SDG indicator set as multi-level and multi-sectorial decision support tool combining national reporting and local knowledge on the built environment

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Abstract. Providing a sustainable built environment through appropriate actions and investment decisions taken by various decision-makers calls for a renaissance of planning and a targeted supply and use of data as information. Data is seen as lowest level of abstraction constituting the basis for creating information and knowledge through interpretation (Dühr et al. 2012). Data as interpreted information and knowledge would eventually turn into decision support systems (Evers 2008) and thus unfold its internal power related to the translation from a complex reality into data as well as its external power referring to the communicative function of data (Söderström 1996). Before completing this turn, data needs to be validated. This is a process that requires both, generating and aggregating data on higher levels of abstraction and governance as well as integrating data, which originates from local sources (Kyttä et al. 2013), while pursuing the objective of providing a multi-level and multi-sectorial decision support tool for purposes of planning and decision-making. The 17 SDGs and their 169 sub-goals as part of the Agenda 2030 as well as the 175 paragraphs of the New Urban Agenda provided as starting points for this provision the basis for collecting in Germany in cooperation with cities and counties official data deriving from multi-level sources (Bertelsmann Stiftung 2018). A set of respective indicators has been developed in cooperation with local authorities and national statistical institutions as well as by using publically available open data sources (e.g. Open.NRW, Hackday Niederrhein) and is currently being tested. Considering the sustainable built environment, it is particularly SDG 11 that bridges between overall planning orientations and detailed building actions. The author of the paper suggests combining national reporting mechanisms and local knowledge, reflecting data sources and indicators in urban and spatial typologies as well as referencing the elements against other cultural approaches and international standards.

1. Context and background – A renaissance of planning and a target supply and use of data as information

Today, 55 % of the worldwide population live in urbanized areas according to the Revised 2018 UN Urbanization Prospects. These prospects estimate that the percentage of the global urban population will increase to 68 % by 2050. Against this background, the percentage of the urban population would
rise in the EU from 76 % as of today to 85 %, whereas in a country like for example Germany the percentage would increase from 77 % to 84 % in 2050 (United Nations 2018). Urbanization is thus an international, supranational and national phenomenon. In response to the ongoing urbanization, the General Assembly of the United Nations adopted the New Urban Agenda (United Nations 2017) as well as the Agenda 2030 and its 17 Sustainable Development Goals (United Nations 2015) of which urban issues constitute an integral part.

Against this background, providing a sustainable built environment through appropriate actions and investment decisions, which are taken by various decision-makers, calls for a renaissance of planning and a targeted supply and use of data as information across sectors and on multi levels.

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The Sustainable Development Goals (SDGs) as part of the Agenda 2030 as well as the New Urban Agenda are the starting points for this provision. In Germany, the 17 SDGs and their 169 sub-goals as well as the 175 paragraphs of the New Urban Agenda provided the basis for collecting in cooperation with cities and counties official data deriving from supranational, national and local sources. A set of respective indicators was developed in cooperation with local authorities and national statistical institutions (Bertelsmann Stiftung, 2018) as well as by using publically available open data sources (Open Knowledge Foundation Deutschland e.V., 2020). This indicator set is compatible with the national reporting system provided by the Federal Statistical Office DESTATIS as well as the supranational one managed by EUROSTAT. The main data-related product of the Federal Institute for Research on Building, Urban Affairs and Spatial Development BBSR, entitled Indicators and Maps on Spatial and Urban Development and known in relation to its acronym INKAR (BBSR, 2020), has been equipped accordingly with respective SDG-related layers. A phase testing of the SDG indicator set is currently carried through in Germany for all cities above 5,000 inhabitants and all counties.

This SDG indicator set aims at linking the data gathering from official and open sources and the application of data via decision support systems like INKAR with planning processes on various levels of planning, whether these are supranational, national, regional or local ones. With regard to INKAR, this link already exists insofar as the tool allows for some time the monitoring of urban areas as places of centrality via regional planning mechanisms. Aspects of the built environment are part BBSR’s inner-urban monitoring system and the respective evaluation of long-lasting National Urban Development Promotion Programmes. In any case, testing the SDG indicator set is equivalent to validating the gathering of data.

2. Main scope and methodology

2.1. Connecting the data gathering and its validation with the Agenda 2030 and the New Urban Agenda of the United Nations

The SDG indicator set is based on the 17 SDGs and its 169 sub-goals of the Agenda 2030 as well as the 175 paragraphs of the New Urban Agenda. Taking both documents as references underlines that in fact they are closely intertwined – particularly with regard to SDG 11 on sustainable cities and communities. As stated elsewhere: “10 of the 17 SDGs goals are linked to Goal 11 (5 explicitly, 9 implicitly), 30 % of the targets are linked with Goal 11 (12 % explicitly, 18 % implicitly), 39 % of indicators are linked with Goal 11.” (Misselwitz et al., 2015: 17)
Given the somewhat similarities of both documents, an initiative of all relevant stakeholders (cf. Bertelsmann Stiftung, 2018) collected in Germany in cooperation with cities, communities, authorities and statistical institutions official data deriving from multi-level sources. The initiative developed a set of respectively SDG-related indicators and added, whenever appropriate, publically available open data, e.g. from Hackday Niederrhein as part of the initiative Code for Niederrhein (Open Knowledge Foundation Deutschland e.V., 2020). In that respect, the basis had been prepared for the testing phase as validating the data.

Connecting the data gathering and validation with the two reference documents of the United Nations required a third dimension: Indicators are only meaningful in a respective local, regional and national context when they respond to given constitutional settings or challenges of relevance for the society as a whole. Any local authority might only be able to deliver data whenever the underlying indicator is equivalent to a given task or predictable future challenge – particularly with regard to the sustainable development of cities and communities, including the built environment.

The SDG indicator set valid for the testing phase mirrors the set of dimensions: The initiative selected indicators against their relevance towards constitutional settings and societal challenges as aforementioned as well as their compatibility with the established national reporting system on sustainability. Independently from the character of the respective data source – whether it is big data, crowd data, small data or any data else – taking this multi-dimensionally referential characteristic has been and will be crucial as methodological guiding principle throughout the entire process of setting up the SDG indicator set as well as testing it. Potentially revising and/or amending the set would be based on e.g. further local knowledge input, whenever appropriate and considering the aforementioned methodological guiding principle. In that respect and as mentioned in the following, the different sorts of data do not play different roles in connecting the national reporting level with the level of local knowledge on the built environment. On the contrary, they take a coherent role in addressing both levels and operationalising common denominators.

2.2. SDG 11 building the bridge between overall planning orientations and detailed building actions

Though the SDGs tend to stay at a certain general header level, they clearly demonstrate their benefit for monitoring sustainable development. The following five indicators are currently in use for measuring the progress in implementing SDG 11 as a prominent bridge between overall planning orientations and detailed building actions (Bertelsmann Stiftung, 2018):

- SDG 11 (11.1.1) Rent prices (average net cold rent per square meter)
- SDG 11 (11.2.1) Modal split (volume of pedestrians, cycling and public transport traffic / total traffic volume * 100)
- SDG 11 (11.2.2) Traffic injuries/fatalities (number of injured or killed persons in traffic accidents/number of inhabitants * 1.000)
- SDG 11 (11.3.1) Land use (settlement and traffic area/total area * 100)
- SDG 11 (11.3.1 / 11.7) Recreation areas (recreation area/number of inhabitants)

Considering sustainable building activities in particular, additional indicators are of interest. The following one can clearly be attributed to given data sources (BBSR, 2020):

- Energy-efficient buildings and built housing units equipped with renewable-energy-producing facilities as percentage of all built housing units

Another similar indicator would measure the rate of the energetic renewal of buildings of all types. Respective data sources are available, yet they do not currently cover entire national areas, e.g. the one of Germany, or they are based on fragmentary open data sources. Completing the scenery of data sources in that respect would also underline that the indicator on energetic renewal and the one on energy-efficient buildings could close the obvious lack of interoperability between numerous processes – at least between different levels. That would then constitute the basis for a well-integrated data-driven and decision-support-system-oriented planning of e.g. single urban neighbourhoods or entire urban areas.
Both indicators refer to SDG 11 (here: SDSG 11.b.1) and its respective target to considerably increase by 2030 the number of cities and communities, which subsequently would implement integrated policies and programmes based on decisions taken by their councils. These policies and programmes would enhance inclusion and resource efficiency as well as they would minimise the impact of climate change and improve resilience against disasters of various kinds.

3. Discussion and conclusion – Towards multi-level and intercultural reporting mechanisms while respecting constitutional settings and challenges of relevance for a society as a whole

Combining national reporting and local knowledge is a complex task per se as both parts should theoretically be closely interlinked in order to be of utmost practical value – they are the two sides of the same coin as the proverb goes. Reporting on the progress or non-progress made in implementing the New Urban Agenda and the SDGs is a distinct national obligation. Referencing this national spatial, urban-regional and urban data-based picture against regional and local realities and spaces of interaction is also a national task, particularly against the background of enhancing sustainable development and framing urbanization processes by the respective national level.

The aforementioned SDG indicator set, including the two additional indicators as described, and its underlying data as well as the testing phase would refer to the assumption of Dühr et al. (2012), Hills (2002) and Stephenson (1999) that data is seen as the lowest level of abstraction which serves as starting point for the development of information and knowledge through the interpretation of data. This interpretation is carried out by the testing phase.

Turning this interpreted information and knowledge into a decision support system via the distillate of the testing phase would take on what Evers (2008) describes as eventual transition from the converted raw information material to the application and use of this interpreted material as the system basis in decision-making processes and actions.

Through the combination of the national reporting mechanisms of data and indicators as well as the test-gathered and interpreted data and information, this approach would respond to Söderström (1996) in the way that the combined information displays its two-sided power function – internally with regard to translating multi-layered realities into data and externally by revealing the communicative function of data as universal language in considering the commonly agreed assumption in data-related languages that 1 equals 1 and 0 refers to 0.

Carrying-out the testing phase would refer in addition to what Kyttä et al. (2013) require as validation of data in planning and decision-making processes, e.g. with regard to investments. The SDG indicator set as well as those detailing urban and urban-regional aspects with regard to the New Urban Agenda would have been validated – based on the aforementioned cooperative exercise in developing the respective indicator set. The testing phase would thus detail and further enhance this validation and therefore significantly contribute to generating and aggregating data on higher levels of abstraction and governance as well as integrating the data which originates from these localised sources of test-responders.

A possible reference to other cultural approaches and international standards would be to incorporate for example ISO 37120 (Indicators for city services and quality of life), ISO 37122 (Indicators for smart cities) and ISO 37123 (Indicators for resilient cities). These standards are based on data-related local knowledge deriving from cities and communities in the same way as they generalise data-related approaches whenever meaningful. These standards have been referenced against the SDGs (ISO, 2018; ISO, 2019).

Human settlements and the built environment are in transition. They both would require appropriate measures to cope with the transition phase in which humankind is currently in. In that respect, the aforementioned testing phase will enhance the given SDG indicator set and those indicators deriving from the New Urban Agenda. The set as such will then constitute – together with the underlying local, regional and national, but also supranational data – an appropriate decision support system for planning processes and their renaissance oriented towards this transition as well as respective actions to be taken on investments as discussed by others (cf. Marsden, no date).
In order to broaden the input basis for the decision support system and thus significantly contribute on measurable grounds to the sustainable built environment conditions – particularly in Europe – the sample of cities and inputs in the testing phase will hopefully be as numerous and manifold as possible. Taking a truly critical view would be feasible once the testing phase will have been completed. Ongoing research thus targets this challenge.

References
[1] Bertelsmann Stiftung (Ed.) (2018): SDG Indicators for Municipalities, Summary, access: https://www.bertelsmann-stiftung.de/de/publikationen/publikation/did/sdg-indicators-for-municipalities-summary/ [retrieved on 06.01.2020]
[2] BBSR – Bundesinstitut für Bau-, Stadt- und Raumforschung (2020): INKAR online, access: https://www.bbsr.bund.de/BBSR/DE/Raumbeobachtung/InteraktiveAnwendungen/INKAR/inkar_online_node.html [retrieved on 06.01.2020]
[3] Dühr, S., Müller, A. (2012): The Role of Spatial Data and Spatial Information in Strategic Spatial Planning, Regional Studies, Volume 46, Number 4, pp. 423-428, access: https://www.tandfonline.com/doi/abs/10.1080/00343404.2012.669535 [retrieved on 06.01.2020]
[4] Evers, M. (2008): DSS for Integrated River Basin Management – requirements for appropriate tools and structures for a comprehensive planning approach, PhD thesis, Leuphana University of Lüneburg
[5] Hills, S. (2002): The role of environmental information in spatial planning: a case study of regional planning in Brandenburg. Germany, PhD thesis, University of the West of England, Bristol
[6] Kyttä, M. et al. (2013): Towards contextually sensitive urban densification: Location-based softGIS knowledge revealing perceived residential environmental quality, Landscape and Urban Planning 113, pp. 30-46
[7] ISO – International Organization for Standardization (2018): ISO 37120. Sustainable cities and communities. Indicators for city services and quality of life, access: https://www.iso.org/standard/68498.html [retrieved on 06.01.2020]
[8] ISO – International Organization for Standardization (2019): ISO 37122: Sustainable cities and communities. Indicators for smart cities, access: https://www.iso.org/standard/69050.html [retrieved on 06.01.2020]
[9] ISO – International Organization for Standardization (2019): ISO 37123. Sustainable cities and communities. Indicators for resilient cities, access: https://www.iso.org/standard/70428.html [retrieved on 06.01.2020]
[10] Marsden, J. R. (Editor-in-Chief) (no date): Decision Support Systems and Electronic Commerce, access: https://www.sciencedirect.com/science/journal/01679236 [retrieved on 06.01.2020]
[11] Misselwitz, P., Rowell, A., Salcedo Villanueva, J. (2015): Sustainable Development Goals and Habitat III: Opportunities for a successful New Urban Agenda, Cities Alliance Discussion Paper, N° 3, access: https://www.citiesalliance.org/sites/default/files/Opportunities%20for%20the%20New%20Urban%20Agenda.pdf [retrieved on 06.01.2020]
[12] OECD (2019): A Territorial Approach to the Sustainable Development Goals, access: https://www.oecd.org/cfe/territorial-approach-sdgs.htm [retrieved on 06.01.2020]
[13] Söderström, O. (1996): Visual thinking in urban planning, Ecumene 3 (3), pp. 249-281
[14] Stephenson, R. (1999): Information systems and policy processes in planning, PhD thesis, Oxford Brooks University
[15] Open Knowledge Foundation Deutschland e.V. (2020): Code for Niederrhein, access: https://www.coderforniederrhein.de [retrieved on 06.01.2020]
[16] United Nations (2015): Transforming our world. The 2030 Agenda for Sustainable
[17] United Nations (2017): New Urban Agenda. Quito Declaration on Sustainable Cities and Human Settlements for All. A/RES/71/256*, access: http://habitat3.org/wp-content/uploads/New-Urban-Agenda-GA-Adopted-68th-Plenary-N1646655-E.pdf [retrieved on 06.01.2020]

[18] United Nations, Department of Economic and Social Affairs, Population Division (2018): World Urbanization Prospects. The 2018 Revision, access: https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html [retrieved on 06.01.2020]