Smart City
D I A L O G
International Smart Cities Network

REPORT

Data-Driven Cities

Conference for the Urban Common Good

Nairobi, Kenya and online
12–13 February 2024

This publication reports on the **Data-Driven Cities: Conference for the Urban Common Good** which was hosted by the following organisations:

Contents

List of abbreviations

BMDV	German Federal Ministry for Digital and Transport
DPAT	District Performance Assessment Tool
BMWSB	German Federal Ministry for Housing, Urban Development and Building
DDDP	District Development Data Platform
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
ICT	Information and Communications Technology
IoT	Internet of Things
KPIs	Key Performance Indicators
LLM	Large Language Models
MICDE	Kenyan Ministry of Information, Communications and The Digital Economy
NGO	Non-governmental organisation
OASL	Office of the Administrator of Stool Lands
OCL	Open Cities Lab
QoL	Quality of Life
RNI	Resilience Network Initiative
SATURN	StrATegy-compliant mUltimodal RoutiNg
SDG	Sustainable Development Goal
SEZ	Special economic zone
TUMI	Transformative Urban Mobility Initiative
USE	Urban Smart Energy
UX	User experience

Executive summary

Data-Driven Cities: Conference for the Urban Common Good – or in short, the Data-Driven Cities Conference – convened various stakeholders from multiple countries in Africa and Europe to exchange ideas on the future of our digitalising and urbanising world. After all, it is in cities and communities that many of the crucial societal transformations of the upcoming years and decades will take place.

The Kenyan Ministry of Information, Communications and The Digital Economy (MICDE), the German Federal Ministry for Digital and Transport (BMDV) and the German Federal Ministry for Housing, Urban Development and Building (BMWSB) jointly invited delegates to the Data-Driven Cities Conference. For the two German federal ministries, it marked their first collaboration hosting such an event abroad. It was also the first international event of the Kenyan-German Digital Dialogue. Represented by their state and principal secretaries, the ministries from Kenya and Germany welcomed participants on-site and online.

Through the conference's programme, participants explored three dimensions of data-driven cities: data strategies, data platforms and use cases.

A total of 21 experts from different countries, governance levels and stakeholder groups provided input in the form of keynote speeches and use case pitches. Each of these inputs was followed up in dedicated working sessions that yielded audience engagement. Together, participants discussed topics such as which types of data sets are 'quick wins' or 'hard wins' to manage via urban data platforms, what the success factors and replication potentials of use cases were and which new use cases could emerge from existing data platforms. More details on this can be found in the respective chapters of this report.

Of course, the wide variety of geographies, contexts and approaches that came together meant a lot of translation work. In addition, certain aspects may differ diametrically across use cases, such as the demographics of the citizenry and practitioners involved or access to funding. Germany, for example, faces a shortage of skilled personnel in many industries and in the public sector and has well-established institutions and spatial realities. Mostly, this combination only allows for incremental and sometimes slower (digital) interventions. Kenya, on the other hand, currently faces a relatively high level of youth unemployment but has access to several spaces allowing for greenfield development (such as Konza Technopolis). The now famous leapfrogging example of the M-Pesa payment system is a further example of the possibilities for fast and dynamic moves towards digitalisation in the country's cities and communities.

There were also many other intriguing variations in aspects that did not necessarily follow geographical lines but were certainly illuminating when analysed. Further details on these can be found in the following chapters. Such variations can revitalise processes and approaches as well as mutual learning.

However, it was also overwhelmingly clear how strikingly similar many of the challenges for to-day's cities and communities are. In the face of highly dynamic developments in spatial digitali-sation, we are seeing an accumulation of funda-mental questions around data governance, data sharing and trust-building among data holders and stakeholders. The need to remain up-to-date is always crucial. There was wide agreement that progress on these challenges can only be made through continuous knowledge exchange and the further leveraging of existing pools of open-source solutions.

The Data-Driven Cities Conference has shown that there is a vibrant ecosystem in 'Silicon Savannah' (as Nairobi and the region is often dubbed), Germany and the other regions represented. It has hopefully provided another step towards building an 'ecosystem of ecosystems', one that links various hubs for a common good-oriented development of data-driven cities. The countless contacts established and new networks emerging among individuals, often already manifesting in follow-ups, partnerships and project ideas in the weeks after the conference, are a clear testimony to that.

There can be no doubt that the urban future will also involve large-scale data processing. But it is the way in which data governance develops that will determine whether this is really directed towards serving the common good and is really leaving no one behind, or whether it will mainly nourish value capture and stratification favouring a select few. We hope that all those present and the readers of this report will be inspired anew to support the former objective.

//*Asante sana, Dankeschön and thank you.*//

Core information on the conference

Background

In an interconnected world where cities are hubs for innovation and technological development, harnessing data is an important measure to drive urban well-being and sustainability. Local governments and authorities, businesses and even citizens are increasingly engaged in data-driven projects to enhance the quality of urban life. Smart metering, digital recycling programmes and crowdsourced public transport maps are just some examples of the possibilities. Yet, not all projects fulfil their set-out objectives. Against this backdrop, the question arises of what makes data-driven projects successful. How can they be used effectively to promote welfare and sustainability in urban areas? What partnerships are required to ensure their success? The Data-Driven Cities Conference on 12 and 13 February 2024 served as a platform to find answers to these questions. Stakeholders from different sectors and countries came together to explore the
opportunities of using data for urban progress. They also addressed common challenges faced in data-driven projects. By exchanging best practices, participants were able to draw on each other's experiences and expertise.

Objective

The conference aimed to promote a common understanding of the benefits of data utilisation for well-being in cities. For this, it looked at how cities can create an enabling environment to encourage the generation, exchange and use of data. As the conference brought together experts from Germany, Ghana, Kenya, South Africa and other African countries, it provided a unique opportunity to share best practices and learn from use cases that illustrate the benefits of data use in urban spaces.

Participants

The conference brought together a diverse group of stakeholders, including national policymakers, officials from city governments, and representatives from businesses (startups and global players), civil society and academia.

It recorded a total of around 120 participants on-site and about the same figure online, with a roughly even distribution across stakeholder groups (see figure below for on-site participants). The attendance of delegates from medium-tier governance (regional level) and supranational governance was lower than for other governance levels.

All in all, delegates from six countries attended, with the largest number coming, naturally, from Kenya, where the conference took place.

Count of stakeholder groups

Stakeholder group	Count
Academia	12
Civil society	10
Local government	3
Multilateral	3
Municipality	14
National government	16
Other	8
Private business	33
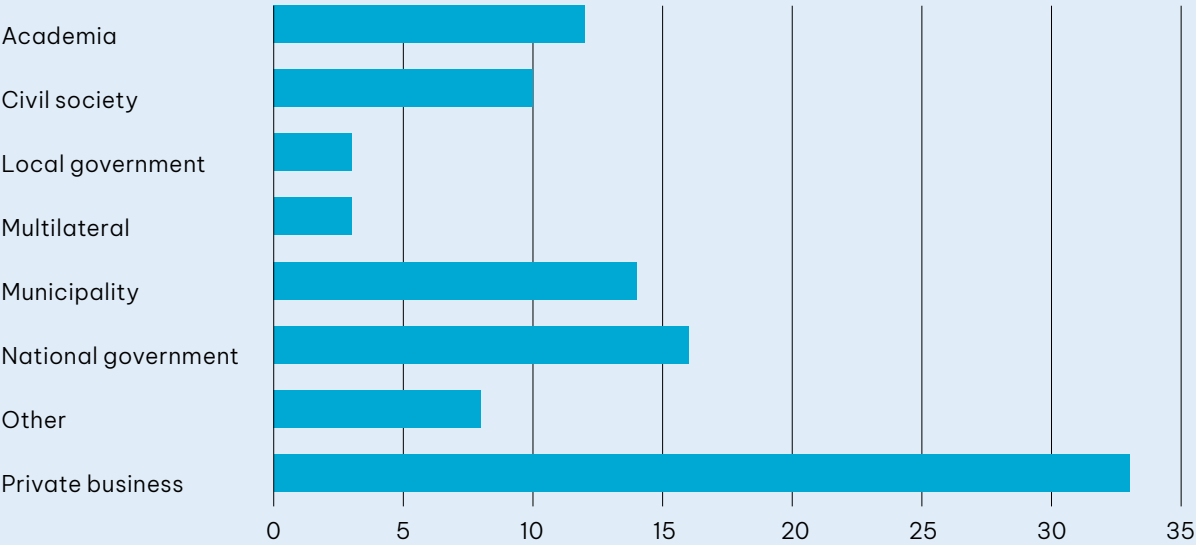
Source: GIZ

Count of stakeholder groups for on-site participants

Stakeholder group	Count
National government	39
Local government	4
Municipality	11
Civil society	10
Academia	7
Private business	25
Other (associations, media, etc.)	38
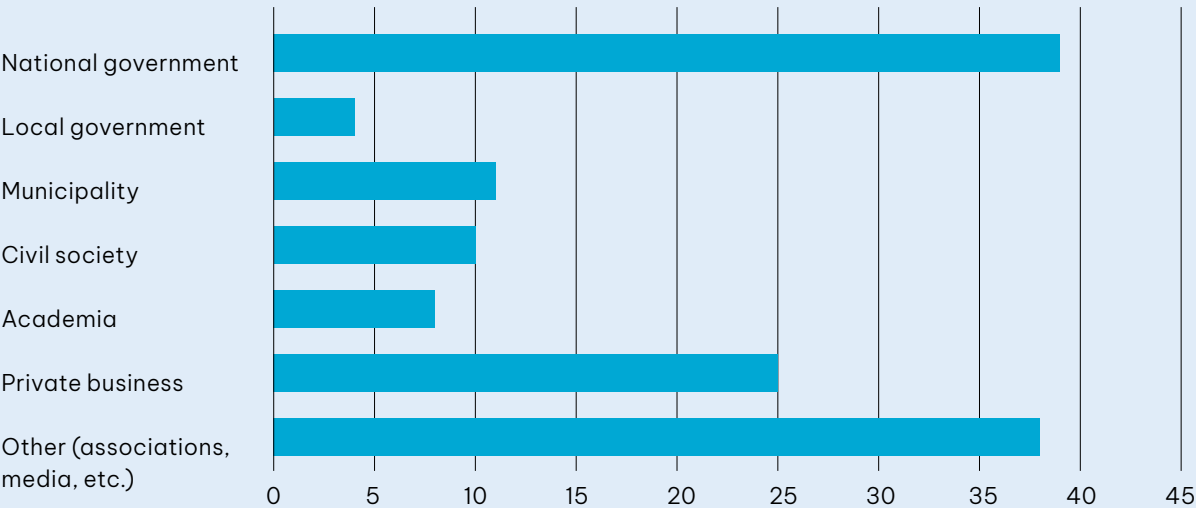
Source: GIZ

Agenda

12 February 2024

Welcome and Opening Remarks
- Stefan Schnorr, State Secretary, German Federal Ministry for Digital and Transport (BMDV)
- Dr Rolf Bösinger, State Secretary, German Federal Ministry for Housing, Urban Development and Building (BMWSB)
- Prof. Edward Kisiang'ani, Principal Secretary, Ministry of Information, Communications and The Digital Economy (MICDE)

Inputs on data strategies from South Africa and Germany
- South Africa: City of Cape Town, Hugh Cole
- Germany: BMWSB, Gudrun Schwarz

Plenary discussion on data strategies for the urban common good
- South Africa: City of Cape Town, Delyno du Toit
- Germany: BMWSB, Gudrun Schwarz

Presentation of data platform projects for urban development from South Africa, Ghana and Germany
- Germany: City Administration of Freiburg, Yourui Yeo
- Germany: BMDV, Clara Schüürman
- Ghana: Ministry of Local Government, Decentralisation and Rural Development, Judith Quarshie
- South Africa: Open Cities Lab, Richard Gevers

Working group session 1: 'Urban data platforms as a driver of development'

Presentation of use cases for data-driven urban development solutions from Kenya, Ghana, South Africa, Rwanda and Germany

Urban Mobility:
- Transformative Urban Mobility Initiative, Milcah Asamba
- Rwanda Information Society Authority, Alice Higiro
- Zweckverband Kommunale Dienste Oberland, Caroline Sester & Federal Highway Research Institute, Peter Lubrich

Urban Resource Management:
- Sheba Plastic, Mamadou Oury Diallo
- County Government of Mombasa, Victor Odenda
- Senate Chancellery of Berlin, Karen Laßmann

Urban Spatial Organisation:
- Enzkreis District, Dr Jannis Hoek
- City of Munich, Klaus Illigmann
- Leibniz Institute of Ecological Urban and Regional Development, Robert Hecht
- Office of the Administrator of Stool Lands, Atsu Norgbedzi
- Ushahidi, Angela Oduor Lungati

Working group session 2: 'Data-driven use cases for the urban common good'

Summary day 1 and closing remarks

13 February 2024

Site visit to Konza Technopolis

Organisation

The conference was co-hosted by the Kenyan Ministry of Information, Communications and The Digital Economy (MICDE), the German Federal Ministry for Digital and Transport (BMDV) and the German Federal Ministry for Housing, Urban Development and Building (BMWSB). The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH was responsible for organising the conference.

Kenyan Ministry of Information, Communications and The Digital Economy

MICDE supervises and enhances policies related to broadcasting and information. Since 2022, the ministry has been divided into the State Department of Broadcasting and Telecommunications and The State Department of ICT and Digital Economy. Their overarching objective is to transform Kenya into a competitive economy driven by knowledge and to ensure widespread availability of ICT infrastructure and services across the entire nation.

German Federal Ministry for Digital and Transport (BMDV)

BMDV is committed to creating a common international framework for digital transformation. Its goal is to make the opportunities afforded by digitalisation available to everyone and thus contribute to sustainable development. BMDV pursues this goal in bilateral Digital Dialogues with important partner countries. They serve to compare digital policy agendas, address specific issues in bilateral relations and develop joint positions for multilateral forums.

German Federal Ministry for Housing, Urban Development and Building (BMWSB)

The aim of BMWSB is to ensure sufficient, affordable and climate-friendly housing, an attractive living environment with functioning and efficient infrastructures, and attractive public spaces. BMWSB supports smart cities in Germany and worldwide in a joint dialogue between politics, administration, business, science and civil society.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

GIZ is a service provider with worldwide operations in the fields of international and development cooperation. It is a public-benefit federal enterprise and supports the German government as well as other public and private sector clients in a wide variety of areas, including economic development, digital governance, employment promotion, energy and the environment, and peace and security.

Hosts

Cabinet Secretary Eliud Owalo, Kenyan Ministry of Information, Communications and The Digital Economy

Source: Kenyan Ministry of Information, Communications and The Digital Economy (MICDE)

Eliud Owalo (FIHRM) is the cabinet secretary of the Ministry of Information, Communications and The Digital Economy in Kenya.

He worked as an economist, management consultant and strategy expert between 2001 and 2022. Until his appointment, Mr Owalo was a practising managing consultant at Eliud & Associates (E&A) Management Consultants, an international management consultancy and training firm. He holds a BA in Economics and Business Studies from Kenyatta University, an MBA in Human Resource Management from the University of Nairobi and is currently a doctor of philosophy (PhD) candidate in Strategic Management at the University of Nairobi.

He is a fellow of the Institute of Human Resource Management (FIHRM), a member of the Professional Trainers' Association of Kenya (PTAK) and a former director/council member of the Kenya School of Government (KSG).

His lead consultancy assignments in both the public and private sectors have focused mainly on macro- and micro-economics; strategic planning; business planning; organisational re-structuring; job evaluation and pay structure architecture; performance management; management of strategic change; training needs assessment (TNA); organisational design/development; executive search, selection and placement (recruitment); human resource audit; market research/surveys; and feasibility studies.

Stefan Schnorr, State Secretary, German Federal Ministry for Digital and Transport

Source: Sandra Steins/Bundesregierung

Stefan Schnorr has been serving as state secretary at the Federal Ministry for Digital and Transport since 2021.

Prior to this role, he worked for many years at the Federal Ministry for Economic Affairs and Energy, including as director-general. His career has included further roles as deputy director for federal affairs at the Representation of Rhineland-Palatinate to the Federal Government and the European Union in Berlin and as head of the Representation of Lower Saxony to the Federal Government in Berlin.

Stefan Schnorr holds a degree in law from the University of Trier and completed his legal clerkship at the Higher Regional Court of Koblenz.

Dr Rolf Bösinger, State Secretary, German Federal Ministry for Housing, Urban Development and Building

Source: Henning Schacht/German Federal Ministry for Housing, Urban Development and Building (BMWSB)

Dr Rolf Bösinger has been serving as state secretary at the Federal Ministry for Housing, Urban Development and Building since 2021. In this role, he is involved in smart city topics at both national and international levels.

Prior to that, he held the position of state secretary at the Federal Ministry of Finance from 2018 onwards. Moreover, his career has also included two roles in the Free and Hanseatic City of Hamburg, where he was head of the planning staff at the Senate Chancellery and state secretary at the Ministry of Economic Affairs, Transport and Innovation.

Previously, Dr Rolf Bösinger worked for many years in various areas at the Federal Ministry of Labour and Social Affairs.

Speakers

Alice Higiro, Ministry of ICT and Innovation, Rwanda

Alice Higiro, a project manager with over ten years of experience, currently serves as the project director of Smart Cities at Rwanda's Ministry of ICT and Innovation. She leads the Rwanda Smart City Hub, focusing on initiatives to foster smart, sustainable and resilient urban environments. An alumna of the Young African Leaders Initiative (YALI) and the World Economic Forum (WEF) Global Shaper Alumni-Kigali Hub, Alice sits on several organisational boards. She holds a bachelor's degree in Business Studies from Cardiff Metropolitan University, an MBA from the University of South Wales and is pursuing PMP certification. Passionate about technology's potential to enhance lives, she is also a talented creative arts enthusiast and a public speaker.

Angela Oduor Lungati, Ushahidi

Angela Oduor Lungati is a technologist, community builder and open-source software advocate passionate about building and using appropriate technology tools to impact the lives of marginalised groups. She has over ten years of experience in software development, global community engagement and non-profit organisational management.

She is the executive director at Ushahidi, a global non-profit technology company that helps communities quickly collect and share information, enabling them to raise voices, inform decisions and influence change.

Atsu Norgbedzi, Office of the Administrator of Stool Lands

Atsu Norgbedzi is a senior public officer at the Office of the Administrator of Stool Lands (OASL) in Ghana. He has over ten years of experience in land administration and management. In his current position, he leads initiatives related to revenue mobilisation from land use for development, land governance, land tenure, environmental sustainability and alternative dispute resolution. Atsu is a key member of the Central Committee of the OASL, integrating digital technologies to drive institutional transformation. He holds an MSc in Environmental Resource Management from the University College Dublin and a BSc in Land Economy from Kwame Nkrumah University of Science and Technology.

Caroline Sester, Zweckverband Kommunale Dienste Oberland

Caroline Sester is currently the head of mobility and traffic management at Zweckverband Kommunale Dienste Oberland. Her specialist knowledge includes project management, project control, participation workshops and traffic management. She completed a master's degree in Geography at the University of Bamberg and has gained experience through internships and working student jobs in the field of mobility consulting and data management.

Clara Schüürman, German Federal Ministry for Digital and Transport

Clara Schüürman is a senior policy officer at the German Federal Ministry for Digital and Transport (BMDV), where she coordinates open-data initiatives. She oversees BMDV data infrastructures, including the Mobilithek and Mobility Data Space, and contributes to European data initiatives such as the European Mobility Data Space. Clara is dedicated to advancing digital transformation in mobility at national and European levels. She previously worked in IT consulting and gained international experience in Sweden and the United States. She holds bachelor's and master's degrees in Economics & Business Administration.

Delyno du Toit, City of Cape Town

Delyno du Toit is the manager of the Data Science branch in the City of Cape Town, where they harness the transformative power of data to ensure all residents of Cape Town reap the benefits of informed decision-making and impactful actions. The introduction of the City of Cape Town Data Science Unit was a first for South Africa at any level of government. Prior to his current role, he applied his industrial engineering qualifications to implementing asset management systems for the rail industry in the UK, as well as leveraging data and digital services to optimise business models for prominent companies in the manufacturing, logistic and retail banking industries in South Africa.

Gudrun Schwarz, German Federal Ministry for Housing, Urban Development and Building

Gudrun Schwarz is a senior policy officer at the German Federal Ministry for Housing, Urban Development and Building. Her career encompasses many years of experience in spatial planning and digitalisation within the urban development sector. A main focus of her work is developing and implementing innovative strategies to enhance urban living through smart city initiatives. She is an expert in policy formulation and cross-sector collaboration and has a strong commitment to sustainable and inclusive solutions.

Hugh Cole, City of Cape Town

Hugh Cole currently serves as policy and strategy director at the City of Cape Town. In this role, he is responsible for policy, strategic and infrastructure planning, economic analysis, research and international partnerships. Before joining the City of Cape Town in 2017, he was the director of country programmes at the International Growth Centre, a collaboration between the London School of Economics and Oxford University. He is also a visiting fellow of the School of Public Policy at the London School of Economics.

Dr Jannis Hoek, Enzkreis District

Dr Jannis Hoek serves as sustainability officer in the Enzkreis district. In this role, he coordinates the implementation of the 2030 Agenda and advises mayors and local councils on diverse topics covered by the agenda. He is also responsible for data-based monitoring in line with the SDGs. He holds a doctorate in urban planning and has several years of research experience in municipal development, covering natural and social science issues, technical infrastructure systems and innovative aspects.

Judith Quarshie, Ministry of Local Government, Decentralisation and Rural Development, Ghana

Judith Quarshie is an information technology officer, currently serving as the head of the Library and Documentation Unit at the Ghanaian Ministry of Local Government, Decentralisation and Rural Development. Additionally, she holds the role of coordinator for the District Development Data Platform (DDDP), overseeing the integration of project implementation on data platforms across 261 metropolitan, municipal and district assemblies in Ghana.

Before assuming her current position, Judith gained valuable experience as the head of IT at the Thai Union Group of companies (TTV Limited), specialising in database management. She earned her BSc in Computer Science and Information Systems from Kwame Nkrumah University of Science and Technology, Ghana.

Karen Laßmann, Senate Chancellery of Berlin

Karen Laßmann has served as the project lead for the 'Modellprojekte Smart Cities' at the Senate Chancellery of Berlin since 2020. Last year, she also took on the position of head of the Smart City Unit at the Senate Chancellery. She holds a degree in Business Administration from the Technical University of Berlin and has worked in various positions in Berlin public services since 2006.

Klaus Illigman, City of Munich

Klaus Illigmann is the head of the Strategic Urban Development Planning Unit at the City of Munich's urban planning department. His responsibilities include overseeing Munich's urban development plans, such as 'Perspective Munich' and the new 'STEP 2040', as well as coordinating Smart City activities across the department. Additionally, he serves as the speaker of the Bavarian Innovation Platform 'Smart Cities/Smart Regions' and is involved in steering committees and strategy groups related to digitalisation and standards in urban development.

Mamadou Oury Diallo, Sheba Plastic

Mamadou Oury Diallo is the founder of Sheba Plastic, a circular solution using technologies like QR codes and smart bins to reduce plastic pollution in Africa. As a passionate advocate for sustainable solutions, he envisions data-driven cities that combat plastic pollution. His pioneering work in data-driven waste management through Sheba Plastic aligns with his commitment to fostering smart, eco-friendly cities.

Milcah Asamba, Transformative Urban Mobility Initiative

Milcah Asamba is an independent qualitative researcher based in Nairobi, Kenya. She has over 15 years of experience exploring and understanding behaviour and user experiences through participatory research methods, ethnography, focus groups, in-depth interviews and contextual understanding. She has worked for research agencies in Kenya covering the wider East African region. She is currently pursuing a doctorate in Development Studies at Jomo Kenyatta University of Agriculture and Technology, focusing on hidden hunger, health, climate change and sustainable development.

Peter Lubrich, Federal Highway Research Institute

Peter Lubrich is a dedicated researcher at the Federal Highway Research Institute (BASt) in Germany, specialising in the intricacies of data exchange within the realms of connected and automated mobility. He actively contributes to various projects focused on conceptualising and implementing data ecosystems, platforms and applications. Peter has previously worked with consulting firms specialising in transportation planning and traffic engineering, both in the USA and Germany. This background provides him with a unique perspective and a nuanced understanding of the challenges and opportunities within the domain.

Richard Gevers, Open Cities Lab

Richard Gevers is the founder of Open Cities Lab, a civic technology lab with a focus on the development of open data for application to urban challenges that operates within cities in Africa. He is also the CEO and co-founder of Tenji, a data science startup with a focus on building data products and tools that will aid cities of the future. Prior to founding Open Cities Lab, Richard worked as an economist, based in Durban, South Africa, where he interacted with both private clients and all tiers of the South African government on a range of projects in various sectors. He is an entrepreneur with a dedication to the advancement of African communities through dynamic solutions and tools, hoping to empower socio-economic development and to effect social change. He has a deep interest in openness and transparency in society.

Robert Hecht, Leibniz Institute of Ecological Urban and Regional Development

Dr Robert Hecht is senior researcher in the group 'Spatial Information and Modelling' at the Leibniz Institute of Ecological Urban and Regional Development (IOER) in Dresden (Germany). He has expertise in geoinformatics, cartography and applied remote sensing. He earned his doctorate at the TU Dresden studying the development of approaches for automatic building classification and detection of urban structures.

Victor Odenda, County Government of Mombasa

Victor Odenda has been employed by the County Government of Mombasa since 2020 and holds a position in its energy department. His responsibilities include the overseeing of programmes related to renewable energy, energy efficiency, and resource mobilisation. Victor holds a Bachelor's degree in Economics and Sociology from Agra University, India.

Yourui Yeo, City Administration of Freiburg

Yourui Yeo is the use case manager for the Smart Cities Project 'DATA:SPACE:FREIBURG' at the City Administration of Freiburg. She is responsible for designing and implementing a structured use case management process to promote sustainable urban development.

Yourui has an MSc in Environmental Governance and a BA in Economics and Organisational Studies. She is passionate about bringing together different stakeholders to drive the urban sustainability transformation.

Presented content

Overview

The Data-Driven Cities Conference marked the first collaboration between the Kenyan Ministry of Information, Communications and The Digital Economy (MICDE), the German Federal Ministry for Digital and Transport (BMDV) and the German Federal Ministry for Housing, Urban Development and Building (BMWSB). It was also the first international event of the Kenyan-German Digital Dialogue. The conference was officially opened by Prof. Edward Kisiang'ani, Principal Secretary for Broadcasting and Telecommunications at MICDE, State Secretary Stefan Schnorr of BMDV and State Secretary Dr Rolf Bösinger of BMWSB. All three hosts emphasised the great importance of transnational cooperation for the development of digital solutions for the urban common good. Their message was clear: Together we can use digital tools to make our cities more liveable.

The Data-Driven Cities Conference thus aimed for a comprehensive exchange of ideas between stakeholders from Germany, Kenya, Ghana, South Africa and other African countries on the development of liveable and sustainably digitalised urban futures. Participants elaborated on this in a comprehensive manner, with the agenda including sections on data strategies, data infrastructures for data-driven cities, i.e. (urban) data platforms, and use cases. These could be built on pre-existing infrastructures or set up independently from them but with a view to integration.

The agenda followed the ideal chronology of the development of common good-oriented data-driven cities, in which common ground is first found on data usage strategy in terms of what data should be used for and how it should be processed. Subsequently and in alignment with the strategies, the (public) establishment of data platforms ensues. Lastly, a dynamic development of use cases grounded in data strategy and platforms can be expected, as well as the linkage of existing use cases back to a data infrastructure oriented to the common good. In reality, of course, these steps go through various iterations, adaptions or even variations of order as practice often differs from this linear model. Use cases and platforms often already exist and an additional task is their consolidation and renewed coordination according to the needs of the city.

Data strategies

With the help of data, a city can ultimately better recognise its own internal processes, issues, conditions, resources and potentials. Any 'self-conscious' city, i.e. one that directs the collection and processing of data towards a purpose, rather than this being an end in and of itself, ought to formulate values and principles for proper data governance. Often, this is codified in a data strategy.

Following the introductory remarks of the above-mentioned representatives of the hosting Kenyan and German ministries, a section on data strategies ensued with presentations from the federal level in Germany and from the city level of Cape Town, South Africa.

First, Ms Gudrun Schwarz, senior policy officer of the German Federal Ministry for Housing, Urban Development and Building, led the audience through Germany's pillars of smart city development in her keynote address. These include the national dialogue platform Smart Cities, the federal funding programme for Model Projects Smart Cities (MPSC) and international knowledge transfer through the International Smart Cities Network (ISCN). The national dialogue platform involves the regular convening of around 70 experts from cities, districts and municipalities, as well as from municipal umbrella associations, federal states and departments, scientific organisations, business, civil society and professional and societal associations; it was through this platform that the German Smart City Charter (2017) and the guidelines for municipalities on Data strategies for common good-oriented urban development (2021) and Accelerated change and resilience (2023) were developed. With the objective of a strategic use of data in the public interest, these documents enshrine guarantees for transparency in decision-making processes and ethical principles, as well as for data sovereignty or data sharing through partnerships and cooperations. One of the practical implications of this is the adherence to the principle of 'public money, public code' for the MPSC funding programme.

Ms Schwarz then proceeded to illustrate how this strategic foundation manifests itself in selected measures and projects, such as the Connected Urban Twins (CUT) initiative of the cities of Hamburg, Leipzig and Munich. Lastly, lessons learnt and recommendations were shared with the audience for further discussion and consideration, among them the adjustment of broader strategies to local context and the importance of keeping in mind the viability and robustness of data governance, as propositions and approaches are dynamic and continuously contested. This can be achieved through a continuous strengthening of interoperability and standards as well as capacity building at local levels. The outlook is promising due to the ever-more sophisticated combination of data sets for accurate information and the discovery of new patterns as well as, for example, a deepening of mutual collaboration through (decentral) data spaces.

Hugh Cole, the policy and strategy director at the City of Cape Town, complemented this with a strongly municipal perspective. After offering a brief overview of the chronology of Cape Town's more than 20-year journey through data and research reform, and how it led to the institutional setup of a policy and strategy department, as well as a dedicated data science team, he gave a more in-depth analysis of the city's internal and public data strategy. Within the administration and based on the fundamental idea of data being a shared asset and a collection of public goods for Cape Town, it follows that data should be multi-use and worked with across departments, spheres of government and with the public. The functional embodiment of this was the build-up of data science capacities within the city administration; this matched the wide range of disciplines within the data science field with (mostly) open-source tools. The data science team's projects are straightforwardly linked to use cases and immediate needs such as cost-benefit analyses, data-driven pandemic responses, data collection on informal settlements and data-driven electricity asset management.

Mr Cole stressed that Cape Town's data strategy is continuously evolving and aims to bring together sound and ethical data governance with a proper data culture and the necessary data architecture. This means further developing the hitherto successful beginnings of building a team of skilled people and the use of open-source tools, as well as the ongoing provision of analysis-ready data sets. As an inspiring end point for his keynote speech, he left the audience with the question of whether developing cities in particular have the opportunity to 'leapfrog' to modern data approaches.

Data platforms

The next section offered keynote speeches from four different urban data platforms, each with different aims, contexts and topical focuses. Yourui Yeo began with her presentation of DATA:SPACE:FREIBURG, the City of Freiburg's ambitious project, as one of the MPSCs in Germany, to integrate several existing city platforms into one data space. As such, this was an example of an urban data platform infrastructure led by a city administration.

She was followed by Judith Quarshie, who presented the District Development Data Platform (DDDP) from Ghana, which has a wider geographical scope, bringing together local, regional and national data for reporting and monitoring. The platform was designed as a single standard for urban data management, prioritising interoperability with other national platforms. The project thus responds to the challenges faced by many municipal administrations in Ghana, such as inadequate data infrastructure and access to data, as well as poor data management.

Next was Richard Gevers from the Open Cities Lab (OCL) in South Africa, who helped set up the Durban Edge Open Data Portal for the eThekwini municipality. The platform aims to open up economic data in order to promote evidence-based decision-making by economic stakeholders. The eThekwini municipality has collaborated closely with OCL, thus providing an example of how non-profit organisations can become crucial contributors to the digital infrastructure of a data-driven city.

Initial classification of platforms
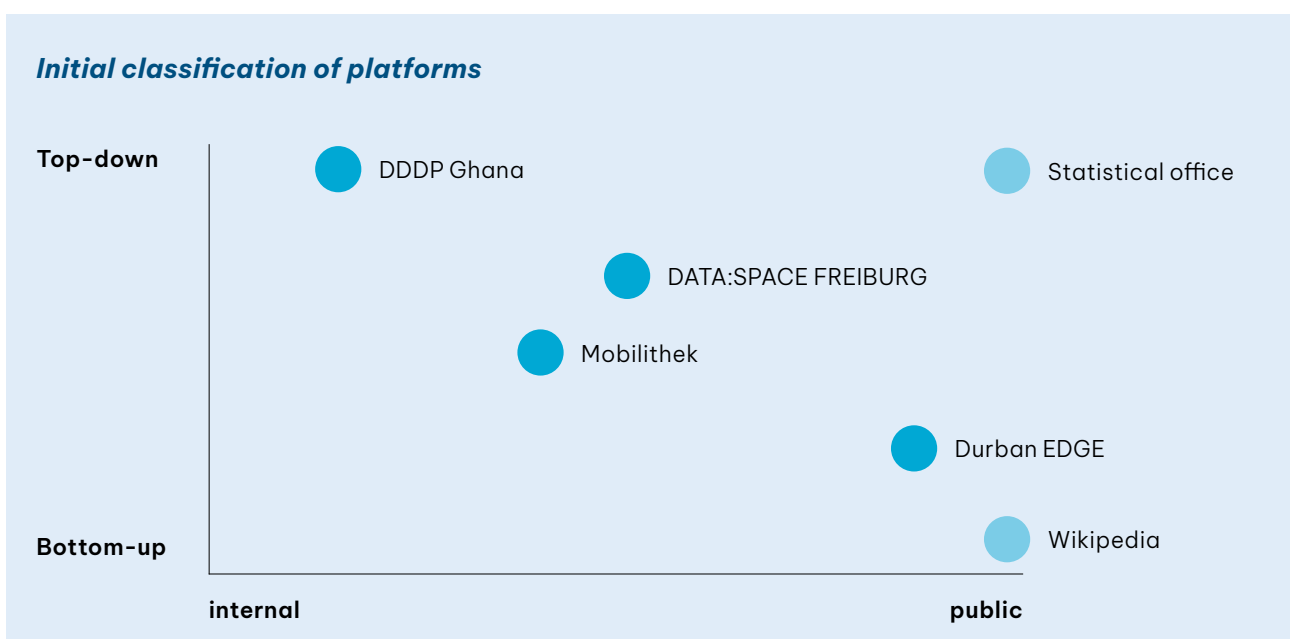
Source: GIZ

Clara Schüürman (Federal Ministry of Digital and Transport) finished off the platform presentations by giving the perspective of a data platform set up at national level but readily available for municipal use and purposes. The Mobilithek is a platform for sharing mobility data among different stakeholders, offering both data with individual usage rights and open data.

In sum, these keynote speeches encompassed a fascinating variety of platforms for data-driven cities, giving an overall idea of the potential opportunities available when an ecosystem of different drivers comes together for the benefit of a city.

Profiles of each presented platform can be found in the annex below.

Use cases

The last section of conference day one was dedicated to use cases. A total of eleven were presented, clustered around the themes of a) urban mobility, b) urban resource management and c) urban spatial organisation. The use cases were an ideal addition to the programme as they showed how diverse the possible applications of data-based solutions in urban development are. These contributions not only offered inspiring best practices but also highlighted challenges and lessons learnt.

A profile of each use case can be found in the annex below.

Aggregated impressions/ patterns

In the context of the conference, platforms and use cases were briefly surveyed on some of their characteristics to gain an aggregated impression of the ecosystem convening at the event. While these may offer interesting indications and ideas of scopes for some aspects of use cases and platforms, it is important to note that there is limited potential for generalised conclusions.

In the case of this conference, nearly every use case had public administration involvement, but the involvement of stakeholders from higher government levels was only reported by half of them. There was no clear trend for any other stakeholder groups (private business, research institutes, associations, civil society groups or citizens); their involvement instead depended on the individual use cases.

Due to the wide variety of scopes and geographies, the comparison of reported cost estimates is of limited and very relative informational value. However, none of the use cases or platforms had set-up costs exceeding EUR 10 million and most were in the range of EUR 50,000–300,000 or EUR 1–2 million.

Reported range of set-up costs (EUR) (schematic)

| 50,000 | 300,000 | 1–2m | | 10m |
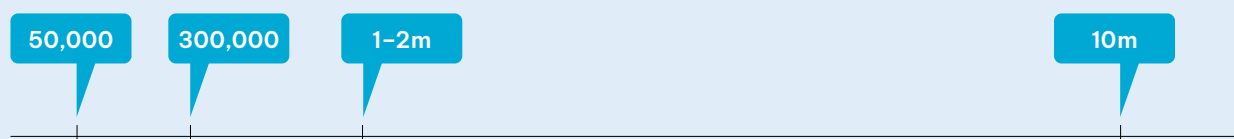
Source: GIZ

Reported maintenance costs were always a fraction of the initial set-up costs. This clearly shows the advantage of the cost cycles of immaterial, digital solutions and also how much of the financial burden is to be expected at the beginning of project cycles.

The software employed was overwhelmingly open source, in one case complemented by proprietary software. In a few instances, only proprietary licensing models were applied, but even these are considering open-source licensing for the future.

Similarly, all but one of the entries used and provided open data. APIs were also widely employed. There was a high prevalence of assessment criteria; however, these were not always in the form of (quantitative) KPIs. When asked about processed data volumes, not all use cases and platforms were able to provide these. However, an overall scope of around 500 MB per month at the lower end (largely using .csv) and around 4 TB per month at the upper end shows how there is room for both small and big data solutions in successful and enhanced data-driven cities. This is a good reason to ensure that the scale of data remains a discussion point in the future.

Site visit: Konza Technopolis

Central to day two of the conference was a field trip to Konza Technopolis, the Kenyan government's ambitious and far-reaching greenfield development that aims to create a smart city and innovation ecosystem. As a clear instance of place-based policy, it bundles together various policy approaches, including its designation as a special economic zone (SEZ), the specific attraction of best-in-class data centres, the establishment of a post-graduate research university and an additional focus on the creative sector. While touring the extensive site after listening to a detailed keynote speech on the project, lively discussions developed on the similarities and differences between greenfield and brownfield developments, the challenges of coordinating both planned and organic agglomeration and growth, and the right mix of public investment and leveraged private engagement. There were also technical discussions on linking resource streams (water and electricity) to various applications in the most effective and efficient manner. The group returned to Nairobi with a lasting curiosity on what the future holds for the project.

Working sessions

The conceptualisation of the working sessions

All conference attendees, both on-site and on-line, were invited to attend two dedicated working sessions offering the opportunity to come together and exchange insights, experiences and ideas on the journey towards data-driven cities designed for common good-oriented urban development.

In working session 1, 'Urban data platforms as the driver of common good-oriented development', groups were allocated specific questions to discuss, each with one of the previously presented platforms as a reference point.

For example, one sub-group discussed which potential data sets should be managed via urban data platforms and whether these can be deemed to be either 'quick wins' or 'hard wins' in terms of collection, processing, provision and overall data governance. Other groups discussed in more detail the factors that could improve data foundation, interoperability and the accessibility of urban data platforms or what success factors and challenges exist and how replication could succeed. Moreover, the ideation of hypothetical use cases stemming from platforms was encouraged.

In working session 2, 'Setup of use cases for the urban common good', each group discussed the same set of questions but in relation to one specific use case and its presenter.

The questions were:

1. *What success factors could be identified?*
2. *How is collaboration promoted?*
3. *How could the use case (at hand) be replicated?*
4. *What could be further improved in this use case?*

Results

Some themes, thoughts and ideas from the working groups' discussions can be summarised as follows:

In the discussion on potential data sets to be managed via an urban data platform, there was consensus that census data, employment data, travel times and waste management are some of the 'classical data sets' that have already been collected by statistical offices over the long term. As such, managing these via data platforms was widely perceived as a 'quick win', especially if enhanced by additional dimensions. For example, while census and employment data exists, more information on its sectoral and spatial distribution could illuminate urban planning processes and the locations of policy intervention. Similarly, data on waste management or housing stock is available on a first baseline, for example with data points on volume, weight or broader material categories (waste), but not in further detail, which would facilitate better price capture of the ingredients of rubble.
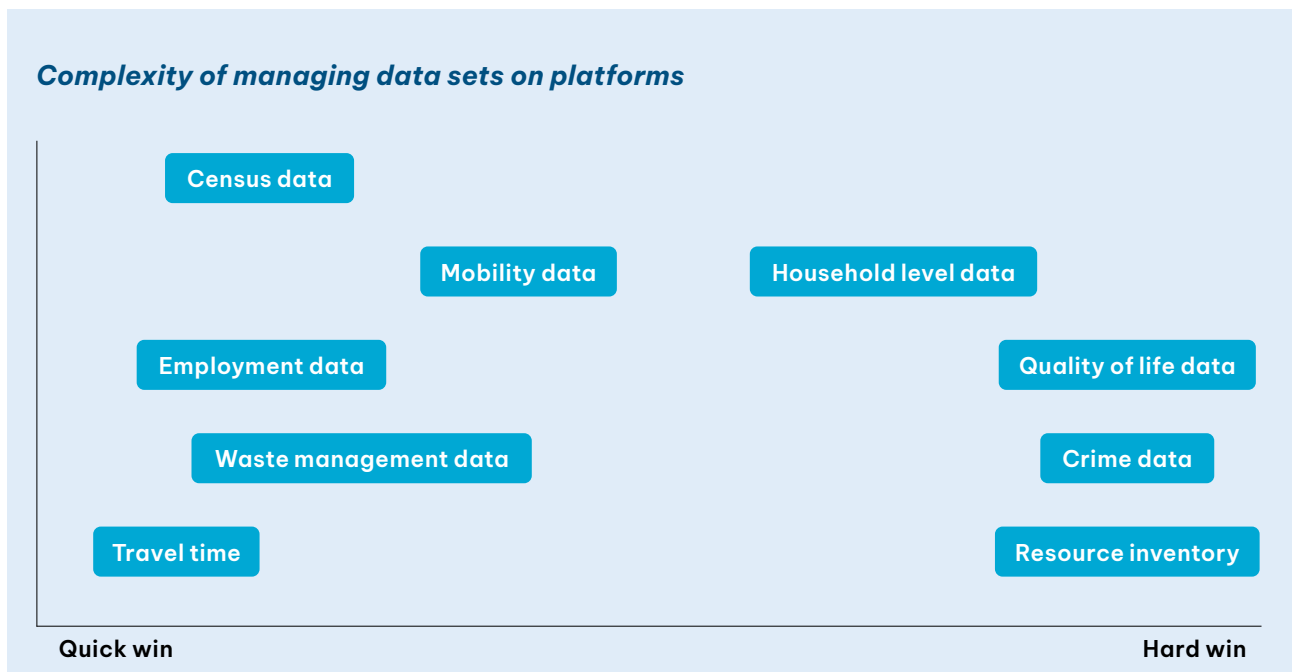
Data sets on mobility or sectoral data at a household level were contested in terms of how easy it would be to provide them on urban data platforms. For example, there may be estimates on the composition of vehicle fleets in cities, but proper recording on the age and type of vehicles or a formalisation of roads is often still recent and not integrated. The same goes for more sustainable transport modes like walking, cycling or public transport, which have hitherto far fewer recorded data points than private vehicles. Live parking slot availability was also ranked as a little more difficult since the subject matter requires many more and shorter intervals of data pushes.

In regard to 'hard wins', i.e. data sets that require both scrutiny and good governance for their collection, interpretation and dissemination, the data sets that were brought up related to crime or liveability and quality of life (QoL), as well as detailed inventories on resources and infrastructure. Indeed, the provision of these seems to be complicated by contested methodologies as well as, sometimes, conflicts of interests and is globally still rare.

The most frequently mentioned challenges for platforms were harmonisation across sectors, rigid government structures but also outdated or unstructured databases.

The success factors identified for replication were a **clear and sustained political will** backing the projects, **engaged decision-makers, ownership by users, capacity building and guidance on implementation.** Internal and external **transparency on more detailed implementation stages** was seen as both an opportunity but also as an entry point for additional friction.

Broad agreement existed on the necessity of bringing together locally relevant stakeholders across sectors to achieve the contextualisation of each solution while replicating it. Even if a solution has already been proven in other places or elevated in global discourse as best practice, bringing local stakeholders to the table early on can secure early buy-in and motivation for continuous evolvement. And several participants stressed that replication efforts are often assessed first through the lens of improving revenue streams for the city – a straightforward criterion to guide contextualisation.

Complexity of managing data sets on platforms

| Census data |
Mobility data	Household level data
Employment data	Quality of life data
Waste management data	Crime data
Travel time	Resource inventory

Quick win   **Hard win**

Source: Working group results, collected by GIZ

For working session 2, the results were slightly more scattered given the diversity of use cases. Nevertheless, common threads on success factors, replication steps, the promotion of collaboration and possible improvements emerged. **Political will, multi-stakeholder engagement and trust** were widely viewed as providing the basis for success. While seemingly commonsensical, many participants' anecdotes illustrated how the human factor should never be underestimated, no matter how technical a use case might seem on paper. In anticipation of generally rising turnover rates, one use case project offered positive experiences with **broad capacity building beyond the persons immediately responsible** for operation. Other voices noted the saliency of having **individual, dedicated project leaders** who can focus fully on driving the project forward, optimally with a designated backup. While this may seem to contradict with the (often rightly) depersonalised learnings of similar conversations, it raises awareness of a possible need to adjust assessments in hiring pipelines,

when setting up teams or when considering support for initiatives from the public sector. These propositions aligned well with the desire for organisational focus and to bear size in mind. One speaker, for example, illustrated how big of a difference it made in his city if a project was assigned to a division that could foster collaboration among many subdivisions, compared to if it was assigned directly to one subdivision (in his case, the former was preferrable).

Another success factor that may often receive less attention was an emphasis on user experience (UX) and the intuitiveness of applications. Some observed that this often still seems to be an afterthought or a 'nice-to-have' for many publicly funded developments or those coming from civil society initiatives, risking a further gap between levels of UX for private and public applications.

The consensus on replication lay in the **conviction that contextualisation and adaption are always necessary.** However, this is a task not only for the start of the replication process but one that must be repeated frequently. In addition, even when strongly affirming the need for contextualisation, the necessary discussions should still take place if, among the wide array of available tools, codes and solutions, some initially claim to be universally applicable. When we talk about open-source solutions in particular, the door to flexible adjustments remains open.

Similarly, an alignment with other existing platforms is often available, and this should not be neglected. The open-source platform 'Open SDG' was raised as an example here as it lowered initial costs substantially. For the frequent challenge of having a replicable base code or solution, but not the required data or inputs to bring it into use, a large proportion of the workshop participants advocated for embracing a variety of data generation methods. Sometimes going through central institutions may be warranted, but at other times it may be more effective to go through dedicated hubs or use crowdsourcing approaches. Addressing the frequent and significant mention of funding challenges, one creative idea was to seek funded replication through a

revolving mechanism in which the amortisation effected through one replication instance could fund the setup of the next. However, concepts for such approaches seem to be mostly still in their infancy.

As for ways to promote collaboration, attendees came up with a plethora of answers. Stronger investment in digital public goods and the continuous backing of open-data initiatives were widely perceived as being fundamental. In addition, groups touched upon the intricacies of better storytelling via social media or other channels to engage more (young) people. Organisationally, several speakers also shared information on initiatives where they observed that traditional public-private-partnership (PPP) constellations with a principal-agent structure were enhanced by a willingness, not least by private companies, to engage in local and explorative data initiatives. Some suggested that further exploitation of links with academic institutions could be beneficial. Perhaps unexpectedly, interaction between students and municipal administrations remains rare.

And, not forgetting that collaboration still often works best face-to-face, workshop attendees shared a wide spectrum of collaboration ideas, including for (mobile) city labs and formalised exchange programmes on technology and budget transfer.

There was often perceived to be further room for adaption and improvement, particularly in enhancing the nuance and granularity of data, but also in further automating processes. Emerging AI technologies and Large Language Models (LLMs) could drive performance in new ways here or help to enforce data protection. Although rarely at the foreground of project documentation, some attendees suggested making the applied legal frameworks or procurement guidelines more readily part of knowledge sharing efforts. The standardisation of data sets can already be coordinated at city level to increase the speed of such undertakings at higher governance levels. Significant leeway was often seen regarding incentivising people to provide more data sets for public use (rather than semi-voluntarily sharing it with big data companies) and in more diligently applying quantifiable indicators and monitoring and evaluation frameworks.

ANNEX

Profiles of presented data platforms and use cases

On the following pages, you can find brief profiles of the data platforms and uses cases that were presented during the Data-Driven Cities Conference. Each profile also includes a link to the original presentation.

Additionally, you can find the presentations on data strategies under the following two links:

• **Data Strategies for Common Good-Orientied Urban Development by the German Federal Ministry for Housing, Urban Development and Building**

• **City Data Strategy by the City of Cape Town**

Data platforms
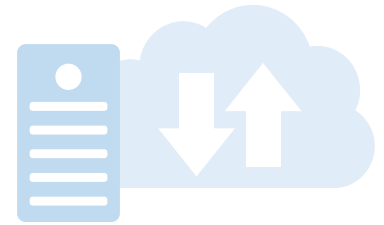
DATA:SPACE:FREIBURG 🇩🇪

Overview: The City of Freiburg already has a few open-data portals (one for statistical data, one for geodata and one for political documentations). However, these data exist in their own 'silos'. The objective of the project is to connect and link data from all these different silos. In this way, information is not only presented individually but also contextualised and made usable. The data is refined and presented in such a way that it generates added value for planning, politics and society. With the right kind of data collection and analysis, many minor and major questions can be answered or more effective solutions found. Until now, many issues relating to the urban sustainability transition have required time-consuming measurements and expensive appraisals. With the urban data platform, planning scenarios can be simulated more easily in the future. It serves as the fundamental basis for generating a digital version of the city, the 'digital twin', in turn allowing the digital simulation of scenarios with data from different fields and thus supporting evidence-based policy-making.

Geographical level: Municipality

User group/access rights: City administration, research institutes, civil society

Purpose: The vision for this platform is to develop a new, future-proof IT and data infrastructure. Cross-sectoral data usage is promoted in order to enable better usage and analysis of existing data.

Employed technologies: Sensors (with IoT Platform), BI/reporting tools (e.g. Superset, Power BI), data platform (data integration module), data catalogue (e.g. Piveau, Datahub)

Collaboration partners: German Federal Ministry for Housing, Urban Development and Building, different departments in the city administration

Key takeaways

- *Minimally invasive, maximally effective: Using established data platforms and existing infrastructure components and integrating them into a new project proved to be an effective strategy.*

- *For interoperability reasons, it is important to develop data platforms such as DATA:SPACE: FREIBURG based on open-source tools and with a systems-of-systems conceptualisation.*

- *The use of agile project management methodology, entailing prototypical phases and use case orientation, helped to formulate requirements. Training in agile methodology for some project members and workshops to improve collaboration across departments were a helpful cornerstone of capacity building.*

PROJECT WEBSITE →

PRESENTATION →

District Development Data Platform (DDDP) 🇬🇭
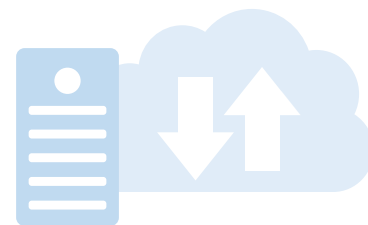
Overview: One of the primary challenges in Ghana's journey towards data-driven decision-making has been the accessibility and quality of data. Many municipalities in Ghana struggle with inadequate digital data infrastructure, the lack of easy access to data and poor data management, including data collection, analysis storage and reporting. As a response to those challenges, the DDDP has been developed to centralise and streamline data at the municipal level. The DDDP is a web-based monitoring, evaluation and reporting platform for municipalities and serves as a data repository for the municipalities, with data on different sectors including education, health, agriculture and commerce. For instance, data on municipalities' projects and programmes regarding climate resilience or sanitation are entered into the DDDP. One significant use of the DDDP is its integration with the District Performance Assessment Tool (DPAT), an initiative that is aimed at assessing and improving the performance of districts across the country. To date, nearly 500 indicators are being monitored, ensuring that assessors have up-to-date, accurate, reliable and comprehensive information from the platform to evaluate municipalities' performance.

Geographical level: Rolled out by the national government as the standard data management platform for municipalities in Ghana

User group/access rights: Municipal officers and policy makers

Purpose: The overarching goal of the DDDP is to centralise municipal-level data in real time, transitioning from paper-based to digital reporting. The platform employs interactive dashboards and data visualisation tools, making data more understandable for stakeholders. In this sense, policy makers and government authorities have access to timely, accurate, relevant and comprehensive data for informed decision-making.

Employed technologies: Open-source software

Collaboration partners: Ministry of Local Government, Decentralisation and Rural Development, National Development Planning Commission, Ghana Statistical Service, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Key takeaways

- *To ensure sector collaboration and sustainability, data platforms should be designed with scalability and interoperability with other national platforms in mind. In this way, the different data platforms from the various sectors within the country can share and use data to inform decisions.*

- *To ensure transparency, accountability and advocacy, it is important that citizens can also access data. For that reason, a public portal for the platform with access for citizens and civil society is being developed.*

PRESENTATION →

Durban Edge Open Data Portal 🇿🇦

Overview: Durban Edge is an open-data portal for the eThekwini municipality's economic intelligence unit. It comprises data stories, dashboards and raw data sets curated and uploaded by the Durban Edge team for public consumption. Data sets on employment, economy, tax, business and building plans (often dis-aggregated by race and gender) are available and raw data sets can be downloaded via a data management system. The project's success stems from collaborative efforts led by the eThekwini municipality and Open Cities Lab (OCL), a non-profit organisation leveraging open-source platforms. Complementary capacity building is done through workshops and tech adaption, empower-ing the team for independent project management and fostering organisational growth.

Geographical level: Municipal level

User group/access rights: City administration, academics, civil society, private businesses, etc.

Purpose: The project aims to promote evidence-based decision-making by economic stakeholders in the city. To reach this goal, data has been made available so that all stakeholders can make informed decisions on urban development. Data is used by busines-ses to do annual investment planning, by academics in their research, by other spheres of government in their planning and by local government administrators and councillors.

Employed technologies: Webflow (content management system for uploading data stories and dashboards), CKAN (data manage-ment system and database for uploading and accessing raw data sets)

Collaboration partners: eThekwini Municipality, South African Cities Network, OCL
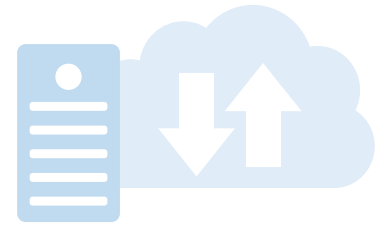
Key takeaways

- *Processes are iterative: Use cases lead to strategies and policies, which lead to more and better use cases.*

- *Engaged, driven decision-makers are a crucial factor for the success of a project like the open-data platform.*

- *Use cases will not lead to city-wide change without intentional cross-departmental data governance interventions.*

- *Operational responsibility: A team with full autonomy over and the capacity for platform content creation is essential for sustainable success. In this regard, capacity building needs to be integrated into the process.*

PROJECT WEBSITE →

PRESENTATION →

Mobilithek 🇩🇪

Overview: The Mobilithek is a platform for mobility providers, infrastructure managers and transport authorities to share digital information. Be it timetable data, real-time traffic information or rental bike locations: In the future, all of the information needed to plan a trip and travel throughout Germany will be centrally accessible and integrated into information services. However, the Mobilithek itself is not an information system for travellers and road users but rather lays the foundations for building these information services in the future. Above all, the Mobilithek will provide data that is particularly relevant to transport policy – for example on public transport or related to road safety. In addition, the Mobilithek can also be used to share data with individual use rights, giving in particular startups and companies seeking to enter the data exchange segment an easy way to test new business models and trade in data on a manageable scale. Much of the data in the Mobilithek will be open data, which means that anyone can use it without restriction.

Geographical level: National level

User group/access rights: Policy makers, transport authorities, civil society, research institutes, mobility providers, etc.

Purpose: The Mobilithek contributes to improving mobility in Germany by providing extensive mobility data. The data can be used by providers or intermediaries in the fields of passenger and freight transport and mobility services to make their services more efficient, convenient and environmentally friendly for their users and customers. Companies or individuals can benefit from the Mobilithek in the following ways: Gaining access to a broad network of data and information, tailoring products better to the needs of customers with the support of up-to-date and relevant information, learning from other data providers and networking with them to develop innovative solutions.

Employed technologies: Cloud-based infrastructure with a web portal

Collaboration partners: German Federal Ministry for Digital and Transport, German Federal Highway Research Institute, T-Systems International GmbH
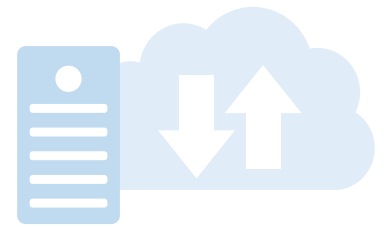
Key takeaways

- *To ensure that the available data is also usable, it must meet a sufficient level of quality. The technical quality of data, such as adherence to standards, can be enhanced through the implementation of processes and tools for technical validation. In order to increase what is known as 'data truth', i.e. reduce the number of factual errors in the data, focused exchange between data owners and data users is essential.*

- *The success of a comprehensive data platform like the Mobilithek depends on the stakeholders who provide the data. Standardised, secure data interfaces and the freedom to choose the terms of use of the data provided are essential to enable good collaboration between different stakeholder groups. These precondiions can increase trust and improve data processing.*

PROJECT WEBSITE →

PRESENTATION →

Use cases: Urban mobility

Bridging the gender gap in transport 🇰🇪

Overview: Over a six-month period, the Transformative Urban Mobility Initiative (TUMI), WhereIsMyTransport and Groots worked in close collaboration with a network of local researchers in Nairobi (Kenya), Lagos (Nigeria), Gauteng (South Africa) and Abidjan (Cote d'Ivoire) to showcase novel ways of collecting gender-sensitive data. The methodology combined a mix of qualitative and quantitative methodologies, complementing online survey questionnaires with ride-alongs, journey mapping workshops and women-only focus group discussions. The data collection process on the ground was carried out by all-female local researchers who played a critical role in ensuring that the methodology was sensitive to local specificities and cultural norms and was conducted in local languages to ease communication and create spaces of trust. The user-centric approach was instrumental in revealing the specifics of women's lived experience and helped to surface the voice of women through stories told by research participants.

Sectors: Mobility

User group: Local transport authorities

Purpose: The aim of the project is to roll out systematic and comprehensive gender-sensitive data collection on women's experiences in the public transport sector in Africa, thus providing insights into the various decision-making stages of a woman's commuting journey. The applied qualitative methods add a level of depth to the 'percentage findings'. The approach reveals the data methodologies that provide the best insights into women's mobility needs and subsequent decision-making behaviour.

Employed technologies: Mobile application (for online surveys) Collaboration partners: TUMI, WhereIsMyTransport (mobility start-up), Groots Consulting

Key takeaways

- *Using multi-stratified sampling ensures that the respondents being targeted represent gender and age groups in the correct proportions and reduces the risk of bias in selecting participants through convenience sampling.*

- *In-person surveys have several complementary benefits: Digital forms can often exclude those representing lower-earning or older profiles as they may lack both access to the internet and digital literacy. As such, they contribute to digital equity.*

- *A user-centric approach in data collection that is sensitive to local specificities and cultural norms is essential for nuanced findings.*

PROJECT WEBSITE ➔

PRESENTATION ➔
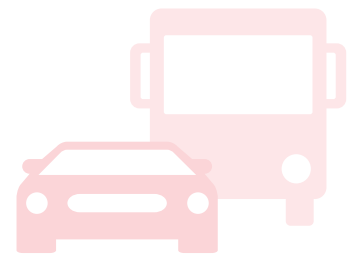
Smart parking management system 🇷🇼

Overview: The City of Kigali tackles the problem of high vehicle density and transport-related issues with a smart parking management system that provides real-time information about parking availability, parking duration and parking congestion. This data is collected through a number of connected sensors deployed around the city, installed in parking spaces and geographically dispersed throughout the city. Additionally, a mobile app (ParikApp) was developed for finding free parking spots and paying parking fees. By analysing the collected data from the sensors and the app, city officials and urban planners gain insights into parking patterns and trends. This information can then be used to make data-driven decisions and enhancements that benefit the urban common good in different ways. Air pollution can be reduced through a decrease in vehicle emissions resulting from the reduced distance travelled in congested zones while searching for parking. Other possible outcomes include less time spent by drivers searching for parking spots and mitigated traffic congestion. Additionally, the smart parking system can lead to a reduction in revenue leakages due to increased transparency in parking usage and payments.

Sectors: Mobility

User group: Local authorities, urban planners, citizens

Purpose: The main purpose of the project is the efficient use of resources. The data collected is used in various ways to improve transport and infrastructure planning. Parking space utilisation can be optimised with the help of parking availability data, and real-time data on parking congestion is used to manage traffic flow. By analysing parking data, planners can gain insight into peak parking hours and areas experiencing parking shortages and consequently react to these challenges with infrastructure planning. Finally, data on parking duration and payment history helps the city to optimise parking fees and fines and supports revenue generation.

Employed technologies: Data collection through connected sensors in parking spaces throughout the city, data streaming platform, Park Management Platform, mobile applications

Collaboration partners/stakeholders: The smart parking management system has been realised in collaboration with national stakeholders (Ministry of ICT & Innovation (MINICT), Rwanda Information Society Authority (RISA)), the City of Kigali and private businesses (SAS, Galaxy Group)

Key takeaways

- *Technology such as the IoT, AI, etc. has to fit the local context. Not all proprietary solutions work everywhere, especially since many IoT solutions are vendor locked-in, posing restrictions in interoperability. The local context needs to be considered even though it may require more time and resources.*

- *Setting up proper systems architecture pays off in reducing later friction when introducing cross-device capabilities (e.g. by adding mobile apps) or bundling additional services.*

PRESENTATION →

SATURN 🇩🇪

Overview: The SATURN (StrATegy-compliant mUltimodal RoutiNg) research project investigates how static and dynamic traffic and mobility data and the traffic management strategies of munici-palities, regions and states can be digitised, made available and linked across borders on a nationwide basis. The cross-border pilot areas are the Munich metropolitan region, Stuttgart and Frankfurt RheinMain. The project aims to collect and maintain comprehensive traffic data and routing strategies in the pilot areas and make them available via the national access point (Mobilithek) to mobility services for leisure, events and commuter traffic. In this way, the public sector's dynamic traffic management strategies will be brought into line with private service providers' information systems. In addition, nationwide 'strategy-compliant routing' is being developed that considers the data and strategies recorded in the pilot areas.

Sectors: Mobility

User group: Local authorities

Purpose: To reduce environmental impacts, larger cities already have traffic management strategies in place to guide users with real-time traffic information. However, the surrounding communi-ties and rural areas lack these options due to a lack of mobility and other traffic-relevant data. Therefore, the project aims to create a system to collect data in the pilot areas in Munich, Stuttgart and Frankfurt and design traffic management strategies for various local authorities.

Employed technologies: Project demonstrator 'Viel mobil', German national access point (Mobilithek), Traff-X.plan (prisma solutions GmbH), RIWA – GIS (RIWA GmbH)

Collaboration partners: Municipal stakeholders (Zweckverband Kommunales Dienstleistungszentrum Oberland, Mobilitätsreferat der Landeshauptstadt München, Integrierte Verkehrsleitzentrale der Landeshauptstadt Stuttgart, ivm Region Frankfurt RheinMain), research institutes (Fraunhofer Institut für Verkehrs- und Infra-strukturSysteme (IVI), Bundesanstalt für Straßenwesen (BASt)), the service industry (Trafficon GmbH – Consultants und Geoservices) and a software company (RIWA – Gesellschaft für Geoinforma-tionen GmbH)
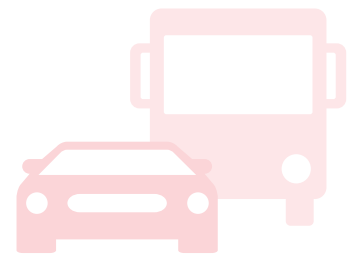
Key takeaways

- *To have a real impact, public traffic data must be integrated into the routing of navigation systems.*

- *Traffic management can only work in collaboration with the relevant stakeholders and with regional cooperation, as small and medium-sized municipalities in particular need support.*

- *For a successful implementa-tion, further digitalisation and the standardisation of the data transfer is required. The large-scale use of standardised data formats is necessary.*

PROJECT WEBSITE →

PRESENTATION →

Use cases: Urban resource management
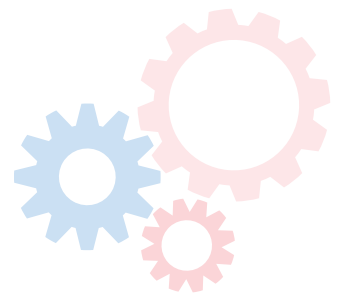
Optimising waste management 🇷🇼

Overview: Rwanda's recycling rate is only 10% due to waste being mixed at its source. Sheba Plastic is a solution designed to tackle this problem, improve waste management and promote a circular economy in Kigali, Rwanda. The project uses a mobile application, IoT sensors, AI-integrated smart bins and a data analytics platform to sustainably collect and segregate recyclable waste at the source, while rewarding users with cash for their sustainable behaviours. The project represents a holistic and data-driven solution designed to combat plastic pollution while fostering community participation and environmentally sustainable practices. The first results show that recycling rates could be increased by 35% within twelve months, with 250 metric tons of plastic waste being diverted from landfills.

Sectors: Waste management

User group: Individuals/households

Purpose: The aim of the project is to increase recycling rates, reduce plastic waste accumulation and heighten environmental awareness. Moreover, the project serves as a demonstration for the potential of data-driven solutions in enhancing urban waste management and collaboration between the public and private sector, as well as local communities.

Employed technologies: IoT sensors and AI-integrated smart bins at the source of the waste, a mobile application for individuals/households and a data analytics platform

Collaboration partners: Sheba Plastic (initiator), Local Government of Kigali, recycling companies in Rwanda, private businesses, African Leadership University, environmental NGOs

Key takeaways

- *Solving a complex problem such as waste management requires the collaboration of different partners, such as local businesses and government agencies.*

- *Smart city startups depend on the public sector taking a collaborative stance when progressing from proof-of-concept to proof-of-work and further upscaling.*

- *Integrating concrete behavioural incentives into processes adds complexity (both technically and in terms of governance) but may lead to more effective outcomes.*

PROJECT WEBSITE →

PRESENTATION →
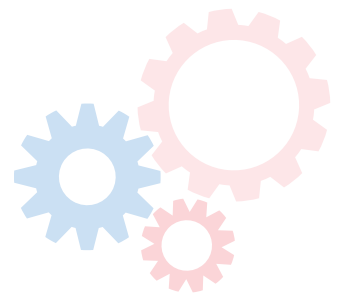
Smart Water 🇩🇪

Overview: Integrating blue-green infrastructure can significantly mitigate the effects of the climate crisis and add additional positive qualities to the city. Smart Water aims to use agile rainwater management planning to enable climate-smart urban planning that specifically mitigates water pollution, heat islands and flooding hotspots in the City of Berlin. Furthermore, the project raises citizen awareness on the potential of rainwater utilisation for water protection and for the cityscape, based on data visualisation. Within Smart Water, three prototypes are being developed:

1. A digital planning tool for Berlin's administrations that is intended to support the agile planning of urban construction projects with a focus on the planning integration of green and blue infrastructure,
2. a (web) application that visualises blue-green infrastructure measures and provides information on their positive effects for water protection and climate adaption and
3. a concept for digital risk communication for city-wide services in the event of flooding caused by heavy rain.

Sectors: Water management

User group: Local planning authorities, citizens, disaster service providers

Purpose: The project Smart Water aims to improve the integration of blue-green infrastructure measures in the City of Berlin into official planning processes and increase the acceptance of these measures among the population. In addition to these climate protection measures, the project improves risk communication in the event of heavy rainfall events.

Employed technologies: Digital planning tool for the combined planning and management of blue and green infrastructure, platform for citizens, concept for an application for digital risk communication

Collaboration partners: Kompetenzzentrum Wasser Berlin (Berlin's leading research institution in the field of rainwater management), Senate Department for Urban Development, Building and Housing; Senate Department for Urban Mobility, Transport, Climate Action and the Environment; Berliner Wasserbetriebe (Berlin's water supply company), CityLAB Berlin (Berlin's public innovation laboratory) and the associated partners Regenwasseragentur and the districts Pankow and Friedrichshain-Kreuzberg

Key takeaways

- *Blue-green infrastructure is a key lever for combining climate action and climate resilience with communal service needs.*

- *Given its integrating role for urban planning, blue-green infrastructure requires the coordination of an especially comprehensive web of stakeholders.*

- *In order to respond to the impacts of climate change and build resilience, cities need tailor-made approaches to maximise the impact of action. Digital tools are essential to support cities in this endeavour.*

PROJECT WEBSITE →

PRESENTATION →
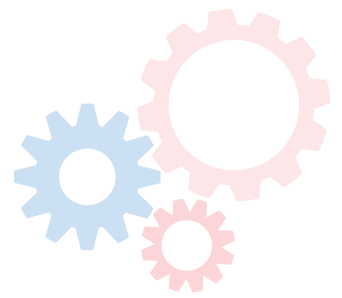
Urban Smart Energy Mombasa 🇰🇪

Overview: Mombasa County faces a rising energy demand driven by a growing population. Increased energy costs and a need for an uninterrupted power supply are also current issues. To address these challenges, the potential of renewable energy and energy efficiency projects in public buildings is being assessed in the project Urban Smart Energy (USE). USE targets public infrastructure owned by Mombasa County to assess the technical and economic feasibility of renewable energy systems. As a first step, a preliminary assessment of buildings and the installation of real-time smart energy meters to accurately measure power consumption have been carried out. With the data collected from the real-time smart meters, potentials for renewable energy and energy efficiency in each of the facilities can be identified and investment attracted. The data also supports the county team on bill validations, correcting power systems issues such as power factor dips, voltage management and in studying the reason for spikes and dips in power demand. It supports anticipatory budgetary allocation on facility operation and maintenance, photo-voltaic size and cost, and capacity building areas.

Sectors: Energy

User group: Public infrastructure

Purpose: USE explores the potential of renewable energy and energy efficiency in public buildings and aims to collect real-time data that will allow the county to evaluate and enforce energy management systems in each of the targeted public facilities. The data is used to (1) assess load profiles' behaviour, (2) establish baseline loads, (3) isolate parasitic loads and (4) explore the sequence of critical machines coming online.

Employed technologies: Smart energy meters hard wired to gateways (modems) for data transmission to the cloud, to be accessed via PC and smart phones

Collaboration partners: County Government of Mombasa, VEER.IO (meter supplier and installer), IDE-E – BASE consultancy, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Key takeaways

- *Capacity building proved to be important for the success of the project: A data analysis workshop with the county team ensured their onboarding to data analysis and reporting.*

- *Successful smart energy solutions can be replicated, for example with the support of peer-to-peer exchanges, as demonstrated by the exchange between Mombasa and Nakuru County.*

PROJECT WEBSITE →

PRESENTATION →

Use cases: Spatial organi- sation in the urban context

Agenda 2030 monitoring 🇩🇪

Overviev: With the council resolution of July 2017, the Enzkreis district committed itself to the United Nations 2030 Agenda and to consider- ing the 17 sustainable development goals (SDGs) in its mission state- ment. The district's sustainability strategy defines the administration's specific contributions to sustainable development according to the SDGs and makes it measurable and governable via 85 indicators. The majority of the indicators have evolved from a basic set of SDG indicators for municipalities in Germany. In addition to this basic set of indicators, the Enzkreis district council has identified its own priorities for monitoring, such as mental health, regional production and consumption, quality education, the securing and training of specia- lists and the inclusion of persons with disabilities. Data was collect- ed via different platforms as well as from the district's own surveys. The collection and presentation of data is a service provided by the district's administration in order to strengthen collaboration between political decision-makers on different levels, the private sector and civil society. Since July 2023, the data has been publicly accessible via a dedicated SDG dashboard based on the open-source platform Open SDG. The Enzkreis district's monitoring platform provides data from recent years in all sectors, e.g. on mobility, greenhouse-gas emissions, water supply, waste and wastewater management, pover- ty and social assistance, housing, construction, health and education.

Sectors: Governance

User group: Regional administration

Purpose: The presentation of data in time series brings evidence and transparency to the district's sustainable development. It also enables stakeholders to actively shape and positively influence this development in line with the global goals and within the scope of the relevant responsibilities and possibilities. In 2024, the Enzkreis climate protection and district development unit is going to prepare voluntary local reports for four different cities and municipalities in the district, thus enabling local decision-makers to build up capaci- ties for local monitoring in line with the SDGs.

Employed technologies: Open SDG, databases, e.g. Federal Statis- tical Office

Collaboration partners: District council, district administration, mayors and local councils of cities and municipalities, private sector companies, civil society, municipal partnership with Masasi town and district in Tanzania

Key takeaways

- *Political support is necessary for implementing Agenda 2030, as it is entirely voluntary for regional and local authorities in Germany.*

- *The open-source solution 'Open SDG' has several benefits, such as low set-up costs, lenient coding requirements, options for users' own design and low data processing volume requirements. However, for a professional setup, internal IT support is recommend- ed. Resources and costs must be considered as data entry (so far) is manual, leading to relatively high maintenance costs.*

PROJECT WEBSITE →

PRESENTATION →

Specialist maps for new urban planning 🇩🇪

Overview: With its 'STEP 2040', Munich has created a conceptually completely new type of urban development plan. Instead of a simple representation of possible development areas, the focus is on the necessary (infrastructural) framework conditions, which are presented in a total of six different topic-centred specialist maps. They describe all the relevant prerequisites for the transformation or further development of the city that must be taken into account during implementation. The development plan draws a picture of the future vision for the City of Munich and integrates six fields of action – open spaces, mobility, neighbourhoods, climate adaption, climate protection and regionality – into one comprehensive plan.

Sectors: Urban planning

User group: Local authorities

Purpose: There is a large amount of data, studies and investigations that should be viewed together in order to create an integrated urban development plan. In 'STEP 2040', the City of Munich has made use of this data with the help of technical tools. Thematic maps were created, providing a very good initial overview and supporting concrete planning and implementation. By breaking down thematic silos, integrated collaboration between the different units is promoted.

Employed technologies: Geodata platform, data hubs

Collaboration partners: Department of Urban Planning, City of Munich

Key takeaways

- Breaking down silos between different fields, e.g. urban mobility, the built environment and infrastructure, is essential for integrated forward-thinking planning.

- Expertise differs between municipal departments. Having technically experienced staff is a key enabler for implementing digital methods.

- By taking an integrated look at the relevant questions, it is possible to raise individual specialist knowledge to a common level in order to make conceptual progress with all parties on an equal footing.

- Spatial visualisation tools (such as digital twins or geoportals) should always be linked back to actual planning processes.

PROJECT WEBSITE →

PRESENTATION →

OASL RevApp 🇬🇭

Overview: The Office of the Administrator of Stool Lands (OASL) generates income through the collection of revenue; this includes rents, dues, royalties or other payments from Stool Lands demarcated areas. Revenue mobilisation is an operational mandate carried out by the district and regional offices. The OASL assesses rent based on the location, size and use of the land and was facing several challenges in collecting stool land revenues and disbursing the same to the state's beneficiaries. These challenges included manual collection, managing and processing data, and manual billing and payment processes. As a result of the manual collection, data was not available for planning and policy decisions. In order to solve these problems, the OASL developed a revenue collection database application: OASL RevApp. The functionalities of the application include data collection, rent assessment, demand note distribution, electronic billing and payment and a feedback system.

Sectors: Public administration

User group: Local authorities

Purpose: The OASL RevApp was set up to enhance the process of collecting land revenues in the following ways: improved efficiency in data collection, a more reliable billing and payment process, improved revenue mobilisation, easy identification and localisation of parcels and property owners, and a centralised data repository. Employed technologies: GIS technologies, open-source database systems, satellite and drone imagery, web applications

Collaboration partners: OASL, Ministry of Local Government, Decentralisation and Rural Development, Ghana Revenue Authority Land Use and Spatial Planning Authority, Land Commission, Customary Land Secretariat, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Key takeaways

- *Capacity building and collaboration between stakeholders needs contextualisation. Traditional authorities, who are the custodians of stool lands, transfer records of stool land transactions through the various Customary Land Secretariats to the OASL for input into the app, thus enabling revenue collection. For their part, the OASL enhances the capacity of the traditional authorities through training on accurate data recording.*

- *Land management is an interesting and rewarding use case for building end-to-end digital processes that integrate different government functions.*

PROJECT WEBSITE →

PRESENTATION →

Colouring Dresden/Colouring Cities 🇩🇪

Overview: Buildings offer enormous potential for savings in terms of energy, building materials and CO2 emissions. In order to be able to understand and develop the building stock in a climate-friendly and resource-saving way, basic information is required, for example on the age, lifespan, construction, material and specific usage of buildings. However, this information is lacking in many countries or is not accessible. In response to this situation and to close this data gap, Colouring Cities, an open digital platform that enables the collaborative collection and visualisation of building data, has been developed. With 'Colouring Dresden', the first Colouring Cities platform in Germany was launched in Dresden in 2023. The platform aims to facilitate the free exchange of data and knowledge about buildings in order to improve their quality, efficiency, sustainability and resilience. The possibilities and prospects of using AI methods to semantically enrich building footprints with the help of the collected citizen science data will play a greater role for the Colouring Cities platform in the future. Project participation can consist of indoor and outdoor mapping via smartphone, computer or tablet, donating geodata as a bulk upload, or opening archives or other photo or map assets and making them available as a research source.

Sectors: Building sector

User group: Citizens, researchers, urban planners, architects

Purpose: By harnessing the power of crowdsourcing, Colouring Cities allows researchers, architects and urban planners to gather spatial information in a more efficient and cost-effective manner than traditional methods. The user-friendly interface and comprehensive data management capabilities make Colouring Cities a valuable citizen science platform, empowering everyone to collect, collate, visualise and share data.

Employed technologies: Open-data platform, collaborative mapping, citizen science, crowdsourcing, GeoAI, web mapping/GIS, open-source technologies

Collaboration partners: Leibniz Institute of Ecological Urban and Regional Development, Association of German Architects (BDA), Saxon State and University Library Dresden (SLUB), Centre for Building Culture Saxony (ZfBK). Partners for local implementation: Städtische Bibliotheken Dresden, Technische Sammlungen Dresden/DLR School Lab, Technical University Dresden. International network: Colouring Cities Research Programme (CCRP)

Key takeaways

- *One of the success factors of the project is the collection of standardised data across countries, which enables analysis on a global level. For successful replication, it is important to develop a culture of sharing. The project contributes to that by providing tutorials to ease replication in other countries or institutions.*

- *The expertise of the various project participants complements each other. The collaborative approach grants access to specific expertise, data collections and sources as well as networks and facilities.*

- *The power of visualisation: Compelling visualisation designs can help mobilise people to engage with and contribute to crowdsourcing.*

PROJECT WEBSITE I →

PROJECT WEBSITE II →

PRESENTATION →

Ushahidi: Resilience Network Initiative 🇰🇪

Overview: Ushahidi's new Resilience Network Initiative (RNI) connects city governments and citizens with technology that makes it easier for individuals, community-based organisations and governments to exchange information about the stresses and shocks they encounter and existing capacities for response. Well-placed technology, designed to support strong social networks, allows these populations to share significantly higher-quality information more responsively and easily – holistically increasing the effectiveness and capacity for response within each city. The RNI helps identify key stakeholders, deploys the appropriate technology and provides services and support for the use of existing or new crowdsourcing tools, all to help city governments communicate better with their citizens for rapid response and shorter feedback loops. The increasing desire for open data strongly influenced the initiative: to promote transparency, to drive innovation, to facilitate participatory governance and to improve coordination.

Sector: Governance, participation

User group: City governments, citizens

Purpose: The RNI aims to identify and establish networks among community leaders, volunteer organisations and other groups in the local landscapes. These networks are valuable assets for communities as they can prevent the duplication of work by new initiatives and build upon the efforts of their predecessors.

Employed technologies: Ushahidi platform (open source) Collaboration partners: Participating municipalities: Surat (India), Da Nang (Vietnam), Semarang (Indonesia), Mandalay (Myanmar), Medellin (Colombia), Boulder and New Orleans (USA)

Key takeaways

- *Acknowledging the importance of user-centric design to maximise usability and adaption is an essential success factor. Engagement with marginalised groups can be facilitated by meeting these audiences where they are, for example by using tools that people already have access to, such as mobile phones, and by supporting multiple languages, allowing people to interact with data in languages they are familiar with.*

- *Building partnerships is essential for the long-term viability and impact of the RNI.*

- *Transparency is at the core of the project's success: All processes and software are available free, online and open source, so anyone can access them. Using a free and open-source platform reduces the cost burden and makes the platform accessible to all, regardless of their financial situation.*

PROJECT WEBSITE →

PRESENTATION →