Compilation and analysis of digital solutions for climate-resilient and low-carbon urban development

giz
Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

Contents

Ho Chi Minh Saigon City, Vietnam
Ashim D'Silva | Unsplash

Foreword

Cities are at the heart of the implementation of global agendas, specially the 2030 Agenda and more than two-thirds of its Sustainable Development Goals (SDGs) but also the New Urban Agenda and the Paris Agreement.

Changes driven by technologies can support the sustainable transformation of urban areas: from digital platforms for citizens participation and sharing economy, smart-sensors for measuring different emissions in the city to smartphone applications that are used for disaster early warnings or to avoid traffic congestion.

Digital solutions for sustainable urban development may not solve all challenges in our partner countries and cities in Asia, but wisely applied, they could be an enabling factor for the achievement of the global agendas at the local level.

The work of GIZ on the ground is being shaped and guided by both the principles of the 2030 Agenda and the Principles for Digital development. For projects dealing with urban issues, it is crucial to understand and apply both set of principles to harness synergies and understand shortcomings of possible solutions.

In 2019, the Sector Network Governance Africa, with its workstreams "Implementing the 2030 Agenda in Africa" and "ICT for Good Governance in Africa" has developed a sound framework for assessing how the 2030 Agenda and the Digital Principles have been put into practice while developing and implementing digital solutions.

Moreover, in the beginning of 2020, the Sector Project on Urbanisation, Municipal and Urban Development has developed a framework for assessing urban development actions against its (potential) impacts, trade-offs and contribution to global agenda targets.

The two mentioned frameworks have guided the work of TUrbOCliC in this publication. On the one hand, the aim was to apply the assessment framework regarding the 2030 Agenda Principles and the Digital Principles for 4 selected solutions (pp. 5–19). On the other hand, the urban development actions framework served as a categorization starting point for the on-going development of a database on urban digital solutions (pp. 20–28).

As sector network and working group speakers, we wish you an interesting read and hope that this study provides valuable lessons and inspiration for other projects in Asia and beyond. We would like to see the assessment approaches being further used, discussed and improved by other initiatives.

For TUEWAS
Vaishali Nandan
Working Group Speaker
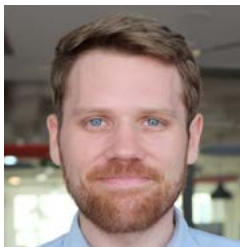
Patrick Pawletko
Sector Network Speaker

For SNGA
Hamidul Chowdhury
Working Group Speaker

Johannes Fritzen
Sector Network Speaker

SNGA. The Sector Network Governance Asia (SNGA) is a regional professional network that enables GIZ experts working in relation to GIZ's governance portfolio in Asia to share information and to improve their knowledge base. The SNGA has more than 30 member projects with more than 340 staff members (international and national personnel) from 15 Asian countries. The development work of the SNGA member projects mostly takes place within thematic areas / clusters, which determine the basic structure of the network: rule of law, good financial governance, democracy and fragility, as well as ad hoc taskforces on digitalisation, enabling environment, state and civil society.

TUEWAS. The GIZ sector network TUEWAS (Transport, Environment, Energy and Water in Asia) is a platform for regional professional exchange and cooperation between GIZ experts in Asia and at head office. Currently, TUEWAS connects around 330 members from 68 projects across 16 Asian countries. Different working groups are clustered along the topics of: climate change mitigation, energy efficiency, renewable energy, sustainable industrial areas, transport and environment and water and climate. Two further working groups are jointly organised with the SNRD (Sector Network Rural Development Asia): on green education and on the sustainable development goals.

TUrbOCliC stands for Transformation – Urban Opportunities – Climate Change. The group is also part of GIZ´s innovative knowledge management tools called sector networks and is a cross-sectoral group across two sector network – TUEWAS and SNGA.

Several bilateral and regional programs are represented in the working group. Topics covered ranges from urban governance, low carbon development, infrastructure, urban resilience, inclusive cities, localizing SDGs, vertical governance integration, urban nexus, metropolitan governance, climate finance, decentralization, capacity development, among others. Created in 2013,

pioneers have been the TUEWAS Cities and Climate Change and the SNGA Urban Opportunities working groups, who have been fruitfully cooperating since 2009.

The main goals are networking, knowledge management, including peer-learning among programs, regional and technical exchange with national and international partners, strengthening the technical and advisory capacities of GIZ staff and partner experts, and work on developing innovative products. Interaction happens through different channels, such as virtual and face-to-face meetings, newsletters, online platform, and innovative subject related webinars.

Background

Former UN Secretary-General, Ban Ki-moon, stated that the battle for sustainable development will be won or lost in our cities. Cities and their local governmens are therefore key spaces and actors when it comes to the implementation of current global agendas (e.g. 2030 Agenda and the Sustainable Development Goals, Climate Paris Agreement, and the Sendai Framework).

The use of digital solutions to support cities to become more sustainable is increasing at an unprecedent rate. Examples range from digital platforms for citizen participation to smart-sensors for measuring emissions to smartphone apps used for disaster early warnings or to avoid traffic congestion.

At the same time, digital solutions can greatly contribute to the realization of the 2030 Agenda. In addtion to its thematic goals, the 2030 Agenda calls for a new, holistic vision of development. GIZ has defined five implementing principles with the aim of mainstreaming the 2030 Agenda into cooperation projects (refer to Box 1).

Moreover, digital solutions could contribute to the achievement of national strategies for mitigation and adaptation to climate change – that is, Nationally Determined Contributions, (NDCs) and National Adaptation Planning (NAPs) – through city-level actions that contribute to reducing greenhouse gas emissions and to increasing resilience and reduce vulnerability at the local level.

GIZ embraced the Principles for Digital Development ("Digital Principles") in February 2018 (refer to Box 2). The Digital Principles are a set of guidelines that are designed to help practitioners to integrate technologies into development projects. These principles have been co-developed by numerous development organisations with the goal of creating a community of practice. They focus on the importance of developing and implementing digital solutions through human-centred, contextually appropriate, collaborative, safe, and sustainable design. By endorsing them, GIZ has committed to put the Digital Principles into practice through its policies, processes and activities.

Objectives

The study aims to compile and analyse selected digital solutions that focus on building resilience to

2030 Agenda Implementation Principles

Universality GIZ programmes need to support the nationally defined goals for implementing the 2030 Agenda in its partner countries.

Shared responsibility More emphasis must be placed on the inclusion of relevant stakeholders and on the structuring of multi-stakeholder partnerships.

Integrated approach In the implementation of programmes, all dimensions of sustainability and the increased use of synergies between measures, policy fields and sectors need to be considered.

Leave no one behind Stronger focus must be placed on marginalised population groups, and there should be a push for more disaggregated data and target-group analyses to understand and address the concenrs of those who are typically left behind.

Accountability A stronger focus needs to be put on reporting the GIZ contribution to the implementation of the 2030 Agenda as well as supporting partner countries in their efforts of strengthening statistical capacities and the reporting mechanisms to inform proper review and tracking of progress.

climate change in cities and fostering low-carbon urban development in Asian cities. The tools should also contribute to the achievement of the 2030 Agenda and are being implemented in line with the Digital Principles. More specifically, the study aims to:

- Take stock of current digital approaches within relevant urban projects in Asia
- Assess which digital solutions, formats or other approaches are already being used or developed by urban GIZ projects in Asia
- Evaluate whether and how the Digital

FIGURE 001

Links between principles, the SDGs and digital solutions for climate-resilient and low-carbon urban development
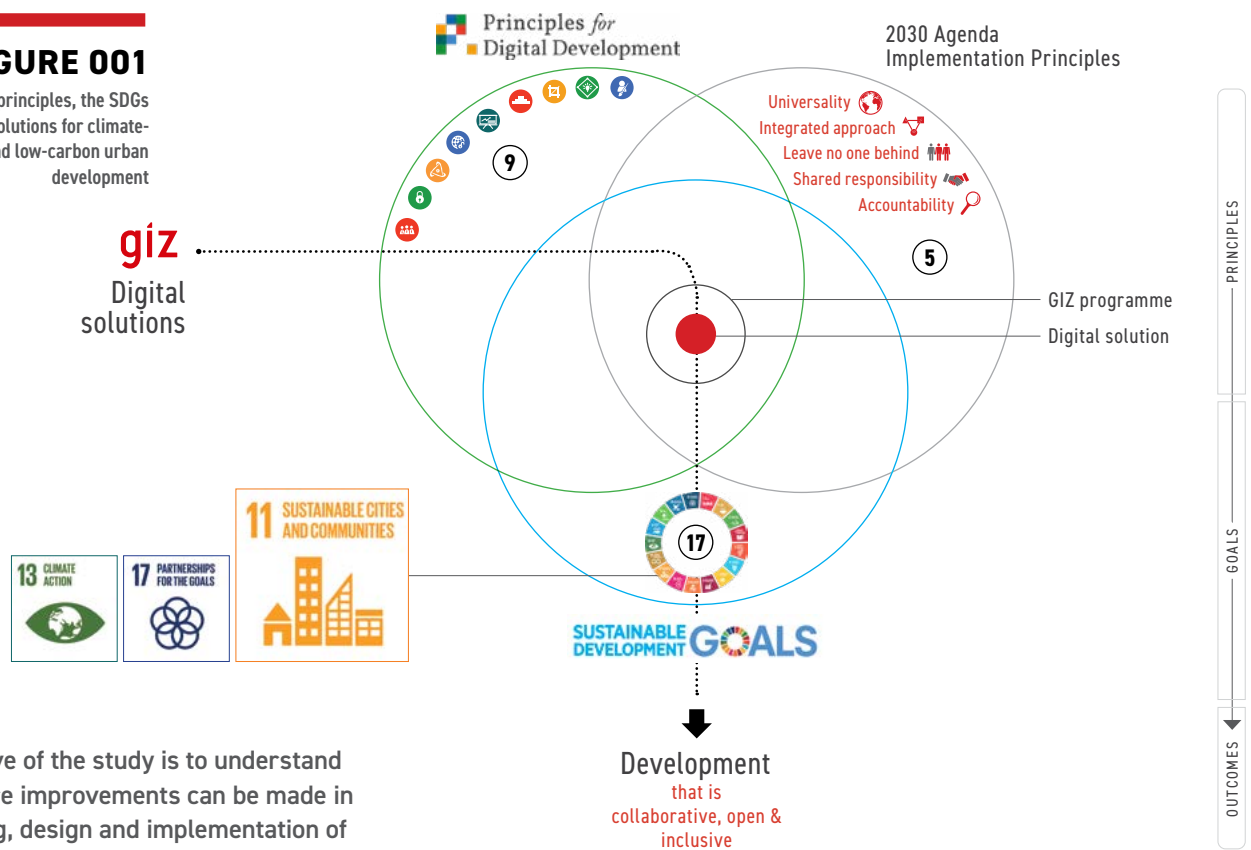
The objective of the study is to understand better where improvements can be made in the planning, design and implementation of digital solutions so that they are likely to deliver sustainable and equitable outcomes.

Principles have guided the development and implementation of the digital solutions

- Critically assess the relevance of digital solutions towards the achievement of the 2030 Agenda,
- Critically assess the relevance of digital solutions towards the achievement of mitigation and adaptation to climate change in cities
- Highlight regional specific requirements, challenges and opportunities for Asia
- Develop practical recommendations, including indentification of gaps and prospects for future development of additional tools
- Promote the exchange of experiences among relevant GIZ urban projects.

Approach

The study is designed on the assumption that there is commonality between the digital solutions implemented by GIZ and its partners in Asia, the Digital Development Principles, the 2030 Agenda Implementation Principles and the Sustainable Development Goals (SDGs) to the extent that they seek to ensure development that is inclusive, open and collaborative. In other words, projects should follow certain principles, and those principles underpin the goals that collectively seek to deliver sustainable development.

The study produced two outputs that are presented in this report: (1) an assessment of selected digital solutions in relation to the Digital Development Principles, the 2030 Agenda and the SDGs; and (2) a database of digital solutions developed for urban climate change and resilience.

A sound conceptual framework and methodology was developd by the GIZ workstreams "ICT for Good Governance" and "Implementing the 2030 Agenda in Africa" from the Good Governance in Africa (GGA) sector network for its study "Digital Tools for Implementing the Sustainable Development Goals in Africa". The GGA methodology was used by this study to assess digital solutions developed for climate change and resilience in Asian cities against the Digital Development Principles, the 2030 Agenda and the SDGs. It should be noted that while the digital solutions assessed often contribute to several SDGs, only the most salient of the SDGs in relation to urban resilience and climate change are listed in the assessments. In all cases, projects were given the opportunity to review and provide additional information for each assessment.

The database of digital solutions was structured using the fields of action developed by the forthcoming GIZ study "Conceptualising Urban Development Actions Towards an Assessment of (Potential) Impacts, Trade-offs and Global Agenda Targets".

Digital solutions for both outputs were identified by (1) searching the GIZ ICTs projects database; (2) web searches; and (3) requests for information sent to the TUrbOCliC Working Group.

Beneficiaries

Beneficiaries of the product are the programmes within the TUrbOCliC Working Group focusing on climate change mitigation and adaptation topics (in China, Bangladesh, India, Indonesia and Thailand), but also those beyond the region. Beneficiaries are both project advisors, and partners and collaborators.

The Digital Development Principles

In the late 2000s, several donors and multilateral organisations turned their attention to the limitations and failures of digital solutions to support development. This led to the emergence of sets of principles, the first of which were the Unicef Innovation Principles in 2009. In 2010, a group of mHealth implementers and donors developed their own set of principles known as the Greentree Principles. The Principles for Digital Development were created by integrating these two sets of principles. There are nine Principles for Digital Development:

[1] *Design with the user*: Get to know the people you are designing for through conversation, observation and co-creation.

[2] *Understand the ecosystem*: Consider the particular structures and needs that exist in each country, region and community.

[3] *Design for scale*: Think beyond the pilot phase and secure funding or partners that can take the initiative to new communities, sectors or regions.

[4] *Build for sustainability*: Think about how to maintain user and stakeholder support, and how to maximise long-term impact.

[5] *Be data driven*: Make quality information available to the right people when they need it, and ensure that they will use those data to take action.

[6] *Be open*: Use open standards, open data, open source and open innovation: Openness can increase collaboration in the digital development community and avoid duplicating previous work.

[7] *Reuse and improve*: Take the work of the global development community further than any single organisation or programme.

[8] *Address privacy and security*: Give careful consideration to how data is collected, acquired, used, stored and shared.

[9] *Be collaborative:* Share information, insights, strategies and resources across projects, organisations and sectors to increase efficiency and impact.

Principles *for* Digital Development

BOX 002

Design with the User

Understand the Existing Ecosystem

Design for Scale

Build for Sustainability

Be Data Driven

Use Open Standards, Open Data, Open Source, and Open Innovation

Reuse and Improve

Address Privacy & Security

Be Collaborative

digitalprinciples.org | #digitalprinciples

Alignment between the Digital Development Principles and the 2030 Agenda Implementation Principles

Given the conceptual coherence of the Digital Development Principles and the 2030 Agenda Implementation Principles around equitable, open and inclusive development, one would expect there to be a high level of alignment between the two sets of principles. And, on this basis, one would expect it to be possible to trace the connections between aligned principles. At the same time, such attempts to make strict, linear connections between the principles can come across as forced or artificial. Nevertheless, as illustrated in Figure 2, it is possible to attempt such a linking, although it would be prudent not to let these linear connections mask the overarching, common developmental objectives of both sets of principles. Nor should the linking be taken to suggest that, in some cases, a single Digital Development Principle cannot be linked to multiple 2030 Agenda Implementation Principles.

FIGURE 002

Alignment between
principles

2030 Agenda Implementation Principles	Digital Development Principles
Universality	Design for scale Be collaborative
Integrated approach	Understand the ecosystem Openness
Leave no one behind	Design with the user Address privacy & security
Shared responsibility	Reuse and improve Be collaborative
Accountability	Build for sustainability Be data driven

The 2030 Agenda Implementation Principle of universality emphasises the need for change in *every* country in the interests of sustainable development. Further, the donor-recipient dichotomy falls away and all countries cooperate on equal terms to achieve the global goals. Universality also calls for mutual exchange and learning on *equal* terms. The Digital Development Principle of designing for scale links with the principle of universality to the extent that designing for scale means making choices that will enable widespread adoption, including adoption by a whole country or region, rather than by a few pilot communities. A digital solution may, in the first instance, be implemented locally but plans should, ideally, be for its adoption to be universal. The Digital Development Principle of being collaborative aligns with universality. Collaboration is about sharing information, insights, strategies and resources across projects, organisations and sectors, and working together on equal terms across geographies, focus areas and organisations.

An integrated approach, the second 2030 Agenda Implementation Principle, acknowledges the interconnectedness and indivisiblity of global challenges. An acknowledgement of the importance of synergies and mutual dependencies is synonymous with an understanding of ecosystems, the second of the Digital Development Principles. Integration, synergies and alignment are more likely when systems are open, including when information and processes are shared openly. Hence the link drawn between an integrated approach an openness.

The third 2030 Agenda Implementation Principle is to leave no one behind. This principle links with the Digital Development Principle of inclusive design, i.e. including users and other stakeholders – particularly those from marginalised
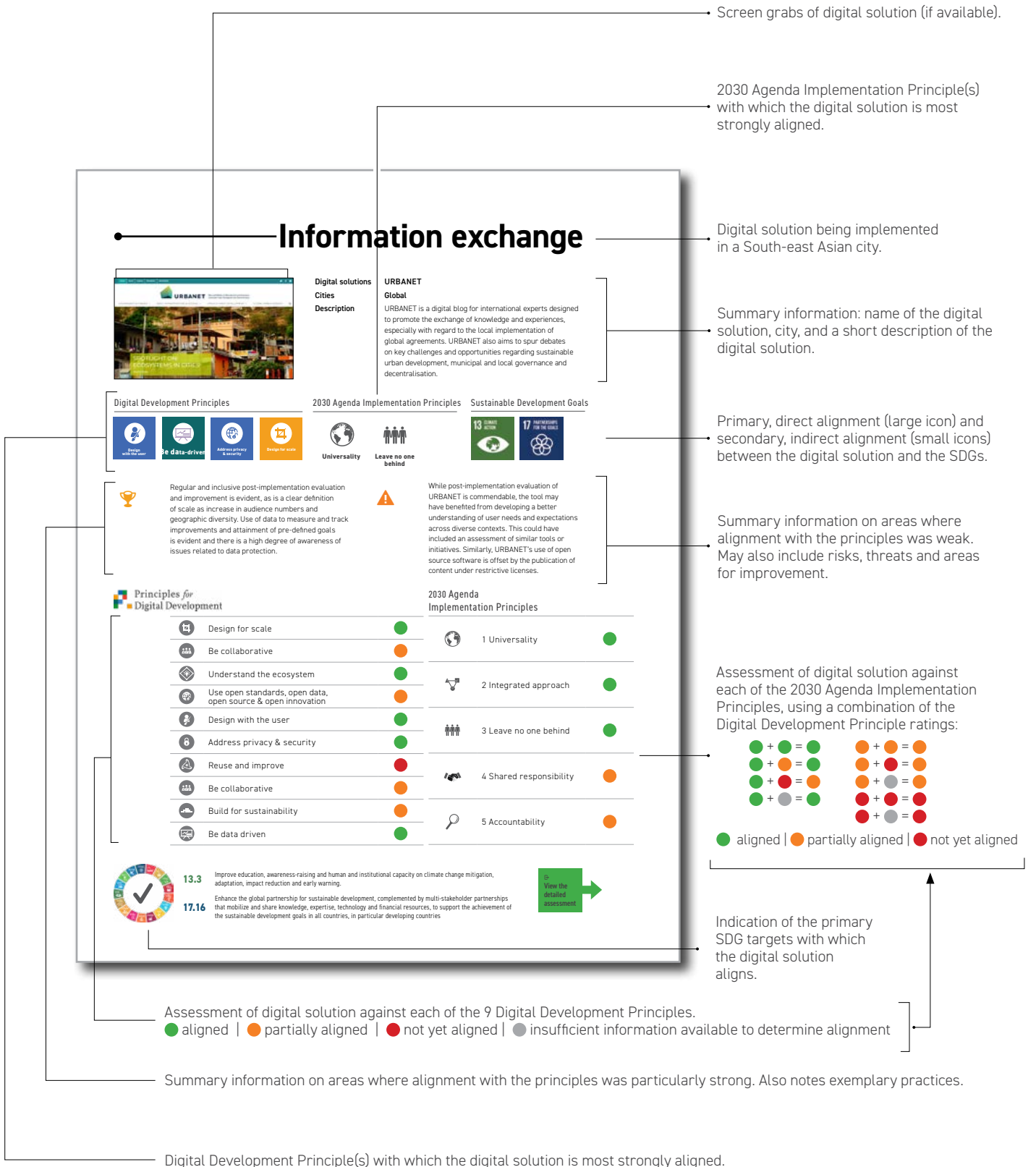
communities – as equal partners to take decisions about how a digital solution can best lead to improvements in their well-being. At the same time, digital solutions should protect rights to privacy and security of all data providers and users.

The principle of shared responsibility emphasises that *all* actors must assume responsibility for the implementation of the 2030 Agenda, including governments, civil society, citizens and academia. This clearly requires collaboration – actors working unilaterally are unlikely to develop a common purpose and understanding in operationalisation, implementation and review of the 2030 Agenda. The reuse and improvement of digital solutions for development is an indicator of such common purpose and shared responsibility taking root.

The fifth and final 2030 Agenda Implementation Principle emphasises the need for constant monitoring and review of efforts to implement the SDGs. Monitoring requires accurate and timely data, linking the principle to the Digital Development Principle for data-driven digital solutions. On the surface, sustainability and accountability may not seem like a natural fit. However, if one considers that accountability only makes sense if there is something to hold accountable, then it becomes more apparent that it is only when a development intervention endures (i.e. is sustainable) that it can be held accountable and is likely to make the kind of impact that an evaluation of the intervention should seek to measure. The Digital Development Principle of sustainability is therefore linked the principle of accountability because there is a relationship between meaningful monitoring and evaluation, and solutions that are sustainable and more likely to deliver the desired impact.
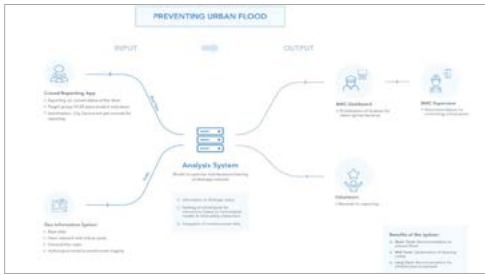
How to read the assessments

Screen grabs of digital solution (if available).

2030 Agenda Implementation Principle(s) with which the digital solution is most strongly aligned.

Information exchange

Digital solution being implemented in a South-east Asian city.

Digital solutions URBANET
Cities Global
Description URBANET is a digital blog for international experts designed to promote the exchange of knowledge and experiences, especially with regard to the local implementation of global agreements. URBANET also aims to spur debates on key challenges and opportunities regarding sustainable urban development, municipal and local governance and decentralisation.

Summary information: name of the digital solution, city, and a short description of the digital solution.

Digital Development Principles

Design with the user | Be data-driven | Address privacy & security | Design for scale

2030 Agenda Implementation Principles

Universality | Leave no one behind

Sustainable Development Goals

13 CLIMATE ACTION | 17 PARTNERSHIPS FOR THE GOALS

Primary, direct alignment (large icon) and secondary, indirect alignment (small icons) between the digital solution and the SDGs.

Regular and inclusive post-implementation evaluation and improvement is evident, as is a clear definition of scale as increase in audience numbers and geographic diversity. Use of data to measure and track improvements and attainment of pre-defined goals is evident and there is a high degree of awareness of issues related to data protection.

While post-implementation evaluation of URBANET is commendable, the tool may have benefited from developing a better understanding of user needs and expectations across diverse contexts. This could have included an assessment of similar tools or initiatives. Similarly, URBANET's use of open source software is offset by the publication of content under restrictive licenses.

Summary information on areas where alignment with the principles was weak. May also include risks, threats and areas for improvement.

Principles for Digital Development

Principle	Rating
Design for scale	🟢
Be collaborative	🟠
Understand the ecosystem	🟢
Use open standards, open data, open source & open innovation	🟠
Design with the user	🟢
Address privacy & security	🟢
Reuse and improve	🔴
Be collaborative	🟠
Build for sustainability	🟠
Be data driven	🟢

2030 Agenda Implementation Principles

Principle	Rating
1 Universality	🟢
2 Integrated approach	🟢
3 Leave no one behind	🟢
4 Shared responsibility	🟠
5 Accountability	🟠

Assessment of digital solution against each of the 2030 Agenda Implementation Principles, using a combination of the Digital Development Principle ratings:

🟢 + 🟢 = 🟢   🟠 + 🟠 = 🟠
🟢 + 🟠 = 🟢   🟠 + 🔴 = 🟠
🟢 + 🔴 = 🟠   🟠 + ⚪ = 🟠
🟢 + ⚪ = 🟢   🔴 + 🔴 = 🔴
                🔴 + ⚪ = 🔴

🟢 aligned | 🟠 partially aligned | 🔴 not yet aligned

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

17.16 Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries

View the detailed assessment

Indication of the primary SDG targets with which the digital solution aligns.

Assessment of digital solution against each of the 9 Digital Development Principles.
🟢 aligned | 🟠 partially aligned | 🔴 not yet aligned | ⚪ insufficient information available to determine alignment

Summary information on areas where alignment with the principles was particularly strong. Also notes exemplary practices.

Digital Development Principle(s) with which the digital solution is most strongly aligned.

Flood prevention

Digital solution	**FLOOD PREVENTION MOBILE APP**
City	**Bhubaneswar, India**
Description	A reporting application for mobile phones that enables citizens to report blocked drains in real-time to the city. Reports received by the city are combined with existing data to optimise the management and clearing of the city's drainage network. The aim of the tool is to minimise disruption in urban areas caused by flooding which, in turn, is attributable to blocked drains in the city.

Digital Development Principles

Understand the ecosystem · Be data-driven · Be collaborative

2030 Agenda Implementation Principles

Universality · Accountability

Sustainable Development Goals

11 SUSTAINABLE CITIES AND COMMUNITIES · 13 CLIMATE ACTION · 16 PEACE, JUSTICE AND STRONG INSTITUTIONS

🏆 Clear problem definition process by mapping problem-opportunity spaces in consultation with a broad range of stakeholders.

Clear evidence of the use of data to inform decisions taken by the project in its design, implementation and evaluation.

⚠️ No evidence of the project exploring or identifying similar solutions developed in other cities.

While the system under the ownership of the Bhubaneswar Smart City Ltd (BSCL) is subject to national data privacy and security guidelines, the was no evidence of the app taking privacy and security issues into consideration.

Principles for Digital Development

🗓	Design for scale	🟢
👥	Be collaborative	🟢
◈	Understand the ecosystem	🟢
🌐	Use open standards, open data, open source & open innovation	🟠
👤	Design with the user	🟠
🔒	Address privacy & security	🔴
⚛	Reuse and improve	🔴
👥	Be collaborative	🟢
🏛	Build for sustainability	🟢
📈	Be data driven	🟢

2030 Agenda Implementation Principles

🌐	1 Universality	🟢
⤵	2 Integrated approach	🟢
👥	3 Leave no one behind	🟠
🤝	4 Shared responsibility	🟠
🔍	5 Accountability	🟢

11.5 Significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels

Planning Information System
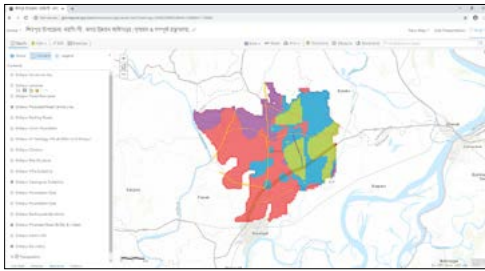
Digital solution	**PLANNING INFORMATION SYSTEM (PLIS)**
City	**Dhaka, Bangladesh**
Description	The Bangladesh Planning Commission's (PC) mandate includes the appraisal of public investment projects proposals. Previously the PC did not have a systematic way to access relevant information when evaluating project proposals. The PLIS tool supports the project proposal appraisal process by providing relevant information. The key features of PLIS are the Geographical Information System (GIS) platform and the database of the public investment project proposals.

Digital Development Principles

Design with the user · Be data-driven · Design for scale

2030 Agenda Implementation Principles

Accountability

Sustainable Development Goals

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE · 13 CLIMATE ACTION

🏆 Narrowly defined user group consulted during all the phases of the development of the tool.

Clear definition of what scaling means in the implementation context and scaling clearly taken into consideration in the design of the tool.

⚠️ No evidence that the project paid attention to understanding the ecosystem prior to planning and design; to the possibility of other, similar tools or initiatives worthy of consideration; or of sharing and consulting beyond the confines of the implementation context (i.e. government).

Principles for Digital Development

Principle	Status
Design for scale	🟢
Be collaborative	🔴
Understand the ecosystem	🟢
Use open standards, open data, open source & open innovation	🟠
Design with the user	🟢
Address privacy & security	🔴
Reuse and improve	🟠
Be collaborative	🔴
Build for sustainability	🟢
Be data driven	🟢

2030 Agenda Implementation Principles

Principle	Status
1 Universality	🟠
2 Integrated approach	🟢
3 Leave no one behind	🟠
4 Shared responsibility	🟠
5 Accountability	🟢

13.2 Integrate climate change measures into national policies, strategies and planning

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.

➡️ View the detailed assessment

⏻ Monitoring, Evaluation & Reporting

Digital solutions	**AKSARA (ONLINE MONITORING, EVALUATION AND REPORTING TOOL)**
City	**Jakarta, Indonesia**
Description	AKSARA (formerly PEP-Online) solves the challenge of Indonesia's expansive island geography. Using this online system, contributors from all 34 provinces, including Jakarta City, can report and monitor their emissions. The website also allows the Government of Indonesia to increase the transparency and accountability of the reporting system for mitigation action activities.

Digital Development Principles

2030 Agenda Implementation Principles

🔍

Accountability

Sustainable Development Goals

🏆 On-going consultation in the design and implementation phases. Use of data-centric approaches to ensure use of tool by government stakeholders. High degree of commitment and co-operation of government as both owner and user of the online tool.

⚠️ No evidence of research done prior to design and implementation, nor of consideration given to scaling or to the re-use of pre-existing emissions measuring and monitoring tools. Some evidence of openness and despite a high degree of user consultation, there is no evidence of attention to data privacy and protection.

Principles for Digital Development

🎞	Design for scale	🔴
👥	Be collaborative	🟠
◈	Understand the ecosystem	🟠
🌐	Use open standards, open data, open source & open innovation	🟠
✎	Design with the user	🟢
🔒	Address privacy & security	🔴
⚛	Reuse and improve	🔴
👥	Be collaborative	🟠
🛠	Build for sustainability	🟢
📈	Be data driven	🟢

2030 Agenda Implementation Principles

🌍	1 Universality	🟠
🔻	2 Integrated approach	🟠
👪	3 Leave no one behind	🟠
🤝	4 Shared responsibility	🟠
🔍	5 Accountability	🟢

11.6 Reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

11.A Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

13.2 Integrate climate change measures into national policies, strategies and planning

➭ View the detailed assessment ➡

15

Information exchange

Digital solutions	**URBANET**
Cities	**Global**
Description	URBANET is a digital blog for international experts designed to promote the exchange of knowledge and experiences, especially with regard to the local implementation of global agreements. URBANET also aims to spur debates on key challenges and opportunities regarding sustainable urban development, municipal and local governance and decentralisation.

Digital Development Principles

2030 Agenda Implementation Principles

Universality **Leave no one behind**

Sustainable Development Goals

Regular and inclusive post-implementation evaluation and improvement is evident, as is a clear definition of scale as increase in audience numbers and geographic diversity. Use of data to measure and track improvements and attainment of pre-defined goals is evident and there is a high degree of awareness of issues related to data protection.

While post-implementation evaluation of URBANET is commendable, the tool may have benefited from developing a better understanding of user needs and expectations across diverse contexts. This could have included an assessment of similar tools or initiatives. Similarly, URBANET's use of open source software is offset by the publication of content under restrictive licenses.

Principles for Digital Development

	Design for scale	🟢
	Be collaborative	🟠
	Understand the ecosystem	🟢
	Use open standards, open data, open source & open innovation	🟠
	Design with the user	🟢
	Address privacy & security	🟢
	Reuse and improve	🔴
	Be collaborative	🟠
	Build for sustainability	🟠
	Be data driven	🟢

2030 Agenda Implementation Principles

	1 Universality	🟢
	2 Integrated approach	🟢
	3 Leave no one behind	🟢
	4 Shared responsibility	🟠
	5 Accountability	🟠

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

17.16 Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries

Assessment summary

The assessments of digital solutions in terms of their alignment with the 2030 Agenda as presented in this report should be read as a first attempt to advise projects on areas which may require more attention as projects are implemented. Assessments such as these can be reductionist and over-simplifications of the complex socio-political realities in which projects unfold. Projects are therefore encouraged to engage with and contest the assessments presented. Doing so provides projects with the opportunity to reflect honestly on whether they are aligned with the 2030 Agenda.

It should also be kept in mind that all projects are different and, as such, not all principles may be equally applicable across a range of projects and digital solutions.

Nevertheless, the assessments presented in this report provide projects with the opportunity to become more familiar with the Digital Development Principles and to make adjustments as their projects

Where alignment with principles was either weak or partial, projects should see those assessments as opportunities for improvement rather than as absolute and fixed indicators.

Projects should revisit areas of strength as they move into the later phases of the project to ensure that implementation and impact meet their expectations.

DIGITAL DEVELOPMENT PRINCIPLES	Bhubaneswar	Dhaka	Jakarta	Global
1 Design with the user	orange	green	green	green
2 Understand the ecosystem	green	green	orange	green
3 Design for scale	green	green	red	green
4 Build for sustainability	green	green	green	orange
5 Be data driven	green	green	green	green
6 Use open standards, open data, open source & open innovation	orange	orange	orange	orange
7 Reuse and improve	red	orange	red	red
8 Address privacy & security	red	red	red	green
9 Be collaborative	green	red	orange	orange

2030 AGENDA IMPLEMENTATION PRINCIPLES	Bhubaneswar	Dhaka	Jakarta	Global
1 Universality	green	orange	orange	green
2 Integrated approach	green	green	orange	green
3 Leave no one behind	orange	orange	orange	green
4 Shared responsibility	orange	orange	orange	orange
5 Accountability	green	green	green	orange

are implemented. Where alignment with principles was either weak (red) or partial (orange), projects should see those assessments as opportunities for improvement rather than as absolute and fixed indicators. Similarly, projects should not rest on their laurels in areas where they are well-aligned with the principles. Projects should revisit areas of strength as they move into the later phases of the project to ensure that implementation and impact meet their expectations.

Comparative findings

Some general patterns are evident when comparing all the digital solutions against the nine Digital Development Principles as illustrated in the summary tables.

The digital solutions included in this assessment are generally inclusive in their design due to the fact that many projects consult widely, invest in understanding the local ecosystem and consider the needs of users rather than rushing headlong into the development phase. Projects also show strong alignment with the principle of being data-driven.

When it came to being collaborative, adopting open approaches, and designing for scale, the findings show a mixed picture across the digital solutions assesssed.

Digital solutions were generally found to be weakly aligned with the principles of addressing privacy and security issues, and of reusing or improving on existing solutions.

In the case of the 2030 Agenda Implementation Principles, it is equally difficult to make generalisable observations. It does appear that projects are faring better in terms of the guiding principle of being acountable. This suggests that strong partnerships are in place between GIZ and its partners, and that projects are subject to rigoruos monitoring and evalutions protocols. Projects also appear to give serious consideration to the sustainability of their digital solutions.

Lessons

A few lessons can be distilled from this preliminary assessment:

[1] *Be more mindful of other initiatives and solutions.* None of the digital solutions assessed showed evidence of making use of previous solutions developed by the global development community. Projects should make a concerted effort to learn from the past experiences of others and to identify possible solutions that can be reused or modified for implemention in their context. This will also create opportunities for greater collaboration and exchange between projects and between cities.

[2] *Define users more clearly from the outset.* Many projects clearly articulate the primary users of their digital solutions and refer to "the public" as secondary users. Such a broad definition is not helpful in identifying the needs of different user groups within the public; nor does it take into consideration the needs and capacities of marginalised communities. Developing detailed user personas combined with stakeholder analysis are useful approaches for narrowing down who the secondary users are.

[3] *Be more open but consider the rights of others.* Being more open can reduce unnecessary replication, ensure sustainability and create more constructive linkages between projects. In the case of digital solutions, adopting open standards can increase the interoperability of smaller pilot projects to create richer and more integrated datasets for planners, researchers and decision-makers. At the same time, projects need to be more aware of how their digital solutions may be infringing on the rights of others.

[4] *Don't underestimate the interest of others in your digital solution.* Projects developed solutions and documentation that are of interest to the broader development community. At times, projects appeared to underestimate the value of their own efforts and/or the value of the supporting documentation produced by the project.

Digital solutions by fields of action

A framework for assessing urban development actions against their (potential) impacts, trade-offs and contribution to global agenda targets has been developed in 2020 by GIZ Sector Project on Urbanisation, Municipal and Urban Development[1] with the help of Urban Catalyst Studio.

Based on a literature review, fields of action have been defined to structure the selection of several urban development actions. These broadly respond to the range of sectoral tasks and themes generally to be addressed within cities. The fields of action are: mobility and transportation, building and housing, social infrastructures, urban ecology, water and sanitation, waste and circular economies, energy, economic development and strategic urban planning.

The study further analyses, for each urban development action, their direct impacts, potential impacts and trade-offs based on 20 social, economic and ecologic categories. Moreover, it also indicates direct and indirect relevance of the different actions in regard to the 2030 Agenda, the Paris Agreement, the Sendai Framework for Disaster Risk Reduction and the New Urban Agenda commitments.

This framework proved suitable to categorize several different digital tools and solutions used at the local level (in specific or multiple cities) collected during this study. In addition to the urban development actions initially defined, a couple of additional actions have been formulated to proper describe some of the tools/solutions (using data to inform planning and create awareness at local level, scenario building, data sharing / open data, climate scenarios, crowd-sourced mapping, air quality / health, creating a culture of sharing and open spending / open budgets.)

The database lists, according to the different urban development actions, an exemplary digital solution, the city/country where it has been applied, a short description of the solution, type of solution (website, app (web and mobile), IoT, game, software (offline and cloud), open data) and the target audience (citizens, experts, government, entrepreneurs). Additionally, the contribution to the different targets within the urban SDG 11 are also specified.

Our networks would like to keep this a living document and welcome anyone to contribute. If you know of any internal as well as external tools/solutions relevant for sustainable urban development, please feel free to approach us.[2]

Fields of Action

BOX 003

- **Mobility & Transportation**
- **Building & Housing**
- **Social Infrastructures**
- **Urban Ecology**
- **Water & Sanitation**
- **Waste & Circular Economies**
- **Economic Development**
- **Energy**
- **Strategic Urban Planning**

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Ref	Urban Development Actions	Name of digital solution	City	Short description	URL / Source	Type	Target audience
MOBILITY & TRANSPORTATION							
MT-1	developing sustainable public transportation	Moovit	Multiple cities, Worldwide	Moovit, an Intel company, is a leading Mobility as a Service (MaaS) solutions company, and the world's #1 urban mobility app.	https://moovitapp.com/	App (mobile)	Citizens
MT-2	expanding cycling infrastructures	YouBike integration into bus transport system	Taipei	Taipei City considers public bicycles as part of public transportation. To reduce the usage of private vehicles and encourage wider usage public bicycles, passengers transfer between Metro and bus within one hour of returning YouBikes receive a discount. Passengers who rent a YouBike in Taipei City within one hour of transferring between Metro and bus will receive the first 30 minutes of the bike rental for free. Furthermore, the monthly "All Pass Ticket" pass holders are eligible for the 30-minute free rental for YouBike.	https://taipei.youbike.com.tw/	App (mobile)	Citizens
MT-3	improving walkability	Dérive	Multiple cities, Worldwide	Dérive app is created as a simple but engaging platform that allows users to explore their urban spaces in a care-free and casual way. It takes the ideals of the Situationists and merges it with digital means in order to create a tool that would imply an exploration of urban space in a random unplanned way as a game. Too often in urban centers we are controlled by our day to day activities thus closing off urban experiences that exist around us. Dérive app was created to try to nudge those people who are in this repetitive cycle to allow the suggestions and subjectivities of others to enter into their urban existences.	http://deriveapp.com/	App (mobile)	Citizens
MT-4	ensuring accessibility	Transmilenio for kids	Bogota	Transmilenio is the public transportation system in Bogota. In order to facilitate its use and adoption, several publicity strategies have been implemented. The Transmilenio website for kids enables them to become aware about their city and how they can use public transport to fit their needs, like go to school, the park e.g. The interactive websites shows a simple map of the transport system plus a link to the real city. The playful interface helps the kids eventually understand the mobility systems of the enormous city, where the game 'bus driver' strengthens their knowledge at an early age.	http://www.transmilenio.gov.co/WebSiteInfantil/index.html	Website	Citizens
MT-5	improving traffic safety	iCone	Multiple cities, Worldwide	ConnectedTech™ is a suite of technology devices that interface with existing traffic control equipment. Once deployed, our interrelated products intelligently report work zone data directly to navigation systems and in-dash of connected cars. The platform improves safety for drivers and workers, travel times, and eventually, will aid real-time decisions of vehicles as they approach active work areas.	https://www.iconeproducts.com/	IoT	Government
MT-6	improving existing transport infrastructure	FixMyStreet	Multiple cities, Worldwide	FixMyStreet makes it easy for anyone to report a problem without worrying about the correct authority to send it to. FixMyStreet takes care of that using the problem's location and category, and sends a report, by email or using a web service such as Open311, to the department or body responsible for fixing it.	https://fixmystreet.org/	App (web & mobile)	Citizens
MT-7	advancing mobility safety for women in (public) transportation	HarassMap	Cairo	HarassMap is based on the idea that if more people start taking action when sexual harassment happens in their presence, we can end this epidemic together. We support individuals and institutions to stand up to sexual harassment before or when they see it happen. By taking a collective stand against sexual harassment, re-establishing social consequences for harassers – and making role models of people who stand up to them – we believe that harassers can be deterred from harassing again.	https://harassmap.org/en/	App (web & mobile)	Citizens
MT-8	ensuring integration of mobility systems	Transportation Portal & Seoul Public Transportation Smart app	Seoul	Seoul Metropolitan Government ensures that citizens access mass transit information more easily through various ICT-based services, including a "path guidance service" designed for pedestrians and cyclists which works in the same way as a navigation system for motorists. Through a free app called "Seoul Transportation Portal" SMG makes sure that citizens can access real-time traffic information on any segment of the roads in the city, arrival times of the metro and buses, locations and fares of parking facilities, and number of public bicycles available.	http://english.seoul.go.kr/policy-information/traffic/	App (mobile)	Citizens
MT-9	reducing air-polluting vehicles	Greenslots	Cities in US, Canada, Singapore, Thailand	Greenlots' mobile app offers the latest features for EV drivers. Use your smart phone to locate the nearest charger, check your charging status, easily make payments and stay up to date on your account.	https://greenlots.com/ev-drivers/	App (mobile)	Citizens
BUILDING & HOUSING							
BH-1	providing affordable housing	Roomi	New York	Roomi's helps people to find flexible, affordable housing and connect with roommates who make the big city feel like home.	https://roomiapp.com/	App (web and mobile)	Citizens
BH-2	upgrading informal housing	Map Kibera	Nairobi	Complete interactive community information project using open street maps, GPS data, surveys. Use of digital tools to empower residents of the Kibera community to create the first digital map of Kibera and to transform a marginalized settlement which was previously a blank spot on the map into an increasingly visible and vibrant community.	https://mapkibera.org	App (web and mobile)	Citizens
BH-3	promoting energy-efficient retrofitting of buildings	Tracking Solar Projects	Barcelona	Information on solar projects in Barcelona presented on a map of the city	http://www.amb.cat/en/web/ecologia/sostenibilitat/transicio-energetica	Website	Citizens
BH-4	promoting the construction of eco-efficient buildings	Neurio	Multiple cities, Worldwide	The Neurio Home Energy software allows homeowners to see their energy usage and production in real-time and shows them how to save money each month.	https://www.neur.io/home-energy-monitoring/	App (mobile)	Citizens
SOCIAL INFRASTRUCTURES							
SI-1	building and sustaining public schools	karri	Multiple, South Africa	App to make paying schools for incidental expenses easier for parents	https://karri.co.za/	App (mobile)	Citizens
SI-2	creating access to health care	BlueBLE Tag	Saensuk City	Saensuk City (Thailand) is providing elderly and handicapped people with a wearable device called BlueBLE Tag to track and monitor their health and behaviour while at home. BlueBLE Tag works with the other three technologies – BlueBLE Dongle, Sensor Hub and IoT Station – to send a notification to the family of the person should there an emergency.	https://www.nationthailand.com/technology/30277848	IoT	Citizens
SI-3	ensuring safe access to lively public spaces	Minecraft	Johannesburg	The City of Johannesburg used digital applications to involve the population in the planning, design and maintenance of safe parks. In a pilot project, the city revived End Street North Park together with residents and park users. This included a workshop with UN habitat in which the computer game "Minecraft" was used for the virtual redesign of the park. The participants were able to create their own ideas for End Street North Park using Minecraft. The results were handed over to the landscape architect commissioned to take them into account in his detailed design.	Let's Talk Digital	Software (offline)	Citizens
SI-4	improving public safety	Fogo Cruzado	Rio de Janeiro, Recife	Fogo Cruzado is a mobile application that crowdsources information about incidents of violence in Rio de Janeiro and notifies people in real-time.	https://fogocruzado.org.br/	App (mobile)	Citizens
SI-5	promoting community centers	Public Lab	Multiple cities, Worldwide	Public Lab democratises science to address environmental issues that affect people. It creates an online, virtual community dedicated to sharing information on several climate-related topics such as indoor air quality, disaster response, water quality, transportation, waste, etc.	https://publiclab.org	Website	Citizens
URBAN ECOLOGY							
UE-1	creating and maintaining green urban spaces	Cleaner Greener Penang	Penang	The "Cleaner Greener Penang" initiative is the road map for the Penang to restore the living environment to deliver a cleaner and greener city, and improve the quality of life.	https://cleanergreenerpenang.com/	Website	Citizens

Ref	Urban Development Actions	Name of digital solution	City	Short description	URL / Source	Type	Target audience
UE-2	interlinking and protecting urban ecosystems	Wildlife Viewer	Barcelona	The AMB Wildlife Viewer shows, in real time, the wildlife observations made in parks and on beaches in **Barcelone through** two citizen science projects of the Institut Català d' Ornithology.	https://visorfauna.amb.cat/viewer/amb	Website	Citizens; experts
UE-3	revitalizing urban river spaces	Rivers for Life	Multiple cities, Africa, Addis Ababa, Kisumu, Kampala, Lilongwe, Nacala, Quelimane	This project is designed to support the daily challenges that local governments in Africa experience around protecting and revitalising their urban natural assets, in particular their river systems. It aims to integrate nature-based solutions into land use planning for increased resilience.	https://cbc.iclei.org/project/una-rivers-life/	Website	Citizens; experts
UE-4	implementing climate risk management	CityOne	Multiple cities, Worldwide	Digital game designed to help IBM's industry and business clients quickly understand the potential effect of 'smarter planet' city solutions in areas of energy, water, retail and banking.	http://gamesforcities.com/database/cityone-a-smarter-planet-game/	Game (digital)	Experts, government

WATER & SANITATION

Ref	Urban Development Actions	Name of digital solution	City	Short description	URL / Source	Type	Target audience
WS-1	building wastewater treatment infrastructures	PlutoCalc	Multiple cities, Worldwide	Plutocalc is a popular calculator for water treatment, wastewater, hydraulics, environmental chemistry and unit conversions. Plutocalc calculations are carefully tuned to require minimal inputs and provide accurate results based in the latest advances of science.	https://www.plutocalc.com/	App (mobile)	Citizens; experts
WS-2	providing access to safely managed sanitation services	Gather Data Hub	Antananarivo	The aim of the Antananarivo Sanitation Data Hub is to transform how sanitation data is collected, shared, analysed and used to improve sanitation provision in the 5th arrondissement of Antananarivo.	https://gatherhub.org/data-hubs	Data hub	Citizens; experts
WS-3	conserving freshwater resources	mWater	Multiple cities, Worldwide	mWater is dedicated to creating world changing technologies for water and health. Over 40,000 free mWater users in 158 countries map and monitor water and sanitation sites, conduct mobile surveys, and collaborate with local governments in real time data views.	https://www.mwater.co/	App (mobile)	Experts, government
WS-4	providing drinking water	Freewa	Multiple cities, Worldwide	Freewa is a Croatian project for drinking water sources preservation. Freewa is a web platform, a mobile app for mapping free drinking water locations worldwide, and an eco water bottle with a bag. By buying a Freewa bottle, you're turning an idea of clean drinking water free to all into reality. Let's prove together that initiatives from small Croatia can change the world.	https://findtap.com/	App (web and mobile)	Citizens
WS-5	managing rainwater	Rain water harvesting	Multiple cities, Africa	This app is practical for individuals as well as communities, local governments, and other actors who are planning to install rainwater harvesting systems in Africa	http://www.rainwaterharvesting.africa	App (mobile)	Citizens

WASTE & CIRCULAR ECONOMIES

Ref	Urban Development Actions	Name of digital solution	City	Short description	URL / Source	Type	Target audience
WC-1	implementing solid waste management	Waste Recyclers	Cape Town	Web application to find out whether residents qualify for kerbside collection of recycling and to locate recylcing drop-off points and buy-back centres in the city.	http://web1.capetown.gov.za/web1/wasterec/map	Website	Citizens
WC-2	strengthening urban-regional food systems						
WC-3	promoting a circular economy	Peerby	Multiple cites, Netherlands, Belgium	Peerby is the app and website that enables you to rent and borrow stuff from people in your neighborhood. It is fast, easy and secure! When you search on Peerby, we ask around for you in your neighborhood. If somebody has what you are looking for, we put you in touch with each other. In this way, you can find and get what you are looking for	https://www.peerby.com/	Website	Citizens
WC-4	growing food in the city	BK Farmyards	New York	BK Farmyards is a large, decentralized urban farming network based in Brooklyn, NY. BK manages several acres of land and brings healthy food directly to residents of Central Brooklyn, where many lack affordable, fresh food options and suffer from health issues related to high poverty rates.	https://bkfarmyards.com/	Website	Citizens

ECONOMIC DEVELOPMENT

Ref	Urban Development Actions	Name of digital solution	City	Short description	URL / Source	Type	Target audience
ED-1	establishing sustainable public procurement	BIRMS	Bandung	Bandung Integrated Resources Management System is an application that is integrated into the bureaucratic activities of the City of Bandung to support effcient, effective, transparent, accountable and administrative governance and public procurement.	https://birms.bandung.go.id/	Website	Citizens; government
ED-2	promoting inclusive urban economies	Jakarta Food Info	Jakarta	Provides the latest information on food prices, price increases and price comparisons between markets in Jakarta. The development of the Strategic Food Price Information Center (PIHPS) as part of strengthening food security programs to achieve the ultimate goal of improving and equitable distribution of public welfare.	https://infopangan.jakarta.go.id/		
ED-3	strengthening municipal finance	Municipal Money	Multiple cities, South Africa	Municipal Money is a web-based tool designed to inform citizens on their local authority's financial performance and allows comparisons between municipalities.	https://municipalmoney.gov.za/	Website	Citizens
ED-4	establishing infrastructures for ICT	Phuket Public Wi-Fi	Phuket	Phuket has rolled out a public Wi-Fi system that has more than 1.3 million accounts. While the service is free for users, Phuket intends to use the data it generates in the future on other applications. This detailed data is collated on a centralised platform where it provides the datal for app development; it can also be analysed to understand tourist behaviour and preferences.	Smart Cities in Southeast Asia, McKinsey		

ENERGY

Ref	Urban Development Actions	Name of digital solution	City	Short description	URL / Source	Type	Target audience
EN-1	promoting green technologies	Metropolitan Energy Observatory	Barcelona	Web platform that allows an analysis and comparison of energy supplies between all metropolitan municipalities in Barcelona in a single environment. It encourages the sharing of good practices and goal setting.	https://blogs.amb.cat/climaenergia/2019/03/13/	App (web)	Citizens; government
EN-2	enhancing decentralised renewable energy production	Chai Energy	Multiple cities, Worldwide	The free Chai Energy mobile app allows you to monitor how your appliances and electronics are performing. It provides the tools and technology to track your home's electricity use, and suggestions to save energy based on your energy data. With a clear view of what's going on in your home, you can reduce your home's electricity use by 20% on average, saving you hundreds of dollars a year.	https://chaienergy.com/solar-energy-app/	App (mobile)	Citizens
EN-3	providing safe access to electricity	Watch Your Power	Various cities, India	In 2007, The Prayas Energy Group (PEG), an Indian NGO, launched the Electricity Supply Monitoring Initiative (ESMI) to collect real-time power quality information by installing Electricity Supply Monitors (ESM) in various locations. With a Google grant, it expanded to two hundred locations in eighteen Indian states across the country. ESMI provides evidence based feedback about electricity supply quality from consumer locations across India. eMARC (Monitoring and Analysis of Residential Electricity Consumption) provides insights on electricity consumption in Indian homes from a selected sample of households and appliances. This data is recorded by advanced IoT metering systems.	https://watchyourpower.org/	IoT; App (website)	Citizens; government
EN-4	promoting sustainable cooking fuels	THRIVE	Multiple cities, Africa	THRIVE is a mobile application that provides step-by-step guidance on how to implement 60 nature-based solutions for the protection and sustainable use of natural assets in sub-Saharan African city regions. The solutions can be used either by an individual or a community.	http://www.thriveapp.co.za/	App (mobile)_	Citizens

Ref	Urban Development Actions	Name of digital solution	City	Short description	URL / Source	Type	Target audience
STRATEGIC URBAN PLANNING							
SP-1	creating a culture of citizen participation	qlue	Jakarta	Qlue is a citizen reporting app established in 2014 in Jakarta in partnership with Jakarta Government. Jakarta Government and its citizens have seen tangible results, such as reducing potential flood points by 94%, improving government performance by 61.4%, and increasing public trust to the government by 47%. Today, Qlue is trusted by more than 50 clients from government, disaster relief organizations, satellite city, companies in various industries, private companies and government agencies in Indonesia.	https://www.qlue.co.id/citizen/	App	Citizens, government
SP-2	developing an integrated urban development concept	URBANET	Multiple cities, Worldwide	URBANET fosters international dialogue on development activities worldwide and shares expertise in the areas of municipal and local governance, sustainable urban development and decentralisation Designed as a digital blog, URBANET addresses international experts and works with multiple renowned authors from around the globe to promote the exchange of knowledge and experiences, especially with regard to the implementation of global agreements such as the 2030 Agenda for Sustainable Development, the New Urban Agenda and the Paris Agreement spur debates on key challenges and opportunities regarding sustainable urban development, municipal and local governance and decentralisation and build opinions on urbanisation and sustainable urban development.	https://www.urbanet.info/	Website	Government, Experts
SP-3	developing a guiding future vision	CURB	Multiple cities, Worldwide	CURB is a climate action planning tool that helps cities prioritize low carbon investments based on cost, feasibility, and impact on energy use and greenhouse gas emissions. CURB allows cities to plan across six sectors in an integrated way private buildings, municipal buildings and public lighting, electricity generation, solid waste, transportation, and water and wastewater. CURB is being used by cities around the world to compare the cost, energy, and climate impact of different technological and policy solutions to select the most effective investments possible, develop and refine climate action plans, set informed targets, and acquire project financing.	http://www.worldbank.org/curb	Software (offline)	Government
SP-4	installing disaster response plans	Da Nang Flood Risk Map	Da Nang	Da Nang City's Climate Change Coordination Office has developed an open data driven flood risk map to increase awareness of problem areas. The open data map help inform communities of potential storms and disasters, and they are accessible to low-income households whose houses are most prone to disasters.	Smart Cities in Southeast Asia, McKinsey		
SP-5	creating post-event recovery plans	Hurrican Harvey response management	Houston	During the aftermath of Hurricane Harvey, the city of Houston worked with a local group of civic-minded technology volunteers to share a Google Sheet on social media so that residents who needed rescue or knew of someone in trouble could report their exact location and specific need. This data was converted into a crowdsourced Google map that both first responders and the "Cajun navy" of volunteer boat owners used to fan out across the metro area.	https://bit.ly/2YekPNo	Software (cloud)	Government, citizens
SP-6	applying land-use management	Social Tenure Domain Model	Multiple cities, Worldwide	A pro poor land information tool that offers a complimentary land administration system that is pro-poor, gender-sensitive, affordable and sustainable.	https://stdm.gltn.net/	Software (offline)	Government
DATA-DRIVEN URBAN DEVELOPMENT							
	Using data to inform planning and create awareness at local level	Map of the Month (GCRO)	Johannesburg	Better planning, management and co-operative government relies on improved data, information, analysis and reflective evaluation essential to the setting of clear strategic agendas shared across government, and between government and its civil society and business partners. The Gauteng City-Region Observatory is charged with building this strategic intelligence.	https://www.gcro.ac.za/outputs/map-of-the-month/	Website	Government, experts, citizens
	Using data to inform planning and create awareness at local level	Quality of Life (QoL) Survey Viewer	Johannesburg	The 'Quality of Life' survey analyses the quality of life of citizens, identifies key areas and groups needing intervention and support, and provides a holistic assessment of life in the Gauteng City-region, South Africa	http://gcro1.wits.ac.za/qolviewer/	App (web)	Experts
	Using data to inform planning and create awareness at global level	Urban Observatory	Johannesburg	The Urban Observatory is an interactive exhibit that gives you the chance to compare and contrast maps of cities around the world–all from one location. It aims to make the world's data both understandable and useful.	https://www.urbanobservatory.org/compare/index.html	App (web)	Experts, citizens
	Scenario building	Climate Adaption App	Multiple cities, Worldwide	The Climate Adaption App gives stakeholders insight in the suitability of adaptation measures in urban development projects. The app is developed to identify and rank feasible climate adaption measures within a minute, so that users can select measures and check their performance on water, drought and heat resilience.	https://www.climateapp.nl/	App (web)	Government, experts
	Data sharing / open data	Taipei City's Intelligent Transportation System (ITS)	Taipei	With ITS, bus information was transformed from the never-changing schedule into the constantly updated real-time information. Information is transferred to the open data platform where private companies can use the data to create value-add products and this means there are more ways for the public to obtain the estimated time of arrival for buses (smart signs, apps, web pages, PDA and audiotext).	Taipei City Voluntary Local Review 2019	Open data	Entrepreneurs
	Climate scenarios	Future climate scenarios for Barcelona	Barcelona	Future climate scenarios for Barcelona	http://geoportal.amb.cat/canviclimatic/visor/	App (web)	Government, experts
	Crowd-sourced mapping	Map Kibera	Nairobi	Complete interactive community information project using open street maps, GPS data, surveys. Use of digital tools to empower residents of the Kibera community to create the first digital map of Kibera and to transform a marginalized settlement which was previously a blank spot on the map into an increasingly visible and vibrant community.	https://mapkibera.org		
	Social infrastructure	My Municipal Services	Repentigny	Repentigny (Canada) streamlined how residents can find available municipal services with an online map made in partnership with GIS firm ESRI Canada. The web-based portal, My Municipal Services, allows any resident to enter their address and view an easy-to-read list of relevant information: waste collection dates, electoral district, police precinct, nearest public transport stop, winter parking regulations, and closest wi-fi access point.	https://www.ville.repentigny.qc.ca/geomatique/servicesMunicipaux/index.htm	App (web)	Citizens
OTHER							
	creating a culture of citizen participation	Dooz	Nablus	The internet platform "Dooz" informs the citizens of the Palestinian city of Nablus about relevant topics from their region and involves them in discussions.	https://www.dooz.ps/	Website	Citizens
	Social infrastructure	Indorelawan.org	Jakarta	An online forum to facilitate collaboration between volunteers, social organisations and the community. Partner of Smart Jakarta initiative.	https://indorelawan.org/	Website	Citizens
	Air quality / health	Beijing Air Quality	Beijing	Website and mobile app providing air quality information and 3-day forecasting by city district.	http://zx.bjmemc.com.cn/	Website, App (mobile)	Citizens
	Creating a culture of citizen participation	Ashtarak Public Consultations	Ashtarak	The website of Ashtarak City municipality (Armenia) integrates various online participation mechanisms that enable citizens to get involved in current debates.	http://ashtarak.am/Pages/DocFlow/Default.	Website	Citizens
	Creating a culture of citizen participation	CitizenLab	Multiple cities, Worldwide	A citizen engagement platform for local governments. Reach more citizens, manage their ideas efficiently, and make decisions based on real-time data.	https://www.citizenlab.co	App (mobile)	Citizens

Ref	Urban Development Actions	Name of digital solution	City	Short description	URL / Source	Type	Target audience
	Open spending	OpenSpending	Multiple cities, Worldwide	OpenSpending is a free, open and global platform to search, visualise and analyse fiscal data in the public sphere. Start searching, or read on to contribute data, code, or domain expertise.	https://openspending.org/	Website	Citizens
	Open budgets	OpenBudgets	Multiple cities, Worldwide	The OpenBudgets platform is designed for public administrations, citizens, NGOs, media organisations, public service companies, and stakeholders working with fiscal data. The key challenge is to provide a scalable platform that is easy-to-use, flexible, and attractive for all these different types of users. This will be realized by providing an open-source software framework and accompanying Software-As-A-Service (SAAS) platform around fiscal transparency and open budgets.	http://openbudgets.eu/		
	Air quality / health	luftdaten.info	Multiple cities, Worldwide	OK Lab Stuttgart measures air particles using the citizen science project luftdaten.info. Allows participants to install self-built sensors to generate a continuously updated particular matter map from the transmitted data.	https://luftdaten.info/en/home-en/	IoT	Citizens
	creating a culture of citizen participation	CONSUL	Multiple cities, Worldwide	CONSUL is a citizen participation tool for an open, transparent and democratic government.	http://consulproject.org/en/	Website	Citizens
	Social infrastructure	SaferSpaces		SaferSpaces is an interactive platform run by and for community safety and violence prevention practitioners in South Africa to connect, share knowledge and learn from each other	https://www.saferspaces.org.za/	Website	Citizens
	Expanding cycling infrastructures	Villo	Brussels	A governmental funded public bike system in the city of Brussels.	https://www.villo.be/en/home	App (web and mobile)	Citizens
	Expanding cycling infrastructures	Ride the City	Multiple cities, Worldwide	This app provides the safest bicycle routes for many cities around the world - San Francisco, Montreal, Barcelona, Paris, Reykjavik and many more. This website is particularly useful for large cities with busy traffic, steep hills and/or an underdeveloped bicycle culture. The website includes a blog, with posts from anyone involved in urban bicycling. A job listings platform–for any job that involves bicycling–is part of the website: from courier to saleswoman. Additionally, the maps on the website indicate the location of bicycle and sports stores.	https://www.ridethecity.com/	App (mobile)	Citizens
	Advancing mobility safety for women in (public) transportation	Hollaback!	Multiple cities, Worldwide	Hollaback! is on a mission to end harassment — in all its forms. We work together to understand the problem, ignite public conversations, and develop innovative strategies that result in safe and welcoming environments for all. We believe that we all deserve to be who we are, wherever we are.	https://www.ihollaback.org/	App (mobile)	Citizens
	Green financing	Spacehive	Multiple cities, Worldwide	Spacehive is a funding platform for ideas that bring local places to life: everything from sprucing up the park, or improving a playground, to starting a street market.	https://www.spacehive.com/	App (web)	Citizens
	Education	Cities: Skylines	Multiple cities, Worldwide	Cities: Skylines introduces players into a virtual world of open-ended city building and management. As a single-player computer game, individuals face interconnected urban planning and policy challenges. Widely recognized for its SimCity inspiration, Cities: Skylines stands out in its capacity to mirror real-world systems in a state of continual flux.	http://gamesforcities.com/database/cities-skylines/	Game (digital)	Citizens
	Providing drinking water	Tap	Multiple cities, US, Canada	Tap is a free app created to help people find fresh and clean drinking water in a Google Maps-like interface.	https://findtap.com/	App (mobile)	Citizens

URBAN DEVELOPMENT ACTIONS

Mobility & Transport

MT-1 Developing sustainable public transport can include diverse modes of transport such as: rail transport (train, metro/subway, tram), bus, ferry, cable-car, as well as sharing schemes for bikes and scooters. The provision and maintenance of the respective infrastructures necessary must be considered.

MT-2 Expanding cycling infrastructures entails the design and construction of bikeways that must increase safety for users, as well as facilities such as bike racks and special traffic signals. The expansion of cycling infrastructures is strongly associated with increased number of cyclists and better public health: if people shift from motorised private transport to bikes, air pollution is reduced, and physical activity increased.

MT-3 Improving walkability can be achieved by ensuring easy and continuous pedestrian access to public spaces, facilities, and destinations in general. Human-centred urban design can contribute to creating lively public spaces that is attractive for pedestrians, for instance by reducing parking lots in inner-city areas or by ground floor activation and tactical urbanism.

MT-4 Ensuring accessibility facilitates physical and affordable access to urban services and public life for all, including marginalised people. In particular, the design of interfaces, e.g. in local public transport, access to buildings or road crossings, should be usable for all people. In case of emergencies, accessibility is crucial for e.g. firefighters or if evacuations are necessary.

MT-5 Improving traffic safety concerns all actions undertaken for transport & mobility in cities that improve and satisfy the coexistence of different users, such as motor vehicles, cyclists and pedestrians. Special attention to vulnerable users, such as kids, the elderly and women must by payed. In addition to providing the necessary infrastructure, such as traffic lights and signs, the enforcement of laws and regulations plays an important role.

MT-6 Improving existing transport infrastructure plays an important role in better connecting neighbourhoods, cities, regions and people, both by securing and upgrading existing roads and railways for different users, but also by securing existing infrastructures against natural forces such as floods, heavy rain or avalanches.

MT-7   Advancing mobility safety for women in (public) transport and at stops is particularly important. The deployment of sensitised security personnel, better illumination, video surveillance and the accessibility and readiness of security authorities can all contribute greatly.

MT-8   Ensuring integration of mobility systems will be achieved through an integrated transport design, cross-cutting and supra-regional tariff systems, journey planning and efficient design of interfaces between different transport systems (mobility hubs), such as the seamless transition from public transport to last mile sharing services.

MT-9   Reducing air-polluting vehicles makes an important contribution to air pollution control and can be achieved by introducing restrictive laws and regulations on polluting vehicles, the introduction of parking tariffs or the general reduction of parking and traffic space. In turn, the necessary infrastructure for alternative technologies such as electric vehicles should be promoted.

Building & Housing

BH-1   Providing affordable housing for urban dwellers in need requires public subsidies for building adequate and safe housing. The absorption and reinvestment of land value increases can, for example, cross-finance social housing development. Ideally, public housing companies expand and manage the stock of social housing and are held accountable by the authorities.

BH-2   Upgrading informal housing aims at providing adequate living conditions for communities in precarious and vulnerable situations. This includes consolidating the premises, draining rainwater, improving public spaces, ensuring access to general urban services and legalising land and buildings.

BH-3   Promoting energy-efficient retrofitting of buildings aims to improve the energy balance of existing buildings. Thermal energy efficiency may be increased by focussing on better insulation, better cooling, or both, depending on local climatic conditions. Electric energy efficiency may be increased by promoting efficient appliances (e.g. exchanging light bulbs). The energy and climate costs for heating, cooling and electrification are thus reduced.

BH-4   Promoting the construction of eco-efficient buildings is characterised by following ecological building principles including the use of renewable (local) raw materials (wood, clay, bamboo, etc.) in construction and finishing. The aim is to recycle the materials used; the greening of the roof and façade can contribute to better climatic conditions inside the building and its surroundings.

Social Infrastructures

SI-1   Building and maintaining public schools for primary, secondary and tertiary education is essential, especially in cities with a growing population. They are a prerequisite for literacy, social integration and professionalisation of citizens.

SI-2   Creating access to health care requires both extensive and publicly available basic and emergency medical services as well as the provision of health-related information offerings and educational programmes with a special focus on sexual health, vaccinations and local health risks, among others.

SI-3   Ensuring safe access to lively public spaces is a prerequisite for peaceful coexistence, urban safety and equal living in public spaces. The design and maintenance of lively, open and multi-purpose public spaces contributes significantly to this.

SI-4   Improving public safety in cities requires the implementation of a fair and inclusive approach to law enforcement and justice. To ensure long-term success, corruption in security authorities must be combated, possible approaches include a fair wage and good working conditions, proper equipment and raising awareness. Special priority is given to protecting the rights of social minorities.

SI-5   Promoting community centres can be done through financial and political support to local initiatives that operate spaces for youth, neighbourhood or cultural work, but also for migrants and ethnic/cultural minorities. Especially long-term project support is necessary for the development of substantial community work.

Urban Ecology

UE-1   Creating and maintaining green urban spaces includes the development and maintenance of parks, gardens and ecologically valuable biotopes. For city dwellers, these spaces are

important for physical activity, recreation and spirituality as well as reducing impacts of natural hazards and climate change such as heat waves and extreme rain events, protecting essential ecosystem functions.

UE-2   Interlinking and protecting urban ecosystems makes an important contribution to biodiversity and as well as ecosystem functions for the city, i.e. fresh air supply, water infiltration, temperature regulation, etc. at an urban level. Networked blue-green corridors are developed on the basis of topographical and natural conditions, as the urban fabric integrates into the ecosystem. By that, plant and animal communities can spread and stabilise.

UE-3   Revitalizing urban river spaces includes renaturation and landscaping to achieve better flood management by increasing water retention while creating green recreation areas with improved public access and habitats for flora and fauna.

UE-4   Implementing climate and disaster risk management supports data-based and more efficient design of urban adaptation strategies on different scales of urban planning and design. Modelled climatic information (e.g. on weather extremes or development processes) must be considered in planning processes.

Water & Sanitation

WS-1   Building wastewater treatment infrastructures that clean and treat household and small business runoff and return it to the natural water cycle is an important component of basic public service provision. In addition, the runoff can yield energy (biogas) and recycled nutrients. The treatment infrastructure is to be provided with locally functional technologies (in terms of scale, climatic, geographic and urban conditions).

WS-2   Providing access to safely managed sanitation services includes the access to clean toilets with hand washing facilities (e.g. in public facilities), laundry facilities as well as protected infrastructure for personal hygiene (e.g. showers).

WS-3   Conserving freshwater resources aims to keep water clean and envisages the protection of aquatic ecosystems. The economical use of water in households and businesses supports this, as does the recovery of grey water for irrigation, or for flushing toilets.

WS-4   Providing drinking water that is safely managed and always available continues to be a global challenge. Climate change and increasing water scarcity as well as population growth and urbanisation pose additional challenges that require integrated water management.

WS-5   Managing rainwater is about creating infiltration and evaporation possibilities for rainwater, for instance by greening roofs, unsealing surfaces or storing rainwater temporarily (sponge city approach). Heavy rainfall events are thus softened and flooding reduced. Water reservoirs are replenished, risks for landslides and mosquito-based diseases reduced, and dry periods can be endured longer by the vegetation.

Waste & Circular Economies

WC-1   Implementing solid waste management involves the comprehensive collection and disposal of household waste. Ideally, these should be sorted and recycled; informal waste collectors can make important contributions here and should be supported in their activities.

WC-2   Strengthening urban-regional food systems focuses on the regional production, marketing and processing of agricultural products as well as food waste management, e.g. for biomass energy production. This reinforces local economic cycles and enables low-carbon supply chains. City and region thus collaborate closely, opening up opportunities for food security in cities and new development potential for rural areas.

WC-3   Promoting a circular economy can be decisively supported by municipal actors, for example in the strategic orientation of municipal water and waste recycling companies. Circular economy relies on business models that recycle and reuse materials whilst taking an integrated view of production, distribution and consumption processes.

WC-4   Growing food in the city can play an important part in food security and functions for social cohesion, public education and public health. Be it on facades, roofs, derelict land or as part of a park landscape, urban spaces provide innumerable opportunities that can be used 'productively' whilst similarly offering urban residents new economic perspectives.

Economic Development

ED-1   Establishing sustainable public procurement is an opportunity for municipalities to gear public contracting to criteria of social and environmental sustainability. The public sector can thus strengthen sustainable economic practices while purchasing ethically correct products.

ED-2   Promoting inclusive urban economies can be achieved by creating jobs for unskilled people, microfinance for start-ups or the integration of informal economies. Local authorities can structure their own operations accordingly and introduce inclusive legislation, including training, further education, counselling and qualification offers. Good cooperation with the private sector, however, remains crucial.

ED-3   Strengthening municipal finance is essential to financing sustainable development locally. It involves the generation of revenue (local tax collection, charges, intergovernmental transfers), the access to finance and loans, as well as solid financial management in order to make long-term investments in resilient infrastructures and climate action and to build capacities locally.

ED-4   Establishing infrastructures for information and communication technologies (ICT) involves first of all the basic availability of the Internet and mobile communications. The provision of urban services in potentially all sectors can become more efficient by applying digital ICT-based solutions, yet the technological sovereignty of municipalities and e-literacy of citizens must be ensured.

Energy

EN-1   Promoting green technologies in the energy, transport, water/sanitation and construction sectors by supporting climate-friendly urban development and ideally building on locally available resources. Municipally owned corporations and municipal energy utilities can set examples in this field.

EN-2   Enhancing decentralised renewable energy generation through combined heat and power plants, photovoltaics, wind energy and small hydro power plants reduces electricity reticulation costs but requires adequate grid and demand side management as well as storage solutions. It also decreases dependence on centralised (fossil) power plants.

EN-3   Providing safe access to electricity for all and in line with people's needs reduces accidents while increasing the stability and reliability of electricity supply. To gain acceptance for formalised electricity supply, affordability must be ensured, if necessary, through (cross-)subsidization of the poorer customer groups. In order to support stability of the grid at the decentralised level, adequate certification and registration procedures of the renewable energy installations should be put in place.

EN-4   Promoting sustainable cooking fuels reduces dependence on charcoal or kerosene. Alternative sustainable energy sources can be LPG (liquified petroleum gas) as well as electricity / heat from renewable sources in the long run, which in turn requires infrastructure development and capacity building.

Strategic Urban Planning

SP-1   Creating a culture of citizen participation requires good collaboration at eye level between public administration, urban society and regional/national actors. It creates a higher level of acceptance for urban development measures at different scales and requires clear and transparent rules. Also important is to ensure effective citizen consultation and grievance mechanisms as well as effective communication campaigns between authorities and civil society.

SP-2   Developing an integrated urban development plan is an important foundation for strategic planning towards sustainable urban development, which requires consideration and balancing between different development options and needs. The integrated development across sectors (ecology, transportation, housing, municipal finance, water and energy, etc.) and cross cutting topics like disaster risk management and climate change must be ensured. Likewise, the integration of different actors, i.e. public institutions, civil society and academia, etc., as well as urban, peri-urban and rural areas is key for shaping the urban development in coherence with competing interests.

SP-3   Developing a guiding future vision can, alongside global agenda frameworks, negotiate and define local development goals by involving a variety of relevant urban actors. Decisions on future development options can build on the values agreed upon.

SP-4   Installing disaster response plans requires city-wide provision of emergency services,

continuous improvement and monitoring of early warning systems, as well as a clear distribution of responsibilities in the event of a crisis.

SP-5   Creating post-event recovery plans shall include all phases and aspects of recovery. From an urban development point of view, the plans should also consider opportunities to build back better and more resilient urban structures.

SP-6   Applying land-use management can be a useful tool, particularly in growing cities with competing land use demands and multiples hazards. The aim is to determine the most appropriate, socially equitable and ecologically sound and efficient use of the available urban land and thus contributing to integrated and sustainable urban development.

SOURCE: Conceptualising Urban Development Actions Towards an Assessment of (Potential) Impacts, Trade-offs and Global Agenda Targets, GIZ Sector Project Urbanisation, Municipal and Urban Development, forthcoming

List of resources

- 2020, Conceptualising Urban Development Actions Towards an Assessment of (Potential) Impacts, Trade-offs and Global Agenda Targets – Sector Project Urbanisation, Municipal and Urban Development – forthcoming

- 2019, Digital Tools for Implementing the Sustainable Development Goals in Africa, GIZ Sector Network Governance Africa – available upon request

- 2019, **Smart Cities: International Study on the Situation and Future Trends in Smart Governance**, UCLG

- 2019, **The Digital Transformation of Metropolises**, Metropolis Observatory

- 2019, **Toolkit 2.0 Digitalisation in Development Cooperation**, BMZ

- 2018, Case Book "**Let's Talk Digital**", GIZ

- 2017, **Digitalization and Urban Development in Asia**, GIZ

- 2015, **Polisdigitocracy: Digital Technology, Citizen Engagement and Climate Action**, C40 and ARUP

- 2014, **Discussion Paper: Smart Cities**, GIZ

- 2014, **The Role of ICT in the Proposed Urban Sustainable Development Goal and the New Urban Agenda**, UN-Habitat and Ericsson

- **Digital Pathfinder**, GIZ

- **Envisioning Cities**

- **ITU's approach to using ICTs to achieve the United Nations Sustainable Development Goals** (website, last accessed 10.06.2020)

- **TechDetector**, GIZ

PROJECTS

- **Climate Digital City Hubs**

- **Climate Smart Cities India**

How to make your digital solution collaborative, open and inclusive*———

According to the report *Implementing the Principles for Digital Development: Perspectives and Recommendation from the Practitioner Community*, 'implementing all of the Principles simultaneously and with equal effect would be difficult if not impossible. It is for this reason that the Principles are proposed as guidance for consideration rather than a checklist to be followed.' Nevertheless, based on the assessment of a select number of digital solutions in South-East Asia, it is clear that there are some principles that warrant greater levels of attention. And it is therefore possible to identify a few key issues that current and future projects should consider from the outset:

01
  a We have given sufficient consideration to the actors, drivers, infrastructures and incentives that make up the context in which our digital solution will operate.
  b We have clearly defined the problem we are trying to solve and how the digital solution is expected to solve the problem.
  c Who have defined precisely who will benefit from the digital solution.

02
  a We have defined what scaling means for our project.
  b We have a plan in place that will allow us to scale our project.

03
  a We have identified the risks associated with the implementation of our digital solution as they relate to data protection and privacy.
  b We have paid particular attention to the risks and usefulness of the digital solution for marginalised communities.
  c We have verified the existence of and the effectiveness of the policies, laws and standards in place to protect others from those risks.

04
  a We have a good understanding of open standards, open data, open source and open innovation.
  b We have a plan in place to develop a digital solution that is open, and, where applicable, we have included reasons for not using open standards, open data or open source.

05
  a We have documented and shared the key processes, outcomes and lessons learned (both the successes and the failures) from all phases of the project with the broader development community.

06
  a We have allocated resources to ensure the sustainability of the digital solution.
  b We have included local stakeholders in the implementation and deployment of the digital solution.

07
  a We know how we will measure and assess the impact of our digital solution.
  b We have allocated resources and allowed sufficient time to measure and assess the impact of our digital solution.

08
  a We have aligned our project with specific SDGs.
  b We have identified which of the SDG indicators we will be informing.

Resources to guide you

The Digital Development Principles websites provides a host of resources to guide projects implementing digital solutions: https://digitalprinciples.org/principles/. Also, do not forget to consult the guides, resources and tools developed by GIZ, and by other development partners and agencies. Some of these are listed below but there is a wealth of additional information to be found online.

GIZ RESOURCES

Capacity Works Tools 2, 9, 10, 11, 13 & 17

Capacity Works Tool 30

GIZ responsible data guidelines
https://intranet.giz.de/cps/rde/xchg/giz_intranet/XSL/hs.xsl/-/HTML/177182.htm

GIZ data help desk
https://gizonline.sharepoint.com/sites/Digital-Gateway/SitePages/Data%20Helpdesk.aspx?web=1

Capacity Works Tools 33, 34, 36 & 42

Capacity Works Tools 7 & 22

The new features of the 2030 Agenda

EXTERNAL RESOURCES

SIMLab
Framework for context analysis of inclusive technology in social change projects
http://simlab.org/resources/contextanalysis/

PATH
The Journey to Scale
https://www.path.org/publications/files/TS_dhs_journey_to_scale.pdf

Digital Impact Toolkit
https://digitalimpact.io/toolkit/

Tim Davies
What is open development?
http://www.timdavies.org.uk/2012/09/10/what-is-open-development/

enterprise.nxt
Open source vs. open standards:
https://www.hpe.com/us/en/insights/articles/open-source-vs-open-standards-know-the-difference-1803.html

EduTech
Running your own FAILfaire
http://blogs.worldbank.org/edutech/failfaire-internal

BetterEvaluation
Identify potential unintended results
https://www.betterevaluation.org/en/rainbow_framework/define/identify_potential_unintended_results

United Nations
SDG Monitoring and Reporting Toolkit
https://unstats.un.org/sdgs/unct-toolkit/SDG-localization-and-implementation/

Appendix 1

Contact persons for the digital solutions assessed in this report:

1 Bhubaneswar Flood prevention solution
Teresa Kerber, Shabaz Khan &
Vaishali Nandan
Climate Smart Cities
vaishali.nandan@giz.de

2 Dhaka Planning Information System (PLIS)
Mahmud Rahman & Kaniz Fatema
Adaptation to Climate Change into the National and Local Development Planning II
mahmudur.rahman@giz.de & kaniz.fatema@giz.de

3 Jakarta Monitoring, Evaluation and Reporting (AKSARA)
Reo Audi & Yuliana Wulan
Monitoring, Reporting and Verification MRV for Mitigation Measure in Indonesia (MRV MMI),
Locally Appropriate Mitigation in Indonesia (LAMAI), Policy Advice for Environment and Climate
Change (PAKLIM) and Vertically Integrated Climate Policies (VICLIM)
reo.audi@giz.de & yuliana.wulan@giz.de
https://pprk.bappenas.go.id/aksara/

4 Global Information Exchange (Urbanet)
Johanna Pohl & Milena Wald
Sector Project Policy Advice for Urbanisation, Municipal and Urban Development
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www.urbanet.info

Appendix 2

Detailed assessments of digital solutions according to the Digital Development Principles
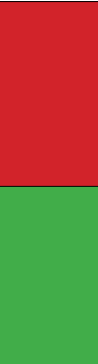
Summary of Digital Development Principles

Digital Principle	Summary
Design with the user	Successful digital initiatives are rooted in an understanding of user characteristics, needs and challenges. User-centered design – also referred to as design thinking or human-centered design – starts with getting to know the people you are designing for through conversation, observation and co-creation. Information gathered through this engagement leads to building, testing and redesigning tools until they effectively meet user needs. By designing with the users, and not for them, you can build digital tools to better address the specific context, culture, behaviors and expectations of the people who will directly interact with the technology. Designing together means partnering with users throughout the project lifecycle, co-creating solutions, and continuously gathering and incorporating users' feedback.
Understand the ecosystem	Well-designed initiatives and digital tools consider the particular structures and needs that exist in each country, region and community. Dedicating time and resources to analyze the ecosystem, or context where you work, helps to ensure that selected technology tools will be relevant and sustainable and will not duplicate existing efforts. Ecosystems are defined by the culture, gender norms, political environment, economy, technology infrastructure and other factors that can affect an individual's ability to access and use a technology or to participate in an initiative. Initiatives that do not account for ecosystem challenges are less likely to achieve their objectives or scale. This may also lead to unintended consequences. The ecosystem is fluid, multifaceted and ever-changing, requiring that digital development practitioners regularly analyze the context to check their assumptions.
Design for scale	Achieving scale is a goal that has been elusive for many digital development practitioners. Achieving scale can mean different things in different contexts, but it requires adoption beyond an initiatives pilot population and often necessitates securing funding or partners that take the initiative to new communities or regions. Different implementers may define scale as reaching a certain percentage of a population or a certain number of users. Designing for scale means thinking beyond the pilot and making choices that will enable widespread adoption later, as well as determining what will be affordable and usable by a whole country or region, rather than by a few pilot communities. By designing for scale from the beginning, your initiative can be expanded more easily to new users, markets, regions or countries if the initiative meets user needs and has local impact.
Build for sustainability	Building sustainable programs, platforms and digital tools is essential to maintain user and stakeholder support, as well as to maximize long-term impact. Sustainability ensures that user and stakeholder contributions are not minimized due to interruptions, such as a loss of funding. A program built for sustainability is more likely to be embedded into policies, daily practices and user workflow. For many digital initiatives, institutionalization by a nongovernmental organization, private company or local government is the ultimate goal in achieving long-term, positive impact. For others, institutionalization is achieved by developing a business model that has sustainable revenue generation.
Be data driven	No amount of data will lead to accelerated impact if it is not used to inform decision making. When an initiative is data driven, quality information is available to the right people when they need it, and they are using those data to take action. The data produced by a digital initiative should be used for more than just outputs, such as published work or donor reporting. Examples of the types of data that can be collected to inform decision making include surveillance, research, operations, project management and data from secondary sources collected outside of the program.
Use open standards, open data, open source & open innovation	Too often, scarce public and international development resources are spent investing in new software code, tools, data collection, content and innovations for sector-specific solutions that are locked away behind licensing fees, with data only used by and available to specific initiatives. An open approach to digital development can help to increase collaboration in the digital development community and avoid duplicating work that has already been done. Programs can maximize their resources — and ultimately their impact — through open standards, open data, open source technologies and open innovation. By taking advantage of existing investments when you are able, you can apply finite digital development resources toward creating global goods. What being "open" means for your initiative will depend on practical and technical constraints, security and privacy concerns, and the dynamics of the people and networks in your space.
Reuse & improve	Instead of starting from scratch, programs that "reuse and improve" look for ways to adapt and enhance existing products, resources and approaches. Reuse means assessing what resources are currently available and using them as they are to meet program goals. Improve means modifying existing tools, products and resources to improve their overall quality, applicability and impact. Start by identifying relevant methods, standards, software platforms, technology tools and digital content that have already been tried and tested. While an existing tool or approach may not exactly fit all your needs for reuse, consider improving and building on it, rather than creating something entirely new. The result is a tool that is now better and more reusable by all because of your improvements. Reusing and improving is not about designing shiny new objects or limiting a technology to internal use; it is about taking the work of the global development community further than any organization or program can do alone.
Address privacy & security	Addressing privacy and security in digital development involves careful consideration of which data are collected and how data are acquired, used, stored and shared. Organizations must take measures to minimize collection and to protect confidential information and identities of individuals represented in data sets from unauthorized access and manipulation by third parties. Responsible practices for organizations collecting and using individual data include considering the sensitivities around the data they have collected, being transparent about how data will be collected and used, minimizing the amount of personal identifiable and sensitive information collected, creating and implementing security policies that protect data and uphold individuals' privacy and dignity, and creating an end-of-life policy for post-project data management.
Be collaborative	Being collaborative means sharing information, insights, strategies and resources across projects, organizations and sectors, leading to increased efficiency and impact. This Principle brings all the others together in practice. People working in digital development have a shared vision to create a better world, and collaboration is essential to making this vision a reality. No single initiative or organization can make it happen alone. We have the most impact when we work together across geographies, focus areas and organizations and in partnership with local communities and governments. By collaborating, those working in digital development and beyond can pool their resources and expertise not only to benefit each initiative but also to strengthen the global community. Collaborating does not just happen accidentally; it requires time, planning and dedicating resources to look for and develop opportunities.

Bhubaneswar, India

Digital solution: Flood Prevention App

Digital Principle	Indicators	Data	Rating
Design with the user	1. User groups clearly defined in project documentation [not 'citizens', 'the public', 'government'] 2. Consultation with users before design [e.g. formal consultations, workshops, focus groups], during [e.g. user testing] and after [e.g. user feedback mechanism] the development of the tool.	1. Yes. Both the users of the app and the users of the data are specified: A: Student volunteers 15-24 years of age. B: Bhubaneswar Municipal Corporation (BMC). 2. Reference to design sprints and to consultations with BMC. "We did consider slums and involved them in the testing phase. Hence, this statement is not correct. Even doing empathy research we gave special attention to most vulnerable communities including slums. Apart from this, we also consider street vendors as one of the key contributors and beneficiaries." (Project feedback). No reference to consultation with student volunteers on the design of the app. No references to post-design testing and/or redesign.	🟧
Understand the ecosystem	1. Research report or similar outputs produced that seek to gain a better understanding of the local implementation context. Research defined as including stakeholder analysis, needs analysis, assessment of local infrastructure, an examination of local policies and legislation, and list(s) of interviews conducted with local stakeholders. 2. Contracting of local researchers as part of the project research team to ensure use of local knowledge.	1. Yes. Clear problem definition process by mapping problem-opportunity spaces in consultation with a broad range of stakeholders. "GIZ consulted with the governing bodies of Bhubaneswar Municipal Corporation, Bhubaneswar Development Authority, Bhubaneswar Smart City Limited, and NGOs on the challenges posed by Climate Change and the scope of the ICT -A project. Due to the factors discussed above urban flooding was chosen as the focus of the ICT-A project." No references to implementation context, e.g. access to mobile phones to report; distribution of skills; mobile phone coverage; etc. 2. Yes. Research was done by BMC, BSCL and GIZ.	🟩
Design for scale	1. Evidence in documentation of what scaling means to the project (e.g. regional, national, continental, global, sectoral OR as percentage of uptake among target population). 2. Evidence of decisions taken in the design and implementation of the tool based on its scalability.	1. Yes. "We promote knowledge transfer among cities and upscale into other 3 cities". 2. No reference of other cities (Guadaljara, Trujillo, Chidayo, Kochi) being consulted regarding the use of the app in those contexts. "The tool was initially developed for a small pilot area of Bhubaneswar and it is already being scaled up to the entire city. In addition, the concept of the digital solution is also being transferred to another city of India, which is facing a similar challenge of urban flooding." (Project feedback)	🟩
Build for sustainability	1. Evidence of a plan or agreement in place with project partners or other stakeholders to assume post-project ownership of the tool. 2. [a] New or in-progress project: Evidence of business plan, funding model, exit strategy or similar. OR [b] Completed project: Tool still in use after end of project.	1. Yes. Project is a partnership between GIZ and the city. City was selected to participate based on existing ICT practices and innovation. Tool was developed in consultation with the city. 2. "One of the key achievements of it is that the city has agreed to integrate the application into their command and control system as well as want to integrate the mobile application into Bhubaneswar.me, which is an integrated mobile application of Bhubaneswar Smart City Limited" (Project feedback).	🟩
Be data driven	1. Evidence in project documentation of the use of data to inform decisions taken by the project in its design, implementation and evaluation. 2. Evidence in project documentation of the project publishing or sharing data with users and other stakeholders to inform their decision-making.	1. Yes. Examples: "In Sept 2016, the city received 155 mm of rainfall overnight, 40 mm of rainfall in 30 minutes in July 2017 and 220 mm of rainfall in less than 18 hours in July 2018."; "According to models on the impact of climate change on Indian cities, a mid-range scenario foresees a 37% increase in heat-related mortality by 2080. Situated near the Bay of Bengal on India's eastern coast, Bhubaneswar lies in the area most vulnerable to cyclones (National Cyclone Risk Mitigation Project)."; "During the primary research, the BMC officials (Drainage division) mentioned that nearly 90% of flooding situations occur due to blockage in drains." 2. Yes. Data is shared from the analysis system via a BMC dashboard and with BMC supervisors via their mobile phones. Data are shared indirectly by providing volunteers who report blocked drains with incentives.	🟩
Use open standards, open data, open source & open innovation	1. a] Use of open source software to develop tool OR [b] Use of open data OR [c] Use of open educational resources OR [d] Statement in project documentation explaining why open source / data / etc. was not appropriate in the context of the project 2. [a] Programme code available on Github or similar under an open license OR [b] Data collected published as open data OR [c] Statement in project documentation explaining why open publication was not appropriate in the context of the project.	1. Yes. "The system entirely developed the digital principle of open source and open innovation." (Project feedback) Bhubaneswar was selected to participate in the project based on the availability of open data in the city. 2. No references made regarding the sharing of data collected by the city as open data or the publication of the code written. BUT "The entire application is published in GitHub." (Project feedback)	🟧
Reuse & improve	1. Evidence in project documentation of visits to conferences, meetings, or organisations in other regions, countries to learn about relevant approaches or tools. 2. Documented assessment of similar tools in terms of their relevance to the needs and objectives of the project.	1. No. No references of visits to conferences, meetings, or organisations in other regions, countries to learn about relevant approaches or tools to crowd reporting or flood prevention. 2. No. No references of assessment to other relevant tools. "One of the key principles of the project is transferability. The concept is already transferred to another Indian city and based on that they already developed a similar kind of solution. The tool was also nominated by the city to participate in an hackathon organized by BMZ." (Project response). The response deals with the issue of scalability and reuse of the developed tool rather than reusing or improving previously developed solutions.	🟥

Digital Principle	Indicators	Data	Rating
Address privacy & security	1. Evidence of documented data collection and protection policy relevant to the context of the project. In cases where tools do not collect personal data, there should nevertheless be policies for how non-personal data is stored to minimise data loss or unauthorised access. 2. Tool displays data policy to users.	1. No. No reference made to whether citizens would be required to register to use the app or how the personal data of those reporting data would be protected. "The system now belongs to the Bhubaneswar Smart City Ltd. (BSCL) and BSCL [is] governed by national data privacy and security guidelines." (Project feedback) This does not, however, resolve the issue of how the project deals with privacy and security issues when developing and implementing the app. 2. No. No reference or examples of the display of privacy policies.	🟥
Be collaborative	1. Project / tool presented at regional or global forum OR is reported on in the online media 2. Project documentation is available digitally and available on at least one of the following platforms: [a] GIZ Knowledge Management System OR [b]public website OR [c] open repository.	1. Yes. "We spread the knowledge and learnings nationally and internationally as part of the Climate Smart Cities Hub." 2. Yes. https://www.giz.de/en/downloads/20190114_CSC%20project%20level.pdf https://www.giz.de/en/worldwide/75009.html https://smartnet.niua.org/csc/index.html	🟩

SDG Assessment

SDG	Description
11.5	By 2030, significantly **reduce the number** of deaths and the number **of people affected** and substantially decrease the direct economic losses relative to global gross domestic product **caused by** disasters, including **water-related disasters**, with a **focus on protecting the poor and people in vulnerable situations**
13.1	Strengthen **resilience and adaptive capacity** to **climate-related hazards and natural disasters** in all countries
16.7	Ensure **responsive**, inclusive, **participatory** and representative **decision-making** at all levels

Dhaka, Bangladesh

Digital solution: PLIS

Digital Principle	Indicators	Data	Rating
Design with the user	1. User groups clearly defined in project documentation [not 'citizens', 'the public', 'government'] 2. Consultation with users before design [e.g. formal consultations, workshops, focus groups], during [e.g. user testing] and after [e.g. user feedback mechanism] the development of the tool.	1. Yes: "Government officials of Bangladesh Planning Commission (the central body of the country for national planning) who are involved in appraising all the public investment project proposals of the country and in preparing mid and long-term national plans." [Q] 2. Yes, all project phases [Q]. Format: "Series of workshops with the users for needs assessment. Bilateral interviews with the selected users. Regular discussion of the technical committee." [Q] Produced a consolidated report on the series of workshops. [Q]	🟩
Understand the ecosystem	1. Research report or similar outputs produced that seek to gain a better understanding of the local implementation context. Research defined as including stakeholder analysis, needs analysis, assessment of local infrastructure, an examination of local policies and legislation, and list(s) of interviews conducted with local stakeholders. 2. Contracting of local researchers as part of the project research team to ensure use of local knowledge.	1. "There is no research report but the consolidated report on the series of workshops on Focused Optimization Management for needs assessment covers most of the mentioned points." [Q] This does not, however, constitute developing an understanding of the ecosystem as defined in the Digital Principles. "The project included stakeholder analysis, needs analysis, assessment of local infrastructure, an examination of local policies and legislation. In addition, the focus group optimization was conducted. Moreover the first phase the inception report of the selected Division of PC i.e. PID was one of the first steps that has been followed. ... Without knowing the ecosystem the first phase even would not be possible. Collection of data from various relevant organizations. " (Project feedback). 2. Project designed and implemented by a local team.	🟩
Design for scale	1. Evidence in documentation of what scaling means to the project (e.g. regional, national, continental, global, sectoral OR as percentage of uptake among target population). 2. Evidence of decisions taken in the design and implementation of the tool based on its scalability.	1. Yes, (1) within government (national) and (2) through integration with other tools. "The system was initially designed to be used only in 01 out of 06 divisions of Bangladesh planning commission and the decision was to expand the use of it to all the other divisions of Bangladesh planning commission (national). The system is web based thus can be made accessible from anywhere. Another potentiality to integrate PLIS with Climate Check Method (CCM) which was developed in the first phase of the program. CCM assist the planning officials in checking the climate vulnerabilities of the project and stimulates in recognizing the risk reduction and adaptation measures within the scope of the project. To apply the CCM and to check climate resilience the project requires some secondary information except the information of DPP (Draft Project Proforma) for both project designers & the approval entity i.e. Planning officials in the planning commission. Here, PLIS can offer secondary information and make it handier. The officials do not need to look for different hard copies as secondary information." 2. Yes. "Up to now the aimed coverage of the system is Bangladesh Planning Commission but the technical platforms that were used to develop the system were carefully chosen to allow scaling up the system to the ministry level." "Web based interface and geographical information system platform were chosen." [Q] Piloting PLIS with a single ministry before making improvements and widening roll-out. [Q	🟩

Principle	Criteria	Assessment
Build for sustainability	1. Evidence of a plan or agreement in place with project partners or other stakeholders to assume post-project ownership of the tool. 2. [a] New or in-progress project: Evidence of business plan, funding model, exit strategy or similar. OR [b] Completed project: Tool still in use after end of project.	1. No description of full hand-over of tool to partner: "Partially the Physical Infrastructure Division (PID)" [Q] 2. Exit strategy will be finalised by 2021. Tool is being piloted and is still being customised. [Q]
Be data driven	1. Evidence in project documentation of the use of data to inform decisions taken by the project in its design, implementation and evaluation. 2. Evidence in project documentation of the project publishing or sharing data with users and other stakeholders to inform their decision-making.	1. Feedback from the users and key stakeholders. ICT acts of the country. Data protection laws. Access 2 information regulations." [Q] 2. "The system contains data on the public investment project proposals as well as geographical information of the country from selected sources. The system is hosted in the intranet of Bangladesh Planning Commission and can be accessible by designated users using certain username and password."
Use open standards, open data, open source & open innovation	1. a] Use of open source software to develop tool OR [b] Use of open data OR [c] Use of open educational resources OR [d] Statement in project documentation explaining why open source / data / etc. was not appropriate in the context of the project 2. [a] Programme code available on Github or similar under an open license OR [b] Data collected published as open data OR [c] Statement in project documentation explaining why open publication was not appropriate in the context of the project.	1. Use of open source software but no use of open data sources. 2. Used proprietary ArcGIS software for GIS data on recommendation of the government partner. No information provided about tool or data licensing. "The data stored in the system are public data" [Q] -- this would suggest that data could be made available more broadly. cf: "By making the government data open to all, the government aims to: encourage the development of innovative solutions for better public service delivery; enhance scope of research to identify and develop innovative solutions; create opportunities for new jobs and more investment; and make government more transparent and accountable."
Reuse & improve	1. Evidence in project documentation of visits to conferences, meetings, or organisations in other regions, countries to learn about relevant approaches or tools. 2. Documented assessment of similar tools in terms of their relevance to the needs and objectives of the project.	1. "We have done a study tour to other regions and workshops outside of Bangladesh for knowing best practices' '. [Project feedback] 2. No relevant documentation produced. [Q]
Address privacy & security	1. Evidence of documented data collection and protection policy relevant to the context of the project. In cases where tools do not collect personal data, there should nevertheless be policies for how non-personal data is stored to minimise data loss or unauthorised access. 2. Tool displays data policy to users.	1. No data protection policy: "The data stored in the system are public data and still used internally by Bangladesh planning commission. Policy of the government will be applicable." [Q] No evidence of how government policy is relevant or applicable. If the tool does not use or collect personal information, there is still no evidence that consideration has been given to how non-personal and potentially security-sensitive data will be stored securely. 2. No display to users of data protection policy
Be collaborative	1. Project / tool presented at regional or global forum OR is reported on in the online media 2. Project documentation is available digitally and available on at least one of the following platforms: [a] GIZ Knowledge Management System OR [b]public website OR [c] open repository.	1. No [Q]. 2. Research report on workshops is not available online. Not available on any other platforms or in any repositories. [Q]

SDG Assessment

SDG	Description
13.2	**Integrate climate change measures** into national policies, strategies and planning
9.1	**Develop quality, reliable, sustainable and resilient infrastructure**, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

Jakarta, Indonesia

Digital solution: AKSARA

Digital Principle	Indicators	Data	Rating
Design with the user	1. User groups clearly defined in project documentation [not 'citizens', 'the public', 'government'] 2. Consultation with users before design [e.g. formal consultations, workshops, focus groups], during [e.g. user testing] and after [e.g. user feedback mechanism] the development of the tool.	1. Yes for government users: "Ministry of National Development Planning (BAPPENAS), RAN-GRK Secretariat/ LCDI Secretariat, line ministries, 34 provincial working group for low carbon development/climate change mitigation." [Q] Non-government users are not clearly defined: "The information of mitigation action of GHG emission reduction could easily be accessed by the public." [Info sheet] 2. "First success factor of MER Online as an effective and efficient system is cooperation of the stakeholders involved. At the national level, all technical ministries which has mitigation actions in different sectors actively involved as contributors, including Ministry of Environment and Forestry, Ministry of Public Works and Housing, Ministry of Industry, Ministry of Energy and Mineral Resources, Ministry of Agriculture, and Ministry of Transportation. The RAN-GRK Secretariat acts as editor of the MER Online system supported by relevant experts." [Info sheet] Yes, all project phases [Q]. Format: "Under the coordination of BAPPENAS, with numbers of interviews, workshops and FGDs, the tool of an online reporting system was developed. The improvement of the tool also took place with several FGDs and workshops." [Q] "The improvement of the tool also took place with several FGDs and workshops." [Feedback] "The tool was developed based on technical guidelines that have been used in provincial level for about three years. Based on the experience, the flow and the user, we documented into software development documentation called Functional Specification Document (FSD) that contains core system development information as a bases for system development." [Feedback]	🟩
Understand the ecosystem	1. Research report or similar outputs produced that seek to gain a better understanding of the local implementation context. Research defined as including stakeholder analysis, needs analysis, assessment of local infrastructure, an examination of local policies and legislation, and list(s) of interviews conducted with local stakeholders. 2. Contracting of local researchers as part of the project research team to ensure use of local knowledge.	1. No evidence of a research report or similar product having been produced. 2. The solution was developed locally by a local development team. The team relied on technical guidelines that had been used at the provincial level for about three years. [Feedback]	🟧
Design for scale	1. Evidence in documentation of what scaling means to the project (e.g. regional, national, continental, global, sectoral OR as percentage of uptake among target population). 2. Evidence of decisions taken in the design and implementation of the tool based on its scalability.	1. Questionnaire response indicates that scaling was not taken into consideration because it was a national-level project. No indication of scaling at the regional or national levels; or to other countries participating in the project. [Q] 2. No evidence that scalability was taken into consideration in the design of the tool or that there is currently a sense of how the current tool could be scaled. [Q]	🟥
Build for sustainability	1. Evidence of a plan or agreement in place with project partners or other stakeholders to assume post-project ownership of the tool. 2. [a] New or in-progress project: Evidence of business plan, funding model, exit strategy or similar. OR [b] Completed project: Tool still in use after end of project.	1. Yes. [Q]. Tool is owned and was developed by the Ministry of National Development (BAPPENAS), under coordination of RAN-GRK Secretariat/ LCDI Secretariat] [Q]. "After the issuance of Presidential Regulation No.61/2011 on National Action Plan for GHG Emission Reduction (RAN-GRK), the Government of Indonesia has established a MER mechanism of mitigation actions at the national and sub-national levels which then the results are reported directly to the President. As planning ministry, the Ministry of National Development Planning (BAPPENAS) set up a national secretariat known as RAN-GRK Secretariat with one of their tasks is to coordinate activity related to GHG emission reduction, including monitoring and reporting of the mitigation actions implemented by both national and sub-national level." [Info sheet] 2. Tool completed and in use. [Q]	🟩

	Criteria	Evidence
Be data driven	1. Evidence in project documentation of the use of data to inform decisions taken by the project in its design, implementation and evaluation. 2. Evidence in project documentation of the project publishing or sharing data with users and other stakeholders to inform their decision-making.	1. Developed standards and methodologies for MER reporting; conducted review of RAN/RAD-GRK in 2015 [PPT] ". BAPPENAS act as the administrator with task to conduct final approval so that the activities submitted by technical ministries could appear in the MER Online system. In total, there are 42 methodologies for GHG emission reduction calculation from all sectors in the MER Online system, which developed by technical ministries and relevant experts coordinated by RAN-GRK Secretariat." [PPT] "The second success factor is learning and innovation. Learning process has been continuously carried out in the period of 2012-2016 when the conventional MER method taken place, by using an excel spreadsheet to be filled by provincial working group on GHG emission reduction and submitted to RAN-GRK Secretariat. Since there are 34 provinces and each province has at least 5 sectors, including forestry, agriculture, energy, transportation and waste sector, therefore the numbers are huge. Each sector requires to report their mitigation action's information in details. In general, the information needed consists of two sets of data: 1) general data of mitigation actions, including name of the activity, location, person in charge, and budget; (2) technical data of mitigation actions, including data activities, emission factors, quantity and number to be calculated into potential emission reduction subject to verification. The monitoring and reporting system using conventional method has numbers of weaknesses, including huge database storage, complex mechanism, and intensive workload for RAN-GRK Secretariat to manually compile all of the data. The data also only available limited within the government, difficult to be accessed by the public." [Info sheet] 2. "The MER Online website is also an effort of the Government of Indonesia to increase the transparency and accountability of the reporting system for mitigation action activities. The information of mitigation action of GHG emission reduction could easily be accessed by the public.." [Info sheet]
Use open standards, open data, open source & open innovation	1. a] Use of open source software to develop tool OR [b] Use of open data OR [c] Use of open educational resources OR [d] Statement in project documentation explaining why open source / data / etc. was not appropriate in the context of the project 2. [a] Programme code available on Github or similar under an open license OR [b] Data collected published as open data OR [c] Statement in project documentation explaining why open publication was not appropriate in the context of the project.	1. Yes, the Django framework was used. The Learning Module is a Moodle, a free and open-source learning management system (LMS) written in PHP and distributed under the GNU General Public License. 2. Data is made public but can only be accessed after registration [Feedback] and the main website is published under a copyright license: "Copyright 2019 Bappenas - All Rights Reserved".
Reuse & improve	1. Evidence in project documentation of visits to conferences, meetings, or organisations in other regions, countries to learn about relevant approaches or tools. 2. Documented assessment of similar tools in terms of their relevance to the needs and objectives of the project.	1. No information provided in the completed questionnaire, info sheet, website or PPT. [Q] 2. No information provided in the completed questionnaire, info sheet, website or PPT. [Q]
Address privacy & security	1. Evidence of documented data collection and protection policy relevant to the context of the project. In cases where tools do not collect personal data, there should nevertheless be policies for how non-personal data is stored to minimise data loss or unauthorised access. 2. Tool displays data policy to users.	1. No information provided in the completed questionnaire, info sheet, website or PPT. 2. No display to users of data protection policy. The sub-website for online information and resources [PRK Learning Module: Knowledge Sharing Media for Regional Low Carbon Development Planning] includes a link to a data use and retention policy page but none of the fields providing information have been completed: https://moodle.redcluwe.id/admin/tool/dataprivacy/summary.php
Be collaborative	1. Project / tool presented at regional or global forum OR is reported on in the online media 2. Project documentation is available digitally and available on at least one of the following platforms: [a] GIZ Knowledge Management System OR [b]public website OR [c] open repository.	1. Yes: "1. Sindonews (Bahasa Indonesia): https://photo.sindonews.com/view/25003/bappenas-luncurkan-aplikasi-pep-online 2. Tempo (Bahasa Indonesia): https://bisnis.tempo.co/read/1027728/bappenas-luncurkan-aplikasi-pemantau-rendah-karbon-online/full&view=ok[Q]. 2. GIZ: Yes. [GIZ Buzz]. [Q] Public website: Yes [own website]. Open Repository: Partial. Repository has limited access https://gitlab.com/gizgelamai/peponline/ or https://gitlab.com/geoenvo/peponline [Feedback].

SDG Assessment

SDG	Description
11.6	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and **municipal and other waste management**
11.A	Support positive economic, social and environmental **links between urban, peri-urban and rural areas** by strengthening national and regional development **planning**
13.2	Integrate **climate change measures** into **national policies**, strategies and **planning**

Global

Digital solution: Urbanet

Digital Principle	Indicators	Data	Rating
Design with the user	1. User groups clearly defined in project documentation [not 'citizens', 'the public', 'government'] 2. Consultation with users before design [e.g. formal consultations, workshops, focus groups], during [e.g. user testing] and after [e.g. user feedback mechanism] the development of the tool.	1. Experts and practitioners in urban development [Q]. "The new Urbanet is generally aimed at an international professional audience consisting of policy makers, academics, practitioners and civil society actors and the private sector. In particular, however, it is also aimed at a German professional public in German language, which provides more detailed information on activities by German actors in the field of international urban development, e.g. via the Scientific Advisory Council of the Federal Government, the German Bundestag, ministries the German Federal Government, Engagement Global, the German Association of Cities, universities or about the work in the communities." [Concept 2016] However, no references to the needs or interests of these audiences in the presentation of the website design in the planning phase [Concept 2016]. 2. "Before becoming a public and openly accessible weblog, URBANET was a GIZ-internal knowledge management tool. We did an evaluation of this internal tool, including interviews with GIZ colleagues/former members of this internal URBANET community to assess the value of its former content/offer and users' general wishes. The results fed into the design of the new tool." (Project feedback). Three consultations were done during and after the development phase (1 online questionnaire; 2 rounds of interviews). [Q] "In December [2016] we had URBANET evaluated in two rounds (quantitative and qualitative survey). The evaluation has shown what has worked particularly well so far - and also how URBANET can become even better in the future. Based on the evaluation, we formulate recommendations for the future of URBANET." [Recommendations for the further development of URBANET Jan 2017]. Evaluation of structure and usability in PPT [Evaluierung Oktober 2018 – September 2019].	🟩
Understand the ecosystem	1. Research report or similar outputs produced that seek to gain a better understanding of the local implementation context. Research defined as including stakeholder analysis, needs analysis, assessment of local infrastructure, an examination of local policies and legislation, and list(s) of interviews conducted with local stakeholders. 2. Contracting of local researchers as part of the project research team to ensure use of local knowledge.	1. No research done prior to development of tool [Q]. "Research was conducted by our consultant in order to help define the aim and offer of the "new" URBANET" (Project feedback). 2. No research done.	🟧
Design for scale	1. Evidence in documentation of what scaling means to the project (e.g. regional, national, continental, global, sectoral OR as percentage of uptake among target population). 2. Evidence of decisions taken in the design and implementation of the tool based on its scalability.	1. "For URBANET, scaling would mean a broad international readership. Hence, our aim in the beginning was to first establish a solid base of readership (1st phase from 2016-2018), and then (2nd phase from 2018-2020) internationalise our readers, i.e. get more and more readers from partner countries of German development cooperation." [Q] Scaling success measured as diversity in terms of readership country of origin [Q]. 2. "[Scalability] influenced mainly the second phase of URBANET and the management of its content and its editorial planning. In order to promote and internationalise our readership, we developed a new strategy, including development of country series, increasing authorship from countries of the Global South, and a targeted social media strategy." [Q] "Audience should become more international and diverse. The vast majority of URBANET users come from Germany and the USA. In order to diversify the audience, we must try to attract readers from other countries and regions. We can achieve this, for example, by specifically recruiting scientists request from certain universities in certain countries to write articles. The Scientists often have good networks in which they spread the article and make URBANET known in this way." [Recommendations for the further development of URBANET Jan 2017] "In order to attract new users, three countries are highlighted each year in the Spotlight (country series). The GIZ sets three countries for 2018. The implementation of the country strategy starts as soon as possible and is taken into account in the author research. The country series is marked differently from the thematic spotlights." [Meeting report URBANET-Kickoff April 2018]	🟩
Build for sustainability	1. Evidence of a plan or agreement in place with project partners or other stakeholders to assume post-project ownership of the tool. 2. [a] New or in-progress project: Evidence of business plan, funding model, exit strategy or similar. OR [b] Completed project: Tool still in use after end of project.	1. Tool is owned by GIZ [Q]. No plans for ownership by 3rd-party [Q]. No business plan, funding model or exit strategy [Q]. 2. Tool still operational. Launched in 2016.	🟧
Be data driven	1. Evidence in project documentation of the use of data to inform decisions taken by the project in its design, implementation and evaluation. 2. Evidence in project documentation of the project publishing or sharing data with users and other stakeholders to inform their decision-making.	1. Make use of 'monthly user evaluations, biannual reviews, user questionnaire/ interviews' [Q]. Set measurable targets during the planning phase: "Three months after the launch, we aim to attract an average of 100 visitors daily that generate 300 page impressions" [Concept 2016]. Use of web statistics and other metrics in evaluation presentation [Evaluierung Oktober 2018 – September 2019]. 2. Data sharing with BMZ and on request from others, such as authors. [Project feedback].	🟩

Use open standards, open data, open source & open innovation	1.	a] Use of open source software to develop tool OR [b] Use of open data OR [c] Use of open educational resources OR [d] Statement in project documentation explaining why open source / data / etc. was not appropriate in the context of the project	1. Used open source software [Wordpress, Matomo]. No use of open data [OD] or open educational resources [OER] [Q] -- unlikely to be relevant. No explanation provided in questionnaire as to relevance of OER or OD.
	2.	[a] Programme code available on Github or similar under an open license OR [b] Data collected published as open data OR [c] Statement in project documentation explaining why open publication was not appropriate in the context of the project.	2. Website published under copyright license: © Copyright 2020 | All Rights Reserved GIZ | Implementation: FLMH Labor für Politik und Kommunikation". No clear reuse licenses for articles published. "Articles can be republished or linked to if Urbanet is referenced as an original source. But indeed, this is not indicated on our website." [Project feedback]
Reuse & improve	1.	Evidence in project documentation of visits to conferences, meetings, or organisations in other regions, countries to learn about relevant approaches or tools.	1. No assessment of other, similar tools [Q]. from that point of view that might be correct but as mentioned before, URBANET has been an internal tool for over 20 years before deciding to turn it into an open weblog. Hence, our project in consultation with BMZ decided to improve this tool as it wasn't used any more or at least very scarcely within GIZ."[Project feedback].
	2.	Documented assessment of similar tools in terms of their relevance to the needs and objectives of the project.	2. No documentation [Q].
Address privacy & security	1.	Evidence of documented data collection and protection policy relevant to the context of the project. In cases where tools do not collect personal data, there should nevertheless be policies for how non-personal data is stored to minimise data loss or unauthorised access.	1. Yes, policy developed [Q]. Evidence in reporting of data protection concerns: "Supplements data protection" and "FLMH creates cloud access and discusses this with the Data Protection Officer" [Meeting report URBANET-Kickoff April 2018].
	2.	Tool displays data policy to users.	2. Policy available online: https://www.urbanet.info/data-protection/ [Q]
Be collaborative	1.	Project / tool presented at regional or global forum OR is reported on in the online media	1. Yes, presented at WUF9 [Q]. No reports in online media.
	2.	Project documentation is available digitally and available on at least one of the following platforms: [a] GIZ Knowledge Management System OR [b]public website OR [c] open repository.	2. a: Yes. b: Yes. "There are links to and reports about URBANET on other platforms, such as the World Urban Campaign." [Project feedback]

SDG Assessment

SDG	Description
11.3	Improve **education, awareness-raising and human and institutional capacity** on climate change mitigation, adaptation, impact reduction and early warning
17.6	Enhance the global partnership for sustainable development, complemented by **multi-stakeholder partnerships** that **mobilize and share knowledge, expertise**, technology and financial resources, to support the achievement of the sustainable development goals in **all countries**, in particular developing countries

Assessment template

Name of digital solution: _____

Digital Principle	Indicators	Data	Rating
Design with the user	1. User groups clearly defined in project documentation [not 'citizens', 'the public', 'government'] 2. Consultation with users before design [e.g. formal consultations, workshops, focus groups], during [e.g. user testing] and after [e.g. user feedback mechanism] the development of the tool.		
Understand the ecosystem	1. Research report or similar outputs produced that seek to gain a better understanding of the local implementation context. Research defined as including stakeholder analysis, needs analysis, assessment of local infrastructure, an examination of local policies and legislation, and list(s) of interviews conducted with local stakeholders. 2. Contracting of local researchers as part of the project research team to ensure use of local knowledge.		
Design for scale	1. Evidence in documentation of what scaling means to the project (e.g. regional, national, continental, global, sectoral OR as percentage of uptake among target population). 2. Evidence of decisions taken in the design and implementation of the tool based on its scalability.		
Build for sustainability	1. Evidence of a plan or agreement in place with project partners or other stakeholders to assume post-project ownership of the tool. 2. [a] New or in-progress project: Evidence of business plan, funding model, exit strategy or similar. OR [b] Completed project: Tool still in use after end of project.		
Be data driven	1. Evidence in project documentation of the use of data to inform decisions taken by the project in its design, implementation and evaluation. 2. Evidence in project documentation of the project publishing or sharing data with users and other stakeholders to inform their decision-making.		
Use open standards, open data, open source & open innovation	1. a] Use of open source software to develop tool OR [b] Use of open data OR [c] Use of open educational resources OR [d] Statement in project documentation explaining why open source / data / etc. was not appropriate in the context of the project 2. [a] Programme code available on Github or similar under an open license OR [b] Data collected published as open data OR [c] Statement in project documentation explaining why open publication was not appropriate in the context of the project.		
Reuse & improve	1. Evidence in project documentation of visits to conferences, meetings, or organisations in other regions, countries to learn about relevant approaches or tools. 2. Documented assessment of similar tools in terms of their relevance to the needs and objectives of the project.		
Address privacy & security	1. Evidence of documented data collection and protection policy relevant to the context of the project. In cases where tools do not collect personal data, there should nevertheless be policies for how non-personal data is stored to minimise data loss or unauthorised access. 2. Tool displays data policy to users.		
Be collaborative	1. Project / tool presented at regional or global forum OR is reported on in the online media 2. Project documentation is available digitally and available on at least one of the following platforms: [a] GIZ Knowledge Management System OR [b]public website OR [c] open repository.		

german
cooperation
DEUTSCHE ZUSAMMENARBEIT