

DECADIESE: a new method to assess buildings' sustainable value through functional performance and externalities integration

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DECADIESE
A new method to assess buildings' sustainable value through functional performance and externalities integration

Context

- Hard to **justify ambitious building retrofits** by energy savings only
- **Return on investment** to divide energy consumption of a building by two is **more than 25 years**
- DECADIESE methodology to **capture the sustainable value of a building** with an original focus
  - beyond the scope of classical analytic methods
  - by extending the perimeter of associated stakeholders in order to allow ambitious building projects.

ANR (French research agency) project

Methodology

Externalities domain (not detailed here)

Externalities	2 Detect potential externalities	Externalities	4 Activate externalities associated with functional performance > threshold	Externalities	Stakeholders 5 Evaluate willingness to pay for selected externalities
	Stakeholders		**Functional performance criteria**		**Investment costs**
Usage functions	**1** Define prescripted functional performance	**Usage functions**	**3** Evaluate functional performance	**Usage functions**	**6** Break down investment costs by functions

Usage functions | **7** Break down exploitation and end-of-life costs by functions — **Exploitation and end-of-life costs**

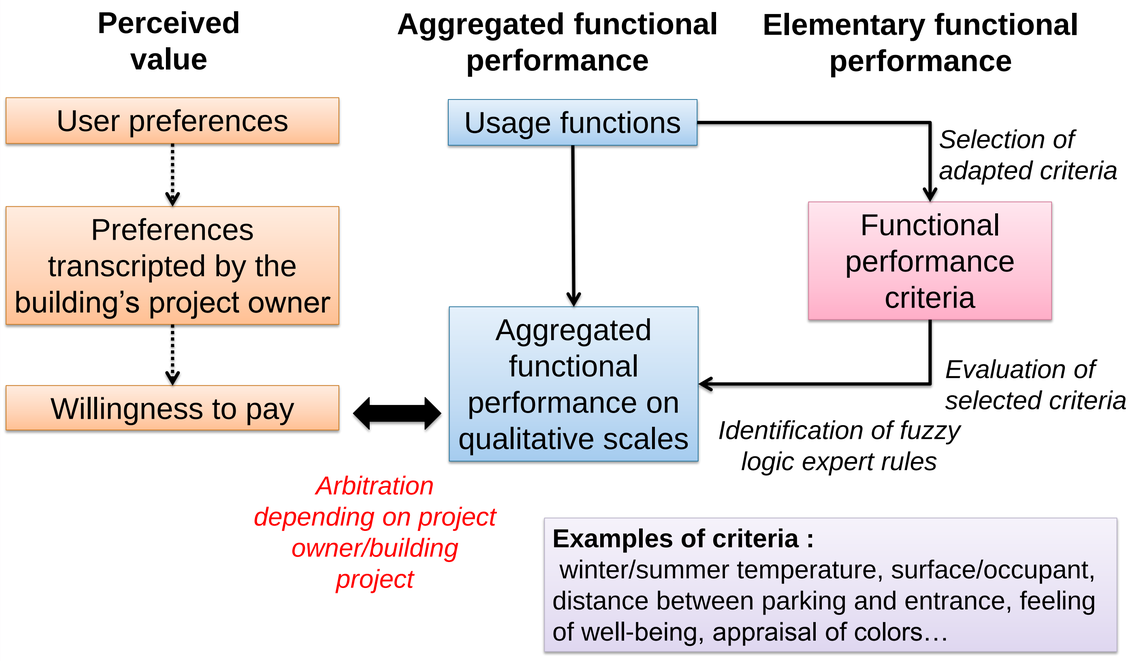
DECADIESE objectives

Aiding decision for buildings' project owners thanks to:

- A **functional perspective** centered on users
- **Externalities elicitation** to identify new value creations

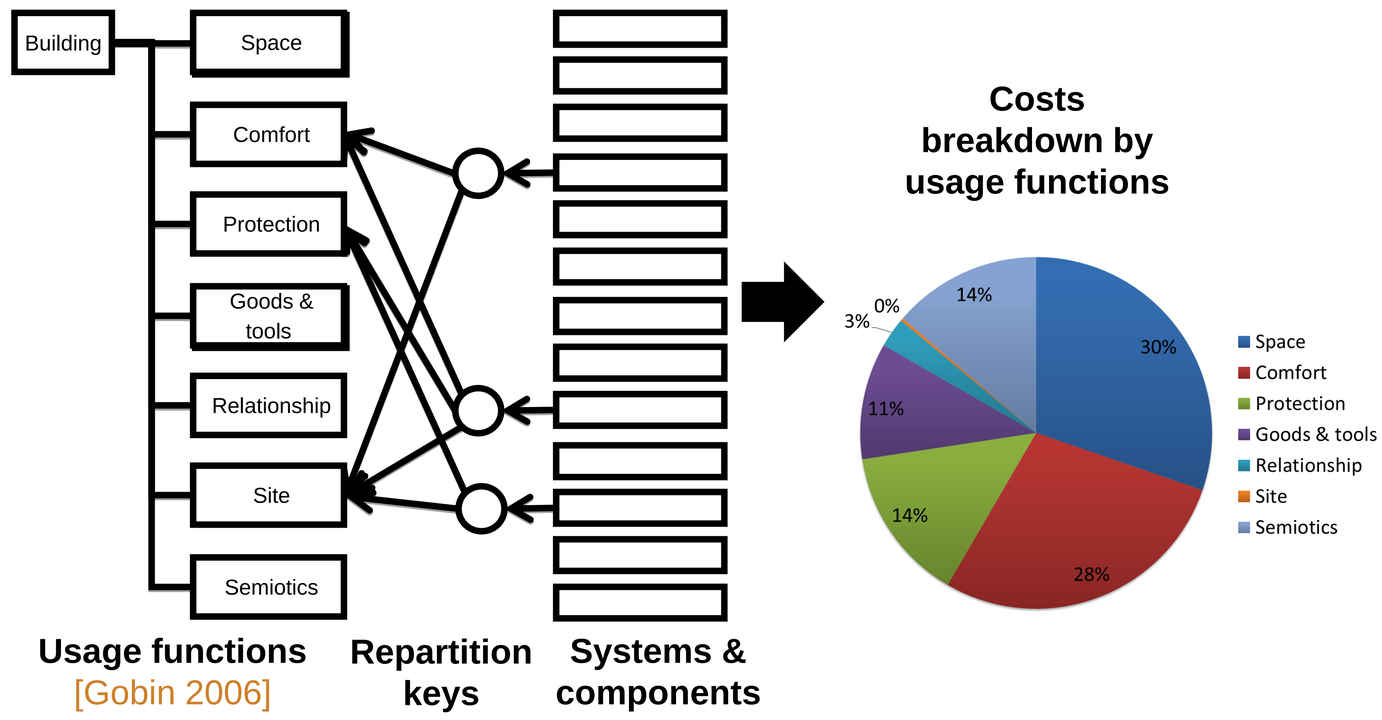
Functional performance domain

Approach based on a list of **95 functional performance criteria** and **fuzzy logic** to aggregate functional performance on usage functions



Usage function costs domain

Approach based on Value Management and **Functional Analysis** [NF EN 12973:2000, Ehrlenspiel et al. 2006]



Application & first results

- **Prototype tools** developed to support DECADIESE methodology
- DECADIESE methodology partially applied on **Skyline building** in Nantes (France)
  - Building designed, constructed, operated and partially occupied by Bouygues subsidiaries
    → all data available
  - Good results obtained by applying function costs and externalities parts
    → **DECADIESE is feasible**



- **Serious game** developed and run for one day to test appropriation of the methodology by real building sector's actors
  → **High interest from these actors**
  → **New directions for future developments**

Perspectives

- **Make the methodology more reliable** by
  - Going further in scientific validation
  - Testing the methodology in more extrem case studies
- Develop **professional DECADIESE software** to support the methodology
  - For different types of applications (offices, housing, hospitals, schools…)
  - For different businesses (building owner, engineering contractor…)
- Implement DECADIESE methodology on **on-going buildings projects**

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