HOW TO MEASURE SUSTAINABILITY?
THE ASSESSMENT OF SUSTAINABILITY IN CONSTRUCTION AND ARCHITECTURE

SBE 16
The 6th of October 2016

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CONTENTS

I. DEMAND FOR THE CONCEPT OF SUSTAINABILITY: “A GLOBAL AGENDA FOR CHANGE”

II. SUSTAINABILITY IN CONSTRUCTION: METHODS OF EVALUATION

III. SYSTEMIC APPROACH – A COMPLEMENTARY ANALYSIS STRATEGY OR AN ALTERNATIVE ASSESSMENT METHODOLOGY?

IV. CONCLUDING REMARKS
INDUCTIVE METHOD
TOWARDS A THEORETICAL MODEL FROM OBSERVATIONS

OBSERVATION

PATTERN

TENTATIVE HYPOTHESIS

THEORY
DEMAND FOR THE CONCEPT OF SUSTAINABILITY
A GLOBAL AGENDA FOR CHANGE
WHAT WERE THEY ASKED TO DO?

"A global agenda for change"—this was what the World Commission on Environment and Development was asked to formulate. It was an urgent call by the General Assembly of the United Nations:
· to propose long-term environmental strategies for achieving sustainable development by the year 2000 and beyond;
· to recommend ways concern for the environment may be translated into greater co-operation among developing countries and between countries at different stages of economical and social development and lead to the achievement of common and mutually supportive objectives that take account of the interrelationships between people, resources, environment, and development;
· to consider ways and means by which the international community can deal more effectively with environment concerns; and
· to help define shared perceptions of long-term environmental issues and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long term agenda for action during the coming decades, and aspirational goals for the world community.

Our Common Future – Chairman’s Foreword
SUSTAINABILITY IN CONSTRUCTION
METHODS FOR EVALUATION
ASSESSMENT OF SUSTAINABILITY

BREEAM UK 1990
BRE Environmental Assessment Method

LEED US 2000
Leadership in Energy and Environmental Design

CASBEE Japan 2001
Comprehensive Assessment System for Built Environment

DGNB Germany 2007
Deutche Gesellschaft für Nachhaltiges Bauen
BREEAM, LEED, DGNB or CASBEE?

Source: Olsson, Daniel: Wide variation in how parameters are regarded in environmental certification systems. REHVA Journal – May 2013.
STANDARDS ON SUSTAINABLE CONSTRUCTION

ISO  International Organization for Standardization
EN  European Standards

• 'Vienna Agreement' between ISO and CEN for parallel development of international standards
→ ISO and CEN have separate standards on sustainable construction - but share the approach on sustainability without major contradictions

ISO 15392  Sustainability in building construction – General principles
ISO 21929-1  Sustainability in building construction – Sustainability indicators – Part 1:
Framework for the development of indicators and a core set of indicators for buildings
ISO 21930  Sustainability in building construction – Environmental declaration of building products

EN 15643-1  Sustainability of construction works – Sustainability assessment of buildings –
Part 1: General framework
EN 15643-2  Sustainability of construction works – Assessment of buildings –
Part 2: Framework for the assessment of environmental performance
EN 15643-3  Sustainability of construction works – Assessment of buildings –
Part 3: Framework for the assessment of social performance
EN 15643-4  Sustainability of construction works – Assessment of buildings –
Part 4: Framework for the assessment of economic performance
EN 15804  Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
The aim of international standardization is to harmonize and to create shared understanding.

Benefits:
- Global applicability
- Independency of commercial rating systems
- Holistic approach on sustainability
- Aspects of sustainable construction are clear and understandable
- Assessment methodology guidelines (indicators) are clearly described
THE SUSTAINABILITY FRAMEWORK
ASPECTS OF SUSTAINABLE CONSTRUCTION AS IN ISO 21929-1

ENVIRONMENTAL
- EMISSIONS TO AIR
- USE OF NON-RENEWABLE RESOURCES
- FRESH WATER CONSUMPTION
- WASTE GENERATION
- CHANGE OF LAND USE

ECONOMIC
- ADAPTABILITY
- SERVICEABILITY
- COSTS
- MAINTAINABILITY

SOCIO-CULTURAL
- ACCESS TO SERVICES
- ACCESSIBILITY
- INDOOR CONDITIONS AND AIR QUALITY
- AESTHETIC QUALITY
- SAFETY
APPLYING THE ISO STANDARD ASSESSMENT IN PRACTICE

LEFT: Suurpelto daycare center, Auer & Sandås arkkitehdit
RIGHT: Leinelä II daycare center, Kimmo Lylykangas Architects & Oy CASE Consult Ab
SYSTEMIC APPROACH
A COMPLEMENTARY ANALYSIS STRATEGY OR AN ALTERNATIVE ASSESSMENT METHOD?
Karl-Henrik Robèrt: *The Natural Step framework* for sustainability

- “*A Science-Based Definition of Sustainability*”
- backcasting approach
- systems thinking
- Respective difference as in eco-efficiency vs. eco-effectiveness
  (Braungart and McDonough)
SUSTAINABILITY ASSESSMENT AND CONTEXT

CONTEXT

The surroundings, circumstances, environment, background or settings that determine, specify, or clarify the meaning of an event or other occurrence

LEVELS OF EXAMINATION

GENERIC (GLOBAL)

SOCIETAL (NATIONAL OR REGIONAL)

SITE-SPECIFIC (LOCAL)
SOCIETAL LEVEL: ZOOM OUT

IMAGES: Rajaton Metropoli 2050 – kehityskuva; Kuuma-kuntien kehityskuva 2035.
TOP-DOWN

Top down approach starts with the big picture. It breaks down from there into smaller segments.

BOTTOM-UP

In a bottom-up approach the individual base elements of the system are first specified in great detail. These elements are then linked together to form larger subsystems, which then in turn are linked, sometimes in many levels, until a complete top-level system is formed.
SUSTAINABLE ARCHITECTURE?

RESPONSES TO RELEVANT QUESTIONS BY MEANS OF ARCHITECTURE

HOLISTIC SITE AND CONTEXT ANALYSIS
A SUSTAINABLE NUCLEAR POWER PLANT?
Harmonization of sustainability assessment is an important step forward in sustainable development and in the construction sector.

The break-down of the concept is a projection of what is expected from the built environment in the future.

The concept of sustainability was created to become a *driver for change*: if an assessment cannot identify problems of the current practices, it cannot be viable as a method.

Analytical and performance-oriented “isolate and measure” approach based on indicators appears to be too straightforward to deal with the *complexity* and *diversity* of sustainability challenges.

**CONCLUDING REMARKS 1 (3)**

**CAN WE BUILD ON THIS?**
CONCLUDING REMARKS 2 (3)
WHAT COULD BE GAINED BY SYSTEMIC APPROACH?

- Sustainability of building solutions needs to be assessed in the context
- Systemic approach could be developed to an complementary analysis method or an alternative assessment method
- An assessment method based on systemic approach would most likely apply bottom-up approach instead of top-down
  would loose the opportunity of benchmarking and comparison of buildings
  would not operate with performance indicators but could focus on the process
  could provide the necessary information on local sustainability problematics and relate to context
  could generate understanding of complex problematics, encouraging for innovative and even radical improvements in current practices
CONCLUDING REMARKS 3 (3)
HOW TO MEASURE SUSTAINABILITY?

Measure what is measurable -

• The accurate figures from performance indicator assessment are useless without understanding of multiple environmental and societal impacts that a building always causes.
THANK YOU FOR YOUR ATTENTION