Tool for assessing Indoor Performance - Case study examples from Perfection project

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Summary

Perfection is an ongoing (2009-2011) FP7 coordination action aiming at the development of an indicator framework concerning the evaluation of the overall quality of buildings' indoor environment. High quality of the indoor environment is essential for the well-being of the end-users of buildings. So far in the project an indicator framework has been developed as well as an indicator tool for the performance assessment with the indicator framework. This paper focuses on the indicator tool which helps to assess the quality of buildings' indoor performance in case studies, from which two hospitals from Finland are illustrated. Later in the project also a web tool – Perfection portal - will be developed to enhance the user engagement and to enable the assessment of buildings' indoor performance by different actors.

Keywords: Perfection project, Key Indoor Performance Indicators, Indoor performance assessment tool, Indoor sustainability rating

This paper describes an approach to manage the indoor performance of buildings with help of an indicator assessment tool developed in the FP7 Perfection (Performance Indicators for Health, Comfort and Safety of the Indoor Environment) project (http://www.ca-perfection.eu).

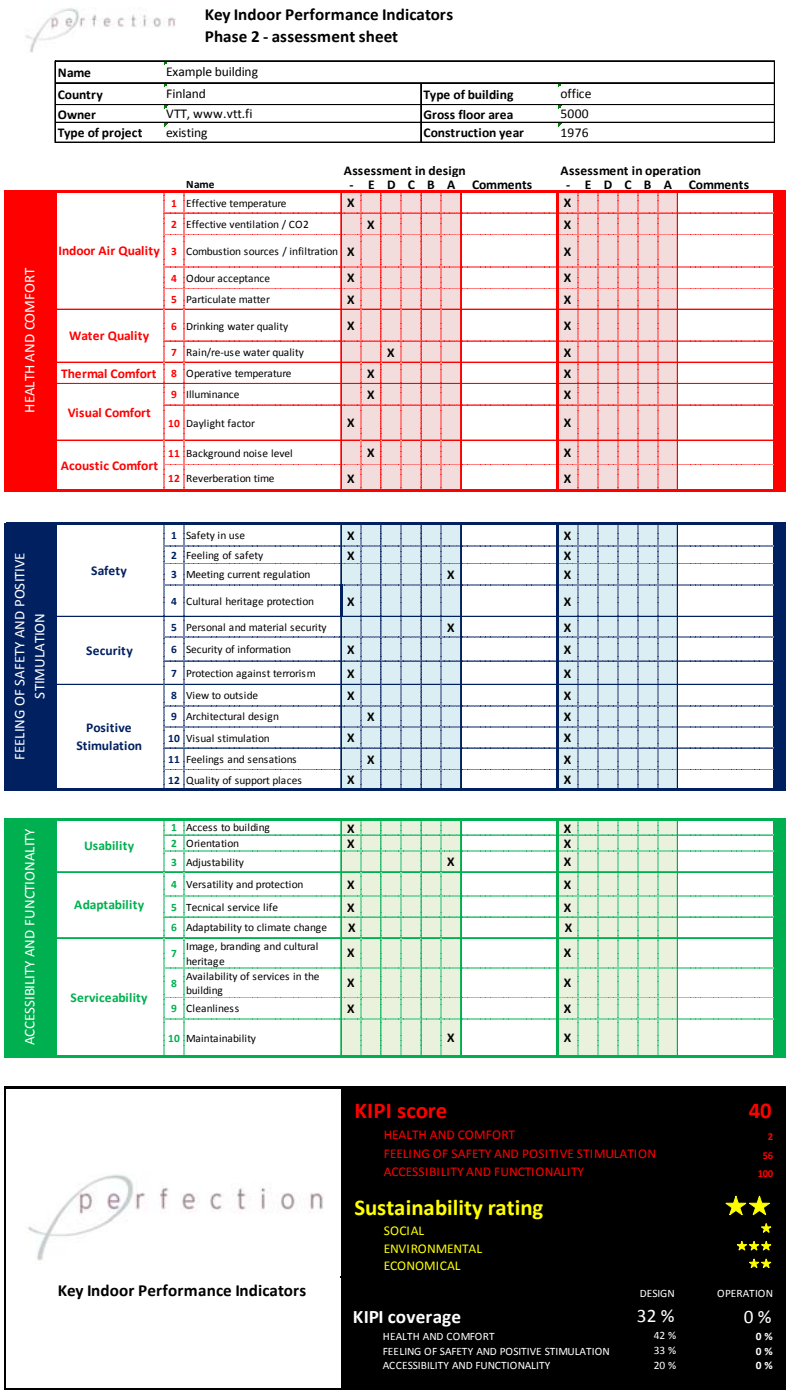
1. Perfection Key Indoor Performance Indicator framework

The objective of the project is to improve the indoor environmental quality of buildings, and thus human well-being, through indoor performance indicators used for the evaluation of buildings in the design, construction or use phase. The indicators focus on health, comfort, safety, positive stimulation, accessibility and functionality of the indoor environment - and their impact on the sustainability of buildings.

So far, a three-levelled framework of 34 Key Indoor Performance Indicators (KIPIs) has been developed. The essential information for the assessment of indicators is presented in uniform indicator templates containing concise information about the indicator, its applicability to different building types, sustainability impacts (social, environmental and/or economic), as well as simple and detailed assessment methods for both design and operation phases. Each indicator of the framework has a weight that states its importance and relevance. Yet the weights are described for a general case, but since indicators are highly case specific also different weights will be developed later for different building types.

2. Perfection indicator assessment tool

An indicator tool has been developed in the project to help evaluating buildings' indoor performance quality in case studies according to the developed KIPI framework. The tool contains case specific general information and detailed indicator information for the evaluation of building performance. Each performance indicator is evaluated with a class from A to E for design, operation or both phases, and non-selected indicators do not affect the overall performance. Finally, the tool calculates values for overall indoor performance in terms of: 1) KIPI score, 2) Indoor sustainability rating and 3) KIPI coverage (see Fig 1). First, the KIPI score (range 0-100) represents the overall indoor performance quality taking into account the assessed indicators. Second, each indicator is valued for sustainability perspective with stars (range 1-3) representing three directions - social, environmental and economic. Third, the KIPI coverage shows the percentage of assessed indicators for both design and operation phases.



perfection

Key Indoor Performance Indicators
Phase 2 - assessment sheet

Name	Example building		
Country	Finland	**Type of building**	office
Owner	VTT, www.vtt.fi	**Gross floor area**	5000
Type of project	existing	**Construction year**	1976

			Name	Assessment in design -	E	D	C	B	A	Comments	Assessment in operation -	E	D	C	B	A	Comments
HEALTH AND COMFORT	Indoor Air Quality	1	Effective temperature	X							X						
		2	Effective ventilation / CO2		X						X						
		3	Combustion sources / infiltration	X							X						
		4	Odour acceptance	X							X						
		5	Particulate matter	X							X						
	Water Quality	6	Drinking water quality	X							X						
		7	Rain/re-use water quality			X					X						
	Thermal Comfort	8	Operative temperature		X						X						
	Visual Comfort	9	Illuminance		X						X						
		10	Daylight factor	X							X						
	Acoustic Comfort	11	Background noise level		X						X						
		12	Reverberation time	X							X						
FEELING OF SAFETY AND POSITIVE STIMULATION	Safety	1	Safety in use	X							X						
		2	Feeling of safety	X							X						
		3	Meeting current regulation						X		X						
		4	Cultural heritage protection	X							X						
	Security	5	Personal and material security						X		X						
		6	Security of information	X							X						
		7	Protection against terrorism	X							X						
	Positive Stimulation	8	View to outside	X							X						
		9	Architectural design		X						X						
		10	Visual stimulation	X							X						
		11	Feelings and sensations		X						X						
		12	Quality of support places	X							X						
ACCESSIBILITY AND FUNCTIONALITY	Usability	1	Access to building	X							X						
		2	Orientation	X							X						
		3	Adjustability						X		X						
	Adaptability	4	Versatility and protection	X							X						
		5	Tecnical service life	X							X						
		6	Adaptability to climate change	X							X						
	Serviceability	7	Image, branding and cultural heritage	X							X						
		8	Availability of services in the building	X							X						
		9	Cleanliness	X							X						
		10	Maintainability						X		X						

Based on the findings, an innovative and user-friendly Perfection portal to attract wide consumer interest will be developed later in the project (http://indoorperformance.net).

3. Case studies

Overall about 15 case studies, including offices, schools, housing, hospitals, and exhibition places, are evaluated in the Perfection project. As an example, two cases are presented from Seinäjoki Central Hospital in Western Finland. Both are managed by South Ostrabotnia Hospital District that serves the wellbeing of the inhabitants in 20 local municipalities.

The first case addresses current running hospital constructed between 1978-1984, while the latter shows results from an ongoing extension project called Y-House. The extension project is very important for the existing hospital, and brings almost one third more spaces compared to existing. The preliminary results from cases indicate an increase in indoor environment quality at the extension part, especially in social perspective strengthened by owner's ambitious goals. The owner has participated in many R&D projects targeted to developing end-user friendly spaces and indoor environment.

Fig 1. Screenshot from the Perfection indicator assessment tool.