# 5 Incentives for Open Science and **Advancing Sustainability: A German Perspective**

**Abstract:** Open science in ensuring equitable access to information is relevant to the attainment of all United Nations Sustainable Development Goals (SDGs). Badges, prizes and awards evaluate and recognise achievements, encourage involvement in open science and open access practices and provide an opportunity to present related activities to the outside world in a succinct form. The focus, however, is not on mundane self-promotion, but rather on the goal of external and internal reflection and promotion of the work done, as well as an appropriate presentation of the open resources and workflows produced. Prizes and awards constitute a stimulus for best practice, education and exchange both within an institution, with an institution's users and with the wider community. This chapter provides an overview of the various badges, awards and prizes relevant to Germany as incentive systems for open science and open access activities. The contributions to the SDGs and education for sustainable development (ESD) are contextualised and discussed. It concludes with a selection of recommendations and summarises the most important results.

**Keywords:** Open access publishing; Open scholarship; Open educational resources; Badges; Awards; Sustainable development goals

# Introduction

Reinforcement of the importance of openness to information particularly in relation to the United Nations Sustainable Development Goals (SDGs), along with suggestions for actions and a possible framework are presented in the UNESCO Science Report: Towards 2030: "As a specialized agency, UNESCO is, itself, committed to making open access and open data one of the central supporting agendas for achieving the Sustainable Development Goals" (UNESCO 2015, 8). The Report suggested a new framework which might be based on assessing science through the lens of a public enterprise working for a sustainable and just world rather than its contribution to a knowledge economy (UNESCO 2015, 13). Further support for the crucial importance of education in, and promotion of, open science is provided in the core tasks and objectives of the *UNESCO Recommendation on Open Science:* 

- i. promoting a common understanding of open science, associated benefits and challenges, as well as diverse paths to open science
- ii. developing an enabling policy environment for open science
- iii. investing in open science infrastructures and services
- iv. investing in human resources, training, education, digital literacy and capacity building for open science
- v. fostering a culture of open science and aligning incentives for open science
- vi. promoting innovative approaches for open science at different stages of the scientific process
- vii. promoting international and multi-stakeholder cooperation in the context of open science and with view to reducing digital, technological and knowledge gaps (UNESCO 2021b, 6).

The *UNESCO Recommendation* highlights the necessity for creating funding and other incentive mechanisms to publicise, promote and strengthen open science:

Establishing regional and international funding mechanisms for promoting and strengthening open science and identifying those mechanisms, including partnerships, which can support international, regional and national efforts (UNESCO 2021b, 32).

A variety of motivational techniques can be used to accelerate and reward achievements in relation to open science and to encourage innovation and new initiatives. The most promising are those with positive signals and recognition:

Politicians and research managers used to speak about carrots and sticks, a combination of reward and punishment to induce the desired open science behaviour. Behavioural psychologists know that generally, reward is more efficient for positive reinforcement than punishment. ...It [meaning the threat of punishment] may work; but it is not helpful to promote ... open science as a positive value and objective (Schöpfel and Azeroual 2021, 449).

Badges, awards and prizes can be a suitable and powerful tool for recognising accomplishments. They are usually based on clear criteria, recognise individual and joint efforts, highlight best practice, create public recognition, and, above all, represent tangible acknowledgement.

This chapter explores open science and the connections between the United Nations SDGs (United Nations n.d.a), the UNESCO education for sustainable development (ESD) *Roadmap* (UNESCO 2020a), the role and contributions of libraries, and potential rewards. The nature of badges and awards is examined and specific

open science badges, awards and prizes which are particularly relevant for, or of interest in, Germany, are identified. The German experience might well serve as an exemplar for others or as inspiration for other countries.

### Open Science and the Sustainable Development Goals

Open science (OS) is the concept of making scientific research, research methods, and source code and its dissemination available to all, regardless of educational level or socioeconomic status, with knowledge shared through collaborative networks. Open access (OA) is digitally available scientific information, usually in the form of peerreview publications, which is available freely online without restriction. Open data are data which are freely available and shared. Open educational resources (OERs) are teaching and learning materials available in any format for free use and reuse. Various studies describe how OS or approaches integrated into OS, including OA and OER support, accelerate or enable the achievement of the SDGs:

Mamtora and Pandey (2018, 6–7) describe the contribution of OA to each of the seventeen SDGs. Access to relevant research results, data and information, along with information and communications technology (ICT), facilitates learning, broadens discussion, advances digital inclusion, assists with policy development and project formulation, creates cultural and social awareness, provides access to cultural heritage, encourages collaboration, and informs strategy, all of which contribute to the attainment of each of the SDGs. Open data assists in the reporting of progress towards attainment of individual SDGs and contributes to the promotion of awareness raising. In addition to OA, Mamtora and Pandey consider open data to be essential (2018, 6–8). They state:

the more freely accessible the information is, without the worry of having to find the funds to acquire the document, the more the likelihood of it being used to solve a problem, and for it to lead towards the successful attainment of a particular goal (Mamtora and Pandey 2018, 3).

Muth and Salvador Lopez (2021) take a more specific look at individual SDGs. For example, OA is primarily of essential importance for SDG 16: "Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels" and in particular for Target 16.10: "Ensure public access to information and the protection of fundamental, in accordance with national legislation and international agreements" (United Nations n.d.e). However, OA is also essential in the context of SDG 9:

"Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation" (United Nations n.d.c) to foster innovation through digitally manipulating open data and to improve knowledge transfer in business and society using freely available information and consequently enhance decision-making by corporations, particularly with regard to sustainable products and services.

In relation to SDG 10: "Reduce inequality within and among countries" (United Nations n.d.d), OA helps to reduce financial inequality, especially the gap between the global north and the global south in access to research information. With regard to SDG 4: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations n.d.b), OA empowers all interested parties to educate themselves on specific topics. "OA democratises the world of learning in which research information is not only available for the academic elites" (Muth and Salvador Lopez 2021). The benefits are available to political decisionmakers, committed volunteers, corporations and non-governmental organisations engaged in sustainable development.

Camkin et al. (2022) emphasise the current unequal access to reliable information affecting the attainment of the SDGs:

Achieving the United Nations Sustainable Development Goals is increasingly challenging due to widening inequality in access to scientific and technological knowledge and resources. With science remaining too discipline based, and policymakers too often science averse, there is a need for greater understanding of the opportunities and challenges of open science for science practitioners, policy makers and communities. Acknowledging that open science can be a powerful tool to reduce inequalities, UNESCO has been supporting the shift to open science. Following global multistakeholder consultation, the UNESCO Recommendation on Open Science was adopted in November 2021, establishing a universal definition, common standards and shared set of values and principles (Camkin et al. 2022, 1).

The UNESCO Recommendation highlights four aspects of open science, including open scientific knowledge, open science infrastructure, open engagement of societal actors and open knowledge with other knowledge systems (UNESCO 2021b). "In open scientific knowledge, users gain free access to scientific publications, open research data, open education resources, open source, and open hardware" (Camkin et al. 2022, 5).

# Open Science and the Education for Sustainable Development Programme

The more information is available and made accessible via OA, open data and OERs, the more important the role of educators becomes. The role of education and the educator is particularly meaningful in the *Roadmap* prepared by UNESCO which is leading and coordinating the Education 2030 Agenda. The *Agenda* focuses on the attainment of the SDGs by 2030:

Educators remain key actors in facilitating learners' transition to sustainable ways of life, in an age where information is available everywhere and their role is undergoing great change. Educators in all educational settings can help learners understand the complex choices that sustainable development requires and motivate them to transform themselves and society (UNESCO 2020a, 30).

In line with the *Agenda*, the UNESCO Education for Sustainable Development (ESD) programme contributes to the achievement of each of the seventeen SDGs:

✓ ESD raises the awareness of the 17 goals in education settings: ESD enhances the understanding of learners and the general public on what the SDGs are and how these goals connect with individual and collective lives.

 $\checkmark$  ESD promotes critical and contextualized understanding of the SDGs: Sustainable development often requires a balancing act among diverse views and priorities. ESD raises questions on the inter-linkages and tensions between different SDGs and provides learners with the opportunity to navigate the required balancing acts with its holistic and transformational approaches.

✓ ESD mobilizes action towards the achievement of the SDGs: ESD efforts address sustainable development issues, more specifically the SDGs. These efforts continue to mobilize action for sustainable development in education settings in particular in communities, through whole-institution approaches to ESD. (UNESCO 2020a, 16).

The ESD programme is particularly important for SDG 4, "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations n.d.b).

While ESD contributes to all 17 SDGs, it continues to have particular relevance for the global education agenda enshrined in SDG 4, in which ESD has a distinct place. ESD is a key element of quality education. Its cross-cutting competencies in cognitive, socio-emotional and behavioural dimensions of learning bear relevance to all areas of education (UNESCO 2020a, 60).

Useful background on the ESD programme, the development of the *Roadmap* and its application in various countries is outlined in a presentation by Won-Jung Byun

(Byun 2020). The UNESCO World Conference on Education for Sustainable Development: *Learn For Our Planet. Act for Sustainability* held online in May 2020 with the support of the German government launched the new decade implementing ESD, ESD 2030 (UNESCO World Conference on Education for Sustainable Development 2020) and resulted also in the *Berlin Declaration* (UNESCO 2022). *Learn for Our Planet* provides an overview of the integration of education into environmental issues globally (UNESCO 2021c).

### **Open Educational Resources**

UNESCO has further highlighted the importance of OERs as part of ensuring access to knowledge to learning for all and adopted a *Recommendation on Open Educational Resources* unanimously at its General Conference in 2019. The role of OERs in building inclusive knowledge societies is noted:

Open Educational Resources (OER) can support quality education that is equitable, inclusive, open and participatory as well as enhance academic freedom and professional autonomy of teachers by widening the scope of materials available for teaching and learning (UNESCO 2020b, 4).

A survey of OERs in Germany focused on a holistic understanding of OERs, identified various challenges, and indicated more attention to policy-led initiatives was required. The report noted in a state-of-the-art analysis of German OERs, summarizing Ebner et al. (2015):

- Best practice examples exist even without public funding, although a lack of public funding may be holding the developments back
- A commonly shared motive for OER is that the knowledge society requires open access to knowledge and free sharing of this knowledge
- OER are seen as motor for more open learning scenarios
- OER is seen as a solution to licensing problems in the use of learning materials from third parties, and
- There remains a concern of how to assure the quality of OER materials (Orr, Neumann and Muuss-Merholz 2017, 31).

Others have also noted the potential of openness in information and knowledge access towards developing global sustainability and transformation:

Open education, OER, and parallel movements, such as open science, open innovation, next-generation empowerment, open communication, open partnerships, and open ecosys-

tems, will be catalysts for systemic change toward a new social contract and knowledge-based action to transform education for global sustainability (Ossiannilsson 2023, 558).

## The Role and Contribution of Libraries to Open Science and Sustainability

Libraries play important roles in the field of open science. A systematic review and synthesis of 65 research articles related to library engagement in OS established that library OS practices were primarily focused on OA, research data management, OERs and citizen science. The researchers defined the role of the library from various perspectives. The most important role for academic researchers was that of OS service providers. Libraries and librarians were also regarded as advocates or educators, policy makers, and publishers or knowledge producers (L. Liu and W. Liu 2023, 9). Other roles for libraries and librarians include promoters of research diversity, enablers, evaluators of data and resources, mediators of agreements between research groups and research advisors (Tzanova 2020, 291–295). Education goes hand in hand with promoting the significance of OA to knowledge acquisition and raising awareness of the issues.

Being strong advocates for Open Access, academic libraries contribute to releasing the research potential of digital technologies and communications by promoting openness and providing easy and universal interfaces to data sets in the institutional repositories, in addition to their primary role (Tzanova 2020, 291).

The roles described for libraries in open science can be largely transferred to commitments, activities and other contributions to achieving the SDGs and, as part of this, target-oriented SDG education within the ESD programme (Figure 5.1). The model presents the library roles in overlapping circles in the centre. The contributions of libraries to both open science and the achievement of the SDG targets are grouped together around the circles. In addition to the provision of ICT, services, and open access to information, libraries offer data and learning materials and support for universal information literacy through institutional curricular support, and also by opening up information access to the general public and citizens, supporting lifelong learning, and emphasising digital inclusion with services to disadvantaged groups and the disabled. Libraries raise awareness and promote OS and the SDGs through community engagement, partnerships with others, and the identification or creation of incentives and rewards for behaviour supporting the achievement of the SDGs. Other contributions include ensuring diversity by offering OERs in multiple languages and from the perspective of different scientific disciplines, supporting policy developments, participating in projects and providing monitoring measures (Ekpolomo 2023; IFLA 2023 Mamtora and Pandey 2018, 6–7; Mashroofa 2022, 52–54; Muth and Salvador Lopez 2021).



Figure 5.1: Roles and contributions of libraries to open science and SDGs. © The authors

Each role played by libraries overlaps the others. For example, creating open access to information, data and resources in order to achieve the SDGs, is one of the core tasks of libraries in their role as service and ICT providers. It can be achieved through services such as funding for OA publishing or ICT such as repositories. The same goal can be supported by libraries as publishers or knowledge producers in the case of library-operated university presses or as editors or maintainers of online journals or books series via open journal systems (OJS) and open monograph press (OMP). Libraries who are publishers or knowledge producers constitute: "Signatories [to the SDG Publishers Compact who can] aspire to develop sustainable practices and act as champions of the SDGs during the Decade of Action (2020-2030), publishing books and journals that will help inform, develop, and inspire action in that direction" (United Nations n.d.f). In addition, the access possibilities must be communicated, explained and promoted by libraries in their roles of educators, advocates, mediators and advisors. Libraries and librarians as assessors of information resources can point out critical and problematic sources and differentiate quality content from inferior outputs of predatory publishers.

Diverse research materials on SDGs including open data, methodology descriptions for data collection and studies, publications of various kinds, and teaching and educational materials integrating approaches from different disciplines can be curated, processed and presented by libraries and their subject specialists. The library as promoter of research diversity comes to the fore. Other activities by libraries might involve ensuring that accessible information can contribute to policy development and target monitoring of SDG targets:

More specifically, libraries can support the implementation of the SDGs by providing access to information, support for literacy and ICT skills, and access to community space...UN Depository Libraries support dissemination of information and research to help decision makers achieve the SDGs (United Nations n.d.g).

Libraries can also function as autonomous policymakers by formulating policies to promote SDG-related and open science practices in their publishing and knowledge-producing activities, distributing the funding required, and allocating funds to publishing through library-managed budgets. When negotiating subscription contracts including publish-and-read agreements, sometimes known as transformative or read-and-publish agreements, libraries can seek to include clauses with terms for wider open access.

### **Badges, Awards and Prizes**

The wide range of activities of OS and OA players, particularly those based in, or supported and influenced by, libraries, and the open resources they have created or enhanced for quality education are not yet perceived or appreciated as they should be, given their societal and global impact over the past decade. Reward systems which seek to recognise achievement and success in OS and OA include badges, prizes and awards which are based on the assessment of a wide range of criteria. They offer the opportunity to promote OS and associated activities in an award-worthy form which can summarise their import and impact.

A European Commission report addressing incentives for OS researchers refers to: "Improved training and support for research dissemination and data curation" as one general measure alongside:

Visible recognition of Open Science activities (including Citizen Science and Open Education), used widely to enhance reputation and credibility of researchers, establishment of Open Science prizes, and encouraging champions and role models (Miedema et al. 2018, 30).

The report presents a blueprint or roadmap including stages, targets and possible activities to guide European countries in implementing open science activities. To "Incentivise" it is suggested that countries:

- Establish a funding-allocation system that rewards Open Science activities, such as Open Data, Open Education and public engagement
- Establish Open Science prizes and awards, [and]
- Promote transparent assessment criteria and open scientometric databases (Miedema et al. 2018, 112).

The development of OS prizes can be seen in the national action plans of some countries:

The French National Plan for Open Science requires in a general way that the assessment system for researchers and research institutions must be updated to reflect the principles and practices of open science, giving greater weight to quality rather than quantity; it also announces a "research data award" to showcase and reward teams that have performed outstanding work in this area ... The purpose is clearly stated: the development of open science and more specifically, as for the researchers, the development of good practice regarding RDM, through incentives and rewards (Schöpfel and Azeroual 2021, 447).

In Finland, "Every year, The National Open Science and Research Coordination rewards open science practices" (Open Science 2024). Finland awards several OS and open education prizes which form part of the Finnish support of open science initiatives and the journey toward open scholarship and the promotion of open research practices in the research community.

Awards and education are two valuable pillars of OS (L. Liu and W. Liu 2023, 1) and, as shown in Figure 5.1, also of the SDGs in the context of ESD. Incentives provide in addition to the benefits of clear criteria and targets, assessment, recognition and promotion opportunities. They are genuine substantive real rewards:

Rewarding and incentivizing require a clearly defined target behavior. However, so far, a comprehensive classification of data-related and contextualized behavior is missing.

- Most proposals of rewarding and incentivizing put the focus on the researcher. Yet, research data management is team work with essential contributions by data librarians, data engineers, data stewards and so on.
- Some of the most often suggested incentives (tenure, promotion, funding) are no real rewards – they already exist and the proposal would just add new conditions to get them. More sticks than carrots, in some way (Schöpfel and Azeroual 2021, 449).

In addition to the creation of public interest as a benefit for the society, there are other motivations for visible engagement in OS (Figure 5.2). Reuse, citation advantage, and meaningfulness of the OS results are the most important drivers for open science prize winners and their researcher colleagues (Röwert 2024, 160).



**Figure 5.2:** Drivers for the engagement of open science prize winners, based on the image by Röwert (2024, 160), translated into English and modified by the authors (Putnings and Zweier 2024)

#### **Defining Badges, Awards and Prizes**

Awards honour outstanding achievements in specific fields, perhaps through winning a competition, but in some cases simply through participation and meeting specified criteria. Awards are sometimes differentiated from prizes, as prizes may be part of a competitive effort and associated with monetary or similar rewards (Gallus and Frey 2016, 1701).

A badge presented or displayed, can represent a special achievement and is sometimes used as a motivator of behaviour, a signifier, a credential, or a pedagogical tool. In the digital and educational sectors, badges are used as evidence of completed learning pathways, achievements or special skills (Ahn, Pellicone, and Butler 2014, 3–4). Digital badges are validated indicators of accomplishment and commonly contain details of the assessment, evidence and other metadata required for the badge. Badges are designed to encourage the sharing of knowledge and resources, create evidence-based transparency about assessments, and provide recognition (Petriashvili et al. 2020, 6–8).

# Positive Effects of Badges, Awards, and Prizes and their Relationship to Certification

When badges, awards and prizes are granted on the basis of a transparent catalogue of criteria, there is a close connection and overlap with certification. Certification is attestation by a qualified objective third party, that requirements, for example in relation to a product, service, system or infrastructure, have been met. The requirements are defined or set out in the respective certification system, together with the granting rules of the certification body, including the conditions for participation, steps in the certification process and the form of the certificate (Putnings 2018, 255–256).

Badges, awards and prizes are, like certificates, promotional symbols guaranteeing that the defined requirements of the awarding body and its stakeholders have been met; in addition, the award increases awareness of, and trust in, products and services made available, and where applicable, the open nature of information resources. Heightened awareness and confidence in quality can have a positive effect in terms of increased usage. Recipients of badges, awards or prizes raise their profiles within their institutions and with funding bodies, which may prove advantageous when competing for resources. The application for badges, awards or prizes is usually preceded by a self-evaluation, including review, documentation and, if necessary, optimisation of activities undertaken which frequently leads to process-inherent quality improvements prior to submission. Receiving a badge, award or prize boosts staff motivation and can be beneficial for staff promotion and career enhancement, and recruitment particularly if the award and commitment to new library roles, such as OS, are used to promote the library (Putnings 2018, 252–253). Badges, awards and prizes, along with certification, are an essential part of quality communication as part of information marketing (Putnings 2018, 259).

# Open Science Badges, Awards, and Prizes Relevant to Germany

This section provides an overview and discussion of selected open science badges, awards and prizes relevant to Germany and its scientific community. A wide range of badges, awards and prizes is available, including OS, OA, open data and OERs, at institutional, regional, national and international levels. Attention is drawn to the most important awards, and, at the same time, their diversity is taken into account. Some badges, awards and prizes included are open only to a specific institution and its members or restricted to certain networks. Badges, awards and prizes that are largely outside the sphere of influence, responsibility or participation of libraries or librarians, are excluded, along with OS badges used by commercial publishers and journals to label the OS methods of their authors. Certifications, such as the Deutsche Initiative für Netzwerkinformation (DINI) Certificate for Open Access Repositories and Publication Services, are also excluded.

A summary of details about the badges, awards and prizes available in Germany are contained in Table 5.1. The specific details, such as the underlying award criteria, the possible group of applicants, the composition and professional background of the jury or the application procedure, vary considerably. Further information can be found on the referenced websites; in addition, an extended preprint version of this contribution with a more detailed tabular presentation of the badges, awards and prizes is available on Zenodo at https://doi.org/10.5281/ zenodo.11617463 (Putnings and Zweier 2024).

Badge, award or prize	Key information and features
YERUN Open Science Awards, an example from a university research network of univer- sities (Yerun 2021a. https://yerun.eu/).	An award of 2,000€ is made by the Young European Research Universities Network (YERUN). Only research- ers, administrative or professional support staff from one of the YERUN universities can apply. Any OS prac- tice or initiative by applicants is potentially eligible.
OEAwards, an example of a global award (OEAwards for Excellence 2024. https:// awards.oeglobal.org).	The annual Open Education Awards for Excellence (OEAwards) by Open Education Global (OEG) recognise contributions to the global open education community in a number of categories. There is no cash prize, but all winners are honoured in a virtual hall of fame and in lavish announcement and award ceremonies re- corded for YouTube.
Enter, an example of a national award (Enter n.d. https://enter-award.irights-lab.de).	The Enter award is a new German OA award created in 2024 via a third-party-funded project and endowed with prize money of €1,000 in each of five categories: Infrastructure, Transfer of Expertise, Young Talent, Pioneering Achievement and Cooperation. Initiated by the Berlin-based think tank iRights.Lab and supported by the Bundesministerium für Bildung und Forschung. The frequency of the award has not yet been deter- mined.

Table 5.1: Overview of selected badges, awards and prizes relevant to German libraries

Badge, award or prize	Key information and features
Humboldt-Universität's Open-Access-Preis/ Open Access Award, an example of an in- stitutional award (Humboldt-Universität zu Berlin. Universitätsbibliothek n.d. https:// www.ub.hu-berlin.de/de/forschen-publizieren/ open-access/preis?set_language=de)	The Open Access Award of the Humboldt-Universität zu Berlin annually honours outstanding achievements in the field of OA and is awarded to individuals or groups from only the Humboldt-Universität. The total prize money is $\in$ 5,000 which can be awarded to a single recipient or shared proportionally among several recipients.
Open Library Badge, an example of an award targeted at libraries (Open Library Badge. n.d. https://badge.openbiblio.eu).	The Open Library Badge, which is administered and awarded by a library working group of volunteers, does not follow a specific awarding timetable, but can be applied for throughout the year. There is no compe- tition. Only libraries can apply and at least five out of fifteen defined criteria must be met. Research groups, educators and special initiatives are excluded. There is no cash prize, but badge holders and their best prac- tices are listed and honoured on the project's website.

The OEAwards for Excellence are open to all eligible applicants worldwide "honoring exemplary leaders, distinctive Open Educational Resources, and Open Practices from around the world" (OEAwards for Excellence 2024a). Applications for the YERUN Open Science Awards also have a global focus and visibility because of network memberships but are restricted to researchers and administrative or professional staff from one of the YERUN universities (YERUN 2023, 2). In Germany, the universities included in YERUN are currently the universities of Klagenfurt, Potsdam, Ulm, Konstanz and Bremen (YERUN 2021b).

The Enter award has a national focus on Germany. Individuals or organisations with a place of residence or registered office in Germany are eligible to apply (Open Access Network 2024); the website is available only in German although such services as Google translate make the content more widely available. Humboldt-Universität's Open Access Award is, as the name suggests, not just national but an example of an institutional award which is restricted to members of the university. "Only members of Humboldt-Universität are eligible. In the case of groups, at least half of the group must be members of Humboldt-Universität" (Humboldt-Universität zu Berlin. Universitätsbibliothek 2024). The Open Library Badge has an occupation-specific character and can be applied for by libraries and their librarians only (Open Library Badge 2024).

### Relevance of the Badges, Awards and Prizes to the Sustainable Development Goals, Education for Sustainable Development and Libraries

All badges, awards and prizes listed contribute to SDG Target 16.10 "Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements" (United Nations n.d.e). The YERUN Open Science Awards, the OEAwards, the Enter award and Humboldt-Universität's Open-Access-Preis/Open Access Award, focus on recognising activities towards OS and its aspects, such as OA and open education and encourage individual researchers or research groups to make their research and teaching results freely accessible and to be recognised for their achievements. The awards are also aimed at administrative staff and catalysts, such as librarians, and at organisations or infrastructures, such as libraries including their repositories and networks. The Open Library Badge does the same, but is limited to libraries, both public and academic.

SDG Target 17.6 "Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism" (United Nations n.d.h) is also implicitly pursued via accessibility, reuse and collaboration through OS involving knowledge sharing. The OEAwards and the Enter award in particular focus on collaboration and cooperation in specific award categories. A good example is the OEAwards Open Collaboration Award made in 2020. The award winners "developed the international online mentoring programme Open Education for a Better World (OE4BW), which has been designed to unlock the potential of Open Education in achieving the UN Sustainable Development Goals" (OEAwards for Excellence [2020]). The YERUN Open Science Awards consider collaboration as a factor in their award criteria through the proven use of open collaborative methods and tools (YERUN 2023). The Open Library Badge is unique in that it is not aimed at collaborative initiatives from the scholarly community itself, but at the supporting role of libraries through the specified criteria of:

Support open knowledge communities. Organize community events in collaboration with Wikimedia or other knowledge communities or participate in projects to improve Wikipedia or Wikidata (Open Library Badge 2023).

All badges, prizes and awards implicitly refer to a possible educational contribution of openly accessible research results or the creation of OERs and therefore to the achievement of SDG 4 "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations n.d.b) and its various targets. In relation to Target 4.3, for example: "By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university", freely accessible academic teaching materials can reduce inequality in access to higher education. Of the five awards presented in this chapter, the OEAwards in particular have the strongest and most explicit focus on SDG 4 and ESD, which is reflected in the Educator Award, the Open Asset Award for Significant Impact OER and the Open Practices Award for Open Pedagogy (OEAwards for Excellence 2024b). The Enter Award also has a separate category for education and skills transfer (Open Access Network 2024). Within the Open Library Badge, there are several criteria which relate to SDG4 (Open Library Badge 2023). The YERUN Open Science Awards do not explicitly refer to education although open education is inevitably part of open science and nor does Humboldt-Universität's Open Access Award, although OA materials can also include, for example, educational textbooks.

As far as other SDGs are concerned, some badges, prizes and awards aim to eliminate inequality between men and women, and to honour inclusion in their award criteria and categories. For example, the OEAwards include a Diversity, Equity & Inclusion Award (OEAwards for Excellence 2024b) while the Open Library Badge includes the following criteria:

Usability for all people. Making your own website barrier-free. Libraries should ensure the accessibility of websites, documents, software, and catalogs as well as buildings and work-places for employees and users.

Library as an open place. The library offers a course program for integration, inclusion, and/ or emancipation to promote equal access for all (Open Library Badge 2023).

Such criteria are relevant to SDG 10 "Reduce inequality within and among countries" and SDG 5 "Achieve gender equality and empower all women and girls".

The OEAwards have more awards that reward not just one but several SDG activities and contributions, for example the Enacting SDG Award which applies to all seventeen SDGs and the Open Resilience Award. The latter identifies exemplary open education practices which address challenges in times of crisis and play a role in SDGs 1, 2, 3, 6, and 13 (OEAwards for Excellence 2024b).

Finally, it may be possible in the Open Library Badge criteria to see a contribution to SDG 8: "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all" (UNESCO n.d.i), as well as to SDG 9: "Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation" (UNESCO n.d.c) with the criterion: Enable text and data mining. The library allows its users to perform text and data mining on their own and licensed collections. In license agreements, it generally negotiates the right to text and data mining and it informs users accordingly (Open Library Badge 2023).

Text and data mining are important aspects for innovation in areas such as artificial intelligence. Regarding the OEAwards, the Open With Artificial Intelligence Award also fosters innovation (OEAwards for Excellence 2024b). Implicitly, however, in addition to resilient infrastructure providers such as libraries, researchers also contribute to innovation by publishing research in OA and making research data available openly along with open source code and open hardware.

### **Further Actions**

Although librarians are typically permitted to participate in the application process for the various awards as administrative staff, all awards, with the exception of the Open Library Badge, are also open to researchers, research groups, and academic educators. With a few exceptions, such as the Open Library Badge, libraries have mostly not played direct roles in the processes associated with the relevant badges, awards, or prizes in terms of their relationships with awarding organisations. Nevertheless, libraries provide invaluable support for research and OS by making existing knowledge openly accessible and by offering advice and infrastructure for open science in all its manifestations.

The traditional proximity of libraries and librarians to researchers is an advantage in driving cultural change. However, libraries could play a more active role by offering prizes themselves either individually or jointly, or by becoming more actively involved in the organisations bestowing the various awards.

For existing awards, it would be advisable to make a stronger and more explicit reference to the SDGs than has been the case to date. The OEAwards Special Awards such as the Enacting SDG Award, the Diversity, Equity & Inclusion Award and the Open Resilience Award are examples worth emulating.

The processes for awarding badges, prizes and awards are either competitive with multiple applicants applying for assessment and only a few winning the award, or non-competitive, as in the case of the Open Library Badge, where award recipients are required to meet certain criteria. In view of the duality, it is recommended to use the best of both. Non-competitive application procedures with extensive transparent criteria requiring fulfilment ensure that anyone can achieve recognition. The result is similar to a quality certificate awarded for meeting, for example, the standard ISO 9001 for quality management and tantamount to certification. However, it is only major celebratory ceremonies that create the appropriate publicity and recognition of awards and their support of OS initiatives. Such events are usually associated with competitive procedures where winners who are the best are honoured. Using both a transparent catalogue of criteria for evaluation and assessment and the regular celebration of excellence and winners will produce effective outcomes. Organisations active in open science are likely to have an open access publishing fund; any prize money results from awards must thus not be earmarked for the payment of open access article processing charges.

Finally, making best practice visible is vitally important. The Open Library Badge's approach should be emulated. It lists not only badge holders, but also best practice, and highlights successful projects or activities which have met the criteria. Others can learn from the descriptions of outstanding projects and replicate work, using OA and any open source tools and methods available. Imitation could lead to multiplication of activities.

### Conclusion

This chapter has examined open science, the SDGs, the ESD programme, the role of libraries, and badges, awards and prizes as stimulators of progress in achieving the SDGs and ESD. The focus has been on the roles of libraries in transforming the learning environment for sustainable development and promoting open science. At least ten of the seventeen SDGs require ongoing scientific input and to achieve these goals on a global scale, it is essential to make research results and other educational resources openly accessible and disseminate them without restrictions to the intended stakeholders (UNESCO 2021a).

As IFLA states, "Libraries have long been key players in advancing open science and development, and today in particular are playing a key role in ensuring that the two come together for the benefit of all" (IFLA 2023). The activities and potential of libraries are, however, often overlooked, and need to be strengthened (Hauke 2023, 86; IFLA 2023). One marketing activity to enhance the role of libraries is the use of badges, awards and prizes, such as the Open Library Badge in Germany, which is a high-profile honour.

The awards and prizes presented in this chapter reflect from a German perspective a choice of international, national, regional, and institutional awards in terms of coverage and visibility, as well as different aspects of OS, with varying award criteria to be met and with uneven impact on and support of the SDGs. Each badge, award or prize has the potential effect, at its respective level and beyond, to raise awareness for open practices in science, to draw attention to best practice and to establish open standards, in addition to providing financial support and appreciation where applicable.

Effective marketing methods that can leverage these activities include organising prestigious award ceremonies, highlighting exemplary champions, producing press releases and presenting overviews of previous winners to promote projects that create or foster open access resources, with imitation leading to a multiplier effect.

Among the badges, awards and prizes considered, two stand out in particular. Firstly, the OEAwards, because they not only focus on OS or its components, such as OERs and OA, but explicitly address SDG aspects with award categories such as the Enacting SDG Award and generally place a strong focus on open education in the context of the ESD programme. Secondly, the Open Library Badge, is noteworthy because it is explicitly and exclusively aimed at libraries and considers openness in a broad sense referring to inclusion, the benefits of text and data mining for enhancing innovation to strengthen the economy and society, and the support of open knowledge communities. Libraries have a great role to play in nurturing open science, implementing measures assisting attainment of the SDGs and participating in ESD. Badges, awards and prizes have a part to play in encouraging involvement, recognising achievement and promoting best practice.

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