

ESG Data Stewardship: *An IFC Good Practice Note for Mining*

*From Disclosure to
Development Program
Knowledge Series*

GOOD PRACTICE NOTE

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About IFC

IFC — a member of the World Bank Group — is the largest global development institution focused on the private sector in emerging markets. We work in more than 100 countries, using our capital, expertise, and influence to create markets and opportunities in developing countries. In fiscal year 2025, IFC committed a record \$71.7 billion to private companies and financial institutions in developing countries, leveraging private sector solutions and mobilizing private capital to create a world free of poverty on a livable planet. For more information, visit www.ifc.org.

About D2D

The From Disclosure to Development (D2D) Program was an IFC-led initiative that supported companies and governments in transforming sustainability disclosure into actionable insights that create shared value. The program operated in Colombia, Ghana, Guinea, Mongolia, Peru, and Sierra Leone. D2D promoted responsible data stewardship, open data practices, and digital innovation to strengthen transparency, improve decision-making, and enhance engagement with communities and stakeholders.

D2D's tools and approaches have been integrated into IFC's Digital Inclusion Advisory - a new service for mining, energy, and municipal clients that supports digitalization and responsible, human-centered AI. It includes help to private sector and subnational governments with building more open and machine-readable datasets, through improved curation, annotation, and governance.

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ESG Data Stewardship: *An IFC Good Practice Note for Mining*

ESG Data Stewardship: An IFC Good Practice Note for Mining Companies

Responsible mining companies benefit from organized, integrated environmental, social, and governance (ESG) data collection and disclosure. While traditional data management and governance focuses on compliance and operational efficiency, data stewardship goes a step further by incorporating public benefit, and creating value for companies, investors, and communities.

As demand for responsibly sourced materials such as lithium, cobalt, and nickel continues to grow, driven by the global energy transition, robust ESG data practices have become essential. These practices enable mining companies to meet stakeholder expectations for transparency and ensure operations align with sustainability targets. PWC's 2021 Global Investor ESG Survey found that 83% of investors viewed detailed, evidence-based ESG reporting as critical to maintaining investment appeal. Additionally, regulatory frameworks like the European Sustainability Reporting Standards (ESRS) under the Corporate Sustainability Reporting Directive (CSRD) require companies to conduct a double materiality assessment—evaluating how sustainability issues may financially impact the company and affect people or the environment. Having the right data is critical to addressing these emerging trends. The question we need to ask is whether ESG data is being utilized to its full potential.

Data stewardship in mining goes beyond managing ESG information—it transforms data into a strategic asset that benefits both the company and its stakeholders. Achieving this requires publicly disclosing data and making it accessible in an open digital format. Effective data stewardship demonstrates a company's commitment to sustainability, addresses community concerns about environmental and social impacts – thereby reducing potential conflicts and delays – and catalyzes innovation by using data as a foundational component for developing digital solutions and products.

What is data stewardship?

Competencies, processes, and practices that seek to manage data for (re) use in a systematic, sustainable and responsible way.

*Stefaan Verhulst, The GovLab
October 2021*

Oyu Tolgoi LLC (OT), Mongolia

In 2023, IFC supported OT in strengthening its social license to operate by leveraging ESG data to improve communities' access to information. IFC conducted a data assessment to identify priority information gaps and align the capacity of OT staff and key infomediaries (intermediaries of information) on data management, analysis, information dissemination, and community engagement. The understanding of mining contributions and impacts improved by 33% in the South Gobi.

Guinea Alumina Corporation (GAC), Guinea

In 2024, IFC provided technical assistance to GAC staff to strategically disclose existing ESG data in support of community engagement, information dissemination and social license to operate. IFC conducted a community information assessment to identify information gaps that could be addressed through ESG data and helped GAC strengthen its data stewardship capacity to adopt digital disclosures in an open format related to local procurement, employment, and community grievances.

EXAMPLES OF ESG DATASETS THAT CAN BE RELEASED BY COMPANIES:

Water management <ul style="list-style-type: none">• Water Use• Water quality	Climate Change and Energy <ul style="list-style-type: none">• Energy Consumption• Climate Risk Assessments• Carbon Emissions (Scope 1-3)
Air Quality <ul style="list-style-type: none">• Greenhouse Gas Emissions• Particulate Matter• Dust Monitoring	Employment and Workforce <ul style="list-style-type: none">• Local Employment• Workforce Diversity• Job Creation• Worker Safety
Land and Soil Management <ul style="list-style-type: none">• Land Use Data• Soil Quality• Rehabilitation Metrics• Biodiversity	Community Engagement <ul style="list-style-type: none">• Grievance Mechanisms• Community Development Agreements <ul style="list-style-type: none">• Relocation Data• Stakeholder Meetings• Training Programs• Human Rights Assessments
Resilience and Mitigation <ul style="list-style-type: none">• Flood and Drought Data• Erosion and Landslide Risks	Revenue and Economic Contributions <ul style="list-style-type: none">• Taxes paid• Procurement data• Social Investment Projects• Development Fund Contributions
Biodiversity <ul style="list-style-type: none">• Wildlife Monitoring• Habitat Loss• Flora Metric• Biodiversity Offset	

List is representative of information demands identified by the D2D Program and is not exhaustive of datasets that can be released.

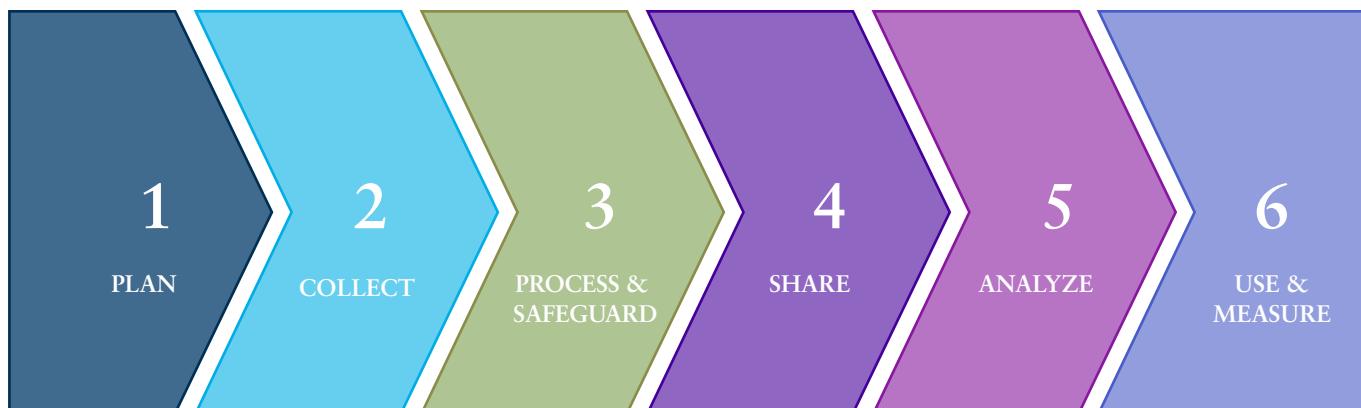
IFC works with mining clients on a multi-step change management process focused on the adoption of good data stewardship practices that can improve access to and use of existing ESG data by different stakeholders.

Good data stewardship encompasses: (a) systematic data collection across the company's operations, (b) its management and (c) disclose of relevant high-value datasets for public benefit. Effective data stewardship can improve:

- 1) transparency and accountability:** effective data disclosure and use can help improve trust with stakeholders, fostering a stable operational environment
- 2) decision-making:** data driven insights can inform strategic operational decisions to reduce ESG risks, improving efficiency
- 3) sustainability reporting:** disclosure of digital data can support regulatory compliance and demonstrate commitment to responsible environmental and social practices to broader audiences (beyond investors)
- 4) resilience:** real-time data on environmental, social, and operational challenges can help companies and communities improve risk management and mitigation responses
- 5) community engagement and collaboration:** digital data disclosures can improve access to and use of information by communities, fostering accountability, dialogue, innovation, and collaboration between companies, communities, and governments on local development.
- 6) data innovation and economic development:** responsible re-use of ESG data enables communities and individuals to develop new insights and business opportunities, promoting economic growth and improving human-well being.

This good practice note proposes a step-by-step process that mining companies can use to boost their data stewardship capacity and implement ESG data disclosure.

The path to good ESG data stewardship





1. Plan

The path to effectively disclosing ESG data begins with planning. The planning stage involves:

- Defining ESG data disclosure goals in alignment with sustainability and ESG practices.
- Identifying data to be disclosed, including its granularity and quality.

Articulating the business case for data disclosure: how will it help the company? What value will it bring to stakeholders?

- Ensuring that proposed disclosure has leadership buy-in and resources allocated (budget and time) in all relevant departments.
- Assessing company's information needs as well as the broader information interests of host communities.

Appointing data stewards is a critical step in the planning stage.

Data stewards coordinate the data disclosure process and act as liaisons with key stakeholders, including company leaders, directors, managers, sustainability officers, and data managers. Ultimately, data stewards collaborate with these stakeholders to

determine what information to share and how, along with what not to share and why. Mining company data stewards should have front-line operational or departmental managerial roles. This role provides insight into daily business operations and equips stewards with the authority and expertise needed to drive strategic collaboration and strengthen data governance. Data stewards actively collaborate with departments to ethically unlock the value of ESG data. They ensure responsible information sharing while safeguarding corporate interests, users, and the wider public.

CHECKLIST: PLANNING FOR DATA DISCLOSURE

- ✓ Clearly define data release goals to guide the planning process
- ✓ Detail anticipated benefits and outcomes for the company and stakeholders
- ✓ Develop terms of reference for data stewards in relevant data-holding departments
- ✓ Identify who owns various data disclosure decisions and document what will be released
- ✓ List out datasets required for mandatory and voluntary sustainability reporting frameworks, depending on jurisdiction:
 - ESRS
 - IFRS S1 and S2
- ✓ Identify specific datasets to be disclosed, based on defined disclosure goals
- ✓ Appoint team to develop comprehensive data release plan, to include:
 - schedules
 - milestones
 - success metrics
- ✓ Establish quality assurance processes to ensure data integrity, including error management.

Resources:

- Data steward terms of reference
- Data release plan template
- Key data players roles and responsibilities

2. Collect

Advancements in technology, such as the adoption of IoT, sensors, and drones, along with stricter regulatory requirements, have enabled mining companies to collect vast amounts of data with greater veracity and velocity. However, data collection often occurs in silos, with limited interdepartmental collaboration, which hinders a company's ability to execute disclosure plans and reduces the quality, reliability, and usability of the data.

Well-planned data collection sets the foundation for effective data disclosures. It is essential in:

- Prioritizing the data to be collected and the methods for collection.
- Formulating precise questions to define granularity of data required.
- Determining appropriate collection and disclosure frequencies.
- Documenting provenance and quality of data collected (using standardized meta-data)
- Ensuring alignment with industry standards for reporting and compliance.
- Establishing centralized data management systems to store, integrate, and analyze data.
- Defining user access levels (e.g., public or internal), confidentiality protocols, and licensing agreements.

Collaboration among data-holding departments is key during this phase, as it will help companies to safeguard the integrity of the data and improve access and use for all interested parties. Ultimately, data that is systematically gathered, organized, and consistently maintained will result in reliable disclosures.

3. Process

The re-usability of disclosed data relies significantly on the quality of data processing. Data processing involves reformatting content into a uniform disclosure template, verifying data points, and correcting clerical errors that occur during data collection. Consistent data processing ensures completeness and accuracy of the disclosed data. Companies often treat data processing as an ad-hoc effort, responding to communication or sustainability report requests without an established data collection strategy. However, this approach is resource-intensive, time-consuming, and unsustainable. Adopting structured data processing practices ensures that accurate data enters

the disclosure pipeline, enabling reliable analysis, actionable insights, and the development of digital services or products. The bottom line is that if faulty or incomplete data goes into the analysis, faulty or incomplete data insights will be drawn.

CHECKLIST: COLLECTING ESG DATA

- ✓ Conduct departmental data inventory:
 - frequency of data collection
 - validation processes
 - security classification for access
 - data ownership
 - licensing/terms of use
- ✓ Prioritize key ESG datasets for disclosure based on user and operational needs
- ✓ Establish digital infrastructure and data management systems to store and share data
- ✓ Assess licensing requirements that govern data usage of priority datasets:
 - type of license
 - frequency of updates

Resources:

- Metadata collection template
- Standardization best practices

CHECKLIST: SETTING CLEAR DATA-PROCESSING PROCEDURES

- ✓ Assess data quality
 - Evaluate the quality and integrity of raw data collected across the operations
 - Develop validation processes for data-holding departments:
 - verify data by cross-referencing data points from primary sources
 - review data-processing procedures on a quarterly basis to ensure consistency of data quality
 - Explore use of digital tools to:
 - automate data quality assurance
 - ensure ease of interface and interoperability across software platforms, particularly of those that feed into disclosures, analysis, and visualization
- ✓ Clean data
 - Establish a data cleaning process that corrects:
 - data entry errors
 - inconsistencies
 - missing values
 - Create uniform and clear data collection templates that include:
 - labels of the variables
 - data units
 - metadata
 - data collection frequency
- ✓ Ensure data safeguarding, security, and integrity
 - Align security measures to safeguard data and its integrity during processing and storage phases (including prevention measure to secure data systems from hacking or manipulation).
 - Consult with legal and compliance departments for their recommended approach.

4. Share

Developing an effective and meaningful data-access or sharing strategy requires careful consideration on not just what to share, but on how to provide access to it. Many mining companies already disclose multiple reports: annual reports, sustainability reports, environmental management plans, procurement reports, local agreements, among others. Data analytics on the uptake, downloads, and engagement with these reports remain limited, representing a missed opportunity for companies to evaluate the effectiveness of their content in reaching the public and to gain insights into what data users need. Making a report public and accessible online does not automatically ensure that the relevant information or data reaches intended audiences. Ensuring that the data disclosures and insights are targeted and formatted for the end-user will be key to maximize the impact of disclosed ESG data in bridging information gaps, providing actionable insights for decision-making, and fostering transparency and accountability.

Optimizing a company's communications investments involves:

- Developing a release plan (refer to step 1 of the data stewardship process).
- Extracting and releasing datasets included in publicly available information from regularly scheduled company reports.
- Tagging datasets according to impact and importance.
- Making use of the range of communications platforms, styles, and user-friendly formats to ensure messaging reaches all audiences —especially local communities.
- Monitoring uptake by tracking metrics on downloads and engagement with communication materials and adjusting approach if uptake remains limited.

CHECKLIST: DEVELOPING A DATA-SHARING PLAN

- ✓ Aligned with your data release plan, data sharing objectives should have a clear scope, objective, and approval process by the relevant leadership.
- ✓ Tailor dissemination strategy for specific audiences.
- ✓ Assemble a data sharing team responsible for:
 - Coordinating with the data stewards to implement data release and sharing plans
 - Leading the roll-out of the dissemination plans at the corporate level
- ✓ Identify data release mechanisms, including social media and other communications outlets.
- ✓ Put in place back-end technical infrastructure to facilitate uploading, publication, and user engagement analytics, including data access platforms and Application Programming Interface (APIs).
- ✓ Detail the release schedule, milestones, and key metrics to guide the sharing process.
- ✓ Establish an online feedback mechanism for the released data so users can request clarifications or report concerns:
 - Set response times
 - Identify roles to oversee response

5. Analyze

For mining companies, effective data stewardship goes beyond collection and disclosure, encompassing data analysis that transforms raw data into actionable insights. Mining operations generate vast amounts of data from diverse sources, including sensors, geological mappings, and social and environmental impact assessments. High-quality data minimizes errors and enhances operational precision. It provides a solid foundation for data-driven decision-making and is critical for analyzing data at scale to generate predictive insights. When managed effectively, analysis drives decisions that enhance operational performance and improve data usability for public benefit.

Gaining such insights and making the most of the data requires:

- Staff with digital and analytics skills.
- Clear lines of accountability for managing disclosure requests.
- Streamlined processes to simplify data sharing.
- Tools that can support complex analysis and visualizations.

CHECKLIST: Analyzing data

- ✓ Conduct a digital skills assessment of staff to determine staff's proficiency in digital technologies and analytics
- ✓ Appoint a technical focal point responsible for insights drawn and liaising with data stewards
- ✓ Build capacity of staff on open data, digital skills, analysis, and visualizations
- ✓ Streamline accountability mechanisms to track ownership of data analysis and decision-making, including:
 - What datasets are used to draw insights
 - Methodologies used for analysis, including limitations and assumptions
- ✓ Adopt digital tools that can handle complex data analysis (leveraging machine learning and AI)
- ✓ Set sensitivity analysis and feedback mechanisms
- ✓ Provide comprehensive documentation for tracing insights
- ✓ Foster a culture of continuous improvement and feedback to incorporate lessons learned for future analysis.

6. (Re)Use

Enhancing data (re)usability is a key benefit for both companies and the public and serves as a central goal of data stewardship. Data (re)use can go beyond analysis and information sharing; it can catalyze new technology-driven innovations that serve the public interest, create new market opportunities, and ensure that all stakeholders—especially communities—have an equal voice in shaping policies and practices that impact their lives.

While the potential benefits of disclosed data and derived insights are compelling, companies often remain apprehensive about the risks of releasing data. In fact, apprehension over the potential business risks can make change management processes slow

to implement, emphasizing the importance of early buy-in by leadership and technical staff to ensure that disclosure plans are effective and include risk mitigation strategies.

Reducing such risks requires clearly defined:

- Well-defined data management processes.
- Clear accountability roles.
- Robust data governance policies and tools.
- Comprehensive risk mitigation strategies.

Looking ahead

As mining companies embrace digital transformation, ESG data disclosure beyond compliance is emerging as a critical trend. With increasing data collection, companies have new opportunities to share information with key stakeholders—not just investors—engage meaningfully with communities affected by mining operations and collaborate with governments, civil society, and transparency initiatives (e.g. EITI) to strengthen open data ecosystems.

IFC's advisory work in Mongolia and Guinea on voluntary disclosure of ESG data is an important reference point for the mining sector. Companies can use voluntary disclosure of open digital data to enhance community engagement and social license to operate. This brief has captured good practices to date, with the goal of helping mining companies enhance their transparency and accountability as well as their relationships with local communities. But this is only the beginning. As more companies embrace the benefits of voluntary ESG data disclosure, more learning will come and practices will surely evolve, contributing to the mining industry's broader progress towards greater accountability, sustainability, and positive social impact.

CHECKLIST: Using open data for decision making and community engagement

- ✓ Identify potential risks associated with data usage and implement mitigation strategies.
- ✓ Detail the budget required for data usage, including:
 - Resources
 - Tools
 - Personnel
 - Other expenses
- ✓ Set a detailed timeline for data usage, including:
 - Key milestones
 - Roles and responsibilities
- ✓ Outline a process for making changes to the data release plan to accommodate evolving data usage needs.
- ✓ Establish a transparent process for resolving disputes that may arise during data usage.
- ✓ Formalize sign-off of changes to affirm the commitment of management and relevant stakeholders.

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RESOURCES FOR COMPANIES

Terms of Reference for Data Steward

Purpose:

- Facilitate responsible and ethical management of data assets within the mining company.
- Ensure compliance with industry standards, legal regulations, and best practices in data stewardship.
- Support the company's commitment to transparency, accountability, and sustainable practices through effective data governance.
- Contribute to change management processes and promote enhanced data governance.

Role and Responsibilities:

Internal Data Oversight:

- Regularly review and assess the quality, integrity, and security of data assets.
- Collaborate with relevant stakeholders to identify and address data-related challenges and opportunities.

Policy Implementation:

- Implement and enforce data governance policies, including those related to data privacy, security, and compliance.
- Advocate for the adoption of industry best practices and standards in data management.

Data Lifecycle Management:

- Oversee the entire data lifecycle, from collection and processing to sharing and analysis of the designated department.
- Collaborate with teams and other data stewards to ensure that data is appropriately managed, archived, and disposed of in accordance with policies and regulations.

Stakeholder Engagement:

- Act as a liaison between technical teams, management, and external stakeholders.
- Promote a culture of data stewardship, providing guidance and support to departments across the organization.
- Ensure a reliable feedback mechanism for users and that the feedback loop gets closed within the pre-established time limits for each inquiry/concern received.

Training and Capacity Building:

- Develop and deliver training programs on data stewardship principles and practices (optional).
- Support the development of data literacy within the organization.

Data Governance Framework:

- Work with data management team to establish and maintain a robust data governance framework aligned with industry standards and best practices.
- Help define roles, responsibilities, and accountabilities for data management within the designated department, in alignment with the broader organization.
- Provide regularly feedback to the data management team on data governance framework to address evolving challenges and opportunities.

Collaboration:

- Foster collaboration between data holders, data users, and IT teams to ensure a cohesive approach to data stewardship.
- Collaborate with senior management to make decisions related to data governance processes and implementation.
- Engage with external partners, industry associations, and regulatory bodies to stay informed about emerging trends and standards in data stewardship.
- Organize outreach events to build users' awareness of the open data and to catalyze its use (through innovation events, data analysis training for youth, etc.)

Reporting:

- Provide regular reports to management on the state of data stewardship within their department.
- Communicate key metrics, achievements, and areas for improvement to relevant stakeholders.

Accountability and Sustainability:

- Be accountable for the effective execution of data stewardship responsibilities.
- Address challenges and issues promptly and proactively, including identify and mitigate risks associated with data management, security, and privacy.
- Assess cost-benefit (ROI) of data disclosure and ensure funding and resources to maintain data stewardship activities

The Data Steward's terms of reference will be reviewed annually and adjusted as necessary.

Data Release Plan Template:

Introduction: Overview of the data release initiative, including purpose and value add for the company of ESG data disclosure in an open data format.

GOALS AND OBJECTIVES		DATA
<ul style="list-style-type: none"> Definition of goals and objectives of release plan Mapping of objectives to the company's sustainability strategy and/or transparency initiative 		<ul style="list-style-type: none"> Description of data preparation processes, including meta data development, data versioning and validation processes Release mechanism: open data portal, Application Programming Interface (API)*, bulk download, etc. Establishment of licensing (e.g. CC BY 4.0) or terms of use for user access <p>*Software that acts as an intermediary, allowing to application to talk to each other. E.g. extract and share data within and across organizations</p>
Scope	Schedules and Milestones	Compliance and Legal Considerations
<ul style="list-style-type: none"> Description of the scope of release, including ESG data identification and metrics/ analytics to be collected during the release 	<ul style="list-style-type: none"> Detailed schedule for the data release plan per department, including dates for individual datasets Corporate milestones and deadlines for each phase of the release processes 	<ul style="list-style-type: none"> Verification of how data release plan complies with relevant regulatory and legal requirements Identify industry standards, compliance requirements that can be leveraged for disclosures
Stakeholder Engagement	Monitoring and Evaluation	ROI and Risks
<ul style="list-style-type: none"> Identification of key stakeholders, including investors, regulatory bodies, local communities and the general public User engagement strategies throughout the lifecycle, including communication plans, preferred channels for announcements, outreach and feedback mechanisms 	<ul style="list-style-type: none"> M&E framework for the impact and effectiveness of the data release plan Evaluation criteria for assessing the success of the ESG disclosures 	<ul style="list-style-type: none"> Estimation of potential costs of release plan vs. benefit Identification of risks and mitigation strategies

ROLE	RESPONSIBILITIES
Leadership	<ul style="list-style-type: none">• Prioritize ESG disclosure in the overall sustainability strategy and communicate change management directives to senior leaders.• Appoint a Chief Data Officer or a Corporate Data Steward to oversee data stewardship initiatives (increasingly a common practice at the corporate level).
Directors/ Managers	<ul style="list-style-type: none">• Implement and strengthen change management efforts related to data governance across the organization.• Appoint data stewards within each department to ensure alignment with governance practices.
Sustainability Officer	<ul style="list-style-type: none">• Ensure that disclosure goals are closely aligned with the company's sustainability priorities and strategy.
Data Manager or Custodian	<ul style="list-style-type: none">• Identify and compile relevant datasets that support ESG goals and reporting requirements.• Coordinate data-related activities across departments to maintain consistency and accuracy.
Data Steward	<ul style="list-style-type: none">• Collaborate with leadership, management, and technical staff to implement established data governance processes.• Ensure adherence to data quality and transparency standards for effective ESG disclosures.

Metadata Collection Template

Administrative and descriptive metadata

The following fields will need to be filled in:

- Title (*): Title of the dataset
- Description (*): Description of the dataset
- Theme(s) (*): Topics covered by the dataset (in the form of keywords)
- Publishing department (*): Department in charge of the dataset
- Validation (*): List of persons or department that validated the publication of the dataset
- Disaggregation level (*): Level of disaggregation of data (e.g. by gender, individual, etc.)
- Number of records (*) (**): Number of rows of data in the dataset
- Keywords (*): Keywords related to the dataset
- Terms of Use and Licenses (*): License to reuse data
- Contact information (*): Contact information to be used (name and email address or telephone number) for all information related to the dataset
- Temporal coverage (*) (**): Temporal coverage of the dataset
- Start date of data collection (*): Date of first data collection
- Processing applied to data (*): List of processing applied to data before publication (anonymization, aggregation, etc.)
- Date last updated (*): Date the dataset was last updated
- Update Frequency (*): How often the dataset is updated (default quarterly)
- Next update date (*): The next update date of the dataset (default is the 10th of the month following the end of the quarter: January 10th, April 10th, July 10th, or October 10th with the year)
- Geographic coverage (*): Geographic coverage of data
- Data collection method (*): Method of data collection or generation (e.g., extraction)
- Related Resources: Other dataset(s) related to the dataset

Structural metadata

The structural metadata will be described in a five-column table with the following headings:

- Column (required): The name or header of the column that appears in the dataset
- Type (required): The type of data in the column. For example, date, string, integer, decimal number. If the column is a fixed string chosen from a set of values, a list of possible values and their meaning must be provided.
- Description (required): Description of the contents of the column
- Example (required): Example of a column value in the dataset
- Additional information (optional): Any other information useful for the analysis of the data in the column

¹ Asterisk indicated required fields

² Fields to be updated with each new publication

Data Standardization Best Practices

In order to comply with the principles of open data, datasets must have the following characteristics:

- The dataset is provided in an open format:
 - CSV is the preferred format for tabular formats. The international standard CSV (RFC 4180) format³ has the following features:
 - The file uses UTF-8 encoding
 - The first line of the file contains the column headers
 - Digital data meets the IEEE 754-2019 format (decimal separator “.” and no thousands separator. Example: 5320.87)
 - Fields are separated by a comma (“,”)
 - Endings of lines are delimited by the character “CRLF”
 - Excel is accepted
 - Long format is preferred for data presentation
 - TXT, RTF, or HTML formats are used for text files. Word, PPT and PDF formats are accepted.
 - XML or JSON formats are used for hierarchical formats
 - PNG, TIFF, or JPEG formats are used for bitmap images
 - SVG format is used for vector images
 - Geojson, geotiff, or shapefile formats are used for spatial data formats
 - The standards mentioned above are recommended, but any other format that is open and that respects an international standard is allowed
- The data is structured and machine-readable:
 - It should be possible to process the data directly, by performing all the appropriate operations such as sorting columns, filtering rows, running aggregates of values. These operations require well-structured data, including the establishment of pure tables with no merged cells, headers, footnotes, comments, or hidden data in text.
 - Common elements of the data are expressed in a uniform manner – for example, dates are always in the same format, codes or names are always in the same case, and numbers are expressed in a consistent and homogeneous manner.
- Data should be disaggregated raw data
- The following data standards are recommended:
 - Dates au format ISO 8601 (2022-05-12T14:57:00Z)
 - Telephone numbers in ITU E.164 format (33688559955 – country code and local number without space)
 - Text fields must indicate the language used in the structural metadata.
 - Null fields must be blank
 - Geographical coordinates
 - Are expressed in decimal degrees (33.9693414)
 - Except for specialized spatial data that requires a particular geodetic system, geographic coordinates refer to the WGS84 (GPS) geodetic system
 - Latitude and longitude must be separated into two columns
 - The units of the values in each column must be expressed in the structural metadata

³ <https://datatracker.ietf.org/doc/html/rfc4180>

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