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Item 3 (b) of the provisional agenda

Substantive issues: access to information

**Draft updated Recommendations on the more effective use of
electronic information tools*****Addendum**

Prepared by the Chair of the Task Force on Access to Information

Supporting explanatory notes*Summary*

The present document contains supporting explanatory notes for the draft updated Recommendations on the more effective use of electronic information tools (ECE/MP.PP/WG.1/2020/14). The draft updated Recommendations were prepared under the auspices of the Task Force on Access to Information pursuant to decision VI/1 on promoting effective access to information (ECE/MP.PP/2017/2/Add.1, para. 13 (b) (i)), adopted by the Meeting of the Parties to the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) at its sixth session (Budva, Montenegro, 11–14 September 2017). Through this decision, the Meeting of the Parties requested the Task Force on Access to Information to update the Recommendations on the more effective use of electronic information tools to provide public access to environmental information set out in decision II/3 on electronic information tools and the clearing-house mechanism (see ECE/MP.PP/2005/2/Add.4, annex).

* Preparation of this document was supported by a consultant with expertise in electronic information tools commissioned by the Convention secretariat. The present document is being issued without formal editing.



The document is based on the outcomes of the consultation on the update of the Recommendations in advance of the sixth meeting of the Task Force on Access to Information (Geneva, 3 and 4 October 2020), comments received at the meeting and follow up consultation in advance of the twenty-fourth meeting of the Working Group of the Parties to the Convention.

Chapter I. Terminology

To facilitate the use of the recommendations (see ECE/MP.PP/WG.1/2020/14), the following terms apply:

“**Aarhus Convention**” and “**Convention**” means the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, done at Aarhus, Denmark, on 25 June 1998;

“**accessibility**” means the set of principles and techniques to be observed when designing, developing, maintaining, and upgrading electronic information tools in order to make them more accessible to users, in particular persons with disabilities;

“**Akoma Ntoso**” defines a set of simple technology-neutral electronic representations in XML format of parliamentary, legislative and judiciary documents;

“**application programming interface**” (**API**) means a set of functions, procedures, definitions and protocols for machine-to-machine communication and the seamless exchange of data. Application programming interfaces can have different levels of complexity and can mean a simple link to a database to retrieve specific datasets, a web interface, or more complex set-ups;

“**artificial intelligence**” refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals;

“**blockchain**” refers to a growing list of records, called blocks, that are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data. By design, a blockchain is resistant to modification of the data;

“**citizen science**” means a form of open collaboration in which members of the public participate voluntarily in the scientific process or environmental monitoring in various ways;

“**crowdsourcing**” means a method to obtain needed services, ideas, or content by soliciting voluntary contributions from members of the public, especially from an online community;

“**data**” refers to all types of data, including:

(a) **dynamic data**, which means documents in a digital form, subject to frequent or real-time updates, in particular because of their volatility or rapid obsolescence (for example, data generated by sensors are typically considered to be dynamic data);

(b) **primary data**, which means the environmental data received earlier and fixed in any form which could be available for processing;

(c) **big data**, which means data that contains greater variety arriving in increasing volumes and with ever-higher velocity;

(d) **research data**, which means documents in a digital form, other than scientific publications, which are collected or produced in the course of scientific research activities and are used as evidence in the research process, or are commonly accepted in the research community as necessary to validate research findings and results;

(e) **citizen science data**, which means data collected by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions;

“**data catalogue**” means a collection of metadata, combined with data management and search tools, that helps analysts and other data users to find the data that they need, serves as an inventory of available data, and provides information to evaluate fitness data for intended uses;

“**data cube**” means a multi-dimensional (“n-D”) array of values and refers to an approach to storing, processing and analysing large collections of environment-related Earth observations and other data. The technology is designed to monitor changes in the state of the environment by being agile and flexible with vast amounts of layered grid data;

“data harvesting” means a process that copies datasets and their metadata between two or more data catalogues;

“data mining” means the practice of examining large databases in order to generate new information;

“data management” refers to management of information and data for secure and structured collection, update, storage, processing and access. Data management tasks include the creation of data governance policies, analysis and architecture; database management system integration; data security and data source identification, segregation and storage;

“digital transformation” refers to the economic, societal and environmental effects of digitisation and digitalisation;

“digitisation” means the technical process of converting analogue information into digital form;

“digitalization” means the organisational or business process of the technologically-induced change within organisations, markets and branches;

“digital divide” means any uneven distribution in the access to, use of, or impact of information and communication technologies between any distinct groups;

“digital environmental information system” is an electronic system that allows sharing of all types of digital data, information, and knowledge relevant to environmental matters to be made available, discoverable and accessible in accordance with the Convention;

“discoverability” refers to users' ability to find data, information, applications or services;

“Earth observations” refers to data and information collected about the planet, whether atmospheric, oceanic or terrestrial;

“e-Government initiatives” encompass the activities of public authorities to deploy information and communication technologies for improving knowledge and information in the service of the public;

“environmental information” means environmental information as defined in article 2 (3) of the Convention;

“environmental indicator” means an indicator supporting all phases of environmental policy-making, from designing policy frameworks to setting targets, and from policy monitoring and evaluation to communicating to policy-makers and the public;

“Internet of things” means the interconnection through the Internet of computing devices embedded in everyday objects, enabling them to send and receive data;

“interoperability” means the ability of a computer system or software to work with other systems or products without special effort on the part of the user. It includes the technical, semantic and legal dimensions;

“linked data” refers to a method of publishing structured data using standardized vocabularies that can be connected together and read automatically by machines with support of standard Web technologies;

“machine learning” means the scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence;

“machine-readable format” means a file format structured so that software applications can easily identify, recognise and extract specific data, including individual statements of fact, and their internal structure;

“metadata” means a set of data that describes and gives information about other data;

“mobile application” means application software designed and developed, by or on behalf of public authorities, for use by the public on mobile devices such as smartphones and tablets. It does not include the software that controls those devices (mobile operating systems) or hardware;

“onboarding” means the process of familiarizing a new user with electronic information tools, taking into account the users’ needs, behaviour, experiences, and goals;

“open data” denotes data in an open format that can be freely used, reused and shared by anyone for any purpose;

“open format” means a file format that is platform-independent and made available to the public without any restriction that impedes the reuse of information;

“open licence” means standardised public licences available online which allow data and other content to be freely accessed, used, modified and shared by anyone for any purpose, and which rely on open data formats (for example, custom-made licences, Creative Commons licences, Open Government licences for public sector information);

“open government data initiatives” encompass activities to make data or information produced or commissioned by public authorities available for everyone to access, reuse and redistribute without any restrictions;

“pollutant release and transfer register” refers to a coherent, nationwide system of pollution inventories or registers on a structured, computerized and publicly accessible database compiled through standardized reporting. Such a system may include inputs, releases and transfers of a specified range of substances and products, including water, energy and resource use, from a specified range of activities to environmental media and to on-site and offsite treatment and disposal sites;¹

“public record” means any information or documents that are made by a public authority or public official and are required by law to be kept and maintained;

“public-private partnership” refers to a scheme that involves cooperation between the public and the private sector aiming at financing, designing, implementing and operating public sector infrastructure and services supporting the implementation of the Convention;

“reuse” means the use by the public of environmental information held by public authorities for commercial or non-commercial purposes other than the initial purpose within the performance of public functions or the provision of public services in relation to the environment for which the information was collected. In technical terms reuse can be supported by data management principles (see chapters II and III below);

“search engine advertising” (SEA) means advertising through search engines;

“search engine optimization” (SEO) means the process of maximizing the number of users to a particular website by ensuring that the web site appears high on the list of results returned by a search engine;

“semantic web” is a mesh of information linked up in such a way as to be easily processable by machines, on a global scale;

“Social media optimization” (SMO) means the use of social media networks to manage and maximize the number of users the online presence;

“standard licence” means a set of predefined reuse conditions in a digital format, preferably compatible with standardised public licences available online;

“text mining” means the discovery by machine of new, previously unknown information, by automatically extracting information from different written resources;

“user feedback” refers to a data quality component that includes information about the data directly provided by users based on their experiences using the data. It may include comments, quality assessments, discovered issues, usage reports, etc. It complements the data quality information provided by its producer;

“widget” refers to a small piece of Web programming code that makes environmental data and information appear on a blog, wiki, or Web page. Information in a widget can feature updated information or let the user do something like use a search box.

¹ The Convention, article 5 (9).

Chapter II. Data sharing and data management principles developed by the Group on Earth Observation

1. Earth Observations includes space-based or remotely-sensed data, as well as ground-based or in situ data.
2. The following data sharing principles and data management principles have been developed by the Group on Earth Observations:¹
 - (a) data sharing principles:
 - (i) data, metadata and products will be shared as Open Data by default, by making them available as part of the GEOSS Data Collection of Open Resources for Everyone (Data-CORE) without charge or restrictions on reuse, subject to the conditions of registration and attribution when the data are reused;
 - (ii) where international instruments, national policies or legislation preclude the sharing of data as Open Data, data should be made available with minimal restrictions on use and at no more than the cost of reproduction and distribution; and
 - (iii) all shared data, products and metadata will be made available with minimum time delay.
 - (b) data management principles:

Discoverability

DMP-1. Data and all associated metadata will be discoverable through catalogues and search engines, and data access and use conditions, including licenses, will be clearly indicated.

Accessibility

DMP-2. Data will be accessible via online services, including, at minimum, direct download but preferably user-customizable services for visualization and computation.

Usability

DMP-3. Data will be structured using encodings that are widely accepted in the target user community and aligned with organizational needs and observing methods, with preference given to non-proprietary international standards.

DMP-4. Data will be comprehensively documented, including all elements necessary to access, use, understand, and process, preferably via formal structured metadata based on international or community-approved standards. To the extent possible, data will also be described in peer-reviewed publications referenced in the metadata record.

DMP-5. Data will include provenance metadata indicating the origin and processing history of raw observations and derived products, to ensure full traceability of the product chain.

DMP-6. Data will be quality-controlled and the results of quality control shall be indicated in metadata; data made available in advance of quality control will be flagged in metadata as unchecked.

Preservation

DMP-7. Data will be protected from loss and preserved for future use; preservation planning will be for the long term and include guidelines for loss prevention, retention schedules, and disposal or transfer procedures.

DMP-8. Data and associated metadata held in data management systems will be periodically verified to ensure integrity, authenticity and readability.

¹ Referenced in the GEO Strategic Plan 2016-2025 and re-affirmed through the Ministerial Declaration adopted by the Group on Earth Observation at the twelfth plenary session (Mexico City, 11-12 November 2015) available at: http://www.earthobservations.org/open_eo_data.php#

Curation

DMP-9. Data will be managed to perform corrections and updates in accordance with reviews, and to enable reprocessing as appropriate; where applicable this shall follow established and agreed procedures.

DMP-10. Data will be assigned appropriate persistent, resolvable identifiers to enable documents to cite the data on which they are based and to enable data providers to receive acknowledgement of use of their data.

Chapter III. Shared Environmental Information System principles¹

1. A shared environmental information system (SEIS) is underpinned by a series of principles that ensure interoperable flow of information about environmental monitoring, data, indicators, assessments and knowledge.
2. The principles of a shared environmental information system is that information should be:
 - (a) Managed as close as possible to its source;
 - (b) Collected once and shared with others for many purposes;
 - (c) Readily available to easily fulfil reporting obligations;
 - (d) Easily accessible to all users;
 - (e) Accessible to enable comparisons at the appropriate geographical scale and the effective participation of the public in the development and implementation of policies relating to the environment;
 - (f) Fully available to the public and at the national level, and available in the relevant national language(s);
 - (g) Supported through common, free, open software standards.
3. A functional shared environmental information system should be structured around three pillars: content, infrastructure and cooperation. First, the system needs to identify the types of content (data) required, as well as potential sources. Second, an effective, web-enabled technical infrastructure is required that takes full advantage of the best available state-of-the-art digital technologies, including web services supported by machine-to-machine communication. Third, the governance structure and cooperation among information providers and users are required to manage human resources, inputs and networking.

¹ See <https://www.unece.org/environmental-policy/environmental-monitoring-and-assessment/areas-of-work/shared-environmental-information-system.html>

Chapter IV. Standards for a nationwide digital environmental information system

1. All data contained in the nationwide digital environmental information system should be accompanied by traceable and linked standardised metadata developed in accordance with standards established by the International Organization for Standardization,¹ World Meteorological Organization,² World Wide Web Consortium,³ Open Geospatial Consortium⁴ and other international forums as mandated.
2. All metadata should be users- and machine-readable, accompanied by an open licence and made accessible, preferably as part of an HTML Web page and via application programming interfaces (APIs).
3. The following metadata standards for the digital environmental information system can be used:
 - (a) Dublin Core Metadata (DCMI) terms (DCTERMS);⁵
 - (b) Data Catalogue Vocabulary (DCAT),⁶ including GeoDCAT-AP and StatDCAT-AP;
 - (c) Statistical Data and Metadata eXchange (SDMX);⁷
 - (d) DDI-Lifecycle standard;⁸
 - (e) [ISO 19115] EN ISO 19115-1:2014, Geographic information – Metadata;⁹
 - (f) [ISO 19139] ISO/TS 19139-1:2019, Geographic information – Metadata – XML schema implementation.¹⁰
4. Data and metadata contained in the digital environmental information system can be shared and made interoperable using the following standards:
 - (a) OGC Web Map Service (WMS);¹¹
 - (b) OGC Web Coverage Service (WCS);¹²
 - (c) OGC Catalogue Service for the Web (CSW);¹³
 - (d) OGC Water Markup Language (waterML);¹⁴
 - (e) OGC Web Feature Service (WFS);¹⁵
 - (f) OGC GEOPackage Encoding Standard;¹⁶
 - (g) [RFC 7946] GeoJSON Format;¹⁷

¹ See <https://www.iso.org/standards-catalogue/browse-by-ics.html>

² See <https://public.wmo.int/en/resources/standards-technical-regulations>

³ See <https://www.w3.org/standards/about.html>

⁴ See <https://www.ogc.org/docs/is>

⁵ See <https://dublincore.org/>

⁶ See <https://www.w3.org/TR/vocab-dcat-2/#introduction>

⁷ See <https://sdmx.org/>

⁸ See <https://ddialliance.org/explore-documentation>

⁹ See <https://www.iso.org/standard/53798.html>

¹⁰ See <https://www.iso.org/standard/67253.html>

¹¹ See <https://www.ogc.org/standards/wms>

¹² See <https://www.ogc.org/standards/wcs>;

¹³ See <https://www.ogc.org/standards/cat>

¹⁴ See <https://www.ogc.org/standards/waterml>

¹⁵ See <https://www.ogc.org/standards/wfs>

¹⁶ See <https://www.ogc.org/standards/geopackage>

¹⁷ See <https://geojson.org/>

- (h) OGC Earth Observation Dataset Metadata GeoJSON(-LD) Encoding Standard;¹⁸
- (i) OGC OpenSearch Extension for Earth Observation;¹⁹
- (j) OGC OpenSearch Geo and Time Extensions;²⁰
- (k) XML for parliamentary, legislative and judiciary documents (Akoma Ntoso);²¹

5. When complementing and not covered by chapter II, the FAIR principles for scientific data management and stewardship²² should be followed to promote accessibility, reuse and interoperability of environmental research data.

¹⁸ See <https://www.ogc.org/standards/eo-geojson>

¹⁹ See <https://www.ogc.org/standards/opensearch-eo>

²⁰ See <https://www.ogc.org/standards/opensearchgeo>

²¹ See <http://www.akomantoso.org/>

²² See <https://www.go-fair.org/fair-principles/>

Chapter V. Single one-stop web access point (portal) for environmental information

1. Develop environmental portal serving as a single one-stop web access point for environmental data and information in accordance with open data sharing principles and data management principles (see also sections II and III of the above-mentioned recommendations and chapters II-IV above) to ensure user customization and accessibility, effective maintenance of integral parts of the digital environmental information system and support of harvesting information through standardized reporting at the local, sub-national, national and international levels, as appropriate;
2. Link the environmental portal through the use of open application programming interface, RSS feeds and other interoperability tools to the thematic portals, platforms, and data hubs (local, sub-national, national and international) as relevant to make environmental data and information discoverable and directly accessible;
3. Enable the use through the environmental portal of new or emerging digital technologies, including cloud computing services, open data cubes, artificial intelligence, blockchain, linked data, text mining, semantic web tools (see also paragraph 33 of the above-mentioned recommendations);
4. Provide the opportunities for the public to participate in design, development and upgrade of the environmental portal taking into account good practices to ensure that the needs of different users are met;
5. Develop the onboarding system for different types of users and take the necessary measures to make the portal accessible taking into account their needs (see also section V of the above-mentioned recommendations).
6. Ensure high visibility of the portal to the public through the use of search engine optimization, social media optimization and search engine advertising as appropriate;
7. Ensure direct access through the environmental portal to disaggregated, real-time and other dynamic data, as appropriate, including to space-based, citizen science, crowdsourced and other data outlined in paragraph 20 (d) and (e) of the above-mentioned recommendations;
8. Provide information on the points of contact to support the public in seeking access to information under the Convention;
9. Ensure that each webpage of the environmental portal containing information and links is updated regularly and contains the date of the last update and the information source;
10. The content of the environmental portal can include the following themes:
 - (a) Introduction
 - (b) Reports on the state of the environment
 - (c) Environment themes (overview of legislation, policy, programmes, plans, international commitments, monitoring, data/data sources, environmental indicators, assessments, map viewers, scenarios, good practices in accordance with section III of the above-mentioned recommendations)
 - (i) Air and Atmosphere
 - (ii) Climate
 - (iii) Water
 - (iv) Soil
 - (v) Land
 - (vi) Ocean and Sea
 - (vii) Subsoil and mineral resources
 - (viii) Natural sites and landscape

- (ix) Forests
- (x) Biological diversity
- (xi) Genetically modified organisms
- (d) Factors (overview of legislation, policy, programmes, plans, international commitments, data/data sources,)
 - (i) Pollutant release and transfer register
 - (ii) Chemicals management
 - (iii) Waste management
 - (iv) Energy efficiency and consumption
 - (v) Noise
 - (vi) Radiation
 - (vii) Use of natural resources
 - (viii) Product passports and other product-related information
- (e) Decision-making in environmental matters:
 - (i) Public consultations
 - (ii) Strategic Environmental Assessment
 - (iii) Environmental impact assessment and state ecological expertise
 - (iv) Licensing and permitting
- (f) Activities, measures and good practices
 - (i) Economic-environmental accounting
 - (ii) Eco-labelling scheme
 - (iii) Eco-audit scheme
 - (iv) Producer responsibilities
 - (v) Green procurement
 - (vi) Public-private partnerships and environmental agreements
 - (vii) Funded environmental projects
 - (viii) Good practices on better environmental management, sustainable consumption and production, best available techniques, green procurement, green and circular economy and sustainable development
- (g) Environmental compliance and enforcement
- (h) Environment-related hazards and emergencies
 - (i) Dashboard and maps
 - (ii) Situation reports and scenarios
 - (iii) Mitigation and remediation measures taken by public authorities
 - (iv) Prevention, mitigation and remediation measures for the public concerned, in particular for groups and communities in vulnerable situations;
- (v) Crowdsourcing data
- (vi) Media resources
- (vii) Training and e-learning
 - (i) Public records
 - (j) Data explorer

- (k) Research and education
 - (l) Publications and downloads
 - (m) Public engagement:
 - (i) Official notice board
 - (ii) Aarhus Convention, its implementation and compliance
 - (iii) Access to information
 - (iv) Citizen science and crowdsourcing
 - (v) Participation in decision-making in environmental matters
 - (vi) Access to Justice
 - (vii) Accessibility menu and accessibility statement for access by persons with disabilities, and capacity-building for onboarding process tailored to different user needs
 - (n) Media news and resources
 - (o) Points of contact
 - (p) Specifications for reuse of data and information
 - (q) Use terms and conditions
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