Izmir Metropolitan Municipality
OPEN DATA STRATEGY

SEPTEMBER 2020

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Acknowledgments

This strategy was prepared for the Izmir Metropolitan Municipality (IMM) by Julian Tait (Open Data Manchester, CIC), Alla Morrison (Sustainable Infrastructure Advisory, IFC), Ozan Beser (ECA Infrastructure, IFC), Roza Vasileva (Sustainable Infrastructure Advisory, IFC), and Mohammad Irfaan Nahoor (ECA Infrastructure, IFC) under the guidance of Veronica Nyhan Jones (Sustainable Infrastructure Advisory, IFC) and Patrick Avato (ECA Infrastructure, IFC). It is based on an open data review carried-out by IFC and the Manchester Open Data's team in close collaboration with IMM's Open Data Task Force and under guidance of Güler Sağıt (Department of IT, IMM), Gülhan Saruhan (Department of IT, IMM) and Onur Eryuce (Advisor to the Mayor, IMM).

This strategy would not have been possible without the collaboration of the Open Data Task Force, as well as numerous interviews and focus groups' participants from the government, business community, representatives of civil society organizations, and academia. The team wishes to thank all contributors for their generous and thoughtful sharing of experience. They also thank Rikki Campbell Ogden for designing the document.

Preamble

This strategy outlines the necessary steps to deliver a sustainable open data programme for the City of Izmir that aligns with the city's strategic goals.

It identifies the processes needed to build a robust and responsive supply of open data. It also highlights the need to develop and support emerging open data practices within the city through the creation of an effective stakeholder engagement plan.

The strategy highlights the need for sharing insights and expertise from within and outside the administration, creating a virtuous circle of data production and use that benefits all the city's stakeholders—from citizens through business to academia, and the administration itself.

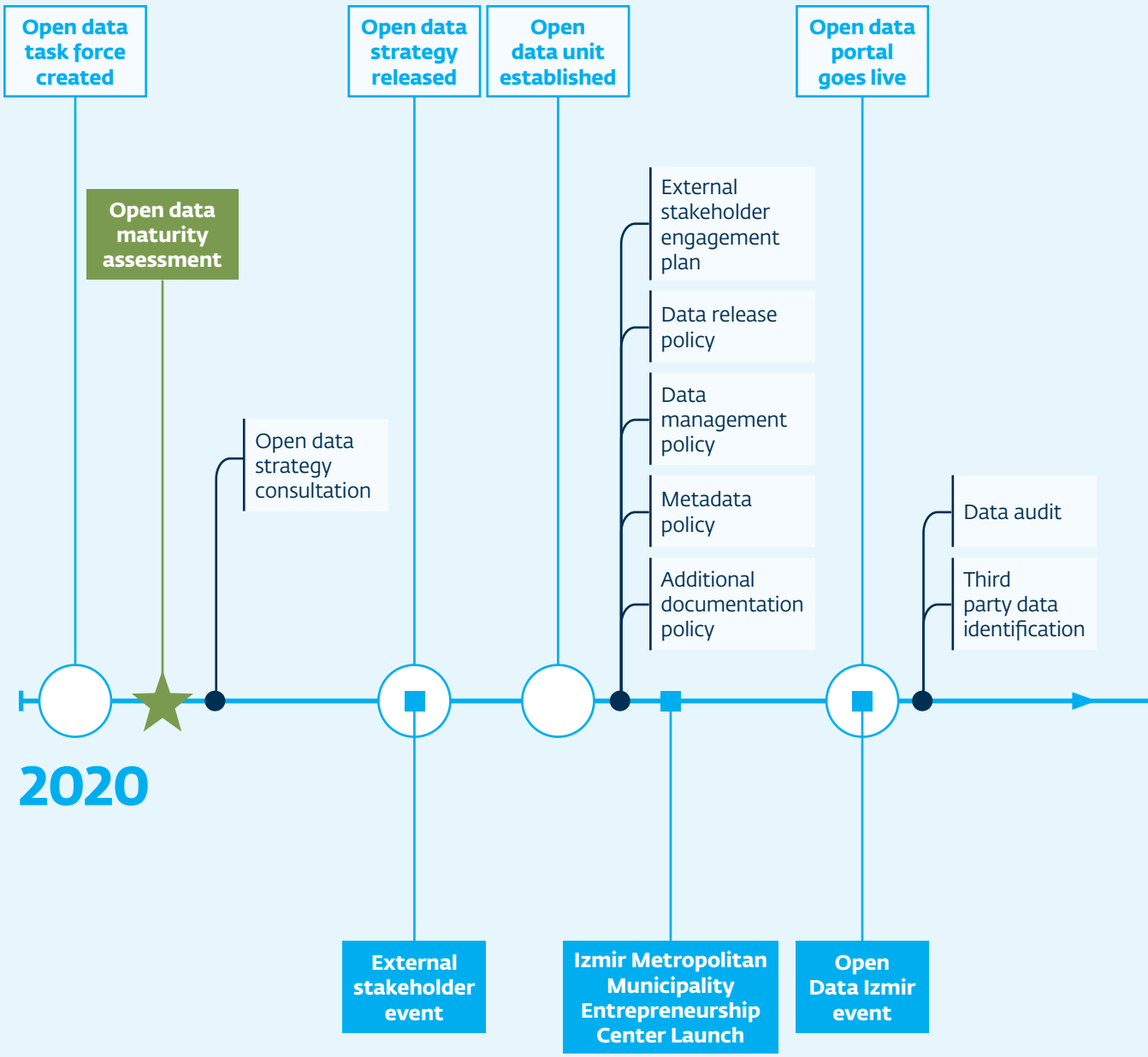
The strategy reduces the risk of efforts being wasted in making available open data that finds no use. This is done by better understanding the needs of the external data re-users, and prioritising data that provides the most value.

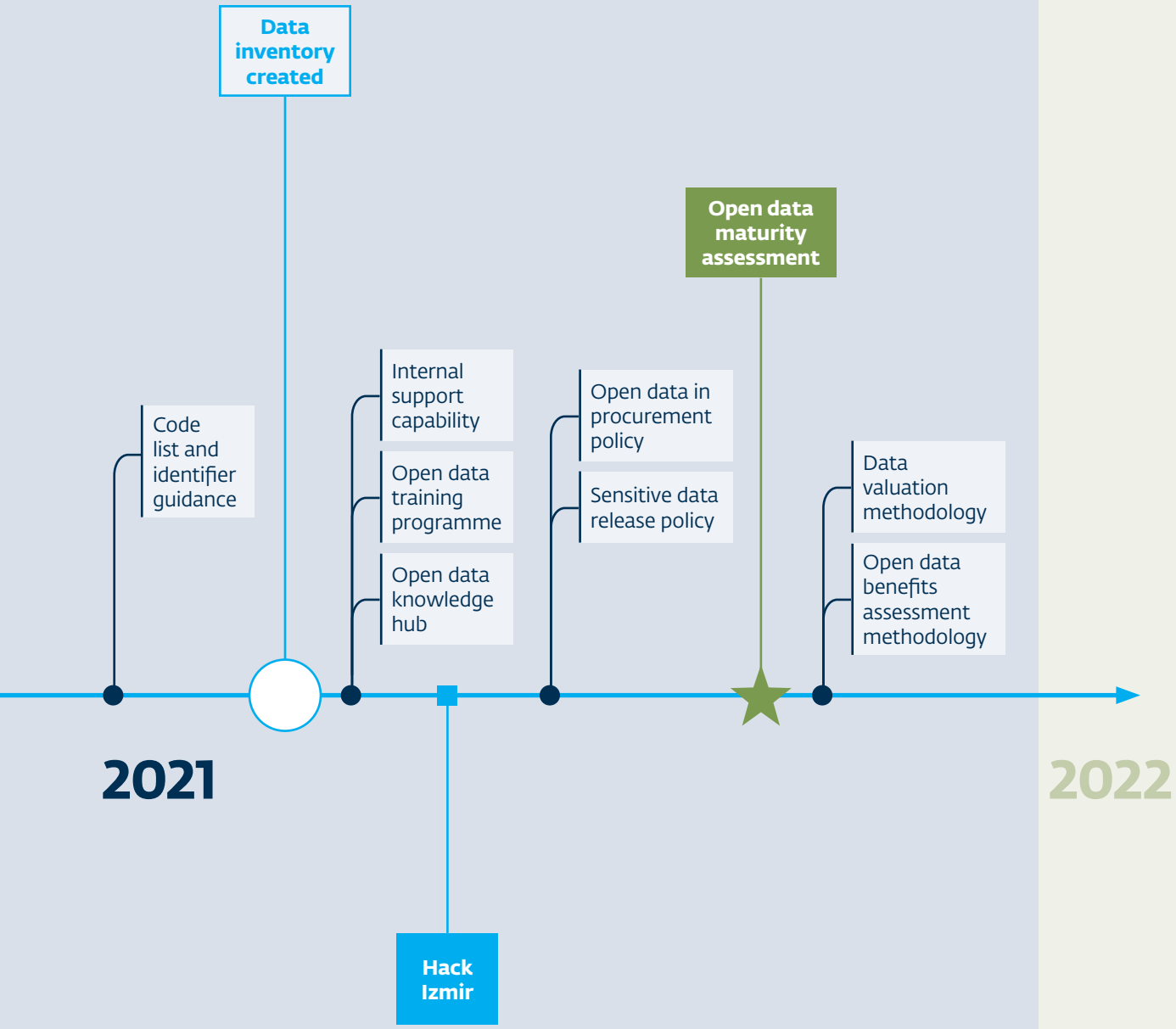
IMM understands that a long-term commitment to publishing open data at a standard that allows products and services to be developed needs on-going investment in both infrastructure and people, and these costs may be offset by financial benefits from opening data.

Although the demand for open data is known, open data practice in Izmir is still emerging. In order to bring about an inclusive and sustainable open data programme, this strategy emphasises the need to nurture, develop, and support the development and use of open data—it is a journey that cannot be taken by the municipal government alone.

To ensure that we deliver on the strategy's ambition we will benchmark and measure our open data journey.

Implementation Roadmap




Data inventory created
Open data maturity assessment
Code list and identifier guidance
Internal support capability
Open data training programme
Open data knowledge hub
Open data in procurement policy
Sensitive data release policy
Data valuation methodology
Open data benefits assessment methodology
Hack Izmir
2021
2022

Purpose of this strategy

This strategy provides a foundation for the adoption of open data by IMM and the development of a sustainable open data ecosystem within the city. It sets out how open data will benefit citizens, businesses, academic institutions, and the administration itself; how open data will help in the delivery of the city's strategic goals; the underlying processes that will enable the city to supply good quality open data, and how the city will support the development of an open data practice, while ensuring alignment with international principles.

What is open data

Open data is non-personal and non-proprietary data accessible to anyone via the internet, in a machine-readable format, and free of restrictions on use and re-use for any purpose, including commercial.

"Open data is data that can be freely used, shared and built-on by anyone, anywhere, for any purpose."

—Open Knowledge Foundation

Data must be open legally, through being clearly licensed in a way that permits commercial and non-commercial use and re-use without restrictions.

Benefits of open data

City's Administration	Increased discoverability of cultural assets and events, enhancing tourism.
	Better scrutiny of operational processes, enabling improved governance and citizen participation.
	Improved environment for data driven products, and more efficient service delivery.
	Increased effectiveness of information sharing, reducing the risk of information silos.
	More services co-designed both across the administration and with external stakeholders.
Citizens	Greater awareness of the city's available opportunities, and enhanced understanding of the challenges the city faces, and how they can be overcomed.
	Increased transparency and accountability, enabling improved democratic dialogue and participation.
	Improved access to information that is tailored to different needs of the community.
Businesses	Empowered local digital economy and promotion of new enterprises.
	Improved efficiency when making business decisions.
	Strengthened environment for more constructive and responsive relations with the city.
	Better informed transportation decisions with enhanced benefits to businesses and their employees.
	Creation of opportunities to develop new business ideas, products and services based on city's data.
	Potential to reduce time to market for new business opportunities.
Academia	Development of cutting edge research based upon city's data.
	Harnessing intellectual capabilities and curiosity of students attending universities in Izmir.
	Creation of a 'Living Lab' environment, where new ideas can be tested out.
	Reduced time for research and development when using city data.
	More effective collaborative environment for new ideas and thinking.
	Increased discoverability of the city, making it more attractive to students.

Open data vision for the City of Izmir

The city creates a wealth of data across its 39 departments and associated companies, yet outside of its initial purpose, the value of this data for Izmir's citizens, businesses and institutions is often unrealised.

Open data is integral to Izmir's journey to become a smarter, more inclusive and modern digital city, which puts Izmir's citizens at the centre of its services through greater transparency and accountability, and enhancing informed democratic participation.

By harnessing the city's data assets and digital infrastructure programmes, such as IzmirNet, WizmirNet and BizIzmir, IMM can leverage the intellectual and creative energy found within the city and its academic institutions, and become an incubator of innovative new products and services based upon city data.

Allowing a frictionless flow of information enabled by open data, creates the potential for a more resource efficient city, and reduces waste through a more effective targeting and use of efforts and resources. This supports the creation of a greener, more sustainable and environmentally friendly city that is vibrant, healthy and resilient.

How open data will help the City of Izmir deliver on its strategic goals

The development of a sustainable open data ecosystem can help Izmir meet its goals within its strategic plan[1] and aspirations to be a smart city through:

1. Infrastructure—Data related to spatial planning, zoning, and performance on its green infrastructure will enable a greater understanding and measurement of policy implementations, and facilitate more collaborative ways of delivery.
2. Quality of life—Open data can help people access transport more efficiently through multi-modal travel planning, allow better access to leisure and health facilities, and help them make better decisions, considering environmental impacts.
3. Economy—Creating an environment for:
   - Inclusive data-driven innovation powered by open data.
   - More sustainable development through more efficient resource use.
   - Better data driven decisions to be made in agriculture.
   - More effective targeting of resources to those who need it.
4. Democracy—Helping citizens access the information they require to make a difference to their communities, scrutinise decisions, and participate in the city's democratic decision-making processes in a more informed way.
5. Nature—Better data on Izmir's environment and citizens' impact, through the decisions that they make, can enable more sustainable and greener living, whilst also helping people engage with and support more environmentally sound practices.
6. Learning—Creating an open data and information environment encourages new learning and better open data related practices.
7. Arts and culture—Making cultural assets and activities more attractive and discoverable, enhancing participation and tourism.

Additionally, open data is an enabler of a more citizen-centric and collaborative smart city. It helps match problem owners to those with the ideas and the technical knowledge required to solve them, and it creates a more level playing field allowing equal access to data for SMEs and established businesses alike. It also enables resource efficiencies through a better identification and targeting of needs. The list of Izmir smart city initiatives that could potentially benefit from, or create open data can be found in Annex 1.

[1] İzmir Büyükşehir Belediyesi Stratejik Plan 2020–2024, p. 30. Accessed on August 7, 2020

Context

Statutory environment

At the present time, the legal basis for the release of open data in Turkey is unclear, although the 1982 Turkish Constitution (amended in 2001) refers within Article 74 to the right of access to public information, and establishes that everyone has the right to obtain information.

Access to public information is regulated by Law No: 4982 of 2004 on the Right to Information. In addition, Circular No. 25356 by Prime Minister Recep Tayyip Erdogan on "The exercise of the right of petition and access to information" was enacted to identify the basis of this policy in the principle called "citizen-oriented approach in public services". Within the scope of the law, any citizen can request data from government bodies that is available in physical paper or electronic forms, and should receive it within 15 working days.

Previously, several national strategy and planning documents stressed the importance of using open data in the development of information society, e-government and smart cities in Turkey, and made related plans and commitments:

- 2015–2018 Information Society Strategy and Action Plan[2] (Ministry of Development) includes an article on sharing public data, which states that "public data held and produced by public agencies, including local governments, will be available to third parties for the development of value-added services, and hereby, emergence of new enterprises, transparent public administration" (Article 67, pp. 109–110).
- 2016–2019 National E-government Strategy and Action Plan[3] (Ministry of Transport and Infrastructure) includes the objective on broadening the use of open data emphasizing economic benefits of open data (Objective 4.2, pp. 50–51).
- 2020–2023 National Smart Cities Strategy and Action Plan[4] (Ministry of Environment and Urbanization) commits to establishing national and local smart city open data platforms, and ensuring their operability and sustainability (Act 19, pp. 582–593).

IMM conducted a legal review with regards to opening the city's data, and found that there is no regulatory restriction for the municipality to release open data for citizens. However, these data should not reveal firms' confidential information, citizens' personal information, and should not violate intellectual property rights.

The City of Istanbul also makes open data available free of charge under a license developed by the Istanbul Metropolitan Municipality that is compatible with the Creative Commons Attribution License. 4.0 and the Open Data Commons Attribution License, both of which license copyright and database rights.

[2] 2015–2018 Information Society Strategy and Action Plan: http://www.bilgitoplumu.gov.tr/en/wp-content/uploads/2016/03/Information_Society_Strategy_and_Action_Plan_2015-2018.pdf. Accessed on September 23, 2020.

[3] 2016–2019 National E-government Strategy and Action Plan: http://www.egovturkey.com/wp-content/uploads/2018/08/2016-2019-National-e-Government-StrategyAnd-Action-Plan-1.pdf. Accessed on September 23, 2020.

[4] 2020–2023 National Smart Cities Strategy and Action Plan: https://www.akillisehirler.gov.tr/wp-content/uploads/EylemPlani.pdf. Accessed on September 23, 2020.

Other Turkish cities' open data initiatives

Although open data is an emerging practice within Turkey, Izmir looks to learn from other cities, and their experience of developing and delivering municipal open data programmes.

The Istanbul Metropolitan Municipality has recently revitalised its open data initiative, as part of its Smart City Digitalisation Roadmap, and sees open data as a vital part of its journey to become a smart city, enabled through data. The launch of the portal has created great interest from digital communities both within and outside Istanbul, and the portal has served data across 10 themes including: disaster management; mobility; environment; energy; living; security; economy; people; information and communication technologies, and governance.

International collaboration and principles

IMM is an active member of several international initiatives and networks. This is driven by its need to learn from others and become a leader in sustainable and open digital transformation. Like Istanbul, it has recently joined the Open and Agile Smart Cities (OASC) network, which gathers 152 cities from 30 countries on four continents, to help realise this ambition. Izmir's open data development is informed by best practices from these networks, and also, through links made while developing this open data initiative enabled by IFC and its partners.

IMM aligns its open data initiative with the principles set out in the International Open Data Charter 2015, which promotes open data as a driver for the development of innovative evidence-based policy and wider social, environmental and economic benefits, as follows:

1. Open by Default—All data should be treated as open and available free of charge, unless identified privacy, commercial or security concerns restrict its release.
2. Timely and Comprehensive—Data should be current, complete and timely available.
3. Accessible and Usable—Data should be discoverable, have good metadata and documentation, and be available in a non-proprietary machine-readable format and with an appropriate open license.
4. Comparable and Interoperable—Data should be created using commonly used standards and identifiers that allow aggregation and comparative analysis with other data.
5. Promote Improved Governance and Citizen Engagement—Data should enable better scrutiny, accountability, and enhanced participation in the processes of government.
6. Promote Inclusive Development and Innovation—Data should enable access to everyone, who is interested to participate and share ideas.

Developing a sustainable open data initiative

The open data strategy was built around the five organisational themes taken from the Open Data Maturity Model.[5] These themes were used to evaluate the organisational capacity and capability of IMM to implement an inclusive and sustainable open data programme.

1. Data management processes.
2. Building knowledge and skills.
3. Data re-user support and engagement.
4. Investment and financial performance.
5. Strategic oversight.

1. Data management processes

IMM sets out to realise the value of its open data through the development of processes and technical systems to ensure that data released meets the aspirations of the city, communities, businesses and academic institutions based in its jurisdiction.

Open Data Unit

Open data is cross-cutting in its impact and resource requirements. Therefore, an Open Data Unit will be established to deliver the open data programme. Its role should borrow from much of good data practice that exists within the municipality at present, but critically be able to design, document and implement processes that will enable smooth and repeatable open data release. This would cover tasks associated with the data publication process as outlined below, but also act as the human interface between the data re-user community and the city.

The Open Data Unit will also plan for success and understand the potential load that the programme will have on the city's data infrastructure.

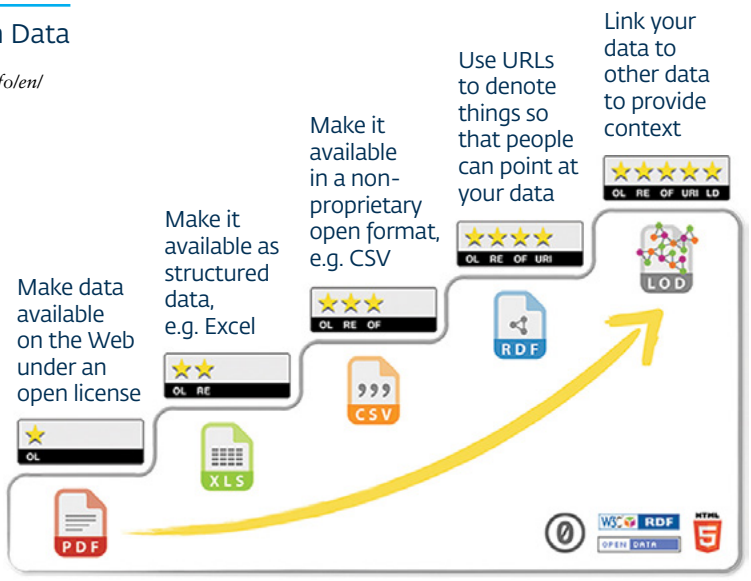
Open data portal

The municipality will make the process of discovery and access to open data, as frictionless as possible, through a single open data portal. Different users have different data needs, and the design of the open data portal needs to accommodate these challenges. Casual users will see data on a map or graph using simple online tools, whereas businesses, academics and other expert users will access raw data in a variety of common formats, either through file download or an Application Programmable Interface (API). Data will be released in

[5] Adapted from the Open Data Maturity Model developed by the Open Data Institute and UK Government—Department of Environment, Food and Rural Affairs.

Five Stars of Open Data

Source: https://5stardata.info/en/



machine readable and non-proprietary formats with a minimum three-star rating, as set out in the Five Stars of Open Data.

In addition to making the process of data access as easy as possible, data must be findable. Data engagement will be promoted by allowing data re-users to search for data on the portal, categorising datasets by themes, and curating data collections that bring together different datasets around a particular challenge. Federating access to data and metadata through services, such as Google Dataset Search can drive users outside the city to find Izmir's open data and allow for an even greater reach.

The open data portal is not only a point of access for Izmir's open data, it is a shop window that places open data at the core of Izmir's smart city aspirations. Blog posts, training materials, challenges and open data events would all feature on the portal, as well as articles showcasing applications and services built using open data.

The portal is the public face of Izmir's open data ambition, as it enables easy and 'frictionless' access to open data. However, this cannot exist, unless underlying processes and technical infrastructure enables it. Strong coordination and governance processes will be put in place to enable a smooth, responsive and repeatable data release.

Licensing

For data re-users to be confident that they can use the data for their intended purposes, explicit open licenses that give a legal right to use it for free will be attached to each dataset. Internationally recognized open data or compatible licenses, which enable re-use of Izmir's open data will be used.

Metadata and supporting documentation

All datasets will be published with a standard set of metadata and supporting documentation to enable a greater understanding and increased usage. This will be backed up by a commitment to maintain the documentation and metadata through the data's lifecycle.

Metadata requirements

Relevance	Context; coverage; original purpose; granularity; summary, and time frame.
Usability	Labelling; documentation; licence; access; machine readability; language used; format; schema, and ability to share.
Quality	Collection methods; provenance; consistency of formatting/ labelling; completeness, and what has been excluded.

The level of documentation detail will vary on the complexity of the dataset and the area it covers. It would typically offer:

- A high-level summary—Purpose of creation, and what it describes.
- Access information—How to access the data, location of archives, and mirrors, if available.
- Indicators—Summary statistics providing insight into size, rate of growth, quality and update frequency of the dataset.
- Relationships—Locations of other datasets that were used to construct the dataset.
- Scope and coverage—Description of dataset contents, the types of entity it describes, geographic focus, and the time period to which it applies.
- Provenance—How the data was processed and collected prior to publication.
- Technical documentation—Data formats, schemas, and a sample record may be included for illustrative purposes.

If data is being made available through an API, documentation that describes how to use the API will also be created.

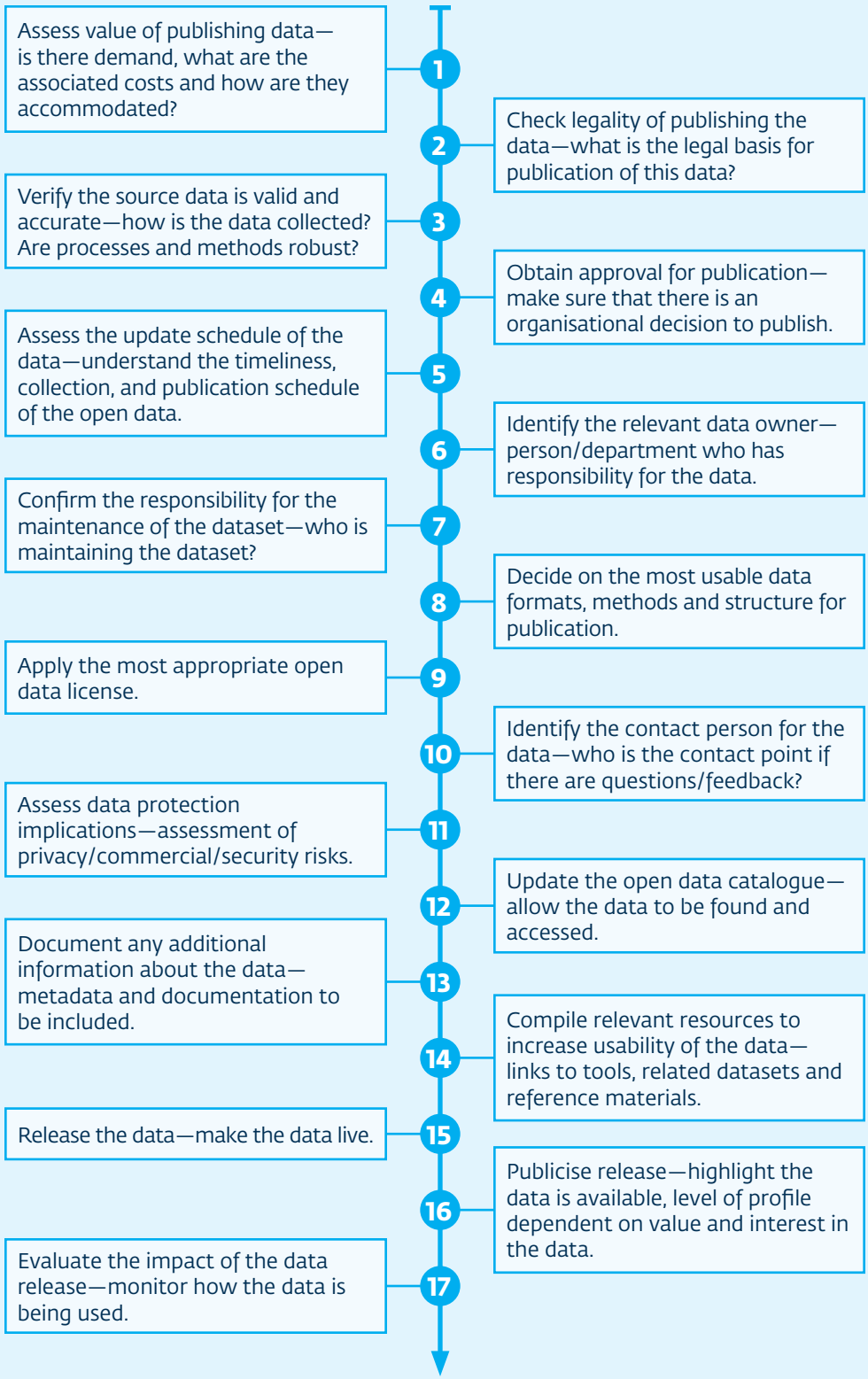
Data publication process

Responsive and repeatable data publication process will be implemented, so that Izmir can confidently release good quality data that enables its maximum re-use. The process below highlights the different stages needed to assess and release data.

Data standards

The role of the Open Data Unit will advocate for the use of common open standards for formatting data, and the adoption of industry standard identifiers within datasets. This approach benefits the organisation, through the use of open source tools, reduction of the burden of maintaining bespoke data standards, and easier recruitment of specific technical expertise. In addition, it increases the likelihood of data re-use through adherence to common standards, widely used identifiers that allow for combining multiple datasets, and the use of identifiers to find particular data.

Data publication process



2. Building knowledge and skills

New ideas bring new ways of working. Building the appropriate skills and understanding open data practices within the administration is of vital importance. For open data to be sustainable, there needs to be a common understanding of the benefits that open data can bring to Izmir's citizens, businesses, academic institutions, and its administration.

Support for key staff should be provided, so it is competent and confident with open data at a technical and procedural level. Those trained will then be able to share those skills more widely within the organisation, and potentially with the wider open data community. This will be backed up with online resources and documentation that staff can access, when needed.

Training will be used to create a common understanding of the value of open data and its application to the organisation, operational skills required to support data governance and publishing, and the development of a strategic understanding, at a senior level, on how to use open data to further the goals of the organisation.

When developing this organisational expertise, it will be important that employees access training to ensure that they understand the risks and benefits of using and publishing open data, and the organisation's open data policies and strategy, and have the ability to apply appropriate levels of data governance to the programme's development.

Knowledge management is an important process in any organisation, and with regards to Izmir's open data programme, it is mainly key for two reasons:

(i) Staff needs to find and use documentation on organisational standards and policies. Many of these policies could also be of interest to external data re-users. In addition, by making Izmir's open data strategy and related policies accessible, it will help build confidence within the external community of the city's commitment to open data publishing.

(ii) Both internal and external users will have access to documentation to support the use of published data, such as technical information on data collection and processing. This will enable better understanding and increase re-use potential.

3. Data re-user support and engagement

To build a sustainable open data programme, the way the municipality engages and supports data re-users is of vital importance. Re-users could range from private citizens interested in a particular aspect of their neighbourhood to create a community campaign, or a data scientist, who needs to model traffic flows into and out of the city, to a private company, or a community organization. Differing needs require differing methods of engagement, and if open data is to deliver on its promise, these need to be designed appropriately.

The development of an external stakeholder engagement plan specifies how the city would engage with re-users through understanding the differing types of users, their needs, and the most effective way of engaging with them. This will help prioritise activities, identify channels of engagement, design appropriate events and programmes, create resources, and develop appropriate levels of support.

The nurturing of the data re-user community allows the open data programme to:

- Prioritise data that is of most interest and value to the data re-user community.
- Release data in a way that is most re-usable by the data re-user community.
- Create better understanding of the processes of data collection.
- Increase the quality of supplied data, and also the processes that create it.
- Enhance trust between data re-users and the city.
- Identify skills within the community that may be of benefit to the city.
- Build capacity within the data re-user community to use data more effectively.
- Identify the potential and actual re-users of a dataset.
- Identify key stakeholders within the community to prioritise and focus activities.
- Understand the types of activities that are most effective.

As the goal of the open data portal is to make accessing data as frictionless as possible, it is expected that the way external data re-users interact with IMM and receive support will become easier. A single point of contact will be available for people to enquire about data, seek help, and make data requests.

The process and criteria for requesting datasets and their release will be transparent and explicit, and will allow to publicly track progress of these requests. Reasons for rejection of a particular dataset will also be made public—with any further advice for following up on the rejection. The data request and release process will be designed with care, in order to avoid vexatious requests or unrealistic demands.

Annex 2 includes a list of datasets to be prioritised, which was defined through engagement with external stakeholders, as part of the development of this strategy.

External outreach and support

To encourage use of the municipality's open data, a programme of external events and activities will be created to stimulate interest within the wider community. Different types of events have different outcomes, and it is essential that consideration is made to the motivations, interests, and needs of this external audience when designing these activities. Proposed events could include:

- Open data meetups—Developing an Izmir-based community around open data.
- Hackathons—Events that bring people together to work on specific problems or thematic areas.
- Data dives—Events or activities looking at specific datasets.
- Innovation challenges—Working on a pre-identified challenge area. These will take place over a period of time, and teams will be supported to develop their ideas to a prototype stage.

The city will use these outreach activities to identify teams, companies, and individuals, who are willing to develop their ideas into mature products and services, and would be supported to do this through mentoring; access to finance; grants; office space, and promotion within and outside the administration.

Citizen generated data

Although the municipal administration and other organisations create huge amounts of data about the City of Izmir, there are many grassroots projects, where data relating to citizens' interests, such as biodiversity and cycling are collected.

Given that this data is traditionally difficult for the city to collect, support will be given to citizen-led projects and groups, so that data can be collected in the most useful way, and if relevant, it could also be made available through the open data portal. Training would also be offered, as part of the wider support and engagement strategy.

4. Investment and financial performance

For the open data programme to have long-term sustainability, on-going investment in both people and infrastructure is required. In addition, the city needs to understand the financial implications of its maintenance. Quantifying these costs can be challenging, especially where financial benefits may be accrued in a different department through increased operational efficiencies, such as de-duplication of data or manifest themselves as externalities, such as changes in citizens' behaviour due to access to better information, or increased economic activity due to availability of good quality data.

The ability to understand the costs of data creation and publishing will enable the organisation to make more informed programme investment decisions based upon a cost-benefit analysis. It is important that the municipality develops a methodology for valuation of datasets, and also understands that datasets, which align with the delivery of the municipality's objectives, may require higher levels of investment. The cost of creating and publishing certain data may be marginal and not warrant such analysis, whereas information, such as real time transportation data will have a higher infrastructural cost. Understanding the costs of serving data, as well as on-going costs of data governance and support, needs to be accounted for.

The municipality will continue to be proactive regarding ownership of data created by third party service providers. Contracts with suppliers will clearly describe the intellectual property rights associated with data provided to the municipality, and with rights granted to the municipality, where possible. When necessary, procurement processes, will ensure that contractors provide information, as to how they will deliver open data as part of the contract. They will also provide clarity around the provenance of any data they use or supply, so that the municipality is clear on rights relating to derived datasets. Additionally, the whole life costs of a service will be accounted, so that data provided allows migration to other suppliers or solutions.

5. Strategic oversight

Open data strategy

This strategy sets out how IMM will build an inclusive and sustainable open data programme. It outlines the processes, roles and responsibilities, and infrastructure needed for implementation, whilst also providing means of monitoring the success of the programme, as well as its progress.

Data catalogue

This strategy reframes data that would traditionally have been collected as part of the everyday processes of the city's management and service delivery. It is an asset that, when made openly available, has the potential to deliver extra value both from within and external to the municipal government.

The municipality will conduct a data audit across all departments to understand the data assets that it owns and maintains. This will help identify the level of data use within the municipality, whilst also help to identify areas of duplication; alignment; structure; format; data gaps; quality; collection methodology; maintenance; privacy, and security considerations. From the data audit process, a data catalogue will be created and maintained. This will form the bedrock of the open data programme, as it will enable the Open Data Unit to quickly respond to enquiries regarding data, allow easier creation of metadata and supporting documentation, and also help prioritise datasets for release.

The administration is not the only creator of data within the municipality. Data from central government, affiliated organisations, private companies, academia, as well as the citizens themselves all have value, if able to be shared as open data. Different data providers will have different constraints regarding the data they create. In addition, if data is appropriately licensed, it can make the open data portal more attractive to data re-users, including the municipality itself.

Measuring success

This strategy was created from conducting a number of interviews and focus groups within the city's administration and externally. Part of the methodology for the creation of the strategy was to adapt and use the Open Data Maturity Assessment, developed by the Open Data Institute, and the United Kingdom's Department for Environment, Food and Rural Affairs. It measures the maturity of open data related practices within the municipality across five themes of:

1. Data management processes.
2. Knowledge and skills.
3. Customer support and engagement.
4. Investment and financial performance.
5. Strategic oversight.

This approach allows the creation of metrics, and a baseline that the implementation of this strategy can be measured against. The administration commits to assessing these metrics periodically, and publishing the assessment openly.

Annexes

Annex 1. Powering the smart city

Data powers the smart city and the development of this open data strategy. The implementation of its recommendations is as a step towards the city's aim to become a digitally enabled smart city.

Izmir's Smart City Initiatives

- IzmirNET
  - Longest local government fibre network in Turkey.
  - 1,000Km fibre infrastructure with 500Km actively managed.
  - Enabling a unified data transfer network between municipality's units and affiliates.
  - Used to disseminate data from the city's geographical information system.
  - Connecting the Izmir's adaptive traffic management system.
- WizmirNET
  - Free Public WiFi—allowing citizens and visitors to Izmir to connect to the internet.
  - Covers 65 parks, 8 ferry terminals and 18 ferries.
  - 317,248 registered users.
- Data Centres
  - Two distributed dark fibre connected data centres giving redundancy and resilience.
  - Integrating the operations of IMM (administration), ESHOT (transportation), and IZSU (water management).
- Transportation
  - Adaptive traffic control and management.
  - Public transport smart card system.
  - BISIM public bike hire—40 stations serving 550 single bicycles and 70 tandems.
  - 20 Electric buses.
  - 65 Smart bus stops rising to 250 by 2021, powered by solar energy with audio/video information boards.
- Energy
  - ESHOT heavy maintenance facilities 1.5 MW solar power plant.
  - IMM Bayraklı solar power plant.
  - Three more solar power plants coming online by 2024 creating a 4.5MW capacity.
  - Intelligent Energy Monitoring and Management System optimising the municipality's energy use.
- IZSU SCADA Water Management System
  - Providing centralised control of water supply and distribution.
  - Flood mitigation through capacity management.

- Waste Management
  - Excavation Software Automation System.
  - Air Quality Monitoring Stations.
  - Recycling and energy from waste facilities.
    - Mechanical Recovery Facility (MRF)—separating materials for recycling biogas through anaerobic digestion and compost.
    - Electrical generation of biogas from anaerobic digestion facility.
- Environment
  - Agriculture Prediction Early Warning System—enabling more effective responses to changing meteorological conditions and active pest management.
    - Reduction in pesticide use by 40%.
    - Increasing crop yield.
  - Urban Green UP programme—creating greener spaces within Izmir.
- People
  - Izmir History—creating a mobile application for people to navigate and understand the historical context of the City of Izmir.
  - FabrikaLab, is part of the global FabLab network—introducing citizens to making, repairing and using open source technologies, such as 3D printing, Arduino, and Raspberry Pi.
- Life
  - 2D/3D City Guide—helping people visualise and interact with the city's urban environment.
  - Geographical Information System for Cemeteries—allowing better management and location of individual graves.
  - Infrastructure Information System—mapping building and excavation work within Izmir.
  - Mobile Information System for City's Administration—allowing more responsive management and monitoring of building works, highways, and citizen complaints.
  - Green Space Information System—managing 330 parks and green spaces in Izmir.
  - ESHOT Transportation Information System—locating transit routes and stops.
  - Municipality Project Tracking System—allowing the management and monitoring of ongoing projects being implemented by the administration.

Annex 2. Data prioritisation

Through discussion with the municipality's Open Data Task Force, external stakeholders, and other expert advisors a number of thematic areas and associated datasets were identified, which if released would encourage open data innovation and participation within the city.

Cities thematic priorities for open data are:

- Environment
- Transportation
- Data related to smart city programmes
- Agriculture

Environment

The city collects a large amount of data on the environment, and areas, such as food hygiene standards and licensing. Steps should be taken to identify key datasets, the technical context in which the data is collected, processed, and stored, as well as the steps needed to make that data available and in good quality.

Transportation

Data is being generated by the city's adaptive traffic management system, smart card system, and automatic vehicle location (AVL) systems used for tracking buses, trams, suburban rail, and ferries. There is also a wealth of data around routes and transport access nodes. Making this data available will help make the city more navigable and improve access to services.

Data related to Smart City programmes

Izmir is an active participant of smart city projects, and although these can be time limited, they offer an opportunity to embed open data practices into them at an early stage. This will help more people engage with the projects, and also ensure a longer-term legacy to projects.

Agriculture

More efficient and responsive farming practices through the release of meteorological; land use; pest; water supply, and other relevant data, can benefit the municipality's farmers and citizens, and improve food security.

Datasets identified through external stakeholder engagement

During the development of the open data strategy a number of interviews and focus groups were held with external stakeholders to understand the existing challenges and opportunities that the release of open data could bring. The following list are datasets identified for release during those meetings:

- Geographical information
  - Road topography, width, turning radii, etc. to reduce disruptions related to the transportation of oversize loads by road.
  - Street names and addresses to enable better route finding.
  - City topography shape files.

- Transportation
  - Location of bus stops.
  - Data that could enable more public transport use by the visually impaired.
  - Real time transit data.
  - Real time car park capacity data.
  - Real time highway disruption data, including road works and excavations.
  - Electricity charging stations data.
  - Location of traffic lights.
  - Real time traffic flow data.
  - Minibus schedule and route data.
  - Public transportation ridership data.
  - Cycle lanes and routes.
- Health
  - Bed capacity and treatment availability in the city's hospitals
- Environment
  - Real time air quality data from city's sensors.
  - Regularly updated water quality data from the bay.
  - Noise data, both real and modelled for the city to enable better urban development.
  - Granular land use data covering the city and surrounding areas.
  - Water quality from wastewater discharge sites.
  - Recycling and waste management data.
- Energy
  - Energy production data from city's green energy (solar, wind and biogas) power plants.
  - Energy usage within the city.
- Other
  - Demographic data.
  - Building type and construction for better earthquake preparedness.

European Commission identified—High Value Datasets (HVDs)

The recent Open Data Directive (Directive (EU) 2019/1024) introduces the concept of high value datasets. They are defined as data whose re-use is associated with important benefits for the society and economy. Data sets should be available free of charge, subject to a set of rules, in machine-readable formats, via Application Programming Interfaces (APIs), and where relevant, as bulk download. The thematic categories of high-value datasets are:

1. Geospatial
2. Earth observation and environment
3. Meteorological
4. Statistics
5. Companies and company ownership
6. Mobility

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