



Federal Institute for
Research on Building,
Urban Affairs and
Spatial Development

within the Federal Office for
Building and Regional Planning



Influence on National and International Urban Development and Urban Planning

Standards increasingly influence the development and planning of cities. Establishing respective standardisation committees thus gathers experts from the private sector, administration, science and civil society. According to the principle of the rule of law, standards have various implications that are to be identified.

This volume compiles possible implications of standardisation on urban development and urban planning and thus contributes to answering the following core questions:

- What does international standardisation mean and which framework conditions are relevant?
- Which standardisation work with relevance to urban development and urban planning is presently done?
- How does standardisation influence urban planning and urban development in practice?

International Standardisation

Author

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Foreword



Dear Readers,

Standards as best available techniques determine our daily life. Planners and builders are dependent on them from a public procurement law and contractual perspective. The role standards play in the field of urban planning and urban development, however, is disputed.

Critics say that standards would standardise entire city concepts. Does the democratic formation of opinion and control fall by the wayside? How to organise public participation, if standards determine how the city should look like and citizens cannot raise their voice? What about the qualitative aspects of urban development? The critique primarily focuses on a possible restriction of the weighting of interests laid down in urban planning regulations and a possible limitation of “bottom-up” initiatives of urban development.

The volume deals with this critique. It thus concentrates on urban planning regulations – without avoiding issues of the principle of the rule of law. The analysis presents interrelations and hints from the current standardisation work and thus underpins the discussion on chances and risks of international standardisation.

I wish you a happy reading.

A handwritten signature in blue ink that reads "Robert Kaltenbrunner". The signature is fluid and cursive, with a long, sweeping underline.

Dr. Robert Kaltenbrunner
Deputy Director of the Federal Institute for Research on Building,
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What does international standardisation mean and which framework conditions are relevant?

Standardisation first of all means to harmonise procedures and create common parameters. With regard to urban development and urban planning it is primarily driven by the private sector, though it gains sociopolitical significance.

Standardisation is said to have a substantive share in the respective Gross Domestic Product (GDP) of a country and – in contrast to other trade mark procedures as licences and patents to fostering innovation – to foster innovation. The Deutsche Institut für Normung e.V. (DIN; see Figure 1) points out on a poster in its premises in Berlin that “(...) the benefits of standardization for Germany are equal to 1% of Germany’s GDP and contribute more to the dissemination of innovation than do patents or licenses. (...)” (DIN 2017; see Figure 1). Especially Germany’s presidency over the twenty most important industrialised and newly industrialised countries (G20) in 2017 is used to communicate the advantage of standardisation in terms of openness and interoperability as well as to establish it in procedures (cf. BMWi 2016).

Standardisation is driven by the private sector – yet it also gains sociopolitical relevance.

Environmental associations engage on purpose in standardisation procedures, whether in the fields of environmental management or resource efficiency and resource protection – the agreement concluded between the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and DIN on considering environmental issues in standardisation (Töpfer Agreement) solemnises its 25th anniversary in 2017. The discourse on planetary boundaries or the Normung 18.0 project of DIN, aiming at the acceleration of standardisation processes, reveal this attitude. The German Standardization Strategy and the Joint Initiative on Standardisation presented by the European Commission as well as the Rolling Plan on ICT Standardisation have to be mentioned here, too. The reporting on the Sustainable Development Goals (SDGs) of the United Nations as part of the Agenda 2030, upon which the signatory states agreed, constitutes another momentum pursuing the aim of introducing an indicator-based and digitally cross-linked sustainability management on the local level in the interest of environmental associations and interested and active persons of urban societies as well as mayors with foresight. Climate protection measures and those in the field of sustainability also release economic stimuli: A recent study shows that climate protection measures implemented in Germany in connection with the Paris Climate Agreement contribute to an increase of the national GDP of about 1% (cf. BMUB 2016). Similar conclusions are drawn by an OECD study (cf. OECD 2017).

Figure 1



Photo: DIN 2017

Additionally, there is a series of free trade agreements, planned or ready to be signed, like CETA (Comprehensive Economic and Trade Agreement), TTIP (Transatlantic Trade and Investment Partnership), TiSA (Trade in Services Agreement) and JEFTA (Japan-EU Free Trade Agreement) as well the work carried out by G20 in the context of the 2030 Agenda (cf. Auswärtiges Amt 2016). In their texts they refer to internationally developed and agreed standards that are to be applied as soon as a good or a service is drawn up, created and traded. International agreements on urban development take a similar path as the New Urban Agenda, since December 2016 serving as a global guidance on the basis of the Resolution A/RES/71/256 of the General Assembly of the United Nations, exemplarily shows by its paragraphs 31, 65, 111, 121 and 157 (cf. Habitat III 2016; UN GA 2017, see infobox).

New forms of design, production and trade as well as other approaches to societal interactions, as discussed in the context of Society 5.0, Industry 4.0 or Internet of Things, also launch standardisation processes or are influenced in their further shaping by norms and standards. They are often process principles in the

field of management or technical elements and basics. Ontologies in the field of information technology as formally organised representations of statistically relevant data material and their existing interrelations may serve as an example.

Standardisation is also on the agenda when societies – particularly urban ones – and global interactions of logistical nature are confronted with crises. In these cases, standards contribute to speaking a common language on minimum requirements on the basis of common core values. In this way, the exchange of information is improved in a targeted manner or even enabled (cf. Nanyang Technological University Singapore 2016).

Generally, every applicant may address the International Organization for Standardization (ISO) and apply for the opening of a standardisation procedure. Against this background, three organisations and associations of organisations as well as enterprises and groups of enterprises (World Bank Group, Association française de normalization AFNOR, consortium of enterprises/Japan) turned to ISO in 2012 to have procedures and procedural elements of sustainable

development in communities standardised. Consequently, ISO established the ISO TC (Technical Committee) 268 Sustainable Cities and Communities. National standardisation bodies followed by establishing their national mirror committees – NA 172-00-12 AA “Nachhaltige Entwicklung in Kommunen” in Germany. Against the customs of ISO, a meeting of the German mirror committee took place in Karlsruhe in March 2017 in the presence of the chair of the French mirror committee. It is planned to also organise the future committee meetings in a bilateral context.

Current standardisation work carried out in the field of urban planning and urban development will be dealt with in the following chapter. This is particularly done with regard to Article 28 of the Basic Law of the Federal Republic of Germany by which the federal states (Länder) and thus communities in Germany are amongst others bound to the principles the rule of law and by which the constitutional guarantee of local self-government is standardised. In terms of applying the principles of the rule of law, this is also valid for standards as part of contracts and as soon as they unfold the power of law.

Paragraphs 31, 65, 111, 121 and 157 of the New Urban Agenda

31: „We commit ourselves to promoting national, subnational and local housing policies that support the progressive realization of the right to adequate housing for all as a component of the right to an adequate standard of living; that address all forms of discrimination and violence an prevent arbitrary forced evictions; and that focus on the needs of the homeless, persons in vulnerable situations, low-income groups and persons with disabilities, while enabling the participation and engagement of communities and relevant stakeholders in the planning and implementation of these policies, including supporting the social production of habitat, according to national legislation and standards.“

65: „We commit ourselves to facilitating the sustainable management of natural resources in cities and human settlements in a manner that protects and improves the urban ecosystem and environmental services, reduces greenhouse gas emissions and air pollution, and promotes disaster risk reduction and management, by supporting the development of disaster risk reduction strategies and periodical assessments of disaster risk caused by natural and human-made hazards, including standards for risk levels, while fostering sustainable economic development and protecting all persons' well-being and quality of life through environmentally sound urban and territorial planning, infrastructure and basic services.“

111: „We will promote the development of adequate and enforceable regulations in the housing sector, including, as applicable, resilient building codes, standards, development permits, land use by-laws and ordinances, and planning regulations; combating and preventing speculation, displacement, homelessness and arbitrary forced evictions; and ensuring sustainability, quality, affordability, health, safety, accessibility, energy and resource efficiency, and resilience. We will also promote differentiated analysis of housing supply and demand based on high-quality, timely and reliable disaggregated data at the national, subnational and local levels, considering specific social, economic, environmental and cultural dimensions.“

121: „We will ensure universal access to affordable, reliable and modern energy services by promoting energy efficiency and sustainable renewable energy and supporting subnational and local efforts to apply them in public buildings, infrastructure and facilities, as well as in taking advantage of the direct control, where applicable, by subnational and local governments of local infrastructure and codes, to foster uptake in end-use sectors, such as residential, commercial and industrial buildings, industry, transport, waste and sanitation. We also encourage the adoption of building performance codes and standards, renewable portfolio targets, energy-efficiency labelling, retrofitting of existing buildings, and public procurement policies on energy, among other modalities as appropriate, to achieve energy-efficiency targets. We will also prioritize smart-grid, district energy systems and community energy plans to improve synergies between renewable energy and energy efficiency.“

157: „We will support science, research and innovation, including a focus on social, technological, digital and nature-based innovation, robust science-policy interfaces in urban and territorial planning and policy formulation and institutionalized mechanisms for sharing and exchanging information, knowledge and expertise, including the collection, analysis, standardization and dissemination of geographically based, community-collected, high-quality, timely and reliable data disaggregated by income, sex, age, race, ethnicity, migration status, disability, geographic location and other characteristics relevant in national, subnational and local contexts.“

Quelle: Habitat III 2016; UN GA 2017

Which standardisation work with relevance to urban development and urban planning is presently done?

Standardisation work currently being carried out with reference to urban development and urban planning follows strict rules provided by the International Organization for Standardization and rests upon a publicly available business plan as the strategic and operative basis of the relevant committee work.

In establishing ISO TC 268, the committee gave itself the following mandate laid down in its business plan and communicated via the respective committee web page: "Standardization in the field of Sustainable Cities and Communities will include the development of requirements, frameworks, guidance and supporting techniques and tools related to the achievement of sustainable development considering smartness and resilience, to help all cities and communities and their interested parties in both rural and urban areas become more sustainable. Note: TC 268 will contribute to the UN Sustainable Development Goals through its standardization work. The proposed series of International Standards

will encourage the development and implementation of holistic and integrated approaches to sustainable development and sustainability." (ISO TC 268 2014)

The definition of smartness with reference to urban development is also given by the business plan: "A smart city is a sustainable, resilient and innovative city that efficiently uses resources, enhanced technologies and data through an integrated systems approach to continually improve quality of life, efficiency of urban operations and services, competitiveness, and transparent and open governance, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects." (ISO TC 268 2016).

Figure 2



Resilience Cycle

Aspects of the standardisation work carried out by the committee and referring to the subject of resilience are oriented towards a resilience cycle (cf. Jakubowski 2013; see Figure 2) which was drawn up and modified by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) on the basis of development work carried out by Fraunhofer Institute for High-Speed Dynamics/Ernst-Mach-Institut (EMI).

Working groups and liaisons

29 participating countries and 22 countries with observer status as well as different groups of actors are currently active in ISO TC 268. The committee consists of 12 working groups at the moment (as of June 2017):



- Chairman Advisory Group (CAG) 1 takes the role of an adviser to the chair of the committee and is generally open to all committee members.
- Technical Group (TG) 1 „Awareness-Raising, Communication and Promotion“ serves overall aims of the committee and is responsible for all community activities related to public relations.
- Working Group (WG) 1 „Management System Standards“ developed the management backbone of the committee (ISO 37101) which defines processes and its sequential steps in communities related to sustainability – generally those which are taken and accounted by community administrations (see Figure 3). A guidance document (ISO 37104) for the exemplary application of this standard by communities is being developed and tested in parallel in reference communities (amongst others, Hangzhou and Tianjin in China, Versailles in France and Grasmere in the United Kingdom).
- Working Group (WG) 2 „City Indicators“ on the basis of different indicators and those tested in the daily work routine composed a catalogue of core and supporting indicators (ISO 37101) which can be used to voluntarily measure sustainability without any obligation for benchmarking. One reference instrument for developing this catalogue is the Reference Framework for Sustainable Cities (RFSC) which emerged under the umbrella of the LEIPZIG CHARTER on Sustainable European Cities. ISO 37120 is currently being revised with clear reference to the SDGs as well as crucial indicator-based Horizon 2020 projects (amongst others, CITYkeys) and their Key Performance Indicators (KPIs) and will be released as ISO 37121. The SDGs-related indicators in particular are thereby seen as generally acknowledged by communities (cf. von Lojewski 2016). The WG gets valuable practice-oriented information by the data portal of the World Council on City Data (WCCD) which is equipped by communities worldwide with their data. The participating communities use the data in their daily local work routine while supporting each other on a voluntary and peer basis. Since 2016, WCCD has been cooperating in Europe with Statistics Netherlands CBS (Centraal Bureau voor de Statistiek) to integrate data related to urban and cross-sectoral topics into classical data and statistic regimes. Additionally, the WG develops an indicator catalogue each for the digital elements (buzz word: smartness) of urban planning and urban development (ISO 37122) and for aspects of resilience particularly related to infrastructures (ISO 37123). The later will amongst others take on the outcomes of the Horizon 2020 project Smart Mature Resilience (SMR) and the expert work of the Stockholm Resilience Centre.
- Working Group (WG) 3 „Vocabulary“ against the genesis of the committee and its variety of elements takes up the task of harmonising the heterogeneous terminology landscape of English as the working language of the committee. WG 3 also reaches a minimum consensus in cases of culture-relevant ambiguities.
- Working Group (WG) 4 „Strategies for Smart Cities and Communities“ essentially links aspects of digital urban planning and urban development with sustainability – the overarching orientation of the committee. The crucial point in terms of content is to integrate the so-called e-factor in processes of urban planning. Reference is provided by the Horizon 2020 project Smarter Together. The Dialogplattform Smart Cities of the BMUB gives crucial hints and impulses towards improving the profile of the standardisation processes with regard to discussions held in the political sphere and daily work routine in Germany.
- Sub-Committee (SC) 1 Technical Group (TG) 1 „Liaison with DIN-DKE-VDE-Steering Group Smart Cities and Ad-hoc-Gruppe Smart Cities“ with a Steering Group and a respective Ad-hoc Group based at DIN constitutes the platform of exchange. They were exclusively established for the Smart Cities field and are coordinated by DIN, the Deutsche Kommission Elektrotechnik Elektronik Informationstechnik (DKE) and the Verband für Elektrotechnik Elektronik Informationstechnik e.V. (VDE).

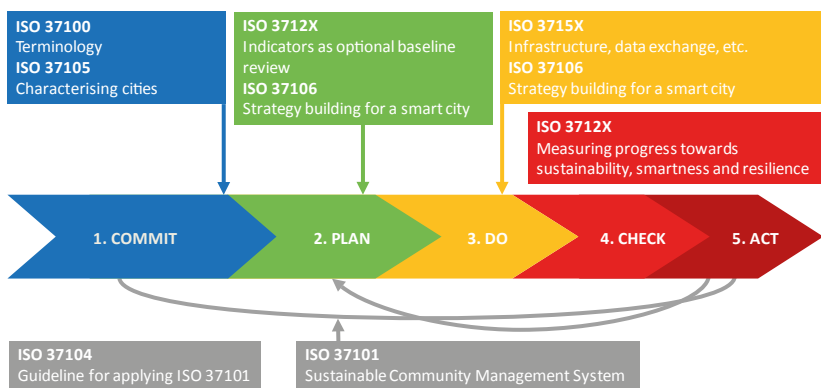
- SC 1 WG 1 „Smart Infrastructure Metrics“ composes the technical elements for measuring the digital aspects of infrastructures and validates them as well as innovative new proposals against the best available techniques. A product of SC 1 is ISO CD (Committee Draft) 37106 Sustainable Development in Communities – Guide to Establishing Strategies for Smart Cities and Communities, a guidance document for developing strategies which aim at integrating the aspects of the digital city into possible technical re-adjustments of urban planning and urban development.
- SC 1 WG 2 „Smart Integration and Interaction Framework“ is amongst others responsible for ISO 37152, a standard which may also be called an interaction matrix one. The following questions are the guiding ones for the WG: Which interactions exist between infrastructures? Which interactions exist between infrastructures and users? Which interactions exist with the environment of infrastructures, including changing economic framework conditions?
- SC 1 WG 3 „Smart Transportation“ decidedly integrates aspects related to transport and infrastructure into the digital layer of urban planning and urban development.
- SC 1 Ad-Hoc Group (AHG) 4 „Multiple Community Infrastructure Info Share“ constitutes the preliminary stage to establishing a SC 1 WG 4 in the future and works on aspects of the digital layer of urban planning and urban development related to information technologies.
- „CEN CLC ETSI Coordination Group on Smart and Sustainable Cities and Communities (CEN CENELC ETSI SSCC-CG)“ as a coordination group leads the information exchange with the respective thematically active European standardisation circles (see chapter “How does standardisation influence urban planning and urban development in practice?”).

As aforementioned in single cases, each ISO Committee may establish official liaisons with other committees or organisations for the sake of quality enhancement and its real-time implementation. ISO TC 268 currently maintains liaisons with the Asia-Pacific Economic Cooperation (APEC), the International Federation of Consulting Engineers (FIDIC), Local Governments for Sustainability (ICLEI), the United Nations Environment Programme (UNEP) and the United Nations International Strategy for Disaster Reduction (UNISDR) as well as with the World Business Council on Sustainable Development (WBCSD). Additional liaisons presently exist with ISO TC 59 Buildings and Civil Engineering Works, ISO TC 207 Environmental Management, ISO TC 224 Service Activities Relating to Drinking Water Supply Systems and Wastewater Systems – Quality Criteria of the Service and Performance Indicators, ISO TC 292 Security and Resilience, ISO PC (Programme Committee) 302 Guidelines for Auditing Management Systems and ISO IEC (International Electrotechnical Commission) JTC (Joint Technical Committee) 1 Information Technology. A liaison with ISO TC 309 Governance of Organizations is planned.

Standards are classified into single levels whose binding effects in applying and implementing decrease from A to C. The single types are as follows:

- Management-System-Standard Typ A – Management System Requirements Standard
- Management-System-Standard Typ B – Management System Guidelines Standard
- Management-System-Standard Typ C – Management System Related Standard

Figure 3 Working Programme Cohesion of ISO TC 268



Source: Bernard Gindroz/ISO TC 268 Chair und Aurore Cambien ISO TC 268 WG 1 Convenor, 2016; modified by AFNOR 2017

Against this background, the Management System Standard ISO 37101 belongs to type A and the ISO 37120 indicator standard as well as the ISO 37122 and 37123 standards planned belong to type C.

First results of the work

According to ISO rules, the group of publishing numbers from 37100 to 37199 has been dedicated to ISO TC 268. In theory and on the basis of the business plan 100 standards might be developed and published in this standards family. The following standards and official standard drafts have so far been developed and published by the committee (as of June 2017):

- ISO 37101 “Sustainable Development in Communities – Management System for Sustainable Development – Requirements with Guidance for Use”
- ISO AWI (Approved New Work Item) 37104 “Sustainable Development in Communities – Guidance for Practical Implementation in Cities”
- ISO CD (Committee Draft) 37106 “Sustainable Development in Communities – Guide to Establishing Strategies for Smart Cities and Communities”
- ISO 37120 “Sustainable Development of Communities – Indicators for City Services and Quality of Life”
- ISO PRF (Proof-Reading) TR (Technical Report) 37121 “Sustainable Development in Communities – Inventory of Existing Guidelines and Approaches on Sustainable Development and Resilience in Cities”

- ISO NP (New Proposal) 37122 “Sustainable Development in Communities – Indicators for Smart Cities”
- ISO NP (New Proposal) 37123 “Sustainable Development in Communities – Indicators for Resilient Cities”
- ISO TR (Technical Report) 37150 “Smart Community Infrastructures – Review of Existing Activities Relevant to Metrics”
- ISO TS (Technical Specification) 37151 “Smart Community Infrastructures – Principles and Requirements for Performance Metrics”
- ISO TR (Technical Report) 37152 “Smart Community Infrastructures – Common Framework for Development and Operation”

Apart from ISO TC 268, the organisations ITU (International Telecommunication Union) and IEC (see page 8) as well deal with standardising digital aspects of resource-efficient urban planning and urban development. At the moment, there is no original and respective standardisation work going on – in the influence area of CEN (Centre Européen de Normalisation) – and thus in the context of the European Union (an outlook towards the future see next pages).

Standards basically can be freely defined. Yet, if they intervene in certain defined thematic fields, they belong to the “geschlossener Kreis” (closed circle) according to the principles of German law. In Germany, the thematic fields “Gesundheitswesen” (health service) and Bauaufsicht (building inspection) belong to this circle (cf. also NZBau 2017 with regard to aspects of the

building code); the thematic field “Stadtplanung/Stadtentwicklung” (urban planning/urban development) is not yet part of this circle. As soon as a topic of the closed circle is affected by standardisation, the supervisory control becomes active, which in Germany is performed by the Federal Ministry for Economic Affairs and Energy (BMWi) with regard to DIN. When converted into national law, developed standards may thus be rejected by the supervisory control and re-transferred to the respective committees for revision.

By the way...

It seems to be forgotten that standards are set to a certain extent by every support programme. The support programmes of the EU might be listed here as examples for implementing the EU Urban Acquis in the areas of urban development and urban planning on the basis of agreements closed between the ministers responsible for urban development in the EU member states. The EU Urban Acquis provides every community, while applying to these funds, with a common ground of values that is enlarged or even replaced in the rarest situations by other – probably more innovative – approaches. The latest attempt of the European Commission in that respect is the envisaged introduction of urban impact assessments of EU regulations and directives (cf. Deutscher Verband 2016). Its political backing is provided by the Urban Agenda for the EU – also known as Pact of Amsterdam and valid since 2016 (cf. Urban Agenda for the EU 2016).

How does standardisation influence urban planning and urban development in practice?

The implications of standardisation may be various, yet a common basis is given by the best available techniques which are addressed by administrative law as well as environmental law.

Standards per se may be applied by choice. Yet, certain framework conditions create the power of facts leading to their application on a mandatory basis – particularly if standards become part of contracts or in case their observance is coercively laid down by the legislator.

Urban planning and standardisation are connected by (commonly) agreed technical rules – also known as best available techniques in the Anglo-Saxon legal sphere. In administrative law, for example in the building codes of the German federal states (Länder) and the model building regulation, reference is made to them. This also goes for environmental law. The best available techniques are of crucial importance for defining the nominal condition of things. They determine the liability standard. In the case of a possible liability they do not give carte blanche. Yet, those who apply ISO and DIN standards, may prove correct action for example at court.

Apart from the regulation of Article 28 of the Basic Law of the Federal Republic of Germany, first of all the public procurement law is to be mentioned. In its Section 13, the contracting of public services is linked to applying common technical rules. As a consequence, everybody who announces public services has to observe tender and contracting standards.

Secondly, the best available techniques are applied when examining whether the substantive law is observed. In case of dispute, a court will first of all examine whether they were applied in delivering a service. That also applies for criminal law in which best available techniques play an important role as a criterion for determining the violation of duty of an action, particularly

when examining negligence. The best available techniques are also mentioned in Section 319 of the German Criminal Code (buzz word: causing danger during construction works). In the context of examining whether a claim is substantiated, it will also play a role that audit offices of local authorities as well as the courts of auditors of the German Länder and the German federal court of auditors follow the question whether a public service might not have been purchased at a lower price if standards had been applied.

Thirdly, sectoral planning has to be addressed. Should it be forced to apply standards on the basis of contracts, the weighting of planning needs as laid down in urban planning might be limited due to their predestination. This would be the case for indicator-based and exclusively standard-oriented planning decisions (see e. g. page 11 “masdarisation” of urban planning) or parts of municipal enterprises, e.g. in the recycling sector. In this way, the long-term effects of investments, predominantly in the infrastructure sector, might not be sufficiently brought in harmony with the complexity of political contexts.

If CEN established a committee similar to ISO TC 268, a fourth party would enter the stage. It would not leave the application of standards open for voluntary actions but realises the direct enforcement of EU regulations. Harmonising certain product groups and reducing trade barriers within the Single European Market, performed in terms of the New Approach of the EU, lead to a development: the European standardisation organisations CEN, CENELEC (Comité Européen de Normalisation Électrotechnique) and ETSI (European Telecommunications

Standards Institute) translate high-level security and health requirements into European Standards (ES) which are directly and legally effective in the EU member states or subject to the presumption of conformity.

Independently from that fact, the Vienna Agreement of 1991 is in force. Its states that standardisation affairs which had already been carried out by ISO are not dealt with again by CEN. Yet, this mode of functioning has to be requested case by case. At the end of 2016, the supervisory board of CEN, CENELEC and ETSI approved the establishment of such a committee as an advisory group (which in CEN jargon is called a sector forum) acting and thus making proposals on the basis of the unanimity principle. This group takes a key role. In that respect, the sustainability management standard ISO 37101 for example could become an ES whose application is mandatory for all 33 member states of CEN – after having finally been agreed upon unanimously. All EU member states as well as the ones of the European Free Trade Association, the Former Yugoslav Republic of Macedonia and Turkey are members of CEN. They would need to translate the ES into a related national standard.

This is already reality in the building sector: Mandate 480 of the European Commission shows that ES unfold direct legal effects in the respective national context of the energy-saving building segment (cf. BBSR 2016).

Examples for planning practice

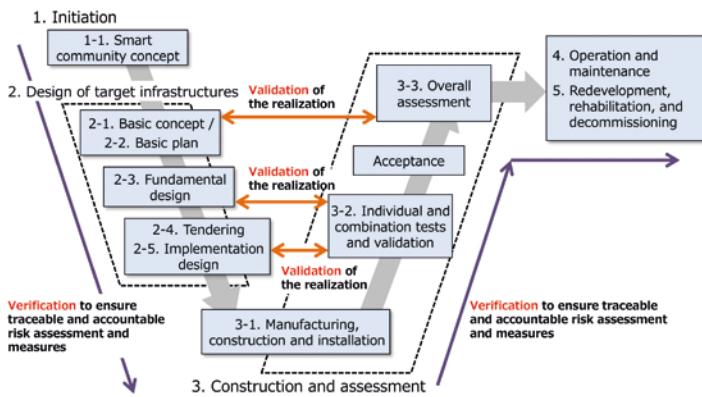
What does standardisation concretely mean for the daily planning routine in communities?

This will be illustrated by selected examples:

- ISO 37152 describes how the e-factor might be integrated in procedures of urban planning. The procedure of integrating the digital layer in the sense of technical infrastructure for example is thus determined for communities as global standard (see Figures 4). Culture-related procedural aspects of urban planning will thus only marginally be considered. Does this standard mean that the renewal of a single neighbourhood or an entire community has to be managed by a single and only valid procedure? Might it possibly be the most low-priced one with regard to human, technical and financial resources? With reference to the CO2 neutral Masdar City example in the United Arab Emirates (cf. Marshall, Müller 2012) should one already talk of a possible “masdarisation” of urban planning? Or does the standard continue to offer choices: Do approaches like the one of the Horizon 2020 project Smarter Together allow best practice solutions developed in learning peer-to-peer-cities networks which are tailor-made for the specific situation in single neighbourhoods? In this project, which is coordinated by Lyon, Munich and Vienna, accompanied by Santiago de Compostela, Sofia and Venice and followed by Kiev and Yokohama, strategies and instruments are being developed between the cities and primarily their municipal energy supplying enterprises to support the integration of the digital layer in procedures of urban planning.
- The discussion on local sustainability management as a community task in the framework of implementing the SDGs shows that there is an obvious need for evidence-based facts, of data-technical and procedural nature and for evaluation and monitoring tools. ISO 37101 herewith offers to generalise procedural provisions which are oriented towards the different local needs. The respective guidance document for its exemplary application, currently being developed, shall neutralise this defective generalisation which fits more theory than practice. To achieve this, communities, which have already introduced a sustainability management on their own initiative on the local level or have gathered respective experience in their daily administrative work routine, have to be involved. This approach would be more target-oriented than limiting to a few KPIs (Key Performance Indicators; see above) and supporting European-wide and globally valid single KPIs. The local management and information systems of some cities in Germany – like Augsburg, Freiburg im Breisgau, Ludwigsburg, Munich, Norderstedt, Nuremberg and Zweibrücken – may serve as examples here.

Figure 4

The digital layer in urban planning according to ISO 37152



1-1. Smart community concept

In this phase...

- Developers (ex. municipalities) clarify the development background.
- Consultants clarify the current state of and the needs for the target city (or area) through investigations.
- Developers or consultants decide the scope of the project (ex. needs to be satisfied) and develop the basic concept of the smart community as a whole.

Image of clarifying the current state of the target area

- Traffic quantity**
 - Pedestrian(people/h)
 - Vehicle(cars/h)
- Geo-environment**
 - Strength
 - Altitude
 - Flooding risk etc.
- Cite owners**
 - XX Factory of XX Company
 - XX company
 - Individually owned residential district

Image of smart community concept

The aims and objectives of developing smart community

- (1) **Zero environmental load**
 - The city's energy demands should be mainly filled by renewable resources.
 - Zero emission electricity, etc.
- (2) **Liveable for the elderly**
- (3) **Resistant to floods and disasters**

Interactions with adjacent/other cities

- coming and going of people
- purchase and sale of electricity
- Proportion of wastes disposed in the adjacent city etc.

Documents to be developed (examples)

- Development background documents
- Current state reports
- Needs reports
- The basic concept of smart community as a whole, including...
 - aims and objectives of developing smart community
 - population composition and zoning
 - outlines of services and operation

2-1. Basic concept

In this phase...

- Developers or consultants clarify the goals of the infrastructures as a whole and the approaches to achieve them.
- The infrastructure systems are not necessarily decided at this phase.
- Consultants develop a list of possible critical risks from the basic concept.

The aims and objectives of developing smart community (from phase 1-1)	Goals of the infrastructures as a whole	Approaches to achieve the goals	Image
(1) Nearly zero environmental load	(1-1) CO2 emission of infrastructures: 0 t-CO2/year	Renewable resources that cover most of the energy demands	
(2) Liveable for the elderly	(2-2) Accessible shopping markets and hospitals for the elderly.	A zero emission transport infrastructure that users can freely choose where to get on/off.	
(3) Resistant to floods and disasters	(3-1) Recovery of lifelines within 3 days.	Robust geo-structures and highly redundant infrastructure.	

Documents to be developed (examples)

- A basic concept of smart community infrastructures as a whole
- A list of possible critical risks etc.

2-2. Basic plan

In this phase...

- Infrastructure combinations to achieve the basic concept is clarified.
- Fundamental specifications of functions for each infrastructure system are clarified.
- The operator of each infrastructure system is selected (ex. a private company operates by the PPP scheme)
- Interfaces with external/existent infrastructures are identified and risk assessment related to the interfaces is conducted.

Ex. A zero emission transport infrastructure that users can freely decide where to get on/off.

LRT (for middle distance transport)
[Specification examples]

- Available for everyone, every purpose
- Governs every commuters from Area A to B at the peak time
- No stress from transfer
- No mutual interference

Self-driving EV taxi (for short distance transport)
[Specification examples]

- Everyone can freely choose where to get on/off
- Financially available for anyone

Ex. Renewable resources that cover most of the energy demands

PV system
[Specification examples]

- Covers 30% of the energy demand in the city

Ex. Robust geo-structures and highly redundant infrastructure.

Multifunction street light system
[Specification examples]

- Monitors city surface and send the data to the central control center, during normal and emergent operation

Documents to be developed (examples)

- Basic plan with fundamental specifications of functions for each infrastructure system
- Report of the risk assessment

4-1. Operation and maintenance

In this phase...

- The operator of each infrastructure system conducts operation and maintenance according to the plans.
- The operator addresses the risks that newly rise (or that are newly identified) in the operation.

Operation and maintenance manuals (developed in implementation design phase)

Design documents

Feedbacks
• Revision of operation and maintenance manuals
• Improvement in designs

Operation and maintenance plans (daily and monthly)

Reports of the risk assessment based on the operation and maintenance reports

Operation and maintenance reports (daily and monthly)

Conducting operation and maintenance

Reviewing new risks identified in operation and maintenance

Image of operation and maintenance processes

Documents to be developed (examples)

- Operation and maintenance plans/reports
- Emergent operation report (in case of emergency)

- Reports of the risk assessment based on the operation and maintenance reports

3-2. Individual and combination tests and validations 3-3. Overall assessment and validation

In this phase...

- Suppliers conduct individual and combination tests.
- Based on the test results, developers accept the infrastructure systems.
- Developers or consultants conduct assessment of the infrastructures as a whole.

Individual tests of infrastructure systems

[Test items for EV taxi (ex.)]

- How properly the self-driving system functions.
- How properly the smartphone reservation system functions.
- The tests will be conducted in the suppliers' sites or their test courses.

Combination tests of infrastructure systems

[Test items for EV taxi (ex.)]

- Whether a user can get on a taxi within 10 minutes after he reserved.
- Whether the taxis can cope with the passengers in a taxi station within 10 minutes.
- The tests will be conducted in real site or by simulation.

Overall assessment (Conformity assessment for the goals of the infrastructures as a whole)

[Assessment items (ex.)]

- Whether the infrastructures are realizing zero emission.
- Whether an old person can go to hospital alone.
- The tests will be conducted in real site or by simulation.

Image of the tests and assessments

Documents to be developed (examples)

- Test reports and delivery documents of the infrastructure systems
- Reports of the overall assessment for the infrastructures as a whole

2-4. Bidding and implementation design

In this phase...

- Developers or consultants conduct bidding, select the winning bidder, and pass the order.
- The winning bidders (suppliers) clarify implementation designs.
- Consultants conduct risk assessment according to the implementation design.

Self-driving EV taxi
[Specification examples]

- A 2 seat car x 300 cars/km2
- 5 dollars/km for the elderly and 7 dollars/km for others
- Able to call the nearest one by GPS smart phone

External design

[Specification examples related to interactions]

- Each taxi station is accessible from each LRT station by xx degrees slope.
- Each LRT station has space for more than 5 taxis

Multifunction street light system
[Specification examples]

- XX Company's YY cameras for surveillance cameras.
- One lamppost illuminates 250m2
- 12 LED light bulbs (10W) with per lamppost

External design

Image of implementation design

Documents to be developed (examples)

- Bid specification with requirements for bidders and evaluation points
- Proposals and the notice of award
- implementation design (1/100) and contract documents
- Operation (normal and emergent) and maintenance manuals

2-3. Fundamental design

In this phase...

- Consultants clarify external (quantified) specifications of each infrastructure system (the system composition is not necessarily clarified)
- Consultants clarify important specifications such as the fee standard and CO2 emission level of each infrastructure system, or whether it is self-driven or not, etc.
- Consultants conduct risk assessment according to the fundamental design.

LRT
[Specification examples]

- Accessible from anywhere in the city within 15 minutes
- Carries more than 3,000 people/h from area A to B

PV system
[Specification examples]

- Supplies more than xx MW from 9 to 18 O'clock
- Recovers 80% within 36 hours after intensity 6 upper earthquake

Self-driving EV taxi
[Specification examples]

- Able to get on within 10 minutes after reserving by smart phone
- Cheaper than 5 dollars per kilometer

Multifunction street light system
[Specification examples]

- Monitors more than 90% of the city surface by surveillance cameras
- Supplies communication environment with more than xx MB/sec
- Keeps 80% of the city surface brighter than xx lx

Image of fundamental design

Documents to be developed (examples)

- Fundamental design (1/2500 scale) with external specifications for each infrastructure system
- Report of the risk assessment

- Singapore might serve as another future-oriented example from practice and a long-term as well as real-time urban laboratory. The ISO 37120 sustainable indicator standard has partly been used by the city nation since 2014. It focuses on the areas of solid waste, education, health, recreation and transportation (cf. CLC Singapore 2014). Digital aspects of urban planning and urban development are integrated in planning processes in Singapore thus applying the ISO 37106 strategy guide and forestalling the yet to be developed ISO

37122 and ISO 37123 indicator standards. Prime Minister Lee Hsien Loong presented the respective Singaporean strategy under the heading Smart City – Smart Nation already in 2014 (cf. PMO Singapore 2014). The first World Smart City Forum thus was staged in Singapore on 13 July 2016 in the framework of the World Cities Summit.

Conclusion

Standardisation affects urban planning and urban development. Yet, the implications cannot generally be

named as each situation has to be analysed case by case and evaluated accordingly. The consequences for “bottom-up” urban development remain to be seen. The presence of some groups of civil society in standardisation work is thus to be taken as a positive sign. The present volume may deliver relevant information on possible implications, though it does not lay claim to exclusive completeness.

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