

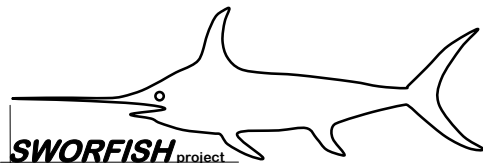
What is superb wood surface?

A trial for define **user preferences** and **service life expectations** – SWORFISH approach

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outline

- what is service life?
- the problem & goals
- the details of the hedonistic test
- what is the wood surface acceptance:
 - female-male
 - country by country
 - age
 - education
- conclusions

What is service life?

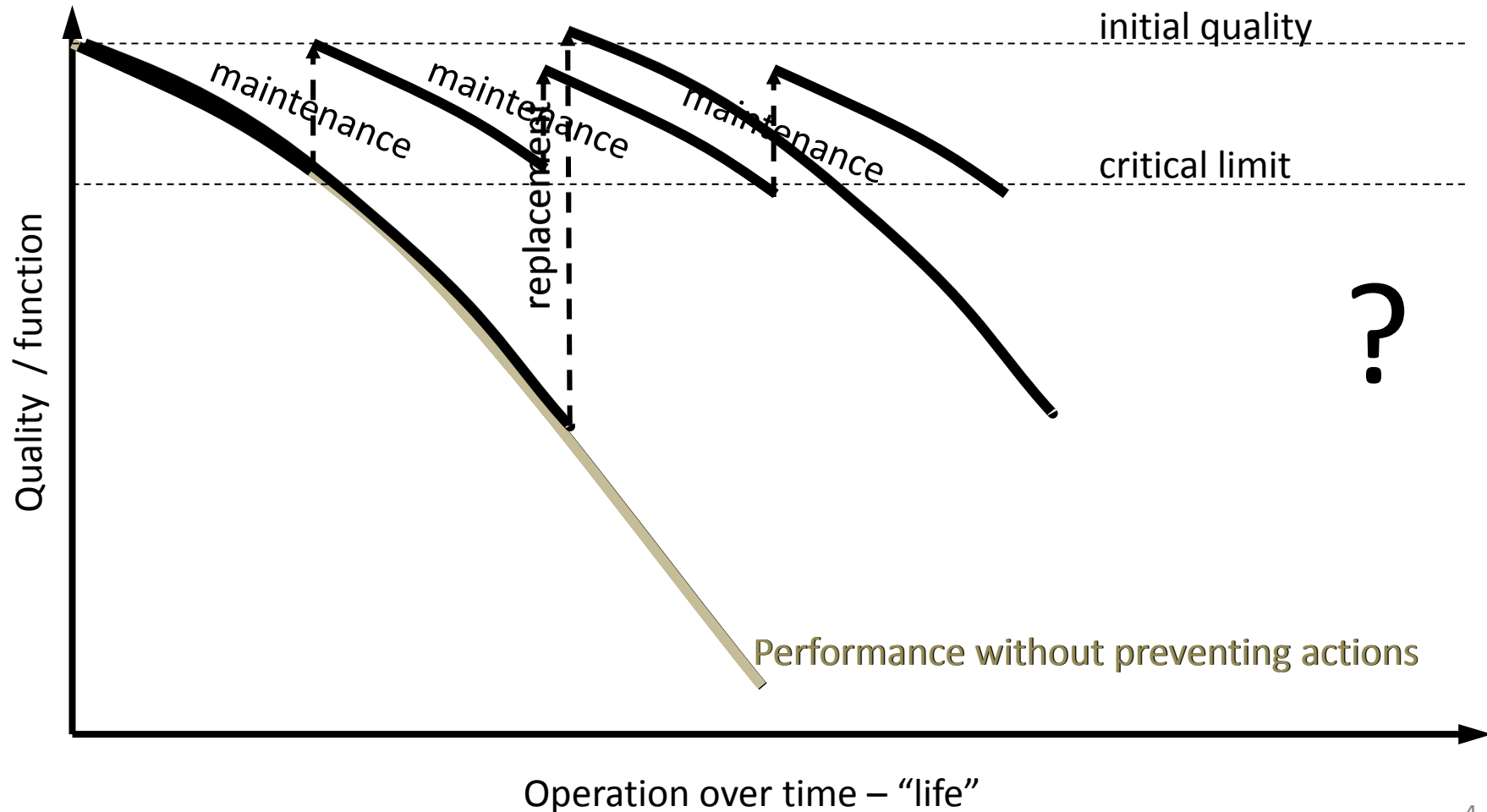
Service life is a **period of time** after construction, during which an object/part exceeds/meets the **performance requirements**.

Reliable data (period of time) regarding service life are **crucial** for:

- **Service Life Planning (SLP)**
- **Whole Life Cost (WLC)**
- **Life Cycle Assessment (LCA)**
- **optimal use of wood** in buildings and constructions
- **defend our industry and compete with other materials**

- what are “performance requirements”?
- are all “performance requirements” equally important?
- is only decay essential?
- is aesthetics also a factor? **If yes, “What is superb?”**
- ...

scenarios of the “service life”



The problem...

Wood is an amazing material, but:

- **Wood products may lose visual appeal** (due to staining, oxidation, and discoloration, etc.) leading to a perceived need for replacement even if they are far from **functional failure**
 - ➔ **service life** is a function of perception as well as technical performance
- The purpose of regular maintenance is, therefore, to maintain the life of the wood product by postponing obsolescence in terms of **both aesthetic and technical performance**

(inspired by “Report for the Wood Window Alliance”, June 2013)

The goal(s)...

of the **SWORFISH** project :

- to develop an algorithm for modeling wood modifications due to various processes
- to establish the scientific and technological bases for production of “superb” high-performing wood-based materials/products

... and of this work in particular:

- to develop a simple **software tool** for “assessing user preferences”
- to investigate what is **acceptance limit for surface defects** in various groups of respondents (perception/tolerance of imperfection)
- to define the **critical limits** (as a factor of aesthetics)

The test

- Simple approach:
 - read the question
 - look at set of images
 - decide & click
- Seven questions in total (only 2 presented here)
- Focus (of this selected questions) on wooden windows, most severe case:
 - softwood coated with a transparent coating
 - Natural weathering, south exposition, no protection from rain
- Data analysis related to age, gender, nationality, education & expertise in wood
- Average time needed for answer all questions in the test:
~226 seconds

The test: user info

START user info.vi

File Edit View Project Operate Tools Window Help

name (Optional)
Jakub Sandak

country
Italy

age
39

gender
male

education
PhD

expertise in wood technology?
yes


Start the hedonistic test

8

Taskbar: More Application Instance, Computer & console, TeamViewer, SW24Cjg_JV4SA..., Testorasci... 8 LxWVW 12.00, Internet Explorer, Inc...

The test: question 1

at which stage are you willing to renovate your window frame
(click once on the image)




The image displays four vertical panels showing the progression of wood rot on a window frame. From left to right, the panels show: 1) a clean, smooth wooden surface; 2) a surface with light-colored, fuzzy mold or mildew; 3) a surface with dark, elongated water stains; and 4) a surface with a large, dark, irregular area of decay and rot.

9

The test: question 2

at which stage are you willing to renovate your window frame
knowing the exposition time?
(click once on the image)



0 years after 1 year after 2 years after 4 years

10

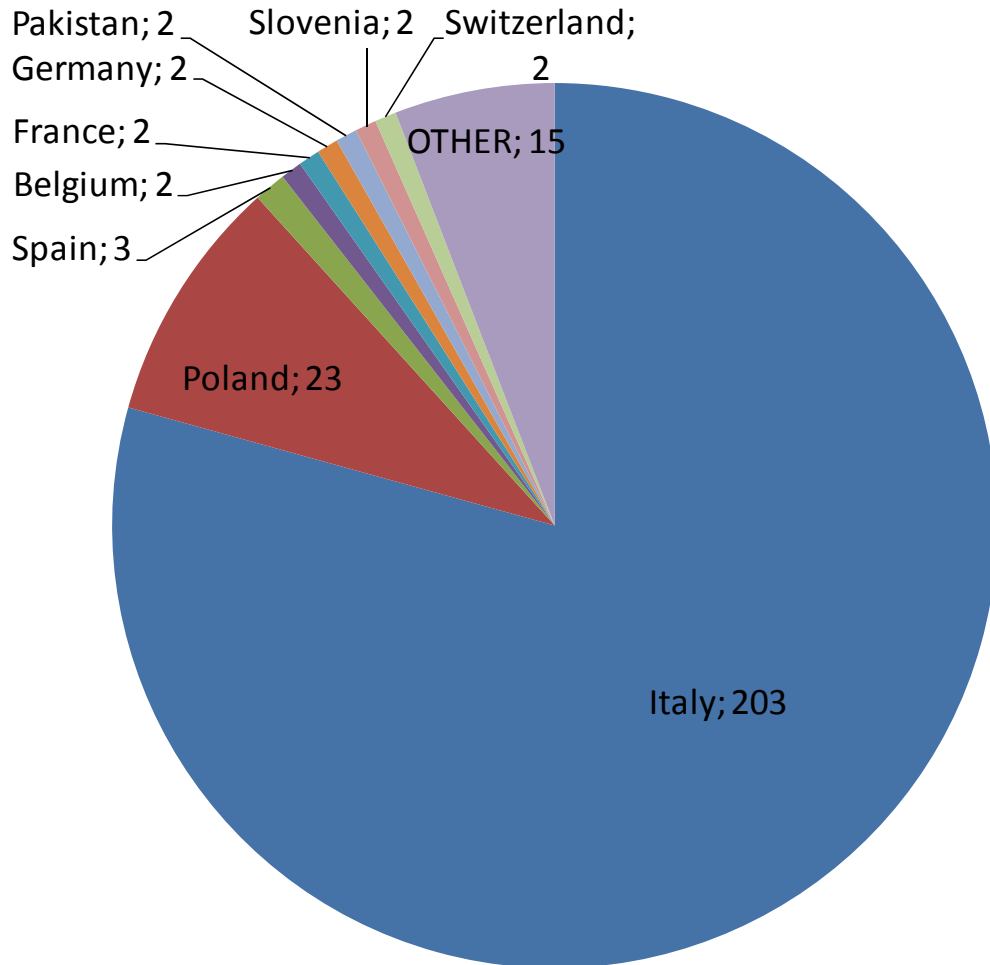
The image displays a software interface for a survey. The main content area contains a question about renovating a window frame based on the duration of exposure. Below the question are four vertical panels showing the progression of wood decay over time: 0 years, after 1 year, after 2 years, and after 4 years. The wood starts as a smooth, light brown surface at 0 years and becomes increasingly discolored and textured as time progresses. The interface includes a menu bar (File, Edit, View, Project, Operate, Tools, Window, Help) and a toolbar with navigation icons. The Windows taskbar is visible at the bottom, showing the Start button, several open applications, and the system tray with the time 18:04.

respondents

- COST Action FP1006 (and FP0904) members
- University of Life Sciences in Poznan (Poland) staff
- University of Trento Structure Engineering students/staff
- Professional secondary school for carpenters in Trento
- Carpenters from association SanPatrignano (Italy)
- Staff/visitors from IVALSA/CNR San Michele & Florence
- Students/teachers from Scuola Media di Mezzocorona
- Others; friends

- You (???), if you would like to contribute...

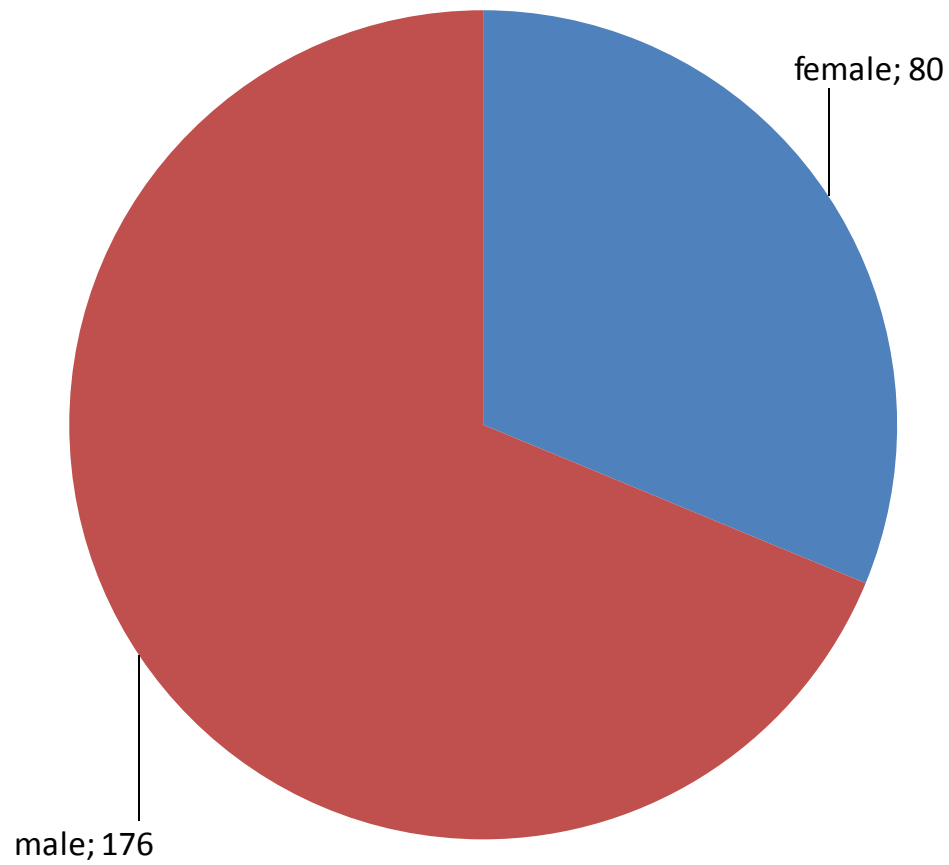
Respondents: country



OTHER

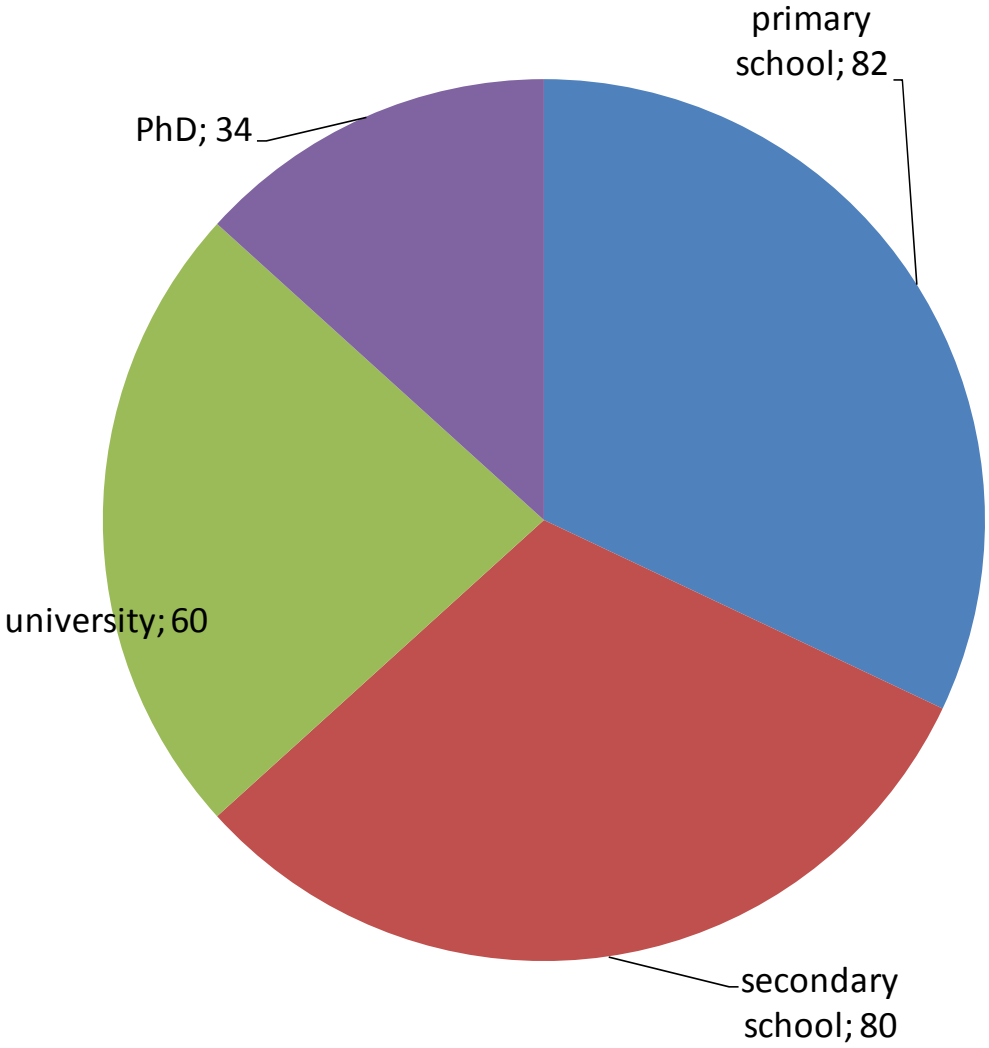
country	number of responses
Italy	203
Poland	23
Spain	3
Belgium	2
France	2
Germany	2
Pakistan	2
Slovenia	2
Switzerland	2
Ghana	1
Austria	1
Canada	1
Croatia	1
Egypt	1
Eritrea	1
Finland	1
Macedonia	1
Marocchina	1
Netherlands	1
Norway	1
Portugal	1
Romania	1
Serbia	1
Thailand	1
TOTAL:	256

Respondents: gender



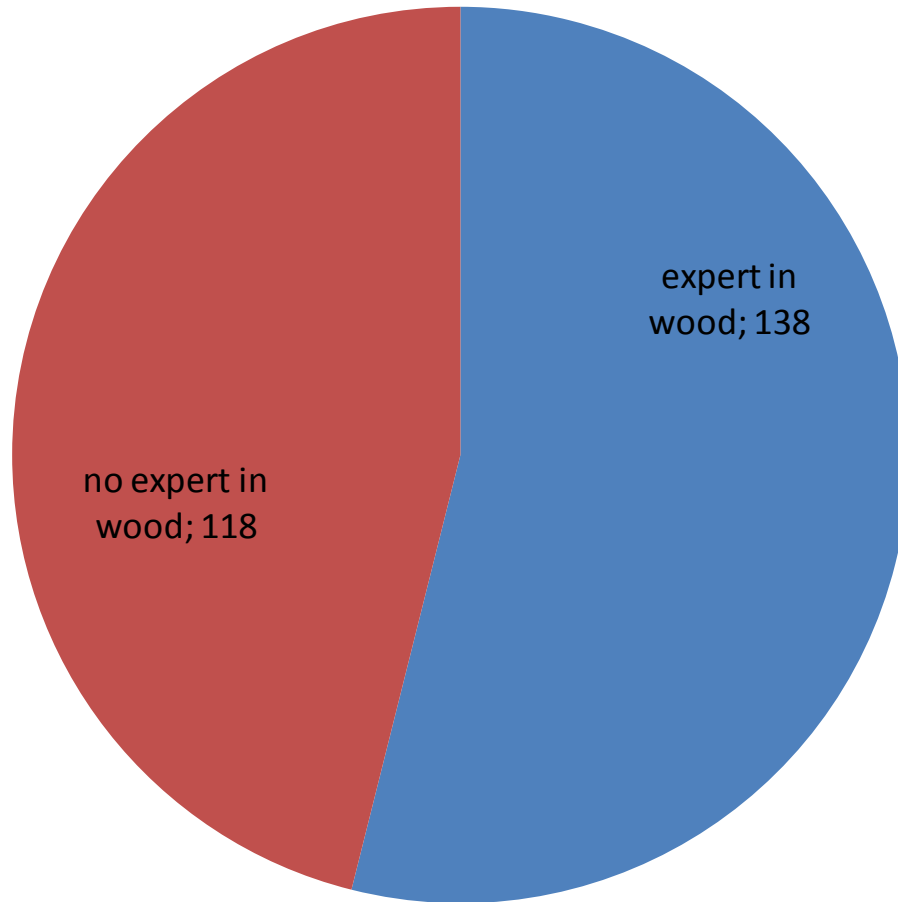
gender	number of responses
female	80
male	176
TOTAL:	13 256

Respondents: education



education	number of responses
primary school	82
secondary school	80
university	60
PhD	34
TOTAL:	14 256

Respondents: **expertise in wood**

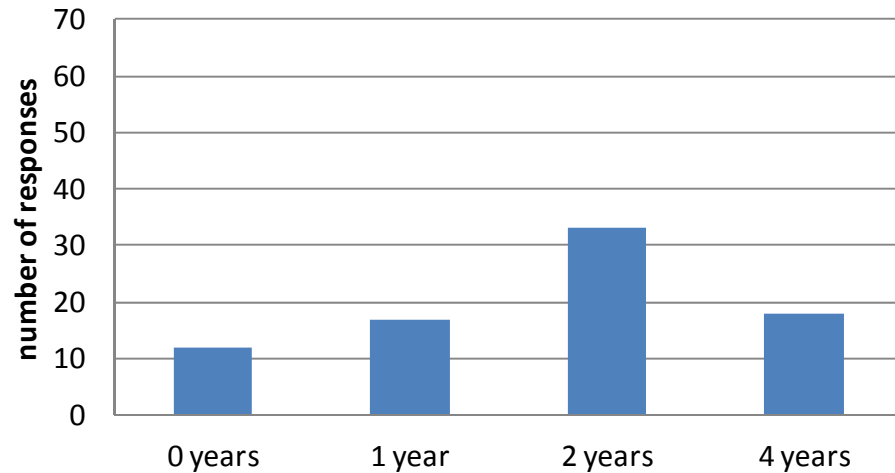


expertise	number of responses
expert	138
no expert	118
TOTAL:	15 256

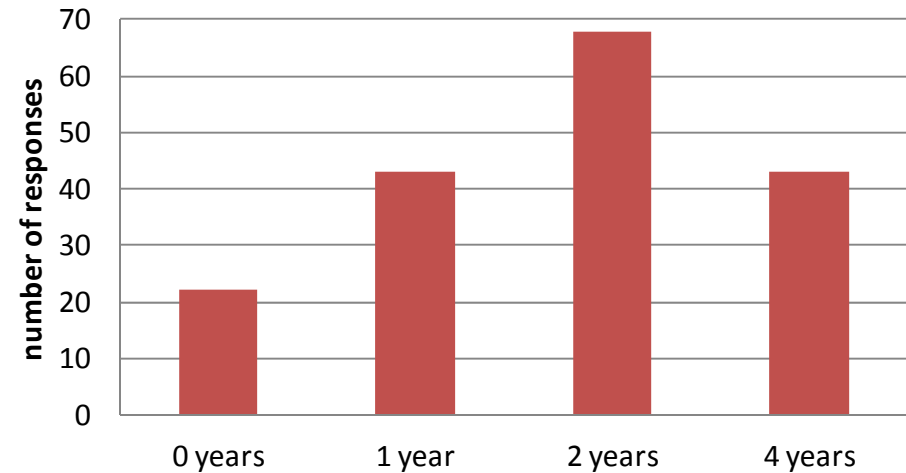
Results: gender

When are you willing to renovate your window?

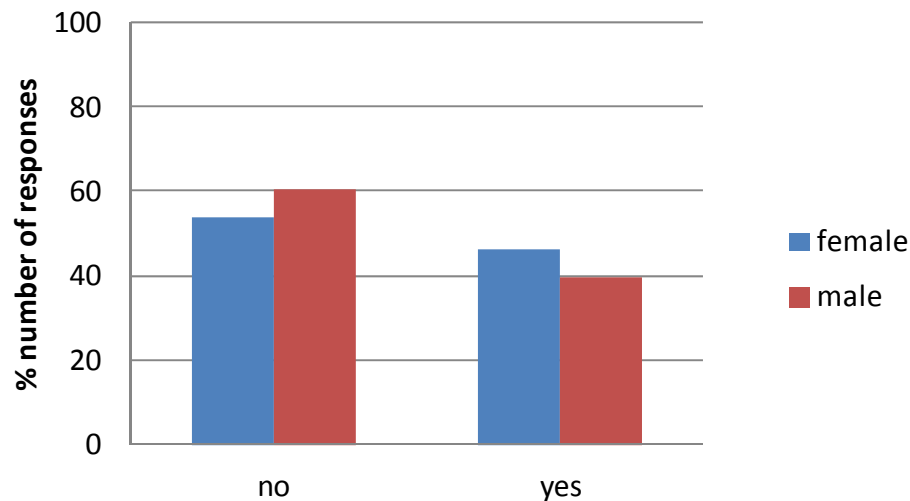
female



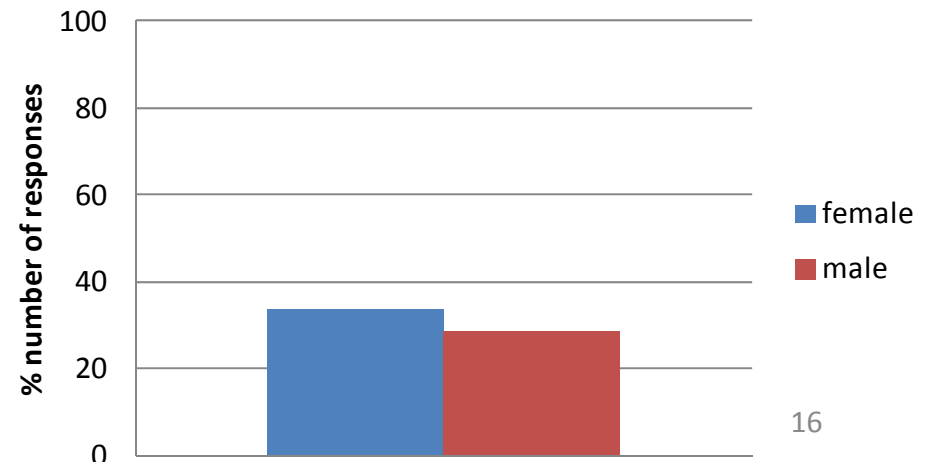
male



change idea after knowing time passing?

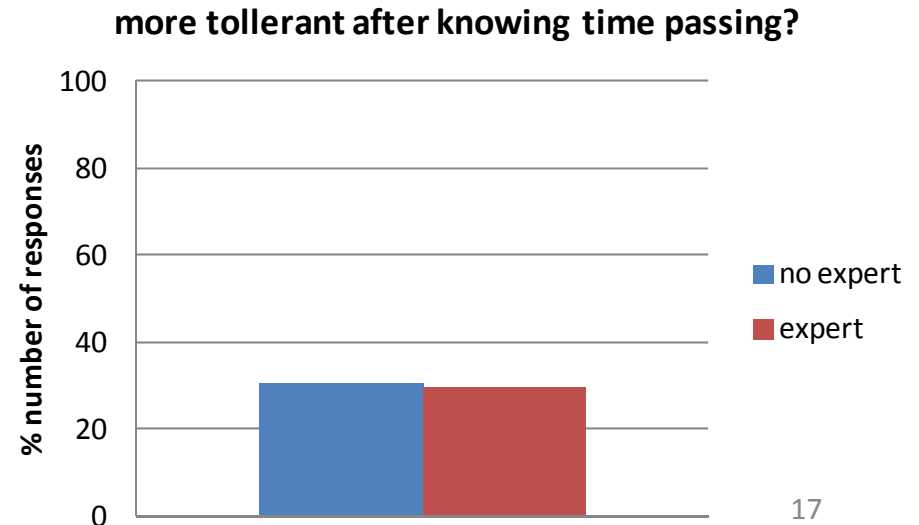
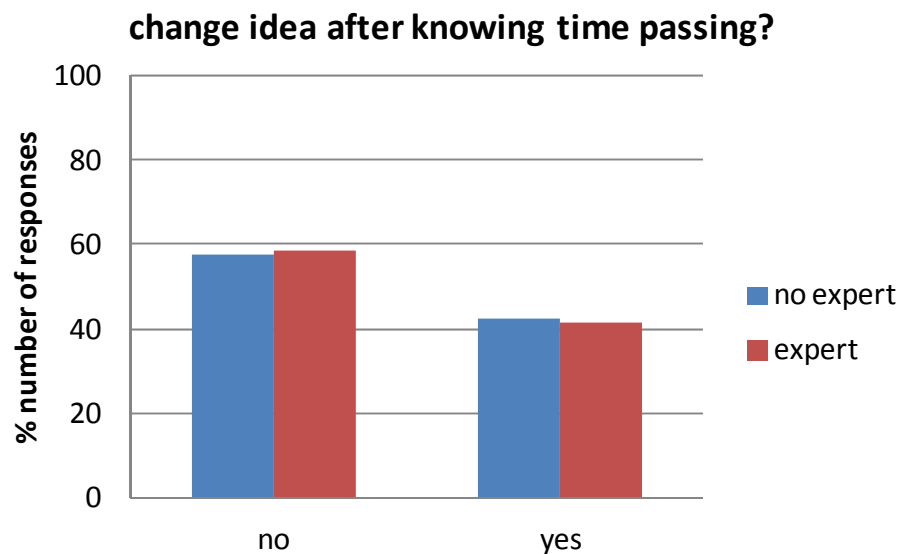
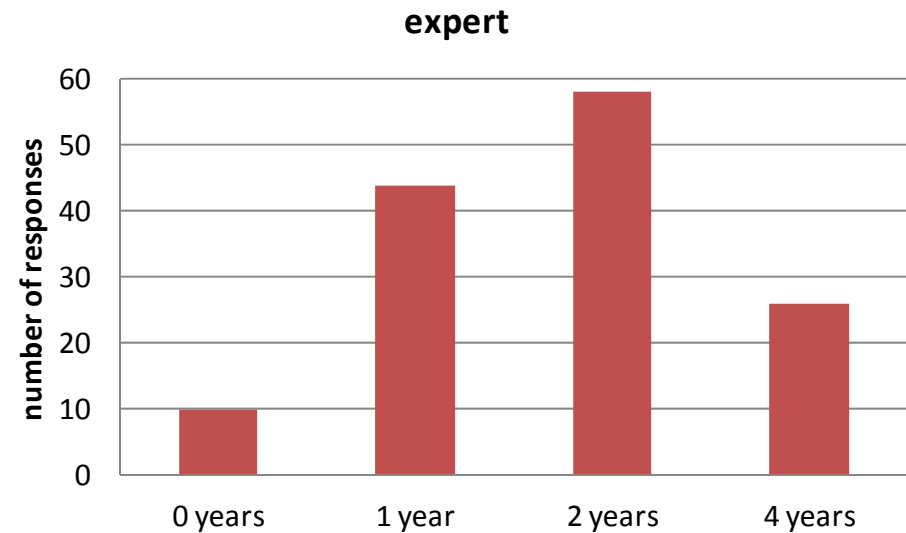
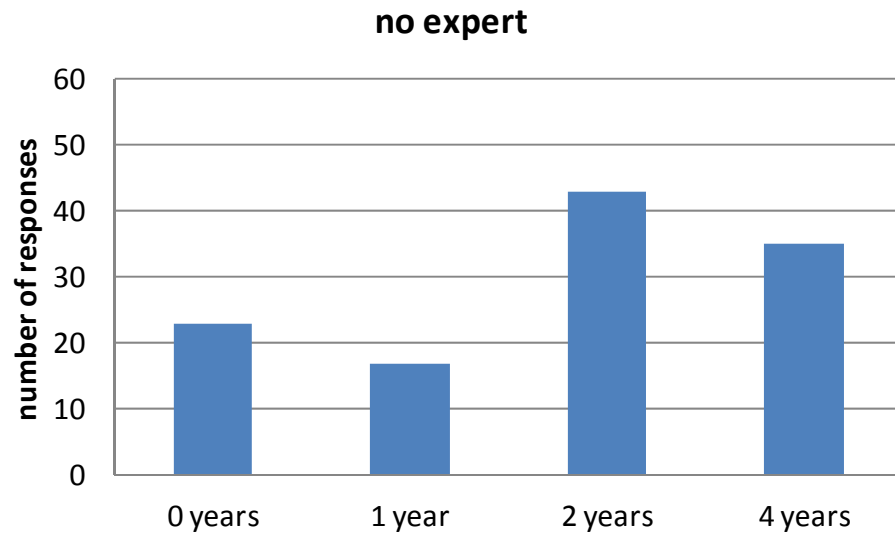


more tollerant after knowing time passing?



Results: expertise in wood technology

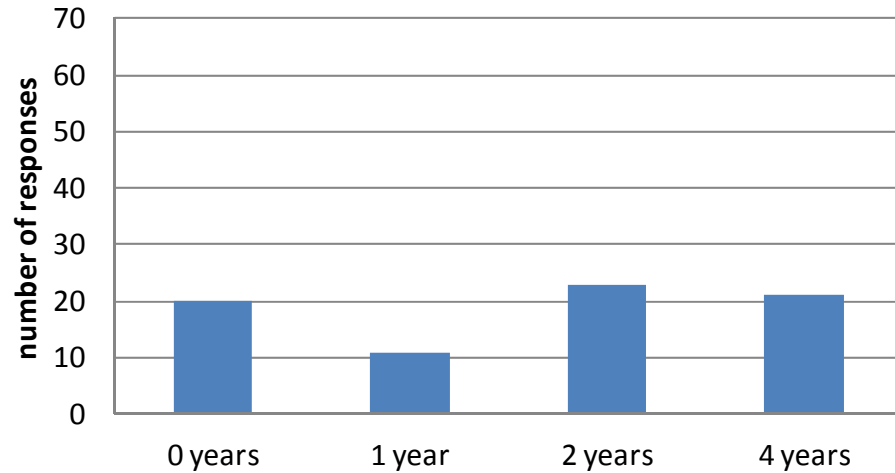
When are you willing to renovate your window?



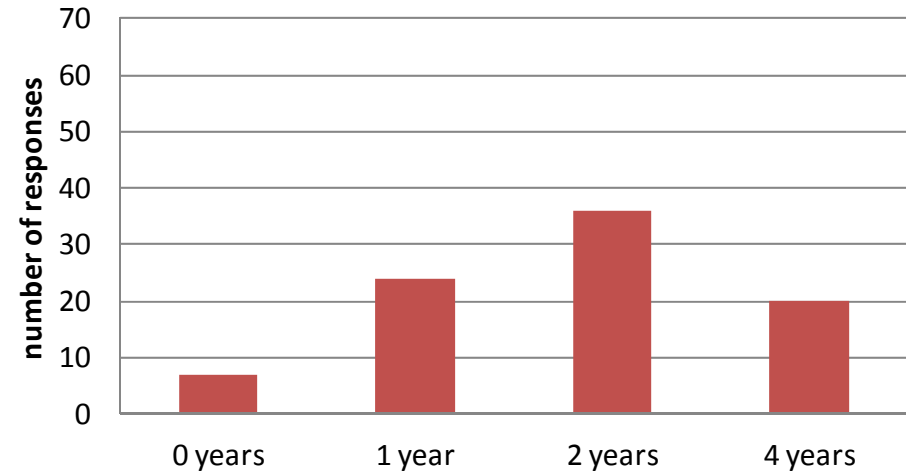
Results: education

When are you willing to renovate your window?

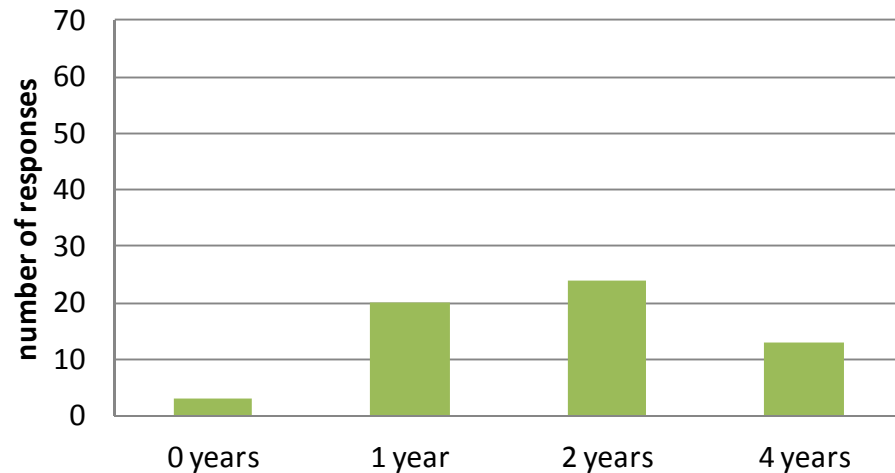
primary school



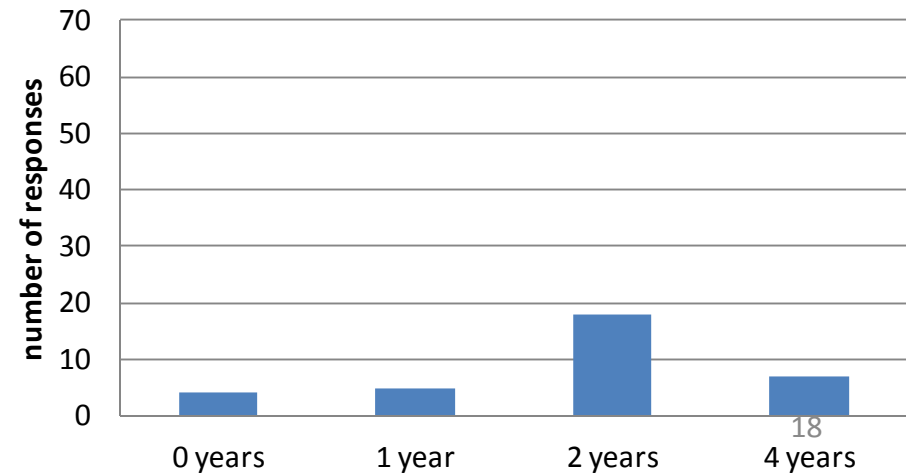
secondary school



university

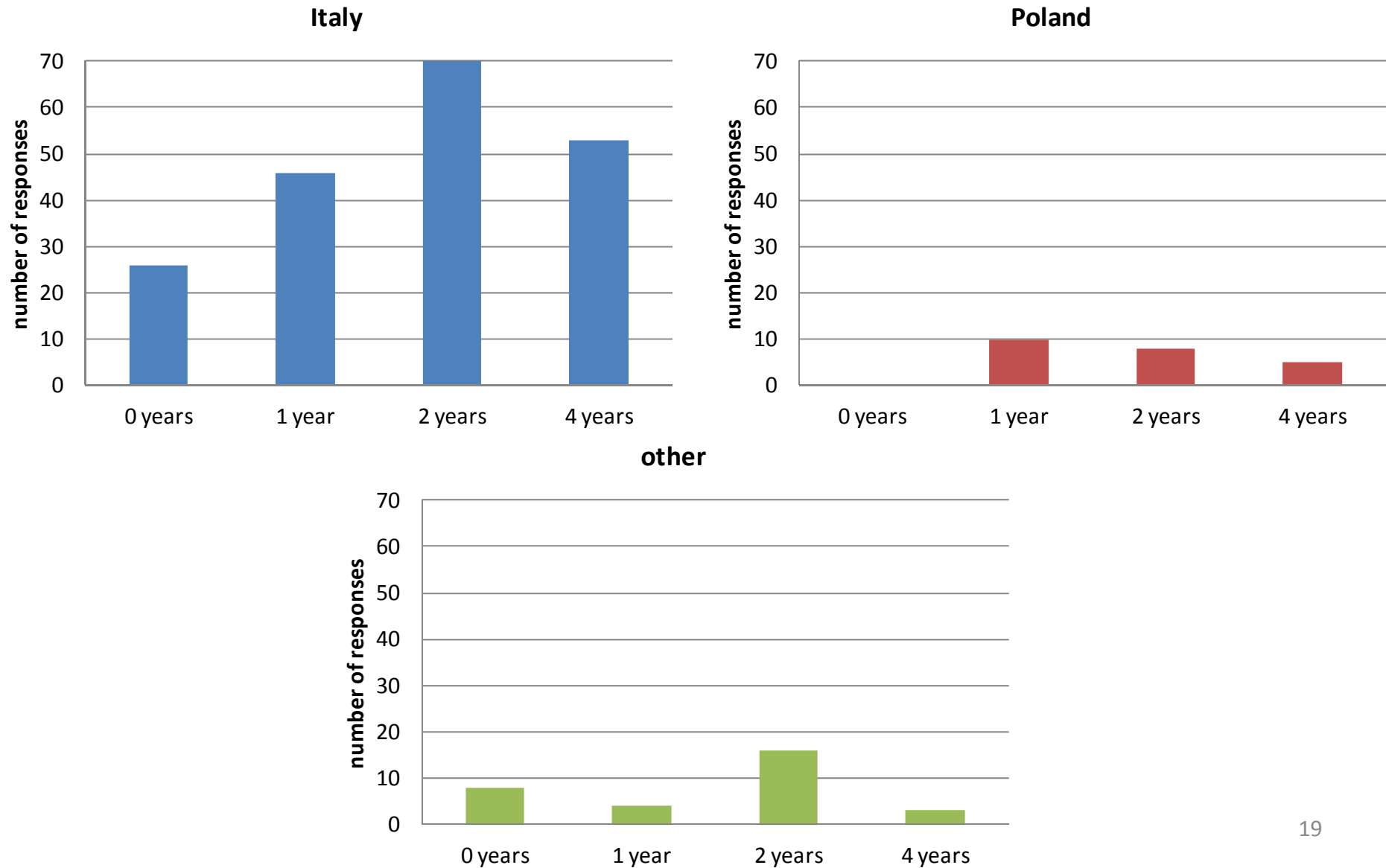


PhD



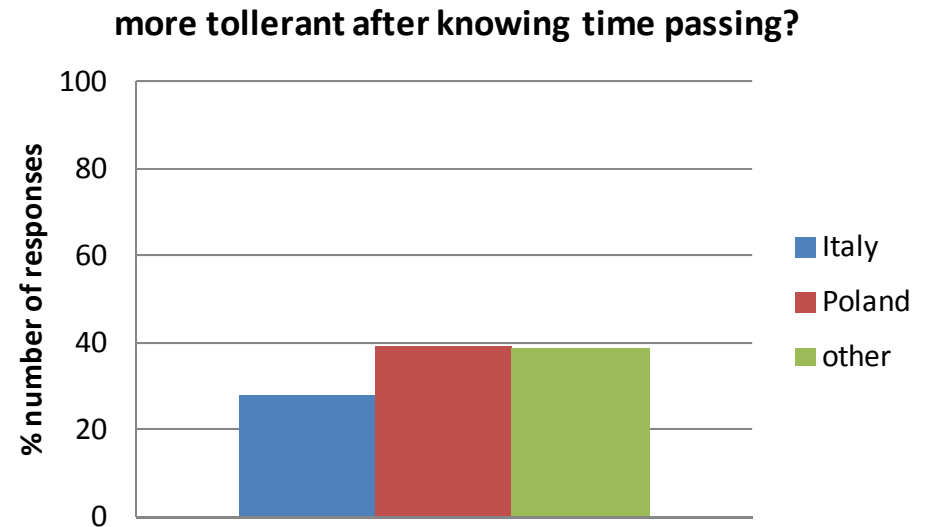
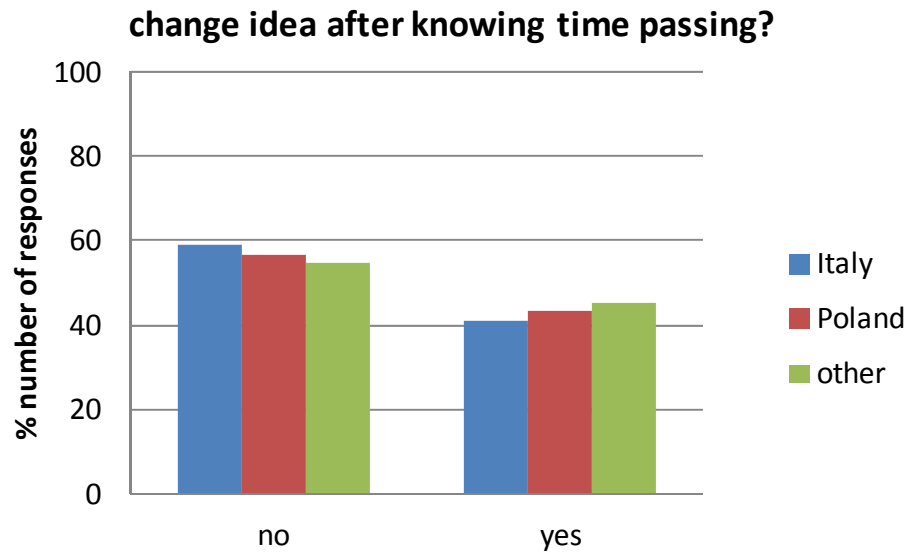
Results: **country**

When are you willing to renovate your window?



Results: country

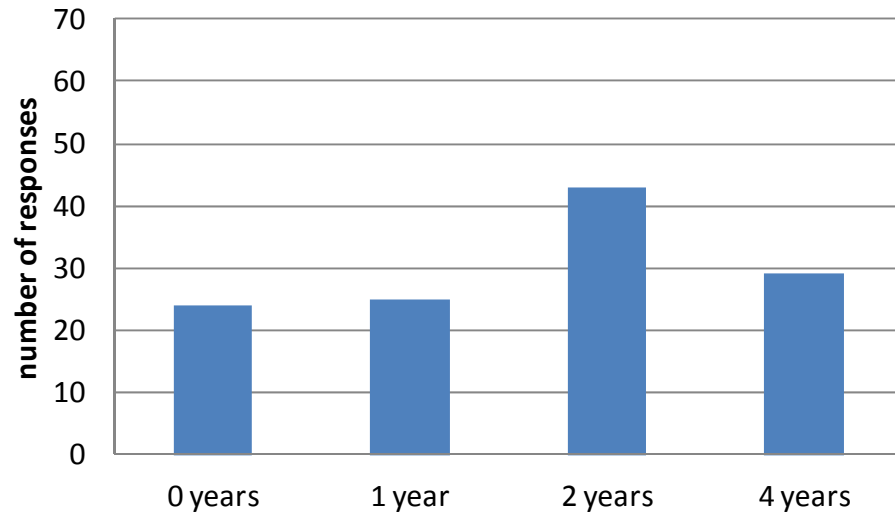
When are you willing to renovate your window?



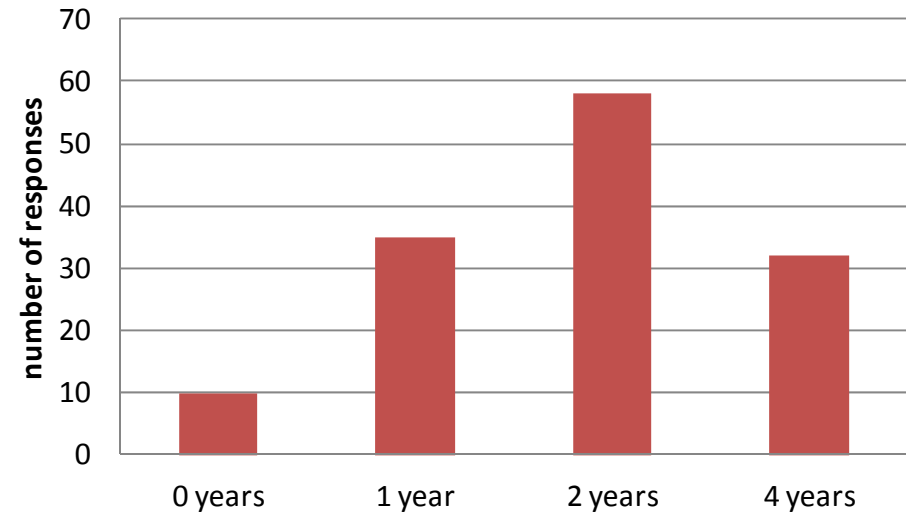
Results: age

When are you willing to renovate your window?

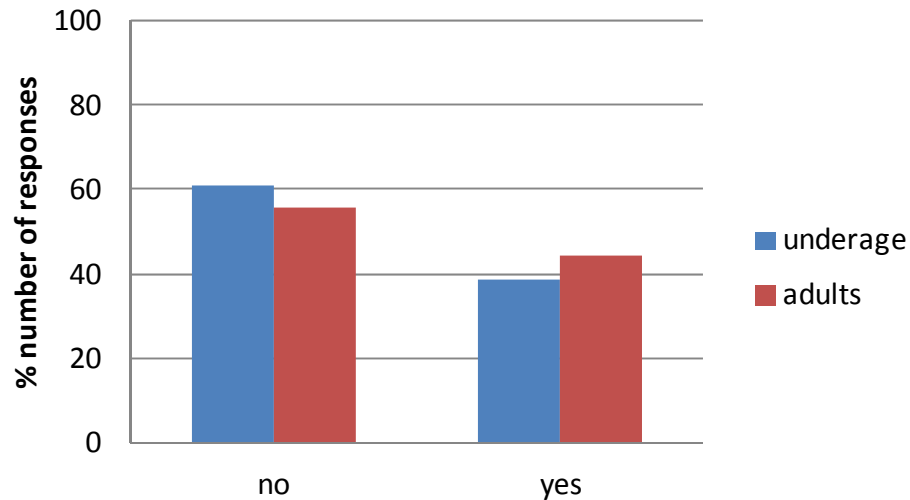
underage



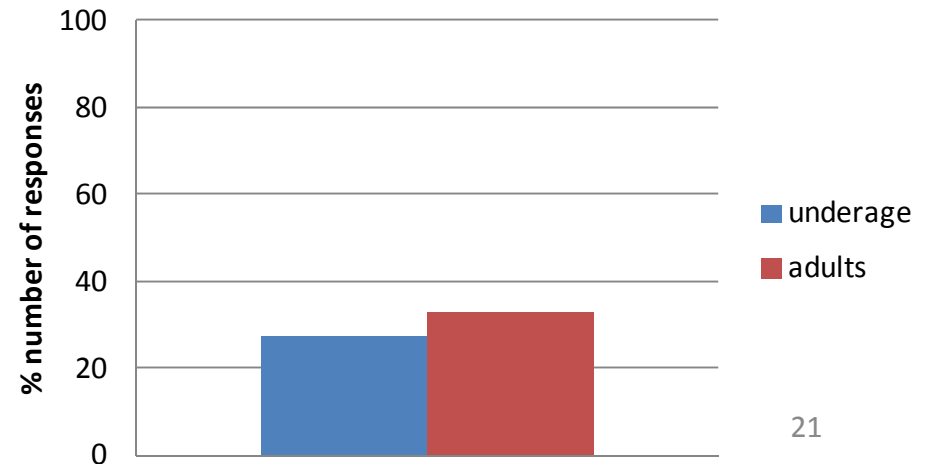
adults



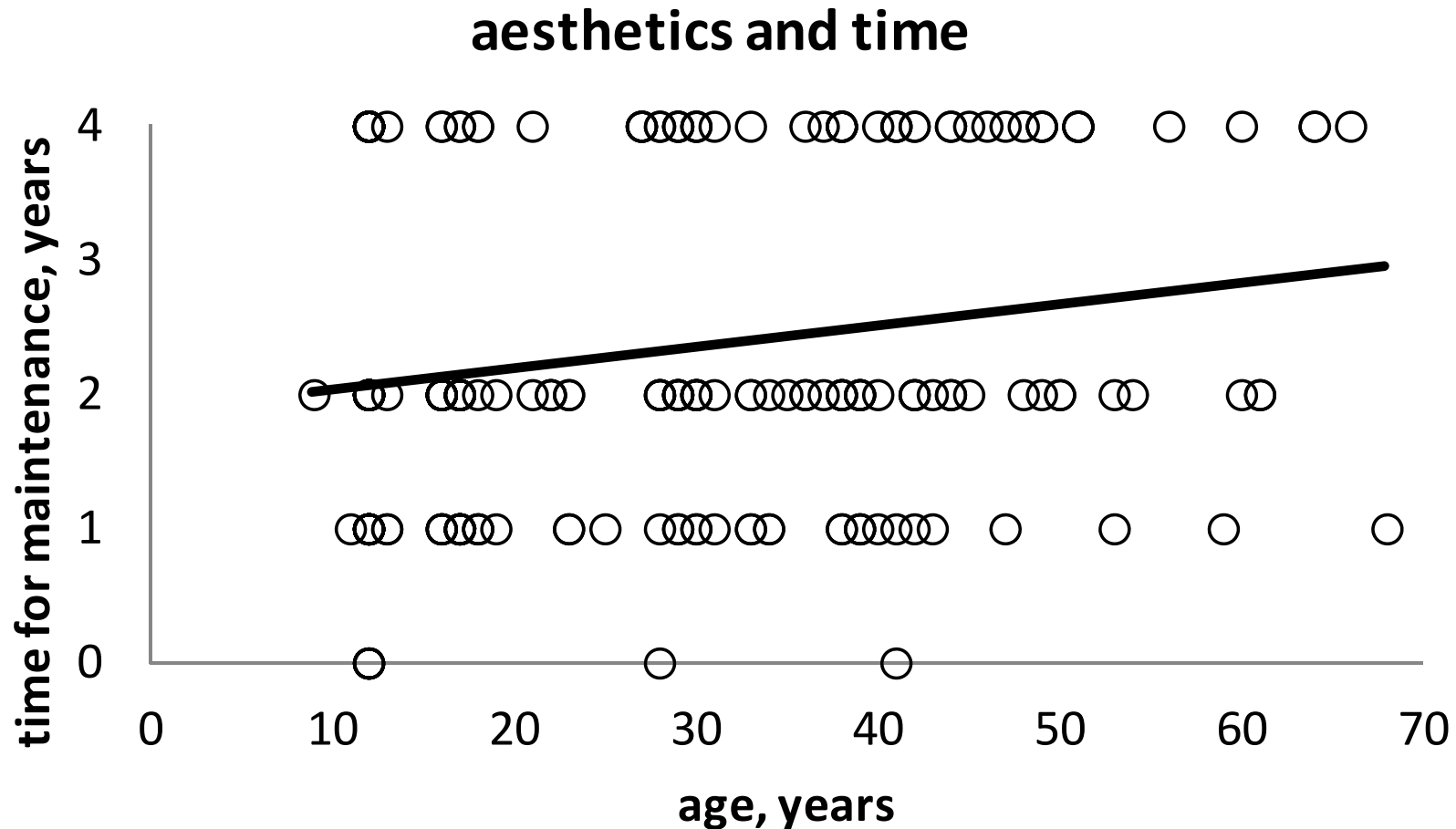
change idea after knowing time passing?



more tollerant after knowing time passing?



How does the extra knowledge about the time passing affects the time of maintenance for respondents of varying ages?



conclusions

- The test is ongoing and therefore “statistical significance” is not computed yet
- Some clear trends in responses can be found however;
 - Most respondents considered 2 years as the due moment to renovate window frame
 - 40% respondents may change the opinion after realizing time of exposition (and efforts necessary for renovation)
 - Most of those are more tolerant to the wood surface imperfections
- It is problematic (due to limited number of responses) to interpret variations between nations, even if Italian group of respondents differed from other countries
- The group of primary school students differed from other respondents, but are very important target as future users

Do not underestimate aesthetical performance!

acknowledgments

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Part of this work has been conducted within collaboration of COST Action FP1006

Martino Negri, Ignazia Cuccui and Sandro Bonfa for providing some images used in the hedonistic test

NIR and Wood, sounds good!

(google it for details)

Invitation for
workshop dedicated for application
of **Near infrared spectroscopy to wood/forest science**

Co-organized by IVALSA/CNR and Italian Society for NIR

15 April 2014

San Michele All Adige (Trento), Italy

Call for abstracts: 15 February

Free of charge!

Bi-lingual: English/Italian

http://www.ivalsa.cnr.it/en/news/dettaglio-news/article/nir-and-wood-sounds-good.html?tx_wfqbe_pi1%5BPERSONA%5D=

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