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Advancing evidence-based policymaking through Open Collections and Open Science Principles

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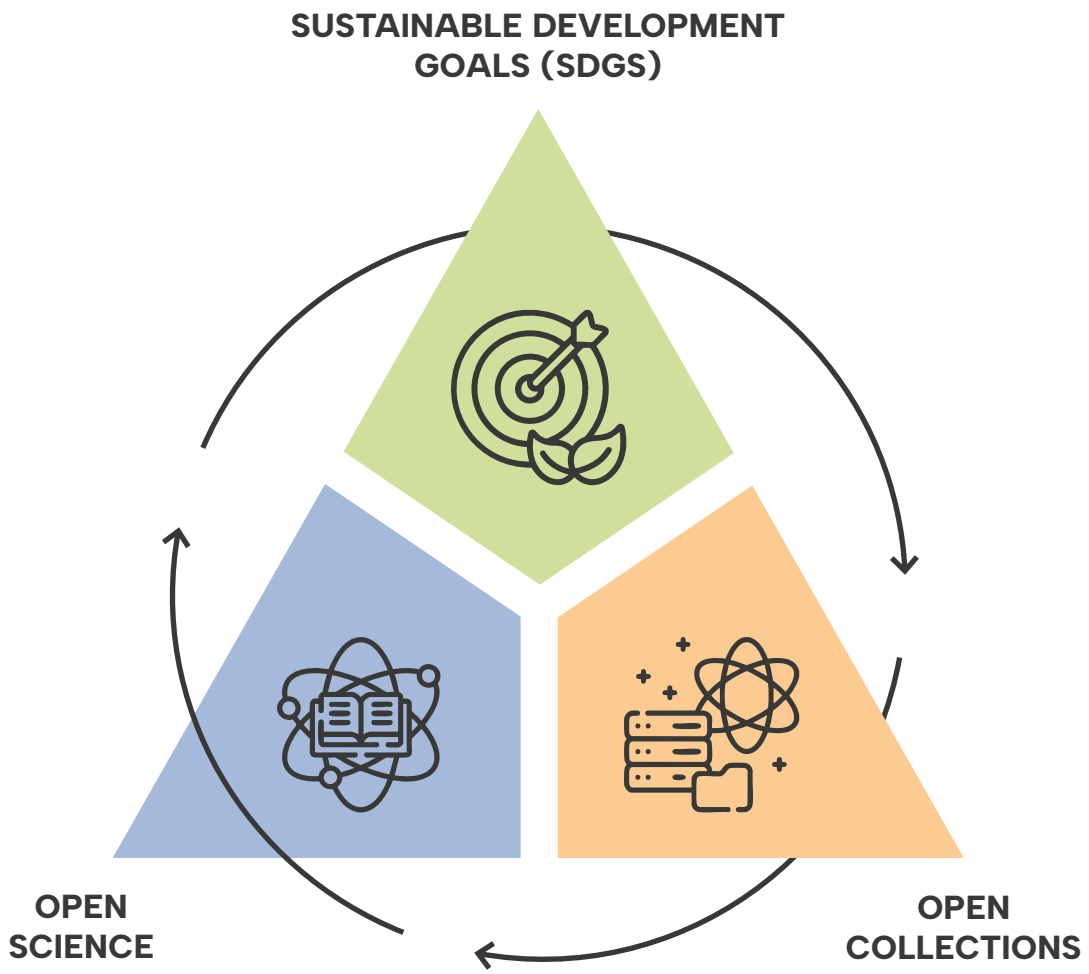
Index

Advancing evidence-based policymaking through Open Collections and Open Science Principles

Overview

This booklet is designed to offer policymakers insight into the essential connections between the United Nations Sustainable Development Goals (SDGs), Open Science, and Open Collections across various domains. It highlights how global policy goals are intrinsically linked to research initiatives that rely on Open Collections to provide evidence for decision-making. Policy measures to develop collections as research infrastructure are making collections more accessible useful for research and subsequently for evidence based policy and impactful decisions. Relevant use cases demonstrate how Open Science and Open Collections are fundamental to achieving the SDGs. We outline future directions for developing and expanding the necessary Open Access to collections.



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Introduction

In a time of fast-paced technological change and complex global challenges, there is a growing need for Open Science approaches aimed at enhancing the potential of scientific research and collections. The Skills for European Open Science Commons (Skills4EOSC) Horizon Europe project leads this effort by facilitating that policymakers, researchers, and other professionals are equipped with the necessary skills to integrate Open Science into their everyday practice. By fostering collaboration, establishing competence centres, and developing training frameworks, Skills4EOSC is creating a foundation for more transparent, inclusive, and effective scientific processes across Europe. This is crucial for institutions housing scientific collections, as their data can provide the evidence needed to address key challenges such as biodiversity loss, climate change and fostering peaceful and inclusive societies. The Skills4EOSC project is committed to empowering policymakers and stakeholders with skills to leverage Open Science in tackling these pressing societal and environmental issues[1].

OPEN COLLECTIONS

Open Collections are a framework for **enhancing access** to museum, archive, library, and gallery collections through processes and practices aimed at providing digital representations of these collections, thereby promoting broader engagement. In this context, "open" aligns with the **FAIR principles** (Findable, Accessible, Interoperable, Reusable), indicating that while collections are made publicly accessible, certain materials may be restricted due to sensitivity, ensuring a balance between openness and necessary limitations[2].

Target Audience

This booklet is designed for policymakers and professionals engaged in policy development and scientific research infrastructures. It seeks to engage individuals who influence or contribute to the formation of policy, particularly those focused on aligning their strategies with sustainability goals and evidence-based decision-making.

(1) Garr, C. (2022). *Skills for EOSC.* Skills4EOSC. https://www.skills4eosc.eu/

(2) Vohland, Katrin; Eichert, Stefan; Fiedler, Sarah; Kapun, Martin; Kroh, Andreas; Mehu-Blantar, Ines; Ott, Iris; Rainer, Heimo; Schwentner, Martin; Zimmermann, Eva: Open Science in Museums - Strategy of the Naturhistorisches Museum Wien (NHMW): The benefits of openness. Version 1.0 (2022-04-27) Naturhistorisches Museum Wien (Vienna 2022). https://doi.org/10.5281/zenodo.6505108

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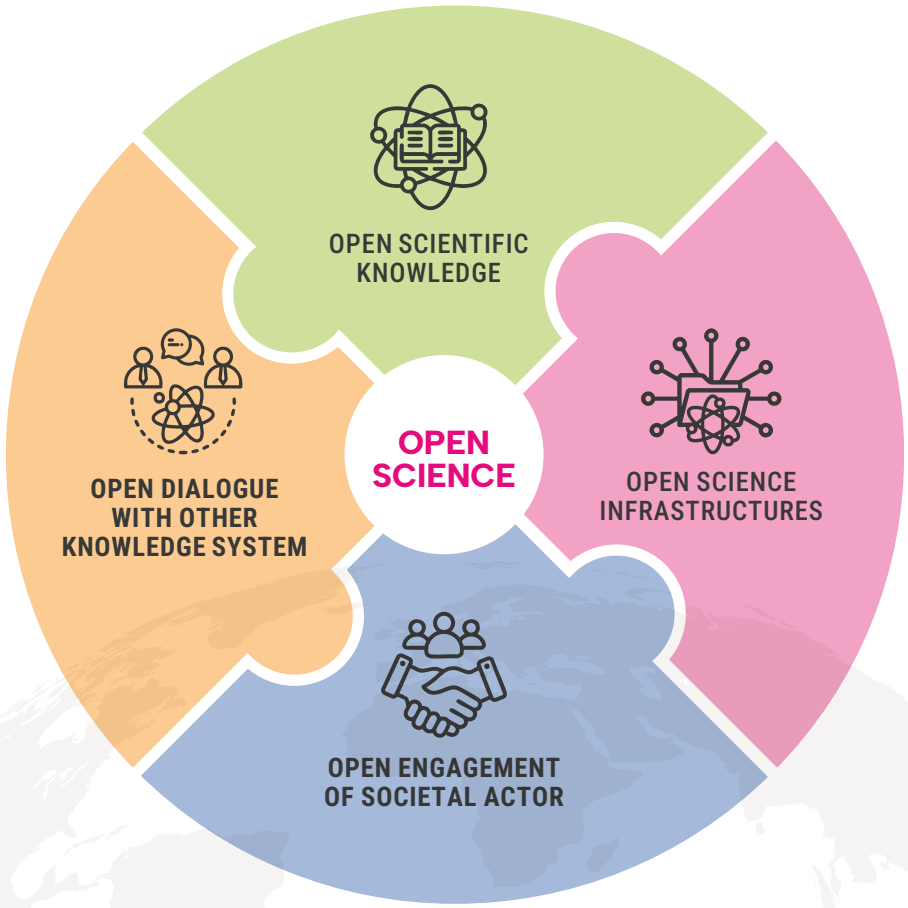
Importance of Open Science and Open Collections in policymaking

Open Science promotes greater **transparency**, **accessibility**, and **collaboration** in research, enhancing the quality of scientific output. These qualities also boost public engagement, trust, and acceptance of scientific findings. For policymakers, Open Science provides **access to high-quality**, **verifiable data**, crucial for guiding evidence-based decisions on pressing societal and environmental issues like biodiversity, climate change, and historical research. The European Commission has shown strong commitment to Open Science, backing initiatives like the European Open Science Cloud (EOSC) – a collaborative environment for sharing data, tools, and results across disciplines. While Open Science presents challenges, the Skills4EOSC project aims to overcome them by fostering a more connected and skilled research ecosystem that supports policy development and societal progress[3].



(3) *EOSC Association. Advancing Open Science in Europe.* (2024). EOSC. https://eosc.eu/

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Map career profiles related to Open Science and define, through co-creation the "**Minimum Viable Skillset**" (MVS) for each of them; create a shared framework for the recognition of competencies acquired by university students, trainers and new professionals as a part of an academic path or a lifelong learning process.

Define a methodology and a Quality Assurance process to ensure the quality and relevance of Open Science learning materials and the management of their lifecycle, thus enhancing their reusability.

Offer training on Open Science and the usage of data in evidence-based policy for civil servants and policymakers and empower Competence Centres, researchers and "honest brokers" through the offering of resources to carry out training for this target.

Define "Open Science and data-intensive science essentials" for inclusion in generic undergraduate, postgraduate and PhD curricula as a key skill that anyone doing research is expected to acquire.

Design and implement **a collaboration model between national and regional Competence Centres and international Research Infrastructures and communities** to provide specialised Open Science competencies targeting the needs of researchers and thematic RI professionals.

SKILLS4EOSC OBJECTIVES

Support lifelong learning through professional networks as an enabling environment to discuss, cocreate and exchange best practices and solutions among Open Science professionals and researchers.

Coordinate national, regional and thematic Competence Centres on Open Science and EOSC in Europe and leverage their expertise to create a widespread user support network and an environment that fosters and harmonises training and skills activities.

Create and implement a strategy for engaging with **relevant stakeholders to co-create and promote the project outputs** (**Curricula**, **shared certification** and QA frameworks, human networks), building partnerships to embed project activities and results among the broadest network of stakeholders.

Establish synergies with key actors within the Member States and in the EOSC arena, and with human capital and training programmes at the national, regional and European levels to maximise the impact of the project activities and results and pave the way for their long-term sustainability.

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Open Collections: Advancing Research and Informing Policy

Open Collections provide significant advantages for research and policymaking by increasing the transparency, accessibility, and utility of data. These digitized collections are not only vital for academic research but also serve as crucial resources for policymaking in areas such as **conservation**, **public health**, and **climate resilience**. Adhering to **FAIR principles**[4] (Findable, Accessible, Interoperable, and Reusable) and ethical frameworks like the **CARE principles**[5] (Collective Benefit, Authority to Control, Responsibility, and Ethics) ensures that these collections can be widely used for diverse purposes – from scientific research to crafting evidence-based policies.

For example, natural history collections are instrumental in **monitoring** biodiversity changes over time, **enabling** policymakers to identify at-risk species, set conservation priorities, and **develop** robust environmental policies. Similarly, historical collections offer valuable insights into cultural heritage preservation and social justice, including areas such as Holocaust studies and human rights advocacy.

This aligns with **UNESCO's Recommendation on Open Science**, an international framework promoting open, inclusive, and equitable scientific practices. Open Science seeks to make research accessible to all, benefiting both scientists and society, while fostering collaboration and information sharing. UNESCO's Recommendation outlines shared values and principles for implementing Open Science, emphasizing transparency, inclusiveness, and equity. It also encourages policy-makers to create supportive environments for Open Science by investing in infrastructure, training, and international cooperation to close knowledge gaps.

The Recommendation underscores the importance of scientific integrity, equity in access to knowledge, and the diversity of scientific practices and outputs. It promotes principles of **transparency**, **scrutiny**, and **reproducibility** to ensure that science not only reaches broader audiences but also has a tangible, positive impact on society[6].

(4) *FAIR principles.* (2022). GO FAIR initiative. https://www.go-fair.org/fair-principles/

(5) *CARE Principles.* (2023). Global Indigenous Data Alliance. https://www.gida-global.org/care

(6) *UNESCO Recommendation on Open Science.* (2021). UNESCO. https://doi.org/10.54677/mnmh8546

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Impact of Open Science on Policymaking

By embracing Open Science, policy-makers gain access to a broader spectrum of high-quality, evidence-based research that directly informs policy decisions. Open Science is a central pillar of the EU's research policy, aimed at making science more efficient, transparent, and impactful, while responding to societal needs and expectations[7]. The objective is to position Europe at the forefront of global research by facilitating seamless collaboration between scientists across disciplines and engaging society as a whole. Open Science **accelerates** the discovery process, **enhances** research quality, and **strengthens** the societal relevance of scientific outputs, ultimately making science a key driver of sustainable development and democracy. By making scientific knowledge accessible to all, Open Science fosters transparency and inclusiveness, which are fundamental to democratic principles.

Furthermore, the EU's Open Science policy emphasizes the importance of dismantling barriers to data sharing and collaboration, developing incentives for data-intensive science, and promoting knowledge exchange on a massive scale. These efforts support policymakers in several critical ways:

- **Facilitating International Collaboration:** Open Science infrastructures, such as the European Open Science Cloud (EOSC), support cross-border research collaboration by promoting data sharing between scientists globally. This open exchange of knowledge allows for coordinated international responses to pressing global challenges like biodiversity loss, climate change, and the fostering of inclusive and peaceful societies. Furthermore, the Horizon Europe framework actively supports Open Science by mandating that research outputs – such as publications, data, and software – are made openly accessible.

- **Raising Awareness and Advocacy:** Institutions, including museums and research centres, increasingly use Open Collections to raise awareness about critical issues. By leveraging their scientific resources, these institutions play a pivotal role in advocating for evidence-based policy changes. Open Science practices, such as public engagement and Citizen Science initiatives, further enhance this by encouraging active participation from society, thereby strengthening public trust in science.

- **Supporting Long-Term Environmental and Public Health Policies:** Open Collections provide policy-makers with both historical and contemporary data on ecosystems, species distributions, and disease outbreaks, offering valuable insights for crafting sustainable long-term policies. For example, natural history collections

(7) *Open science.* (2024). Research and Innovation. https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open-science_en

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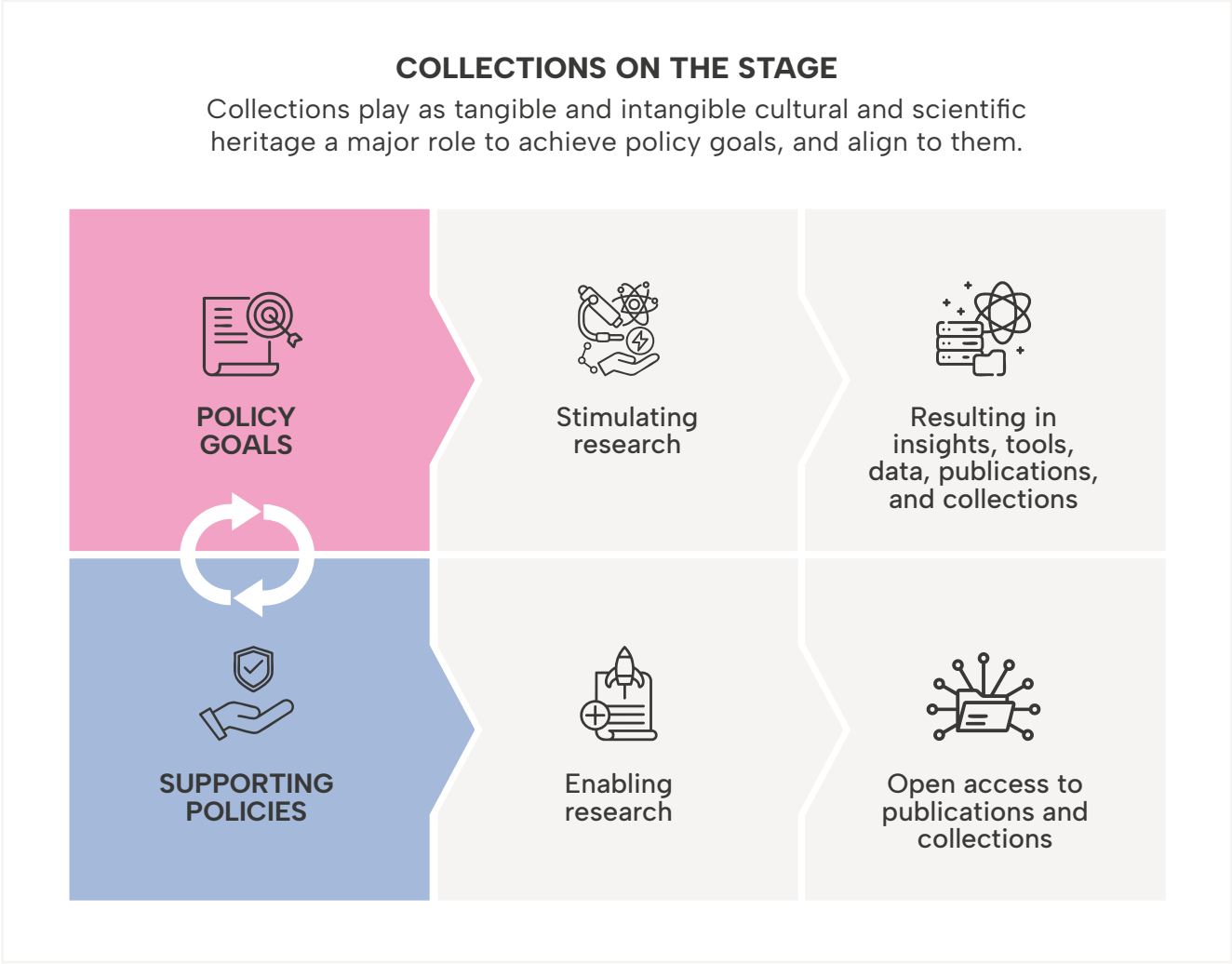
help monitor biodiversity trends, while public health data informs policy decisions regarding disease prevention and climate resilience. Open Science practices, such as early and open sharing of research outputs, ensure that policy-makers have timely access to the most up-to-date information needed for addressing complex societal challenges.

The Interconnectedness of Policy Goals and Open Collections: Promoting Evidence-Based Policy Development

Policy goals are critical drivers of research, which contributes to the development and accessibility of scientific collections, while Open Access to these collections stimulates further research and informs evidence-based policymaking. This dynamic relationship works in both directions.



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1. From Policy Goals to Collections: How SDGs Drive Research and Collections Development

Sustainable Development Goal (SDG)[8]–based policy goals guide collections development to provide scientific data essential for evidence-based decision making.

Biodiversity (SDG 14 & 15: Life Below Water & Life on Land)[9]

- **Policy Goals:** The United Nations Sustainable Development Goal 14 calls for the conservation and sustainable use of oceans, seas, and marine resources to promote sustainable development, while Sustainable Development Goal 15 emphasizes the protection, restoration, and sustainable management of terrestrial ecosystems, including forests, to combat desertification, halt land degradation, and reverse biodiversity loss.
- **Research Development:** Open Access to biodiversity collections plays a critical role in tracking changes in ecosystems. These collections facilitate research into species conservation, the health of marine and land ecosystems, and the impact of human activities on biodiversity.
- **Policy Impact:** Policy-makers can utilize biodiversity data to shape protection initiatives, endangered species conservation programs, and sustainable land-use policies that safeguard ecosystems while promoting sustainable development.

Climate Change (SDG 13: Climate Action)[10]

- **Policy Goals:** SDG 13 calls for urgent action to combat climate change and its impacts. This includes setting policies on emissions reductions, adaptation strategies, and disaster resilience.
- **Research Development:** Different types of collections can contribute to provide evidence of past climate and the impact of climate changes. This evidence support research into climate change trends and potential mitigation strategies. Expanding these collections allows for improved forecasting and more effective responses to this complex challenge.
- **Policy Impact:** Climate-related evidence derived from collections helps policymakers design effective climate adaptation strategies.

(8) *THE 17 GOALS | Sustainable Development.* (n.d.). United Nations. Department of Economic and Social Affairs. https://sdgs.un.org/goals

(9) *Goal 14: Life below water.* (n.d.). United Nations. Department of Economic and Social Affairs. https://sdgs.un.org/goals/goal14 & *Goal 15: Life on land.* (n.d.). United Nations. Department of Economic and Social Affairs. https://sdgs.un.org/goals/goal15

(10) *Goal 13: Climate action.* (n.d.) United Nations. Department of Economic and Social Affairs. https://sdgs.un.org/goals/goal13

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Holocaust and Cultural Heritage (SDG 16: Peace, Justice, and Strong Institutions)[11]

- **Policy Goals:** SDG 16 promotes peaceful, inclusive societies, and aims to build strong institutions that uphold justice and human rights. It also emphasizes the importance of cultural heritage preservation as a foundation for reconciliation and preventing atrocities.
- **Research Development:** Collections documenting the Holocaust play a crucial role in historical research and human rights advocacy. Digitization of archives, testimonies, and artefacts ensures that these records remain accessible for educational and scientific purposes and for informing justice and reconciliation processes.
- **Policy Impact:** Policymakers rely on open Holocaust and cultural heritage collections to further develop human rights policies, educational programs, and truth and reconciliation commissions. These collections help ensure that past atrocities are remembered, guiding policies that promote justice and prevent future violations.

2. From Collections to Policy: How Open Access to Collections Enables Research and Supports Policymaking

The reciprocal relationship between collections and policy is equally crucial. Open Access to scientific collections enables cutting-edge research that directly supports policy formulation.

Biodiversity (SDG 14 & 15: Life Below Water & Life on Land)

- **Current Status:** Open Access to biodiversity collections is becoming increasingly prevalent, with institutions providing digitized species data and ecosystem research to track biodiversity loss and ecosystem health.
- **Future Directions:** Integrating genetic data and functional traits, citizen science contributions, and real-time monitoring will enhance the scope and accuracy of biodiversity research.
- **Policy Support:** Policymakers can leverage these expanded collections to enact stronger biodiversity conservation laws, improve sustainable practices, and develop land-use policies that prioritize ecosystem health.

(11) *Goal 16: Peace, Justice and strong Instutitions.* (n.d.). United Nations. Department of Economic and Social Affairs. https://sdgs.un.org/goals/goal16

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Climate Change (SDG 13: Climate Action)

- **Current Status:** Analysis of digitised natural history collections is informing climate change research by highlighting changes in the lifecycles of species, in how they interact, and where they are found.
- **Future Directions:** Expanding the interoperability of climate data collections across borders and disciplines will allow for a more coordinated global response to climate threats.
- **Policy Support:** Policymakers will be better equipped to develop adaptation and mitigation policies, as well as emergency response plans, using accurate data from these collections.

Holocaust and Cultural Heritage (SDG 16: Peace, Justice, and Strong Institutions)

- **Current Status:** Collections related to the Holocaust and cultural heritage continue to be digitized, preserving testimonies, artefacts, and historical records for use in research, education and policy development
- **Future Directions:** Expanding access to these collections and linking data with digital platforms will enhance their role in fostering human rights awareness, countering anti-democratic discourses in society and politics, and preventing future atrocities.
- **Policy Support:** These collections support the development of justice and reconciliation policies, as well as cultural preservation initiatives, ensuring that the lessons from history continue to shape ethical and inclusive policy frameworks.

The dynamic relationship between policy goals and scientific collections is fundamental to achieving the Sustainable Development Goals (SDGs). SDG-driven policies stimulate research that enhances the development and accessibility of collections, while Open Access to these collections facilitates research that refines and creates evidence-based policies. By recognizing this reciprocal relationship, policymakers can leverage Open Science and Open Collections to craft impactful, evidence-based solutions to global challenges.

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Case Studies:
Open Collections Supporting Policy Goals

One of the central tasks of Skills4EOSC is to demonstrate how Open Collections can directly contribute to achieving policy goals. In collaboration with institutions and projects such as the Distributed System of Scientific Collections (DiSSCo), the Global Biodiversity Information Facility (GBIF), the Vienna Wiesenthal Institute for Holocaust Studies (VWI), the Consortium of European Taxonomic Facilities (CETAF), and the Horizon Europe project "Transforming European Taxonomy through Training, Research, and Innovations" (TETTRIs), case studies have been compiled from three domains aligned with the United Nations Sustainable Development Goals (SDGs):

1. **BIODIVERSITY (SDG 14 & 15)**
2. **CLIMATE (SDG 13)**
3. **HOLOCAUST AND CULTURAL HERITAGE (SDG 16)**

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1. Biodiversity Conservation (SDG 14 - Life below Water & SDG 15 - Life on Land)[12]

Objective: Illustrate the pivotal role of natural history collections in biodiversity conservation, supporting SDG 14 and 15, Biodiversity Strategy 2030 and the EU Green Deal's biodiversity goals. This case study aims to demonstrate how Open Collections and Open Science in biodiversity enhance evidence-based decision-making by improving access to taxonomic data and reference collections. It highlights the importance of accurate species identification for effective biodiversity monitoring, supporting global conservation targets, and promoting ecosystem resilience through informed policy interventions.

Policy Goals: Halting biodiversity loss and promoting sustainable ecosystems.

Case Study: Open Collections for Biodiversity Conservation

The protection and restoration of biodiversity are central to global sustainability efforts, as emphasized by Sustainable Development Goals (SDGs) 14 (Life Below Water) and 15 (Life on Land). Achieving these targets requires robust, reliable, and accessible data on species diversity and ecosystems. Open Collections and Open Science in biodiversity play a pivotal role in this effort, enabling evidence-based decision-making by making taxonomic data, reference collections, and scientific knowledge more accessible to policymakers, researchers, and citizens alike.

The Role of Taxonomy in Biodiversity Conservation

Taxonomy, the science of identifying, naming, and classifying organisms, is fundamental to biodiversity conservation. Accurate species identification is the core of biodiversity monitoring, a critical component of evidence-based policymaking. With this foundational knowledge, it is possible to understand species populations, assess the impacts of human activities, or design effective conservation and restoration policies. For instance, taxonomic knowledge is vital in assessing the decline of pollinators, which are essential for the reproduction of nearly 90% of the world's wild flowering plants. As pollinators decline globally, Open Access to taxonomic data enables scientists and policymakers to develop science-based strategies for their protection and restoration. However, despite its importance, the taxonomic profession is facing a decline in capacity, which in turn diminishes its potential to support global nature conservation efforts. To address these challenges, a transformative change in taxonomy by establishing clear career paths, improving access to reference collections, developing new tools, and promoting the integration of taxonomic science in education, industry, and governance is crucial. Open Access to these tools and data allows a wide range of stakeholders – from scientists to citizen scientists – to contribute to biodiversity protection, ensuring a solid scientific foundation for pursuing global biodiversity goals.

(12) In collaboration with CETAF (Consortium of European Taxonomic Facilities).

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Open Access to Collections for Biodiversity Monitoring

Accurate, timely, and accessible data for species identification are essential for tracking and analysing biodiversity trends, especially in the context of biodiversity and climate crises. Open Collections allow researchers and policymakers to access reference specimens and genomic data, improving the accuracy of biodiversity assessments and helping to identify new threats and challenges affecting the environment. This is particularly meaningful in terms of achieving the goals of the European Union's Green Deal and 2030 Biodiversity Strategy, which emphasise the need for accurate data to reverse biodiversity loss. The digitisation of reference collections and Open Access platforms enhances species identification and transnational collaboration, which is crucial for ecosystem health. Open Collections support effective biodiversity monitoring, enabling policymakers to address species decline and invasive threats, thus mitigating environmental and economic risks. By involving citizen scientists, these collections also enhance public engagement and awareness, essential for achieving global biodiversity targets and long-term sustainability goals.

Policy Implications:

- **Enhanced Access to Taxonomic Data:** Prioritising the digitisation of natural history collections and ensuring Open Access to taxonomic (meta)data for improved species identification facilitating informed decision-making in the field of biodiversity conservation.
- **Expanded Taxonomic Capacity:** Addressing the shortage of taxonomic expertise by investing in Open Science training programs, promoting innovative citizen science tools, and transferring taxonomic knowledge to other sectors will ensure a competent pool of experts capable of supporting the biodiversity monitoring and conservation goals.
- **Sustainable Funding for Biodiversity Research:** Investing in Open Collections through digitisation initiatives and addressing interoperability challenges has the potential to unlock long-term funding mechanisms for policy-relevant taxonomic research, such as that supporting biodiversity monitoring initiatives.
- **Promoting Open Science Principles:** Aligning biodiversity data policies with FAIR (Findable, Accessible, Interoperable, Reusable) and CARE (Collective Benefit, Authority to Control, Responsibility, Ethics) principles for information derived from indigenous communities enhances data usability and international standards consistency and quality.

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2. Climate Change Adaptation (SDG 13 - Climate Action)

Objective: Demonstrate the essential role of digital infrastructures that support Open Scientific Collections in offering scientists a 'time-machine' for ecological changes to be tracked over the industrial period, informing climate change mitigation measures.

Policy Goals: Expanding the evidence-base for the EU's climate action initiatives.

Case Study: Collections illuminate climate change impacts and inform policy

Through digital transformation, natural history collections are contributing to research evidence of historic climate impacts on species distribution, lifecycles, and ecosystem structures. Museums and Herbaria now routinely publish and index data from their collections in GBIF, the Global Biodiversity Information Facility.

These datasets are cited in research papers that are, in turn, cited in high-level policy documents. A case in point is the Intergovernmental Panel on Climate Change (IPCC), which published its Sixth Assessment Report from 2021-2023. The IPCC Assessment Report (AR6) describes three main ways that natural ecosystems are demonstrating climate change impacts; through shifts in the geographic range of species, changes in timing of lifecycle events, and in ecosystem structure.

The EU is one of the top funders of research cited by the IPCC. According to the Commission's analysis one reference out of six is linked to a project funded under FP7 or H2020. Aligning with the IPCC report findings, the EU has reinforced its commitment to climate neutrality by 2050. It has also increased its focus on nature-based solutions and adaptation measures to mitigate climate impacts.

Analysing the impact on the IPCC's work of collections datasets that GBIF has published is more challenging. It helps that datasets have recently become more recognised as scientific outputs in their own right, allowing links to be traced between datasets referenced by research papers, and those papers cited in the IPCC reports. As a result, analysis by GBIF Secretariat shows that IPCC AR6 cited a total of 166 papers that made use of GBIF-mediated data. Of these papers, 43 cited DOIs, enabling GBIF to link the citation to the contributing datasets and publishers. 38 of these papers cited occurrence downloads sourced to one of six major natural history collections in Europe. These represent a small but significant contribution to the IPCC's analysis.

This case study further shows the significant contribution that natural history collections are making to research published since the IPCC's AR6 report, highlighting policy implications of research tracking ecosystem change across the industrial period since the early 1800's.

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Policy Implications:

- **Facilitating International Collaboration:** international infrastructures such as GBIF and DiSSCo are making natural history collections more than the sum of their parts. By making collections data more open and FAIR, they are enabling research that discovers and connects historical specimens with novel forms of species data, e.g. through genetic sequencing. Examples are evident in each of the three main areas of impact identified by the IPCC:
    - **Geographic range:** Insects and other organisms at the base of food chains that have short lifespans are moving north to cooler latitudes. For example analysis of historical records of moths in the UK has shown that the northern limit of their distributions shifted northwards at a rate of 5km per year on average, over a 20 year period.
    - **Timing of lifecycle events:** Herbarium and museum records are proving especially valuable to track changes in when plants flower, bird eggs hatch, and animals breed, showing for example that increasing spring temperatures affect not only when tree leaves form but how the resulting shade impacts on wildflowers beneath forest canopies.
    - **Ecosystem structure:** i.e. the relationships between an ecosystem's living members or its non–living parts, such as sunlight and temperature. Cause and effect relationships are difficult to study due to complex interactions between changes in climate, land use, and pollution. The availability of historic records helps disentangle these, and is especially important where there are potential impacts on human food security, e.g. where changes concern how the lifecycles of crops interact with pollinators such as bees and moths.
- **Raising Awareness and Advocacy:** institutions such as the Natural History Museum in London have taken a proactive stance in using their collections and expertise to raise awareness about climate change and to advocate for policy action. The museum has responded to declarations of a 'climate emergency' by launching new exhibits and programs to educate the public and policymakers about these critical environmental issues.
- **Further digitisation and enhancement of Open Collections of natural history specimen**, digitised and made FAIR with support from DiSSCo, will support the continued research needed to inform policy.

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3. Holocaust Studies (SDG 16 - Peace, Justice, and Strong Institutions)[13]

Objective: The study of the Holocaust is closely tied to the promotion of peace, justice, and the development of strong institutions, which aligns with Sustainable Development Goal (SDG) 16 of the United Nations. The objective of this case study is to demonstrate how Open Collections, through the European Holocaust Research Infrastructure (EHRI) and the Vienna Wiesenthal Institute for Holocaust Studies (VWI), facilitate enhanced access to Holocaust-related resources while supporting evidence-based policymaking. By applying Open Science practices, such as digitization and cross-border collaboration, these collections contribute to academic research and inform policies on human rights, education, and memory culture, illustrating the critical link between Open Collections and policy development.

Policy Goals: Promoting peace, justice, and the establishment of strong institutions (SDG 16).

Case Study: Open Science in Holocaust Research: Strengthening Democracy and Preserving Peace

The European Holocaust Research Infrastructure (EHRI) is a collaborative initiative that advances Holocaust research, education, and commemoration by connecting archives, institutions, and researchers across Europe. Through its online portal, EHRI consolidates data, improving access to Holocaust resources. Supported by the Vienna Wiesenthal Institute for Holocaust Studies (VWI) for 15 years, the Austrian national consortium (EHRI-AT) links key Holocaust research institutions. EHRI promotes Open Science practices by facilitating shared data access, standardizing archival methods, bridging research cultures, and fostering scholarly collaboration. VWI plays a central role in coordinating EHRI's national activities and connecting them with the broader infrastructure. The VWI plays a vital role within EHRI by advancing Holocaust research, including studies on antisemitism, racism, and nationalism. Its fellowship program supports both emerging and established scholars, fostering dialogue and disseminating research findings to specialized audiences. Collaborative projects with the International Scientific Advisory Board enhance research quality and explore broader implications of the Holocaust, including parallels with other genocides. Through its commitment to Open Science practices, VWI enhances its research, documentation, and educational efforts on the Holocaust and related issues. These practices align with the broader goals of Open Science, promoting transparency, accessibility, and public engagement in academic research.

(13) In collaboration with the Vienna Wiesenthal Institute for Holocaust Studies (VWI)

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The VWI's **objectives** are multifaceted:

- **Advance Open Science Practices in Holocaust Research:** The VWI is digitizing its extensive archival and bibliographic collections, including materials from the Archive of the Jewish Community of Vienna and the estate of Simon Wiesenthal. These resources are essential for academic research and public understanding of the Holocaust. By ensuring broader access, this project exemplifies how Open Science democratizes historical knowledge in sensitive fields like Holocaust studies.
- **Support Evidence-Based Policymaking:** The VWI's research and digital resources can inform policy development in human rights, education, and memory culture. By providing access to well-documented historical evidence, the VWI can help policymakers address contemporary issues like antisemitism, racism, and discrimination. Additionally, its work guides discussions on reparative justice and historical memory, ensuring that Holocaust lessons shape public policy meaningfully.

To achieve these objectives, the VWI has undertaken several **strategies** that align with Open Science practices:

- **Digitization and Integration of Collections:** The VWI is digitizing its Holocaust-related collections, including testimonies, archival documents, and artefacts, ensuring their long-term preservation and accessibility. Integrating metadata about these digital collections into networks like the Austrian Library Network (OBV) and the European Holocaust Research Infrastructure (EHRI Portal) allows researchers across Europe to access vital resources, promoting cross-border collaboration.
- **Research Innovation and Fellowship Programs:** The VWI's fellowship program supports early-career and established researchers, fostering innovation in Holocaust studies and developing new methodologies and interdisciplinary approaches. Open Science practices, such as publishing in the Open Access journal S:I.M.O.N, ensure that research outputs are accessible globally, informing educational and public policy debates.
- **Public and Educational Outreach:** The VWI engages a broad audience through public lectures, exhibitions, Open Access publications, and digital educational tools, making Holocaust research more accessible to the public and supporting educators and policymakers. Digitization of frequently requested materials preserves essential documents for educational use. Additionally, VWI documents its outreach activities by recording lectures and events for later research access on its YouTube channel.

Policy Implications:

The integration of Open Science principles into Holocaust studies at VWI has yielded significant outcomes that are relevant to both scholars and policymakers:

- **Enhanced Access and Transparency:** Through the digitization and Open-Access policies of VWI, a wealth of Holocaust-related documents and resources are now more

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accessible than before. This improved access supports not only academic research but also evidence-based policymaking in areas like human rights, education, and justice.

- **Informed Policy Development:** VWI's collections and research outputs have the potential to influence EU and national policies related to historical education, memory culture, and human rights protections.
- **International Collaboration:** The VWI's integration into European research infrastructures, such as the EHRI, ensures that Holocaust studies continue to benefit from cross-border collaboration and sustainable funding. These partnerships also strengthen the long-term viability of Holocaust research and its ability to inform policies that promote peace and justice.

Through these efforts, the Vienna Wiesenthal Institute for Holocaust Studies not only advances Holocaust research but also strengthens the role of Open Science in promoting peace, justice, and strong institutions in line with SDG 16. By making its collections widely accessible and engaging stakeholders through evidence-based insights, the VWI sets an example for how Open Collections have the potential to influence European policy goals and contribute to a more just and inclusive society.

These case studies demonstrate the transformative potential of Open Scientific Collections in supporting evidence-based policymaking. Through their application to societal and environmental challenges, Open Collections serve as powerful tools in advancing the Sustainable Development Goals and shaping European policy for a more sustainable, just, and resilient future, serving as a crucial basis for democratic societies.

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Vision for the Future

The vision for **Open Collections** in Europe goes beyond merely digitizing data. It involves creating an interconnected ecosystem where collections are accessible to researchers, policymakers, educators, and the public. This accessibility will enable:

- **Advancing Scientific Discovery:** Open Collections provide a wealth of data that can support ongoing research in biodiversity, climate change, environmental and societal justice, among others.
- **Enhancing Educational Outcomes:** The widespread availability of scientific collections allows educational institutions to use real-world data to enrich science education and promote public engagement in research.
- **Supporting Sustainable Development Goals:** By aligning research and collections with SDGs, such as those focusing on environmental sustainability, Open Collections contribute directly to achieving global policy objectives.
- **Fostering Open Innovation:** The increased implementation of standards allows to link collection data and information from other domains and allows "learning from nature" and developing sustainable solutions in new dimensions.

Through collaboration, governments, institutions, and the global research community can ensure that collections evolve to support not only the SDGs but also the broader ambitions of Open Science.

Conclusion: Open Science as a Driver of Policy Innovation

The Skills4EOSC project, alongside the broader Open Science movement, is facilitating advancements in policy development. By enhancing Open Science skills and making scientific collections widely available, Europe can address critical global challenges with data-driven, transparent, and collaborative policymaking processes. Policymakers and stakeholders alike are encouraged to engage with Open Science practices, as they hold the key to unlocking solutions for a more sustainable and inclusive future.

This booklet serves as a resource to understand how Open Science, through the lens of Skills4EOSC, can enhance evidence-based decision-making and foster a stronger connection between research and policy. It highlights the critical role that Open Collections and scientific data play in shaping the policies of tomorrow.

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Stakeholder Forum Brussels: Empowering Europe's Green Deal - Open Science Skills and Taxonomy for sustainable innovation

The Stakeholder Forum in Brussels presents a vital opportunity for policymakers to explore how Open Science skills and practices can enhance evidence-based decision-making across multiple sectors. By fostering collaboration among diverse stakeholders, the event offers valuable insights into how Open Science can drive societal progress. Through its focus on taxonomy, the forum highlights a practical example of these skills, addressing key policy areas such as biodiversity conservation and the implementation of the EU Green Deal. The event also aims to engage a broad range of stakeholders, including Citizen Science organizations, education and training bodies, the private sector, and research institutions, underscoring how fundamental sciences paired with Open Science principles, can significantly advance societal goals.

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