



Innovative indicators for energy performance certification of buildings

Based on X-tendo project - towards the next generation energy performance certificates

Maarten De Groote, Vito / EnergyVille (BE)

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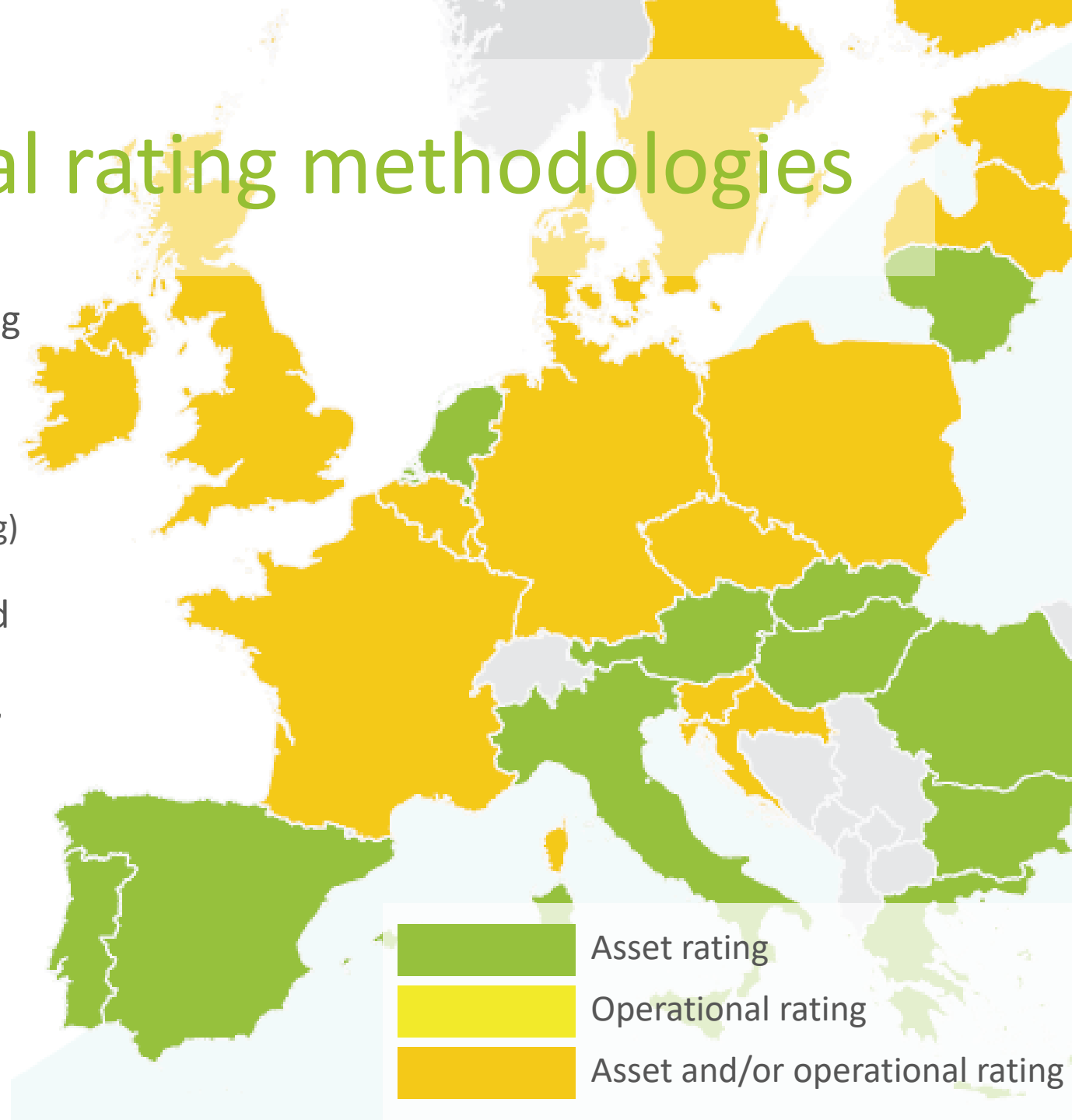
Energy Performance Certification as silver bullet for renovation challenge?



- ◉ Mitigating the adverse climate impact of the buildings stock is a crucial objective of the EU
- ◉ The energy performance certificate (EPC) was introduced almost 20 years ago and has continuously gained significance
- ◉ EPC has faced a lot of criticism and needs to overcome multiple challenges before EU implementation can be seen as effective
- ◉ Huge opportunity in implemented EPC initiatives: trained experts, comprehensive databases, market steering instrument, support mechanisms, etc.
- ◉ Potential to trigger a new wave of renovation activities across the EU
- ◉ To become a catalyst for energy renovations, the next-generation EPC must provide an improved and more reliable service tailored for the end-users

Asset and operational rating methodologies

- ◉ EU regulation provides guidance regarding the EPC calculation methodology
- ◉ The energy performance of buildings can be evaluated based on
 - calculated energy consumption (asset rating)
 - actual energy consumption (operational rating)
- ◉ 12 from the 27 EU Member States have adopted a methodology exclusively based on calculated energy consumption
- ◉ When both asset and operational ratings, the performance methodology depends on building typology, status and available data



Your home is no longer your home...

UK housing demand soars since end of Covid lockdown

Roomier rural houses are selling quickest, says Zoopla, with buyers prioritising space



▲ Large houses in the countryside are selling the quickest, Zoopla reports. Photograph: Colin Underhill/Alamy

Demand for houses has soared since the lockdown ended, according to a report from Zoopla, with three- and four-bedroom houses with space to work from home particularly popular.

DE GROTE MARKT

Coronarot? Niet op de Belgische vastgoedmarkt

Nico Tanghe

Vrijdag 25 september 2020 om 3.25 uur



Que casas se procuram em Portugal em tempos de Covid-19?

Principais redes imobiliárias analisam os comportamentos desde o rebentar da pandemia e ao longo destes últimos meses, perspetivando o futuro do setor.



Raivis Razgals on Unsplash

antique location



Links between wellbeing & pollution

Clean surfaces and ventilate rooms to limit covid-19 spread at home, say experts

European Environment Agency

Healthy environment, healthy lives: how the environment influences health and well-being in Europe

Table 2.1 Summary of indicative links between non-communicable diseases and related environmental risk factors

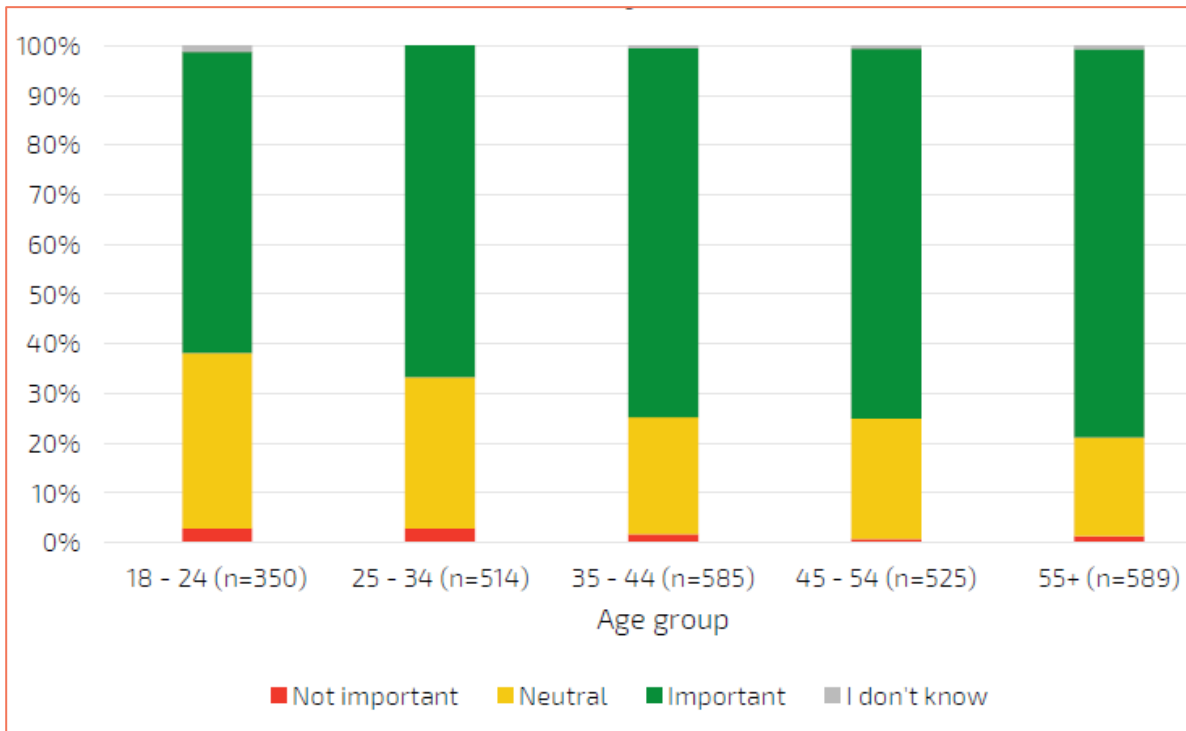
Disease	Environmental risk factors					
	Ambient air pollution	Noise	Chemicals	Climate change	Indoor fuel combustion	Radiation
Cancers	▲		▲		▲	▲
Neuropsychiatric disorders		▲	▲	▲		
Cataracts					▲	▲
Hearing loss		▲				
Cardiovascular disease	▲	▲	▲	▲	▲	
Chronic obstructive pulmonary disease	▲				▲	
Asthma	▲				▲	
Chronic kidney disease			▲			
Skin diseases			▲			
Congenital anomalies	▲		▲			▲
Population attributable fractions	▲ < 5 %	▲ < 5 %	▲ < 5 %	▲ < 5 %	▲ < 5 %	▲ < 5 %

- People spend up to 90 % of their time indoors
- Air quality inside homes, offices, schools, nurseries, healthcare facilities, etc. is an important health determinant
- Indoor air quality is affected by pollutants brought into buildings from outside, as well as pollutants originating indoors
- In 2016, around 15.000 persons deceased in the EU because of indoor air pollution

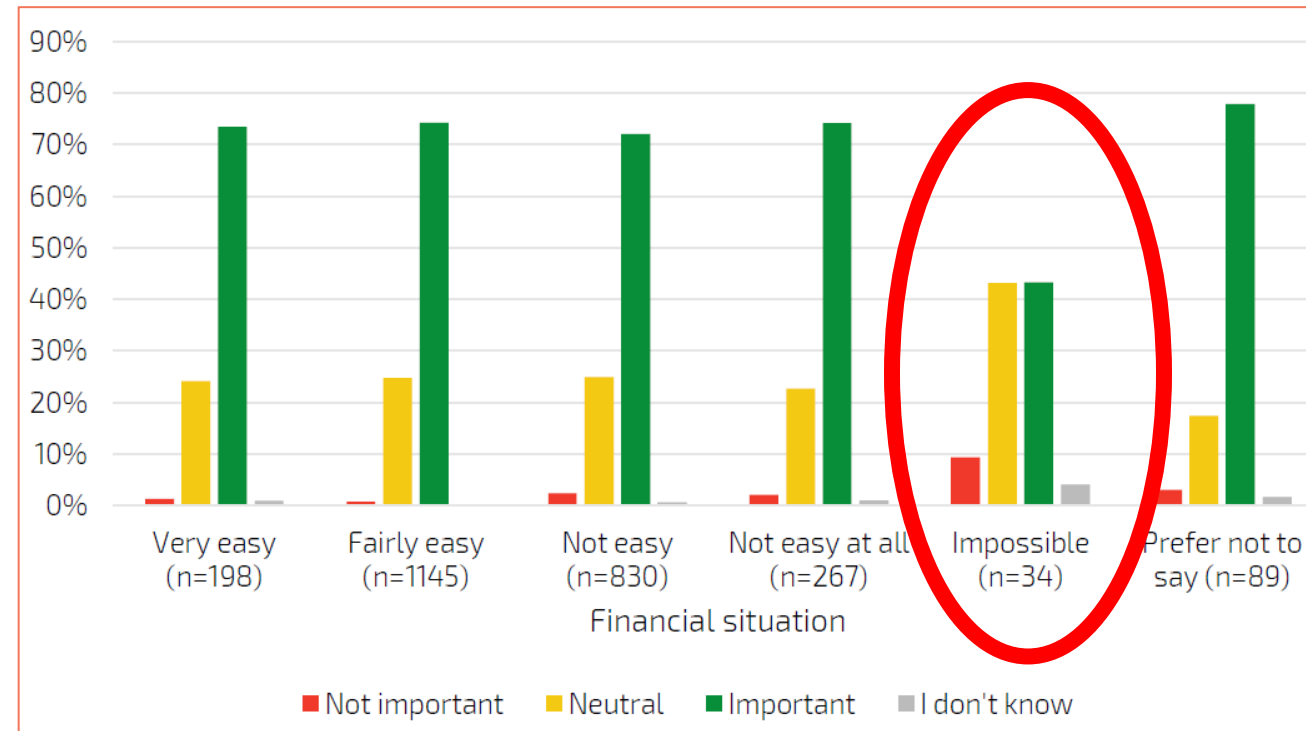


Survey: importance of comfort when buying or renting a house

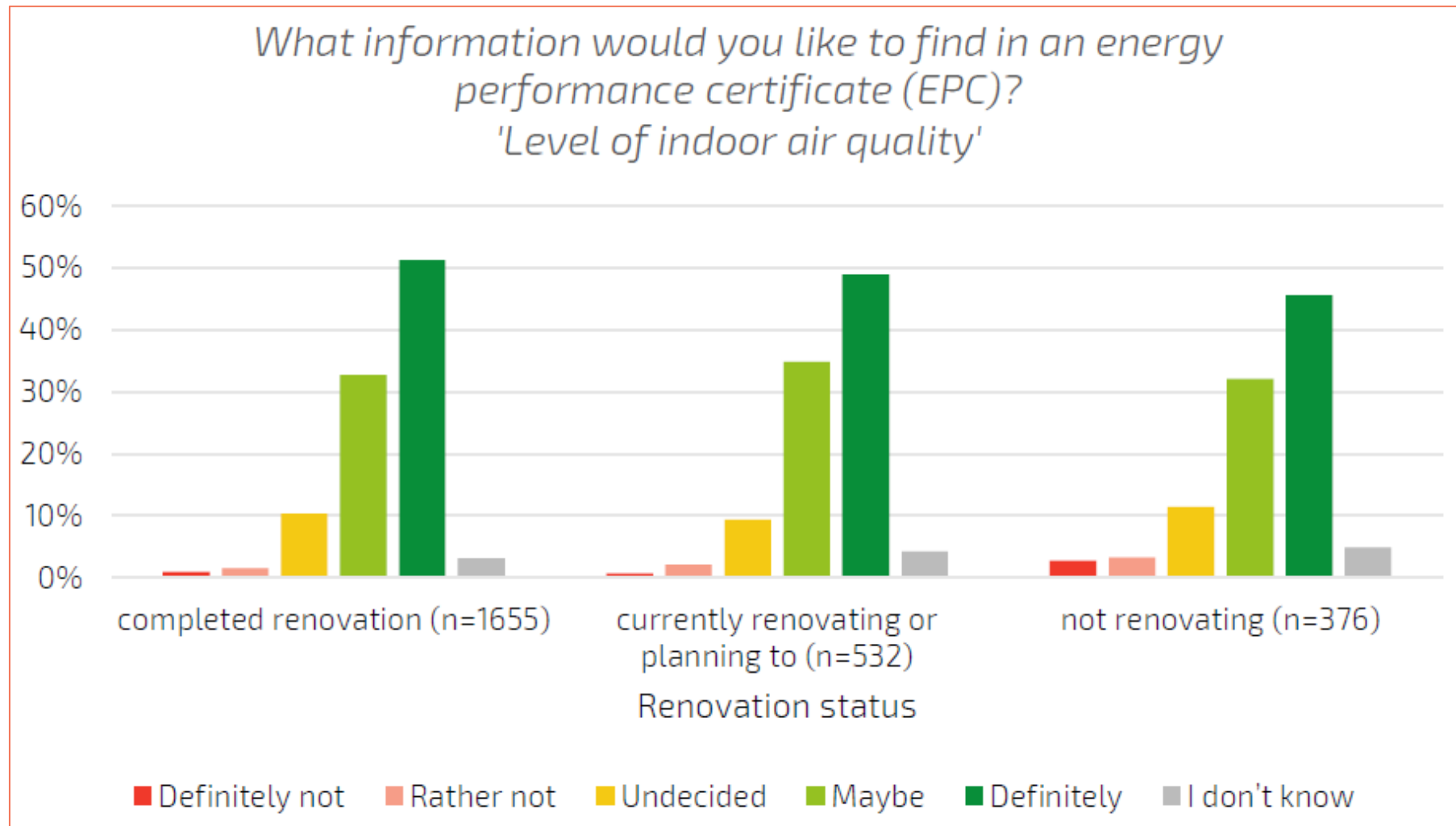
- Importance of comfort among different age groups when buying or renting a house



- Importance of comfort based on financial situation when buying or renting a house



Survey: interest to find “Level of indoor air quality” in an EPC



Increased value of a proper indoor environment



- Smart Readiness Indicator
- Comfort Indicator
- Air Pollution Indicator



Smart Readiness Indicator



Smart and digital technologies in the building sector enable

- ◉ Cost-effective energy efficiency savings
- ◉ Tangible benefits for users in terms of comfort, health and well-being
- ◉ Better integration of renewables to the energy grid



EXAMPLE APPLICATIONS:



optimised energy use as a function of (local) production



optimised local (green) energy storage



automatic diagnosis and maintenance prediction



improved comfort for residents via automation

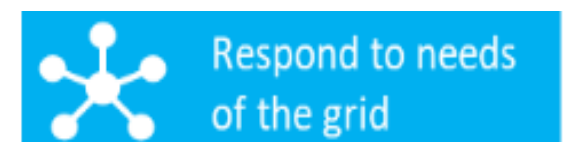
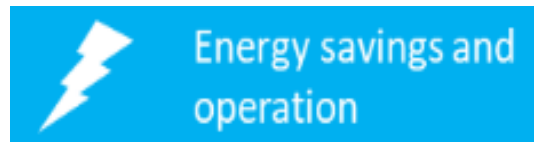


Aggregated impact scores for the Smart Readiness Indicator

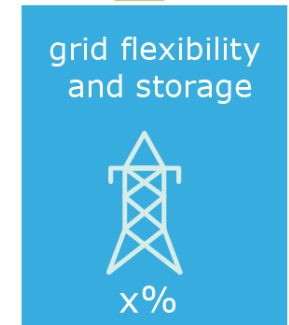
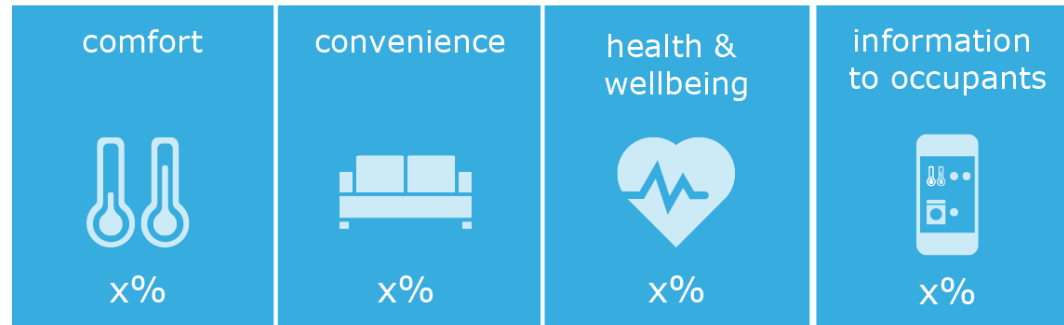
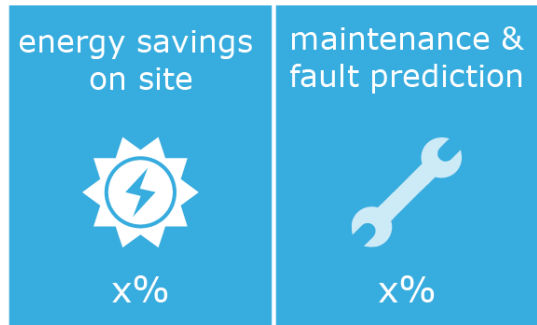
SINGLE SCORE
INDICATOR



3 KEY THEMES

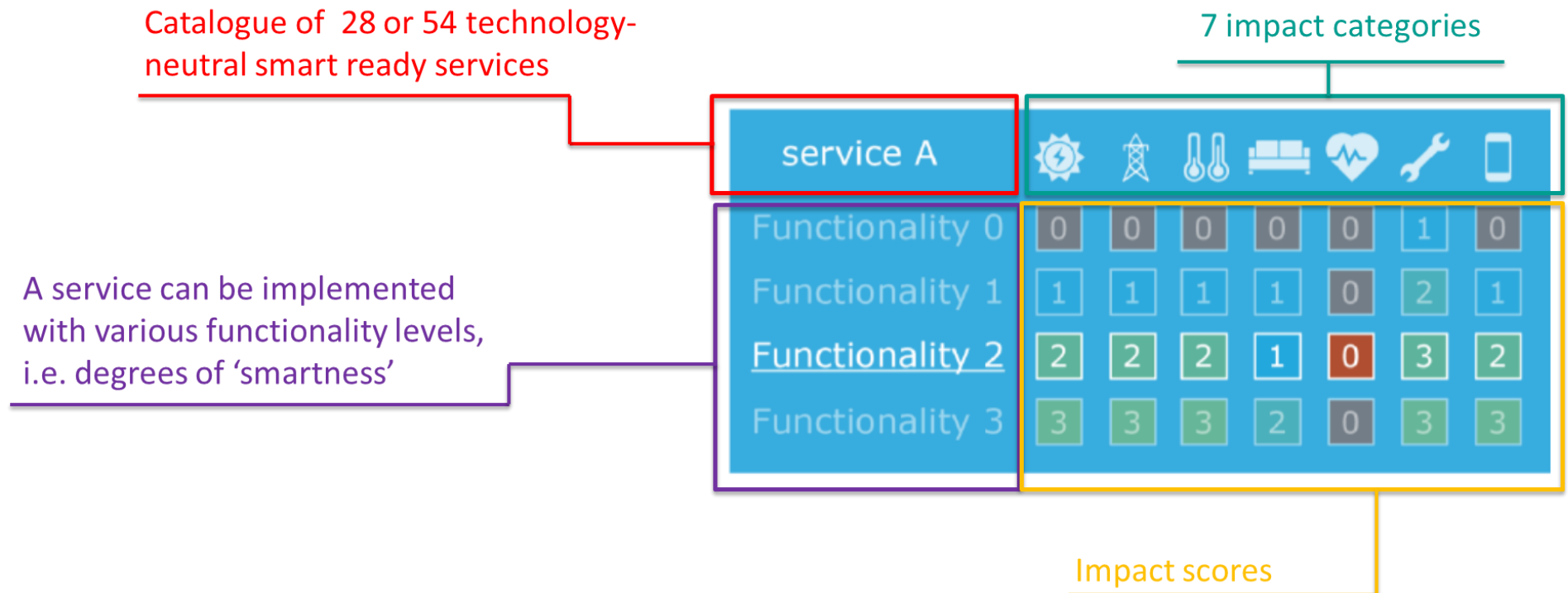


IMPACT
CATEGORIES



The buildings' response to the need of the occupant

- ⦿ The ability to adapt its operation mode in response to the needs of **the occupant** paying due attention to the availability of user-friendliness, maintaining healthy indoor climate conditions and ability to report on energy use, e.g.:
 - Use of CO2 sensors to decide when to increase ventilation
 - Dashboards displaying current and historical energy consumption





Comfort Indicator



Where we get inspiration from?

BREEAM®



CASBEE®



THE HOME PERFORMANCE INDEX (HPI)®
Know that your house is a home.



LIVING
BUILDING
CHALLENGE™



How to apply a comfort indicator in the EPC environment?



- > Use of checklists (observations/measurements)
- > Questionnaire survey to building occupants
- > On-site monitoring depending on the requirement of individual criteria



Flexible and adaptable assessment approach based on building typologies (domestic and non-domestic buildings)



Based on four main indicators:

Thermal comfort
Indoor air quality
Visual comfort
Acoustic comfort



Individual scores for all indicators



Affordability and time-effective assessment

Display of rating per indicator



Label for comfort feature	Score (maximum achievable fraction)
Very bad	$0\% < \text{score} \leq 30\%$
Bad	$30\% < \text{score} \leq 40\%$
Acceptable	$40\% < \text{score} \leq 60\%$
Good	$60\% < \text{score} \leq 80\%$
Excellent	$80\% < \text{score} \leq 100\%$

Indicator	0%-----100%	Label
Thermal comfort	90%	Excellent
Indoor air quality	80%	Good
Acoustic comfort	25%	Very bad
Visual comfort	50%	Acceptable

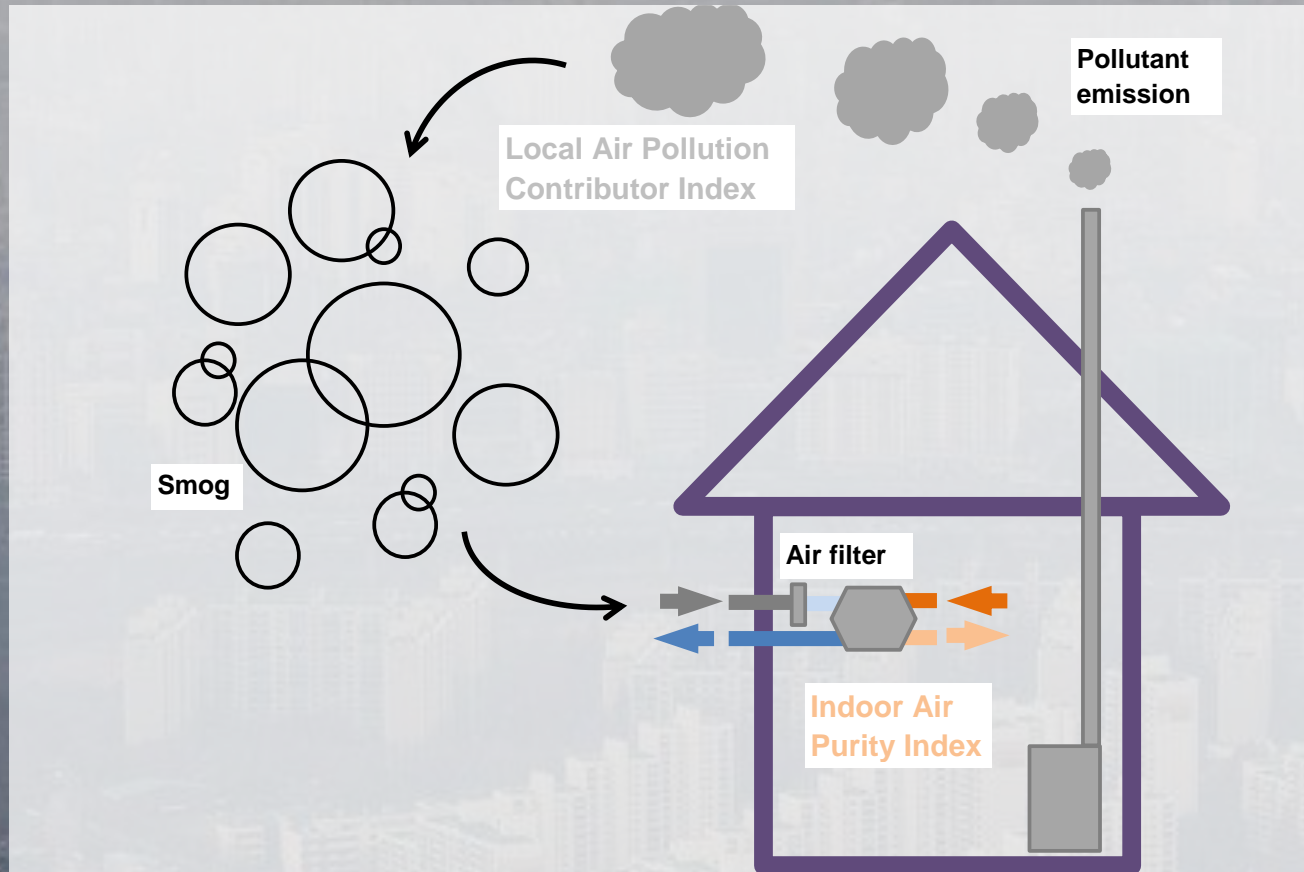




Outdoor Air Pollution



Outdoor Air Pollution



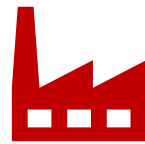
*The **Indoor Air Purity Index** can persuade to invest in mechanical ventilation with air filtration*

*The **Local Air Pollution Contributor Index** can enforce building owners or users to undertake actions of building modernization or energy source exchange*

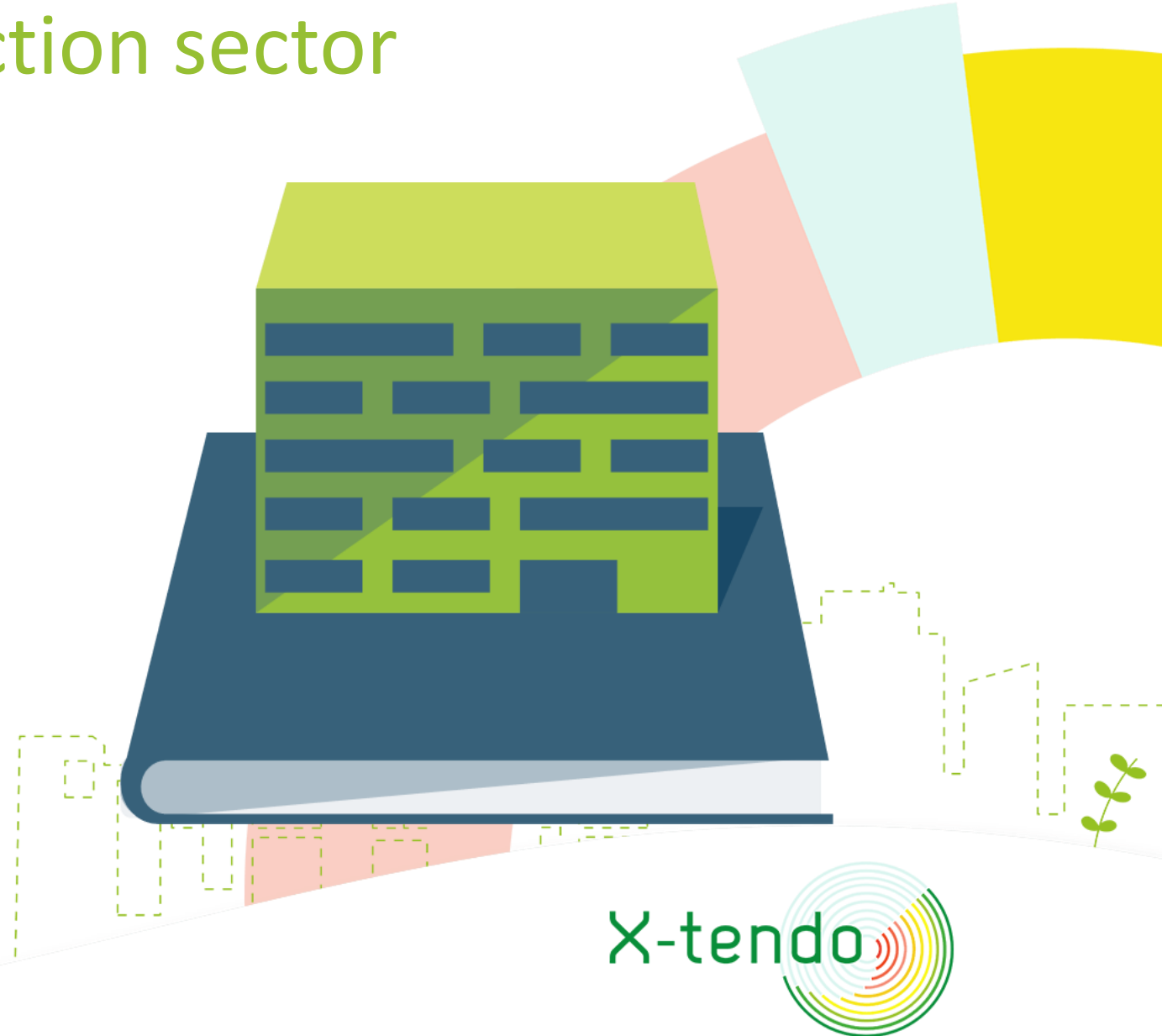
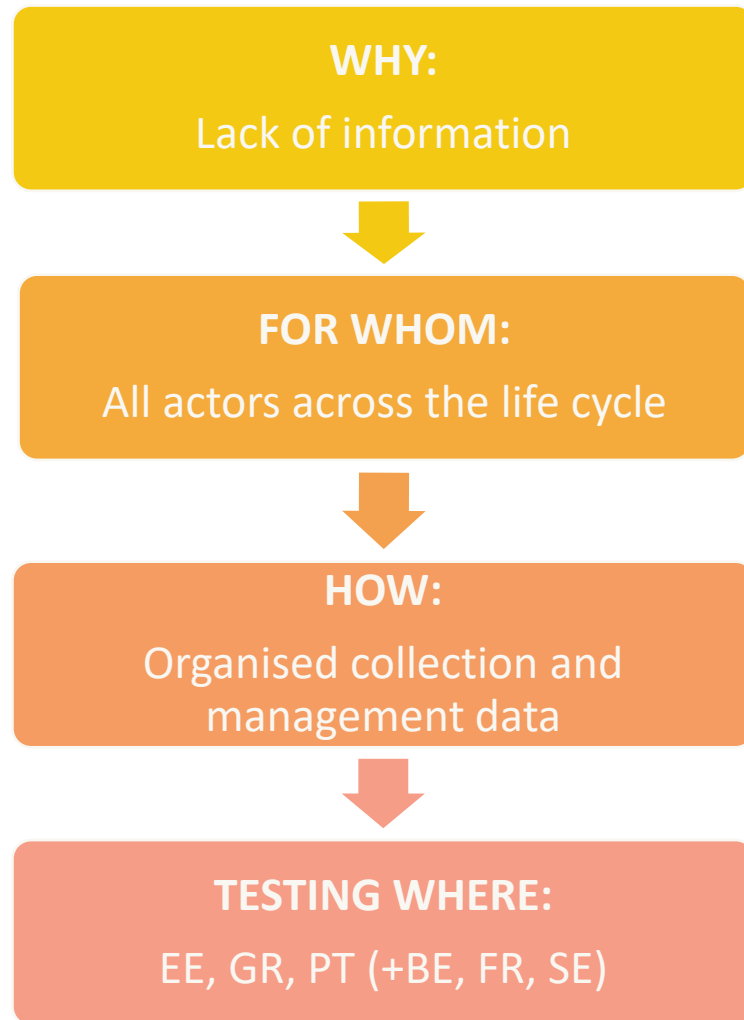
What to do with the EPC data?



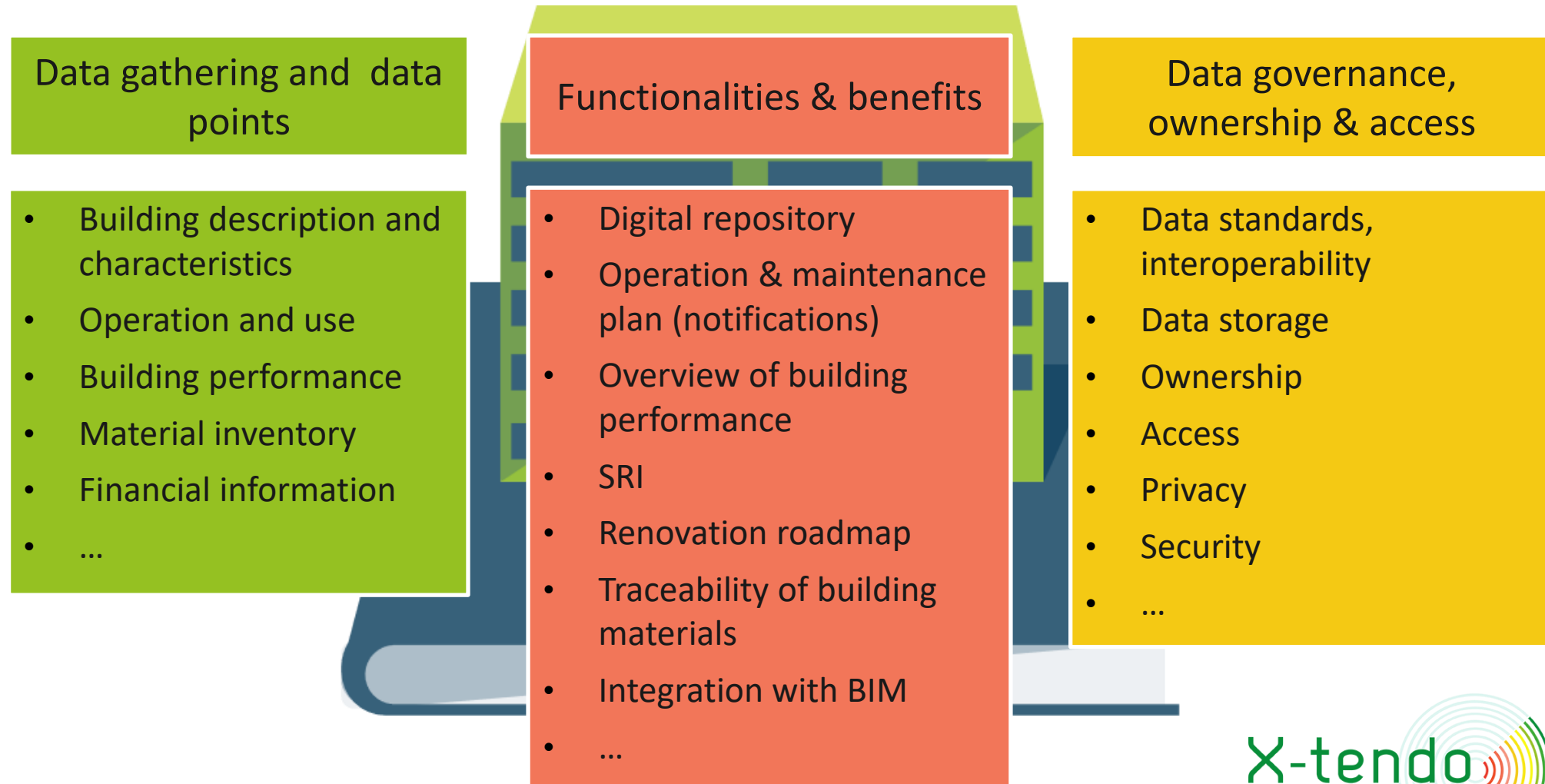
We usually keep records of the things we value...



The Digital Building Logbook is a potential game changer for the construction sector



Core ingredients of the logbook





Maarten De Groote - maarten.degroote@vito.be



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