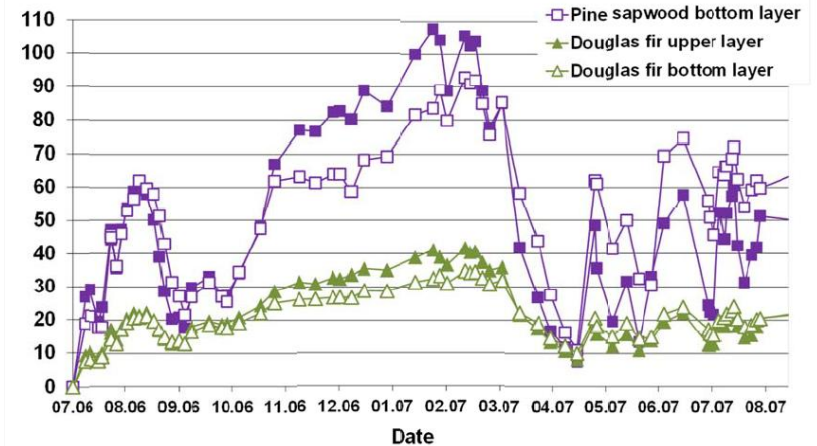
- New moisture relation data
- Moving towards predictions



Weight gain 24h subversion [kg/m²]



Moisture content [%]



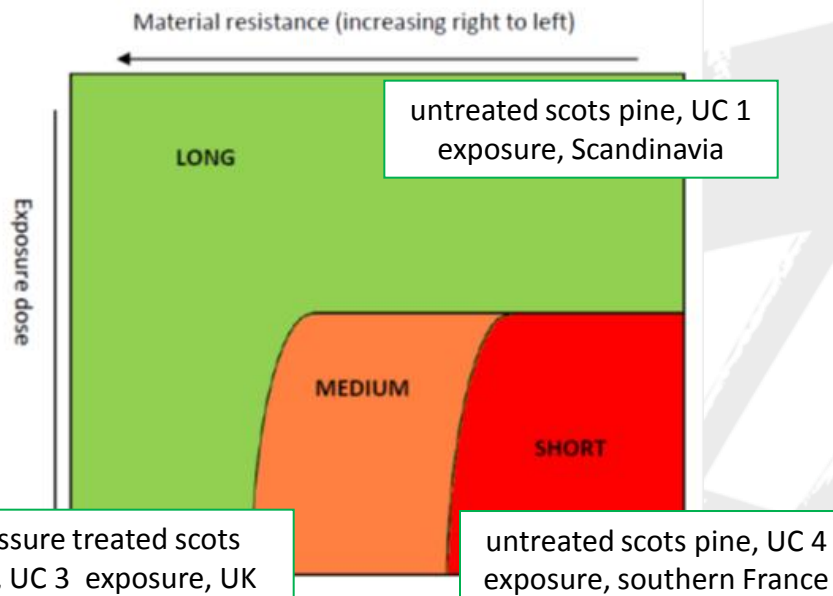
Exposure dose

- We have Use Class
- We need
 - Time of Wetness
 - Coating, maintenance?
 - Climate
 - Design
 - Are termites or insects present or not
 - We must keep it simple at first!

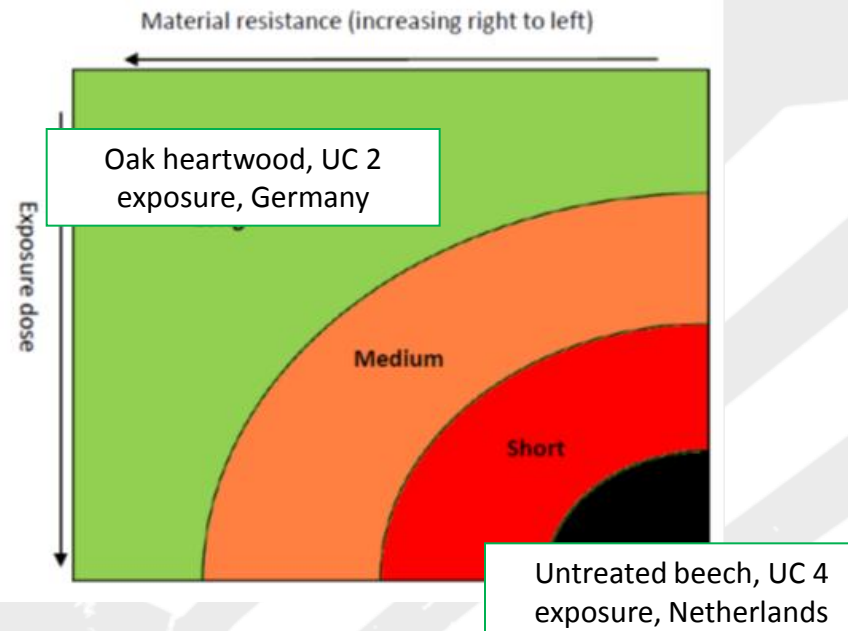
4. Determine critical biological (and other?) hazard(s)

- Input criteria for user – what is the product, where is it being used?
- Propose user friendly ‘tool’ with a continuum of material resistance and exposure dose

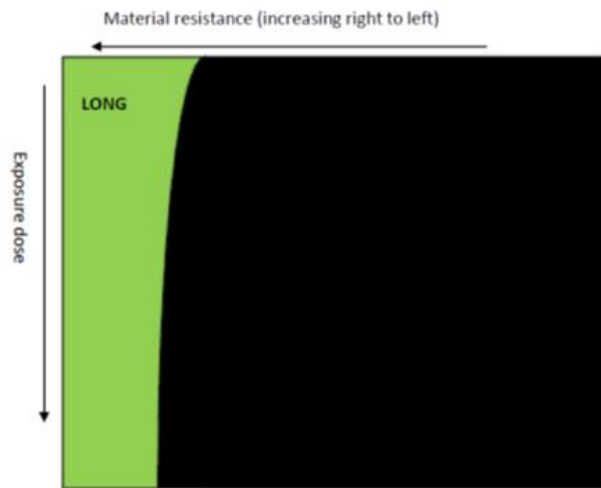
DRYWOOD INSECTS



BROWN ROT FUNGI



MARINE BORERS



5. Determine performance class (EN460)

- Combine Material Resistance and Exposure Dose approach
- Use the charts for the specific end application
- See which performance class is attained

Framework for Europe

- National interpretation
- Short, Medium, Long
- BS8417
- DIN 66800
- FD P20-651

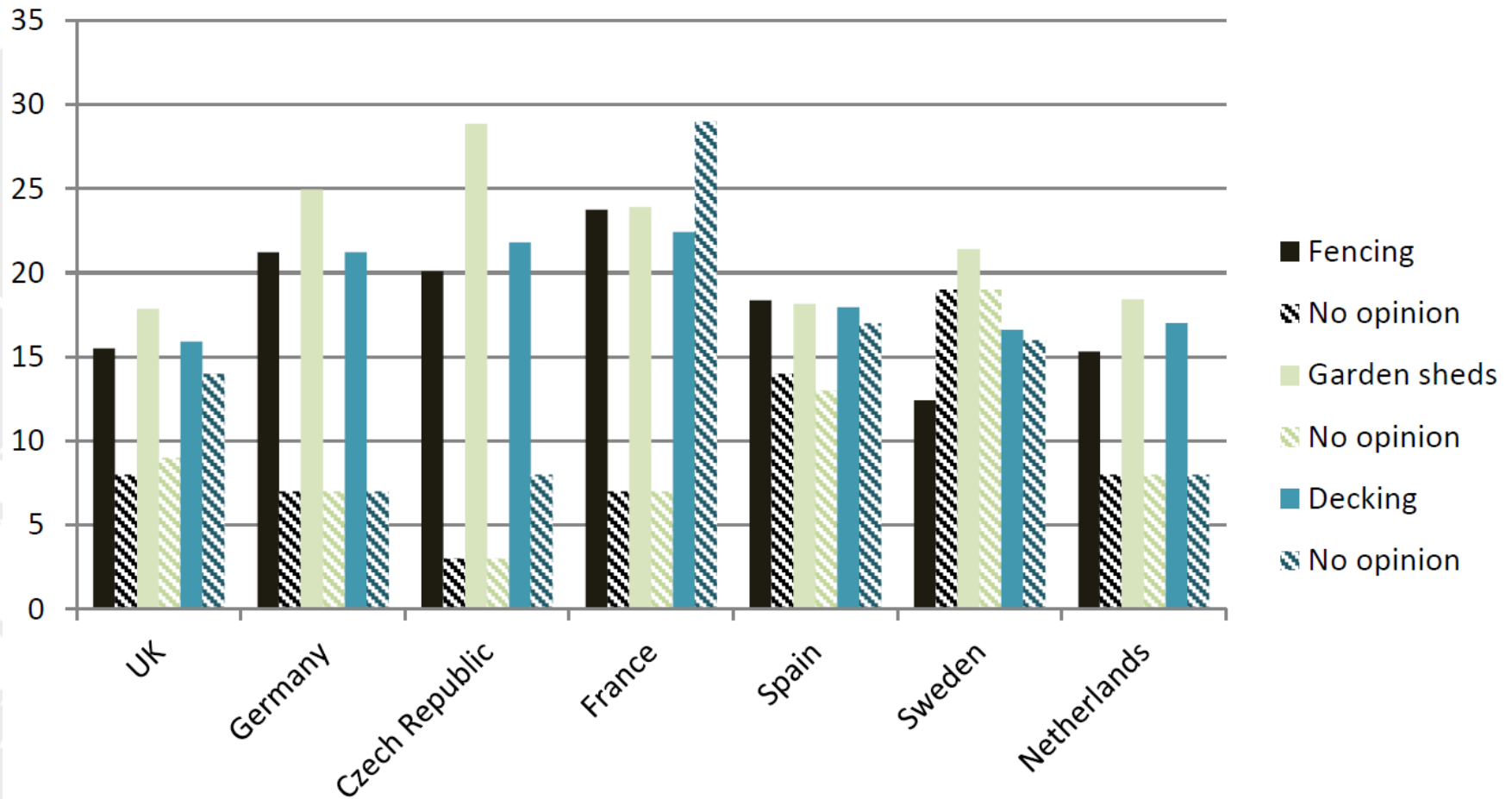
The performance classes of short, medium and long is not defined and should most likely be set at national level against the EN460 framework (e.g. it may be 15, 30 and 60 years in the UK to align with BS8417:2011 or <10, <30 and >30 years in Germany to align with DIN68800).

User expectations

Customer service life expectation data have been collected from across Europe within the project to help guide this.

- Compile and analyse user expectations for service life
 - Public perceptions and experiences (guarantees)
 - Professionals experience
- Compare expectations and reality
 - Historical database of buildings
- Improvements to standards
 - Presentation and terminology

Service life expectations - homeowners



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European users expectations for wood product service life

Deliverable D5.2

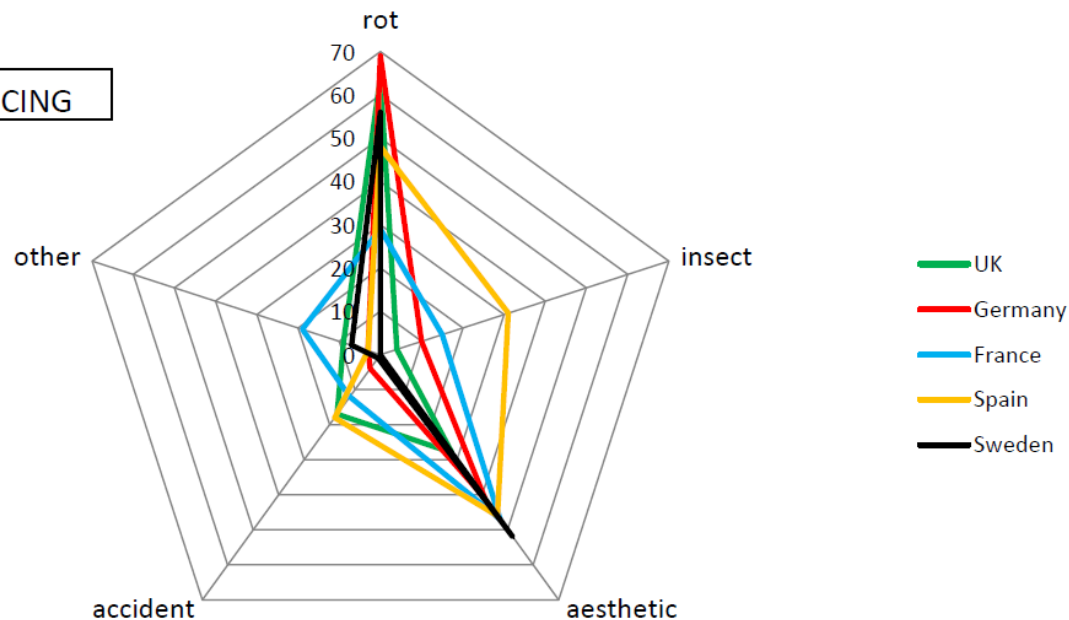
23 December 2013

Author: Finn Englund, SP Technical Research Institute of Sweden

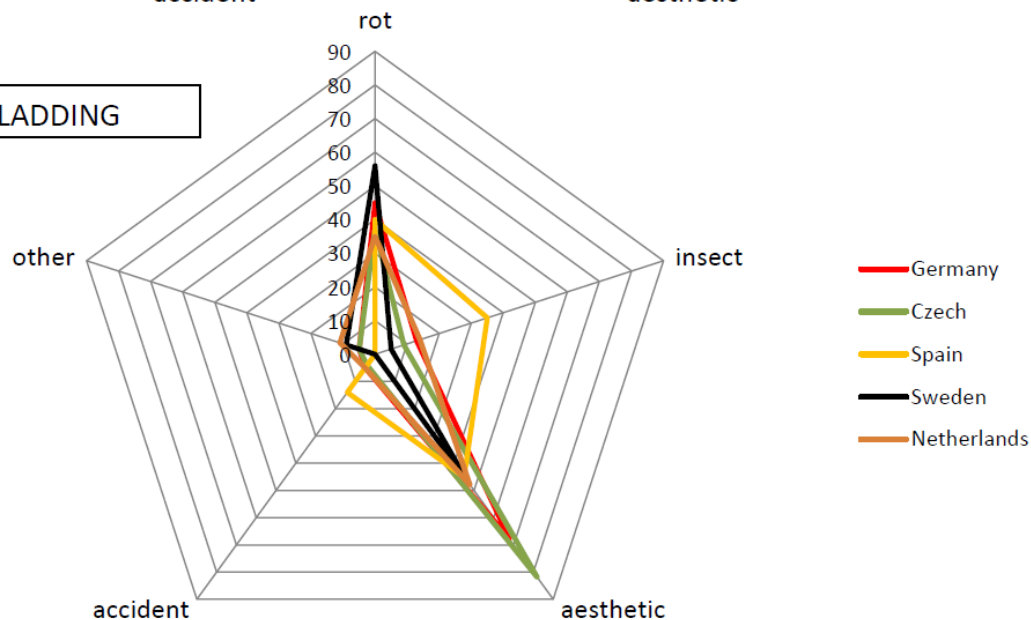


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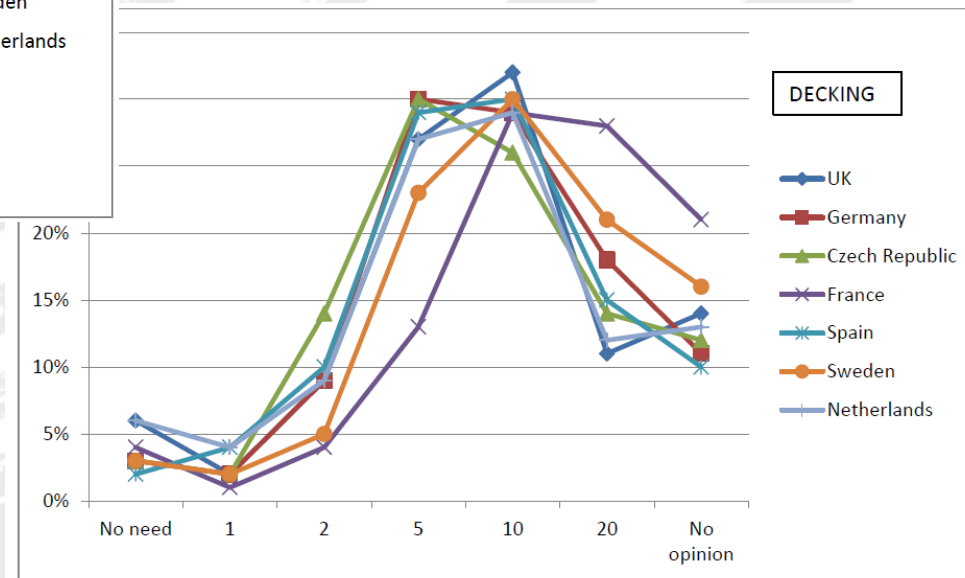
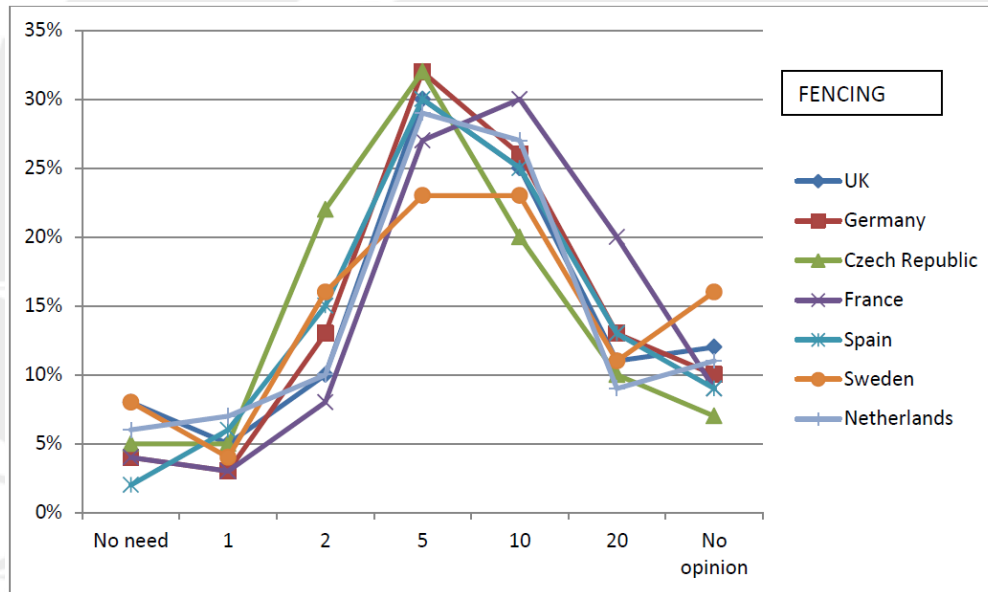
FENCING



CLADDING



Guarantees - homeowners



New or revised documents (EN, TS, TR)

- Durability class linked to reliability and confidence interval
- **Time of wetness** Part 1 solid wood, Part 2 coated wood, **Part 3 plywood**
- **Wetting ability**
- Consequence of failure
- **Material resistance derivation**
- Exposure dose derivation

Thank you

...project partners



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