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Promoting sustainable development in the construction industry through standardization

by Ron Watermeyer, Director of Soderlund and Schutte

The evolution of standards for buildings

The built environment comprises the man-made surroundings that provide the setting for human activity. Buildings, which afford shelter for humans, animals or property of any kind, are central to the built environment and the economy of any country, and are key to the well-being of its inhabitants. Buildings shape and define the environment in which humans live, work and relax.

It is not surprising then, that building standards have been in place ever since man was able to capture his thoughts in writing. The earliest known building code is that of Hammurabi (about 1780 BC), the sixth king of Babylon. The Hammurabi Code dealt with

two basic building issues, namely the fee a builder was paid to complete a house, and the recourse an owner had in the event that a builder did not properly construct a house. According to this code, builders were required, at their own expense, to stabilize any walls that appeared unstable prior to the completion of the house and to compensate the owner in the event of collapse. Compensation awarded to an owner was linked to the severity of the loss. For example, if the collapse killed the owner, the builder was put to death ; if the owner's son died, the builder's son was put to death.

"Standards for buildings should always reflect societal values and expectations."

With urbanization came the scourge of fire and health risks associated with poor sanitation. Over the centuries, many cities were razed to the ground by fire, and millions of people died as a result of poor sanitary conditions in highly populated areas. It is not surprising that the nineteenth century law makers developed building laws to secure proper sanitary conditions and to diminish the outbreaks and disastrous consequences of fires in cities.

Law makers in the twentieth century developed minimum standards for the construction and maintenance of buildings, designed to protect public health, safety and general welfare. These dealt with issues of structural safety and serviceability, fire safety, health and hygiene, moisture penetration, safety, accessibility and usability. Many of these standards, particularly the earlier ones, were prescriptive in nature and addressed only local or conventional construction techniques and methods.

Standards for buildings should always reflect societal values and expectations. Building standards for the twenty-first century need to be developed to address the issues of the day.

The main source of Hammurabi's Code of Laws is a stone slab discovered in 1901 and preserved in the Louvre, Paris.

Performance-based standards

Building standards may be described as being

- **prescriptive** when a collection of standards describes how buildings should be designed, built, protected and maintained with regard to the health and safety of the public,
- **functional** when qualitative functional statements are made, but no quantitative user or technical performance requirements are stated,
- **performance-based** when
  - qualitative functional requirements are established,
  - quantitative user and technical performance criteria are provided, and
  - acceptable solutions, evaluation and design tools are offered.

In the prescriptive approach, each part of the building is described, specified and procured, resulting in a building with a unique but implicit set of attributes. In the performance approach, building attributes are described and specified, but each part of the building or its components is open to multifarious combinations, provided that it can be demonstrated that the specified attributes have been satisfied.

The performance concept is driven by specific stated requirements, which intend to satisfy user needs and expectations. Its key objective is to articulate societal or user needs and expectations, properly capturing these requirements, translating them into required building attributes and performance criteria, and providing the means by which these requirements can be verified.

Worldwide interest in the development of performance-based building standards is primarily driven by the need to address the difficulties posed by current deemed-to-comply and pre-

scriptive standards. Performance-based standards

- cost-optimize building construction,
- introduce product or system and process innovation, and
- establish fair international trading agreements.

Sustainability and sustainable development

Sustainability is the state in which ecosystem components and functions are maintained for the present and future generations whilst meeting current needs. Sustainable development is therefore development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is rooted in the simple concept of providing a better quality of life for all – now and for generations to come. It is a way of looking at all the resources that will result in a higher quality of life for the current generation, without jeopardizing that of future generations.

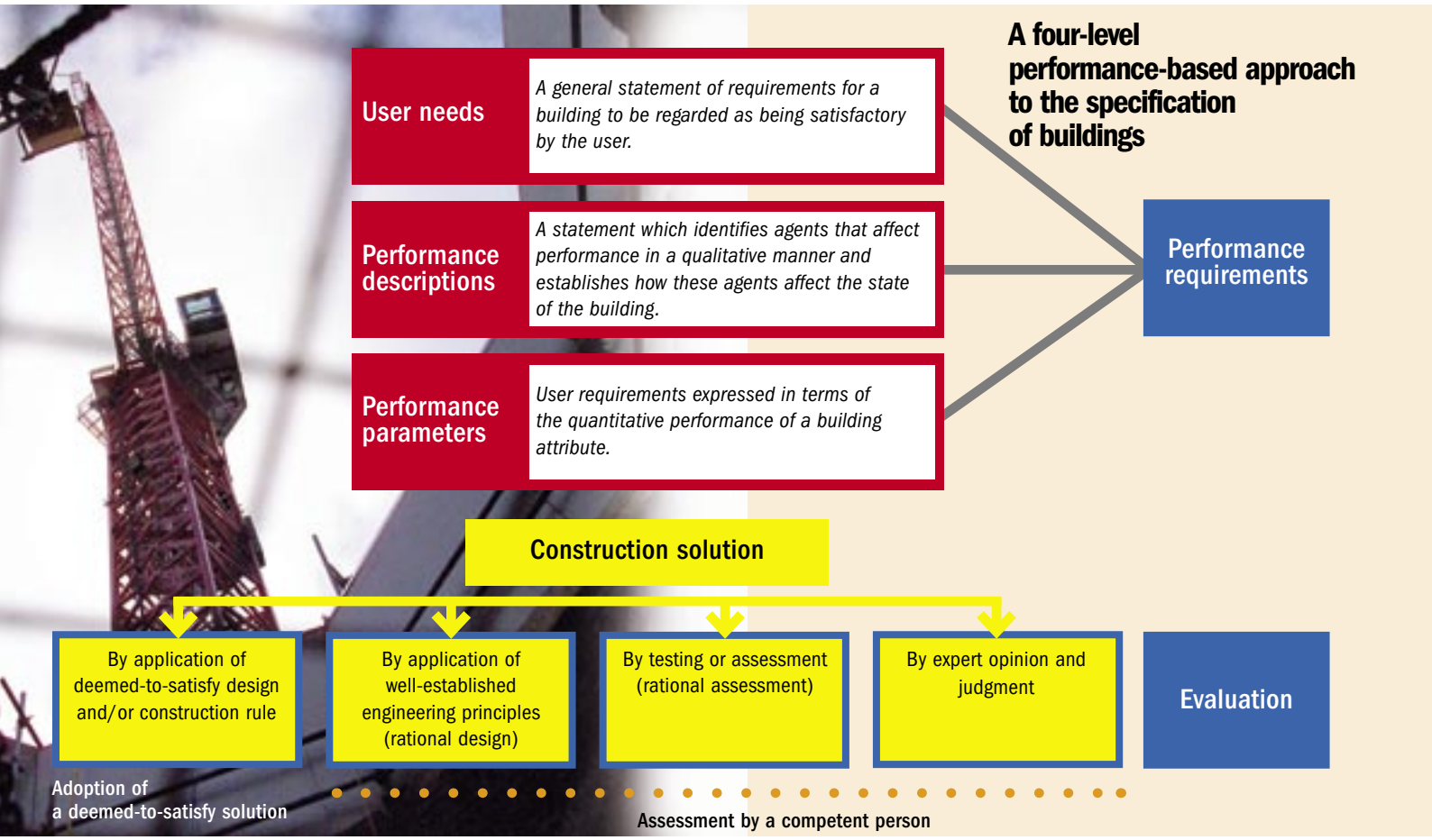
"The challenge of sustainable development is global, but strategies for addressing sustainable construction works are local."

The building and construction sector plays an important role in sustainable development, because

- it is a key sector in national economies,
- the built environment represents a large share of the economic assets of individuals, organizations and nations,
- it is one of the single largest industrial sectors, with all the consequential aspects of employment, economic importance and environmental impact,
- proper housing and infrastructures are key elements in determining the quality of life, and
- it has a significant interface with poverty reduction through the provision of basic services and the potential opportunities to engage the poor in construction, operation and maintenance activities.

Sustainability in construction works involves a consideration of its three primary aspects, namely economic, environmental, and social. These aspects are inextricably linked to each other and are interdependent.

While the challenge of sustainable development is global, the strategies for addressing sustainability in construction works are local and differ in context and content from region to region. Such strategies need to reflect the context not only in the built environment, but also in the social environment, which includes social equity, cultural issues, traditions, heritage issues, human health and comfort, social infrastructure and



The fundamental differences between the "green" and "brown"

NORTH	GREEN AGENDA	KEY CONCERN	BROWN AGENDA	SOUTH
	Ecosystemic well-being		Human well-being	
	Forever	TIME FRAME	Immediate	
	Local to global	SCALE	Local	
	Future generations	CONCERNED ABOUT	Low income groups	
	Protect and work with	NATURE	Manipulate and use	
	Use less	SERVICES	Provide more	
	Affluence and over-consumption		Poverty and under-development	

"Standards will play a vital role in the development of the future built environment."

About the author

Ron Watermeyer is a Director of Soderlund and Schutte, Consulting Engineers in Johannesburg, the chair of SABS's Technical Committee for Construction Standards (TC 5120.61), a member of ISO/TC 59 Advisory Group and a Trustee of the United Kingdom-based charity, Engineers Against Poverty. He was the 2004 President of the South African Institution of Civil Engineering, and is a past Vice President of the Institution of Structural Engineers and member of the Board of Agrément South Africa.
In South Africa, he has led the project on the revision of national standards relating to the application of South African building regulations and the development of standards relating to construction procurement, targeted procurement, management and construction requirements for construction work and the development of dolomite land. He has a keen interest in performance-based standards and sustainable development, and has published more than 60 papers on a wide range of topics relating to the delivery of infrastructure.

safe and healthy environments. It may, in addition, and particularly in developing countries, include poverty reduction, job creation, access to safe, affordable and healthy shelter and mitigation of loss of livelihoods.

Given the disparities in standards of living between developed and developing countries, the general approach to the social component can be very different. This results in different development priorities between the "north" (developed nations) and "south" (developing nations). In countries with dual economies such as South Africa, the priorities differ regionally and within communities, depending on where the poor and the affluent live.

Current work of ISO/TC 59, Building construction

The Technical Committee ISO/TC 59, *Building Construction,* currently has a number of sub-committees that are focusing on twenty-first century issues relating to

- terminology and harmonization of languages, descriptors of performance for dwellings and the organization of information about construction works within a global society,
- functional or user requirements and performance in buildings,
- accessibility and usability of the built environment to ensure that the needs of all people, including the aged and people with disabilities, are accommodated,
- sustainability in building construction, and
- service life planning and life cycle costs.

A proposal is currently being considered to establish construction procurement standards that would ensure that the construction procurement processes, methods and procedures are fair, equitable, transparent, competitive and cost-effective. These standards are considered to be especially relevant for developing countries that lack experience and instruments in this field, helping them to achieve fair competition, reduce possibilities for abuse and improve predictability in procurement outcomes.

Global standards are not developed in isolation. TC 59 liaises with a number of international and European bodies, including the International Council for Research and Innovation in Building and Construction, the United Nations Economic Commission for Europe, the United Nations Centre for Human Settlements, the European Commission, the International Union of Architects, the European Construction Industry Federation and the International Initiative for a Sustainable Built Environment.

Conclusion

The earth's resources are finite. Current growth rate trends indicate that the world's population is set to increase from 6.5 billion to 13 billion by 2067. To accommodate this growth in a sustainable manner, the built environment of 2067 will need to be very different from what we see today. Standards, particularly international ones, will play a vital role in the development of the built environment of the future.