APPENDIX: Case Study Tables and Supplemental Data

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Project Description Template

Thematic Category	Prompts
1. **Project /Programme**	• Type of GLAM organisation • Unit/department responsible for public engagement/ relevant programme • Project description • Web page URL
2. Mission	• Organisational mission • Project /alignment with citizen science
3. **Participation**	• Descriptive (e.g. numbers, type) • Engagement scope
4. **Digital modalities**	• Use by public • Internal to team
5. Knowledge co-production	• Modes • Output(s) • Producers/partners
6. **Skills /expertise**	• Public engagement • Other
7. **Funding and Sustainability**	• Project/ programme funding • Scope • Sustainability
8. Culture shift	• Organisational • Author reflection(s) • Position of author in organisation

1.Summary Descriptions

Tables 1a and 1b provide an overview of the projects with summary descriptions of each study, including organisational details, project duration, coverage, partners and online project presence. Table 1c provides a list of references of published articles by co-authors related to the case studies.

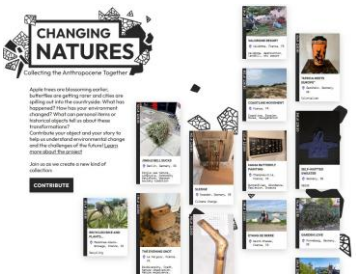
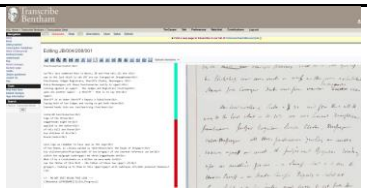
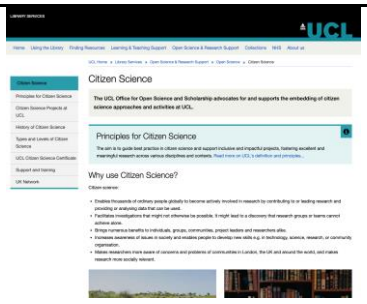
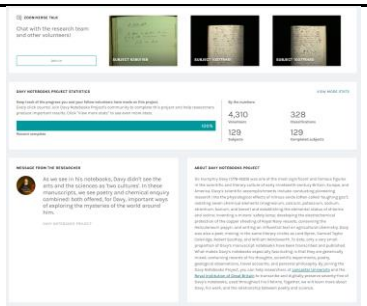
1a: Project descriptions

	Case Study	***Brief description***	***Project Duration***	***Geographic Coverage***	***Institutional lead and Partners***
1	*Changing Natures* https://www.changing-natures.org/	The project addresses anthropogenic environmental change by inviting citizens to contribute directly to the creation of a digital collection	2020-present	Germany and France	Co-leads: Museum für Naturkunde Berlin (MfN) und Muséum national d'Histoire naturelle (MNHN) Paris
2	*Transcribe Bentham* http://www.ucl.ac.uk/bentham-project.	The project focuses on the crowdsourced transcription of the papers of Jeremy Bentham, philosopher and reformer (1748-1832),using an online citizen science platform supported by University College London (UCL) Advanced Research Computing	2010 - present	UK	UCL Special Collections; UCL Advanced Research Computing; UCL Educational Media. Repository managed by UCL Library, Culture, Collections, and Open Science (LCCOS). Partner/content provider: The British Library;
3	*National Education Nature Park* www.educationnaturepark.org.uk	The project aims to achieve and study biodiversity gains and nature recovery on school, college and nursery sites across England, alongside embedding nature and climate in the curriculum, developing young people's green skills, pro-environmental behaviours and enhancing wellbeing.	2022-present	England	Led by the Natural History Museum London, with Royal Horticultural Society, Learning Through Landscapes, Royal Society, UK Centre for Ecology and Hydrology, National Biodiversity Network Trust, Manchester Metropolitan University, Royal Geographical Society, Esri UK

4	*UCL Citizen Science* https://www.ucl.ac.uk/library/open-science-research-support/open-science/citizen-science	The OOSS Citizen Science Support service (part of UCL Library) enables connections between existing projects and facilitates a growing community of practice. It also supports the Citizen Science Academy (CSA) which offers citizen science education and training support embedded within active research projects and imparting knowledge and practical skills to enable place-based social action across different modalities.	2020-present	UK	Led by the UCL Office of Open Science and Scholarship (OOSS), and partnered with UCL Citizen Science Academy (CSA), UCL Institute of Global Prosperity, Co-production Collective, ExCites research
5	*Davy Notebooks Project* https://wp.lancs.ac.uk/davynotebooks	The project focuses on the crowdsourced transcription of the notebooks of Sir Humphry Davy, chemist and inventor (1778-1829), using the online citizen science platform Zooniverse	2019-2024	UK	Lancaster University, the Adler Planetarium in Chicago, UCL and the University of Manchester.
6	*Future Art Ecosystems (FAE)* https://futureartecosystems.org/	Future Art Ecosystems is a program which developed the first trusted data intermediary within a cultural organisation to enable responsible data stewardship for AI training. The case study focuses on a crowdsourced exhibition 'The Call' which is positioned within the FAE framework.	2024-present	UK	Lead: Serpentine Galleries. Collaboration with artists Holly Herndon & Mat Dryhurst on an AI art exhibition titled *The Call*, and partnerships with UK choral groups, Centre for Data Futures, King's College London, RadicalxChange, AWO and Keystone Law

Table S1a. Project summaries

1b: Case Study project website URLs with screenshots

	Case Study	Figure /screenshot	Caption / copyright information	URL
1	***Changing Natures***		Exemplary objects and call to action	https://www.changing-natures.org/en/
2	***Transcribe Bentham***		Transcribing and encoding a Bentham manuscript using the Transcription Desk	*https://transcribe-bentham.ucl.ac.uk/td/Transcribe_Bentham*
3	***National Education Nature Park***		The National Education Nature Park website supports teachers and school leaders to take up the programme. © Department for Education	*https://www.educationnaturepark.org.uk*
4	***UCL Citizen Science support service***		Support service website highlighting principles of Citizen Science	*https://www.ucl.ac.uk/library/open-science-research-support/open-science/citizen-science*
5	***Davy Notebooks Project***		The Zooniverse page for the Davy Notebooks project where the crowdsourced transcription took place	*https://www.zooniverse.org/projects/humphrydavy/davy-notebooks-project*

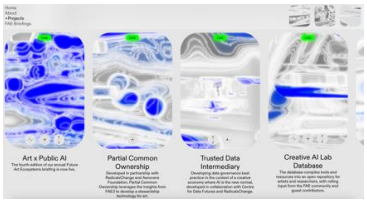
6	***Future Art Ecosystem (FAE)***		Project page Future Art Ecosystems.	https://futureartecosystems.org/projects/

Table S1b: Case Study project website URLs and screenshots

1c: Case Study references

	Case Study	***References***
1	***Changing Natures***	Heyne, E., Weißpflug, M., Sturm, U. (2024) 'Participatory practices and transforming environmental research in the Anthropocene', *Environmental Science & Policy*, 153, 103655, https://doi.org/10.1016/j.envsci.2023.103655 Sturm, U., Heyne, E., Herrmann, E., Arends, B., et al. (2022) 'Anthropocenic Objects. Collecting Practices for the Age of Humans', *Research Ideas and Outcomes* 8, e89446. https://doi.org/10.3897/rio.8.e89446
2	***Transcribe Bentham***	Causer, T. and Terras, M. (2014) 'Many hands make light work. Many hands together make merry work', in *Crowdsourcing our Cultural Heritage*, ed. M. Ridge, Ashgate,pp. 57-88. Causer,T., Grint, K., Sichani, A-M. and Terras, M (2018) 'Making such bargain': *Transcribe Bentham* and the quality and cost-effectiveness of crowdsourced transcription', *Digital Scholarship in the Humanities*, vol. 33, 467–87.
3	***National Education Nature Park***	Burton, V, Gunnell, J, Naylor, R, Soul, L, Robinson, L, Tweddle, J. (2024) 'Boosting biodiversity in school grounds: a theory of change', in *ARPHA Proceedings*, 6, pp.111-115. DOI:10.3897/ap.e125953.
4	***UCL Citizen Science support service***	Wallis, K. (2022) 'Supporting Citizen Science in the UCL Office for Open Science & Scholarship', *UKSG Newsletter*, https://www.uksg.org/newsletter/supporting-citizen-science-ucl-office-open-science-scholarship/
5	***Davy Notebooks Project***	Ruston, S., Lacey, A., Bird, E., Wolf, A., James, F. and Blickhan, S. (2024) 'The Notebooks of Sir Humphry Davy', in *Notes and Records of the Royal Society*, 78(4), pp.539–546.https://doi.org/10.1098/rsnr.2024.0002
6	***Future Art Ecosystems***	Ivanova, V and Ding, J. (2025) *Choral Data 'Trust' Experiment White Paper*, Serpentine Arts Technologies, DOI:10.5281/zenodo.14859320

Table S1c: Case study references

2. Mission and Purpose

Table 2 provides an overview of the mission/purpose of the organisation and project, as well as citizen science alignment.

	Case Study	***Organisational Mission/purpose***	***Mission/purpose alignment with citizen science***	***Project mission/purpose***
1	***Changing Natures***	the initiative seeks to integrate personal, local, and cultural knowledge relating to human influence on nature into contemporary natural history collections. The aim is to build a purely participatory and digital collection of human-made environmental change in order to rethink natural history collection development in the Anthropocene.	Putting citizen science and participatory practices to the core of museums: rethinking and co-creating new collection practices that seek to integrate - according to the topic of the Anthropocene - diverse scientists and disciplines, diverse societal actors and other experts	The project focuses on individual perspectives on human-made environmental transformations: What things from the past can tell us stories about these changes? Which objects and memories surprise us today? What have we long forgotten – or never noticed? Every interested person is invited to contribute an own object to a museum's collection.
2	***Transcribe Bentham***	The aim of the Bentham Project (founded 1959) is to produce the new authoritative edition of *The Collected Works of Jeremy Bentham*, as well as to act as the global centre for the study of Bentham's life and work.	*Transcribe Bentham* was initially established in 2010 as an experiment to investigate whether online volunteers were capable of, and would be interested in, helping to produce transcripts of manuscripts which are routinely complex in terms of composition and layout. This task would be with a view to contributing to the production of a major scholarly edition, and to produce a searchable digital repository of tens of thousands of manuscripts. Such has been the quality and volume of transcripts submitted by volunteers (over 46,000 pages as of March 2026) it is now impossible to imagine the Bentham Project without *Transcribe Bentham* and the work of its volunteers.	*Transcribe Bentham* demonstrates how successfully volunteers can contribute both to scholarly research through the accelerated transcription of historic manuscripts, but also the scholarly and public exploration of that collection.

3	***National Education Nature Park***	The Natural History Museum's mission is to create advocates for the planet - people who speak up on behalf of nature and take action to protect it.	The mission is delivered through five strategic priorities, two of which relate directly to community science - 'Transform the study of natural history', and 'Engage and involve the widest possible audience'. Community science is a priority theme within the Museum's Science Group, and is reflected in the Museum's Strategy to 2031.	The National Education Nature Park has five goals: 1. To increase biodiversity across the education estate; 2. To develop green and digital skills; 3. To improve young people's wellbeing; 4. To promote pro-environmental behaviours; and 5. To involve every young person in formal education in England.
4	***UCL Citizen Science support service***	The aim is to guide best practice in citizen science and support inclusive and impactful projects, fostering excellent and meaningful research across various disciplines and contexts.		
5	***Davy Notebooks Project***	The aim of the Davy Notebooks project was to: ● digitise and make publicly available the full collection of Sir Humphry Davy's notebooks, held at the Royal Institution of Great Britain (RI), in London, and in Kresen Kernow in Redruth, Cornwall. ● Engage volunteers in the crowdsourced transcription of the notebooks, and seek to understand how this changes their view of how poetry and science could co-exist today.	Building on a successful pilot where five of Davy's notebooks were digitised and transcribed, this project sought to engage volunteers to complete an additional seventy notebooks. The involvement of volunteers was intended to engage the public in the production of research, help volunteers to develop new research and technical skills and also to develop a blueprint for the involvement of the public in future transcription projects. A range of public engagement and impact events took place including two in-person transcribe-a-thons, a map-a-thon, a workshop on how to use the newly-developed transcription tools in other crowdsourcing projects and an exhibition of Davy's and others' notebooks. A pre-existing publicly accessible MOOC on Sir Humphry Davy was enhanced to feature new	The Davy Notebooks project successfully delivered the digitisation and transcription of the entire collection of Davy's notebooks. The transcription uncovered new findings and has enabled new scholarship on Davy's work. The project has provided a successful opportunity for Lancaster University Library to partner on a research project, and provides a template for the development of future digital collections.

			tasks specifically on the notebooks.	
6	***Future Art Ecosystem (FAE)***	Future Art Ecosystems is a project for building 21st century cultural infrastructure to support art and advanced technologies for the public good. Through briefings, R&D Labs and a growing community of artists, technologists, policy-makers, researchers and fellow organisations, FAE develops insights, tools and projects that advance our mission. https://futureartecosystems.org	The [Trusted Data Intermediary] experiment revealed the critical importance of creating and formalising roles for trustworthy individuals and organisations in the data ecosystem, particularly in supporting foundational activities that are often overlooked in AI development and that address unbalanced or unfair dynamics in current practices of AI, such as co-production and stewardship of datasets [Ivana and Ding 2025]	A key objective of the Choral Data 'Trust' Experiment, the first of its kind at a GLAM institution, was to develop an operational framework, co-created with the choirs for the governance of the choral AI dataset for AI development as part of *The Call* [exhibition] and beyond.

Table S2 : Mission and purpose

3 Participation

Table 3 provides an overview of the projects from the perspective of the modes and types of participation, the numbers of people and scale of the collections involved.

	Case Study	***Participation mode and coverage***	***Participants***	***Highlights***
1	***Changing Natures***	Hybrid - Germany, France and Europe	From pupils to people of retirement age, with or without academic backgrounds, in France, Germany, and other European Countries.	As of March 2024, the digital collection contained 252 objects, 111 comments, and 1,485 participant-generated keywords
2	***Transcribe Bentham***	Online – UK and international	The majority of contributions from 43 'Super Transcribers', volunteers who submit or have submitted high quality work on a regular basis. A 2011 survey indicated that *TB* volunteers are retired/near retirement professionals with at least one tertiary degree	As of 7 October 2025 volunteers had transcribed 44,687 manuscript pages (a mean of 58 per week since September 2010). Super Transcribers are responsible for 96% of all transcripts, with two volunteers having produced 20,500 transcripts between them.
3	***National Education Nature Park***	Hybrid - England	Nurseries, schools and colleges in England	Over 9,000 schools, colleges and nurseries are registered for the programme as of March 2026, representing over 30% of primary and secondary schools in England. Of these, more than 40% have participated in community science research activities in the first 2.5 years.
4	***UCL Citizen Science support service***	Hybrid - local and international	community represents local, national, and international projects that include longitudinal studies, crowdsourcing, local history, public health, volunteer and community computing projects, gamification etc	Over 100 students and academic staff members (and growing) drawing on the services and support available
5	***Davy Notebooks Project***	Online – UK and international	Volunteers were geographically dispersed around the world and from a wide range of backgrounds	Over 3800 online volunteers contributed to the transcription and annotation of the notebooks.

6	***Future Art Ecosystem (FAE)***	Hybrid - UK and international	15 UK community choirs (300 choristers, 120 soloists), invited by artists Holly Herndon and Mat Dryhurst in collaboration with FAE to record performances of a hymnal songbook composed by the artists Exhibition public interacting with the AI choir data	15 UK community choirs (300 choristers, 120 soloists), invited by artists Holly Herndon and Mat Dryhurst in collaboration with FAE to record performances of a hymnal songbook composed by the artists. Resulting in: • 483 high-quality performance recordings • Choral AI dataset for training choral AI models

Table S3. Participation

4 Digital modalities

Table S4 below summarises digital modalities accessed and/or used by participants in knowledge production in the selected case studies and organisational support in the use of modalities and/or in support of modalities in the process of knowledge production.

	Case Study	Public/Participant digital modes	Organisational support
1	***Changing Natures***	● Multilingual online collection platform enabling object upload, metadata tagging, and commenting. ● A folksonomy system allowing users to generate and expand keyword categories. ● Online collection exploration through a gallery view, object-centered views and map. ● Interactive game Ecocene using AI-generated imagery to reimagine contributions.	Team management and oversight of platform and tools. Future developments include a Research Portal with visualizations of relations between contributions and metadata.
2	***Transcribe Bentham***	● Volunteers transcribe and encode manuscripts through the 'Transcription Desk', a customized MediaWiki. ● The toolbar allows volunteers to add TEI-XML tags	Transcripts are checked for accuracy by Bentham Project staff and those judged accurate and complete are locked, and converted into an XML file for upload to the repository.
3	***National Education Nature Park***	● Website and social media, ●. Participatory knowledge production using GIS-based tools accessed through a browser • iNaturalist app for species observations ● Access to the data via a GIS-based digital map, enabling community scientists to visualise and analyse their own, and others' data.	Team management and oversight of website, social media, GIS-based tools accessed through browser, and data and access security protocols
4	***UCL Citizen Science support service***	● Digital tools available to a participant project (varies for each project) ● In October 2023 launch of the online UCL Citizen Science Community on MS Teams – an informal, internal network for UCL staff and students who are interested in citizen science. • A space to connect, share knowledge and experiences, and spark creativity in participatory	Centralised team support and a growing network of peer supporters

		research.	
5	***Davy Notebooks Project***	● Zooniverse platform for crowdsourced transcription and collaboration ● Discussion threads on the Davy Notebooks Talk Forum	● The Library's Digital Innovation Team worked with TEI files to create IIIF-enabled collections on the Lancaster Digital Collections platform. ● The project team took the outputs of the volunteers and created annotations for the transcriptions.
6	***Future Art Ecosystems (FAE)***	● UK choirs were invited by artists Holly Herndon and Mat Dryhurst in collaboration with FAE to record performances of a songbook composed by the artists. • The artists composed a set of hymns and singing exercises and recorded them being sung by 15 choirs. ● The compositions and recordings of the choir performances were optimised for the collection of a choral AI dataset, purpose-built for training choral AI models	Team support for engagement /participation and data custodian framework. The resulting Data Trust involved choristers and creators to have a say in the usage of their 'data'.

Table S4: Digital Modalities

5 Knowledge Co-Production

Table 5 provides an overview of the modes and outputs of knowledge co-production, as well as participants who are involved in the process of co-production.

	Case Study	***Mode of knowledge co-production***	***Output(s) of of knowledge co-production***	***Who is involved***
1	***Changing Natures***	Co-Created: Project team members and Citizen Scientists jointly develop the digital infrastructure, the platform, and the research questions. This is done through focus groups in which participants contribute their first objects, which are then used to collaboratively develop methods for their description and documentation. Based on this, the results are developed jointly: citizens contribute their own objects, without researchers deciding whether the objects are appropriate or not; rather, all contributed objects are considered valuable. The evaluation and interpretation of the results are carried out collaboratively in participatory formats that include the active involvement of the citizens.	participants produce to knowledge in different ways: 1) selection of objects for the collection, 2) metadata, 3) additions of metadata and comments to objects of the collection, 4) co-design of platform	Project Team, Scientific Committee, Citizen Scientists (diverse age groups, from school children to retired persons, from different cultural contexts (especially Germany and France, but also other European countries)

2	***Transcribe Bentham***	The co-production is primarily through the production and revision of transcripts of original Bentham manuscripts. A volunteer or volunteers produce a draft transcript of a particular manuscript, then submit it to Bentham Project staff for checking. The key question is whether the transcript forms an accurate guide to the content of the manuscript, and forms a viable basis for editing and public searching. Volunteer transcripts serve two main purposes: i) Bentham Project staff use them as a starting point for editing volumes of *The Collected Works of Jeremy Bentham*, a major scholarly editing project, with volunteers credited in the preface to relevant volumes; and ii) transcripts are uploaded, alongside the respective manuscript image, to UCL Library's digital Bentham Papers repository, making searchable and discoverable an archive of vast historical and philosophical value. Volunteers have also helped to co-produce the transcription platform, with the their feedback and requests leading to revisions and improvements. A key example is the introduction, in 2013, of an improved interface that made it more straightforward to understand the TEI XML mark-up.	i) digital images of original Bentham manuscripts; ii) digital transcripts in TEI XML format, ensuring their long-term preservation and interoperability; iii) a revised and improved transcription platform; a digital repository of transcripts and manuscript images.	Bentham Project editorial staff; volunteer transcribers; platform developers; archivists

		The co-production takes two primary forms. The first is the production of the 'Transcription Desk', first developed in 2010 by the University of London Computer Centre, and subsequently revised by ULCC and subsequently UCL Advanced Research Computing in the light of user feedback - a key example being, in 2013, the introduction of an improved transcription interface that made it more straightforward to understand the TEI XML mark-up.		
3	***National Education Nature Park***	Young people and educators map the habitats on their learning site, and conduct nature surveys to record biodiversity. Young people develop a vision for their site and design and implement interventions to enhance their site for themselves and for nature, supported by programme resources. Young people can visualise the data on a map, annotate it and use it to inform their decisions and track their own progress towards nature recovery. Educators can download data to use in curriculum teaching, and school leadership can use data to inform Climate Action Plans and other reporting requirements. A Youth Science Forum enables a small cohort of young people to collaborate with project Postdoctoral Researchers to identify research areas of interest to the young people, to inform and steer the academic research within	Outputs include the ***Nature Park Map***, an open access CC0-licensed dataset of habitats and biodiversity surveys, and co-developed research foci / questions. New knowledge will be published in peer-reviewed publications (currently in draft).	Project partners, educators and children and young people are involved in the co-production process.

		the programme. During project development, pathfinder schools collaborated closely with project staff to test resources and shape the programme.		
4	***UCL Citizen Science support service***			
5	***Davy Notebooks Project***	The co-production took place through the crowd-sourced transcription of the Davy Notebooks. The Zooniverse platform was used to recruit over 4300 volunteers who transcribed and classified the notebooks, and who added annotations on scientific terms, people, places and events. The transcription has led to new discoveries: volunteers discovered the terms 'sodarchium' and 'potarchium', and 'potagen' and 'sodagen' in the notebooks, early versions of the names Davy later decided on for the two new elements he isolated: sodium and potassium. Additionally, the volunteers have helped to develop new understanding of the places that Davy visited, thought and wrote about, and his personal and professional networks	Transcriptions were posted by volunteers to the Talk forum on Zooniverse. Those outputs were then adapted into TEI XML by other volunteers, the project team and digital developers at Lancaster University Library.	Project team, volunteers, library staff

6	***Future Art Ecosystem (FAE)***	*FAE project -exhibition The Call* centres on developing new protocols and materials for the creation of choral AI models. To train the AI, Herndon and Dryhurst composed a songbook of hymnals, singing exercises and a recording protocol, travelling with the Serpentine Arts Technologies team to record 15 community choirs across the UK. The choristers are now part of a Data Trust experiment that allows for the distribution of power between the contributors to the training data and those who use the models.	This groundbreaking experiment has yielded valuable insights into developing collective governance for training data, particularly regarding the challenges of participatory decision-making and legal constraints. These insights fall into two main categories: 1. Best practices in developing AI training datasets, including hiring a Data Steward to facilitate participatory governance for the dataset's use in *The Call* and future AI development; 2. Data rights, IP, and intermediating entities as tools for collective empowerment in the AI ecosystem.	FAE team, artists Holly Herndon & Mat Dryhurst and partnerships with 15 UK community choral groups, Centre for Data Futures, King's College London, RadicalxChange, AWO and Keystone Law. Addition of a dedicated Data Steward to facilitate participatory governance for the dataset's use in *The Call* and AI development

Table S5 Knowledge Co-production

6 Skills and expertise

Table S6 outlines skills imparted to participants and expertise in the project team(s) and other skills/expertise in externally supporting public engagement (e.g. partnerships), as well as resources supporting participation and public engagement.

	Case Study	Participants	Internal (Team)	Resources
1	***Changing Natures***	● Workshops to co-develop the platform, ensuring that language, workflows, and categories were co-defined with participants. ● Expertise from multiple disciplines (natural sciences, cultural studies, design, informatics) was integrated.	● The team has extensive expertise in participatory science and public engagement. ● Diverse team skills include participatory design, moderation of focus groups and on-site workshops, data modelling, and technical development of digital platforms. ● The project team cultivated skills in co-creation, multilingual communication, and digital storytelling.	The institutions have developed educational resources for teachers to integrate the project independently into classrooms.
2	***Transcribe Bentham***	A number of in-person transcribe-a-thon sessions were held. Detailed online guidelines and instructions	Team partnership acquired skills in Mediawiki and TEI	Guidance and resources available on project website
3	***National Education Nature Park***	The programme focuses on developing digital skills amongst young people, such as data collection, use of digital maps and visualisation. Digital skills of educators are also supported as they use the GIS-based tools.	Diverse team skills across community science, education and science research. Partnerships with specialist expertise in GIS.	Resources, digital tools and teacher guidance available via the project website, webinars and ArcGIS Online. In person support offered by regional staff.
4	***UCL Citizen Science support service***	Citizen science methods, including research skills and open science best practice, such as data quality, FAIR principles.	Diverse team supporting different participatory levels and citizen science practices to assist university-wide research groups	The team has run both in-person and online events. Online content is hosted on the OOSS website and LCCOS infrastructure

5	***Davy Notebooks Project***	Crowdsourced contributions by diverse volunteers with expertise and skills in languages, literature, science, history, among other areas.	The team acquired skills in editing, transcription, research, use of social media, writing for the media and academic writing, event organization and planning.	A special issue of *The Notes and Records of the Royal Society* published articles written by the team including contributions from volunteer transcribers
6	***Future Art Ecosystems (FAE)***	choral AI model development and training	A diverse partnership team with expertise in data governance; IP and data rights law; choral AI model development and training; data cleaning and labeling.	Public guidance published on • Collective Data Governance • Legal Rights Collectivisation • GLAM Institutions as Data Intermediaries

Table S6: Skills and expertise

7 Funding and sustainability

Tables S7a,b outline scope of funding by case study, including primary, technical/platform specific and continuation funding, and digital infrastructure sustainability.

	Case Study	**Primary funding**	**Technical /Platform specific**	**Continuation funding /support**
1	***Changing Natures***	Initial funding – national government education and research funding (German Federal Ministry of Education and Research (BMBF) and the French Ministère de l'Enseignement supérieur et de Recherche (MESR))	BMBF, MESR	Partnership in-house Targeted funding calls
2	***Transcribe Bentham***	UK Research and Innovation (UKRI) grants, US philanthropic grant funding, European Research Council (ERC) grant funding.	UKRI, US philanthropic, ERC	Project generally now needs limited resources to run and is supported by small-scale Faculty and internal project funding
3	***National Education Nature Park***	UK National government - Department for Education as part of its Sustainability and Climate Change Strategy.	Department for Education	Department for Education
4	***UCL Citizen Science***	The main body of the case study is internally funded, but open to collaboration. Other parts of the case study have external funding e.g. co-production collective is partly funded by commissions and partly by grants, and the CSA programmes are part of externally funded projects.	Internally supported	Internally supported, but open to external funding and commissioned projects

5	***Davy Notebooks Project***	UK National government research funding	*Project builder tool* funded from US philanthropic grant funding targeted to support digital transcription	Internal and partnerships
6	***Future Art Ecosystems (FAE)***	Core internal funding with some pro bono support from collaborators.	*Pro bono support*	Core internal and pro bono support

Table S7a: Funding

7b Digital infrastructure

Table S7b outlines supporting digital infrastructures of the selected case studies (both internal and external to the organisations), including aspects of sustainability and open access.

	Case Study	Internal (Organisation)	External	Sustainable and Open access
1	***Changing Natures***	● Project technical infrastructure co-developed with MOSAIC (Competence Centre for Participatory Science and Digital Projects) and MNHN/Sorbonne University. ● Data models were custom-built to integrate scientific and cultural metadata and linked metadata to Wikidata.		● The team relies on digital collaboration tools, user testing, and iterative design methods to refine the platform. ● Future developments include a data model facilitating better integration of transdisciplinary data into the databases of established data aggregators.
2	***Transcribe Bentham***	● MediaWiki (Transcription platform) ● UCL Library's digital repository	Text Encoding Initiative (TEI), an international standard for the encoding of texts for display	● The Transcription Desk code is available for re-use. ● TEI-encoded text is non-proprietary and readily converted into other common formats, facilitating long-term preservation and re-use.
3	***National Education Nature Park***	● Browser-based tools to overcome barriers to downloading apps and accessing mobile devices within the school environment. ● Limited access to wifi outdoors so 'offline' versions of most activities are provided. ● Strategies to manage user accounts (in ArcGIS and iNaturalist) to protect privacy, misuse	● The Geographic Information System ArcGIS provides a suite of digital tools, developed by Esri UK ● iNaturalist is an international app for wildlife recording	● GIS-based training resources (StoryMaps), videos, webinars and web pages provide support alongside curriculum resources ● Collected scientific data are shared under a CC0 license. ● ArcGIS digital tools and the iNaturalist app are free for schools at the point of access

4	***UCL Citizen Science support service***	● The team uses common digital infrastructures. ● The online community is built using MS Teams ● Online content is hosted on the OOSS website, and the resources list is hosted on Talis Aspire		The team advocate tools and techniques and connects this work back to Open Science, e.g. improving data quality, making research open, and fair attribution.
5	***Davy Notebooks Project***	The Davy Notebooks are hosted on Lancaster Digital Collections using the Cambridge Digital Collections platform.	Project Builder features of the Zooniverse platform and ALICE (Aggregate Line Inspector and Collaborative Editor)	Lancaster are members of an open source collaborative partnership with the Cambridge Digital Collections community, a partnership with the University of Cambridge and the University of Manchester.
6	***Future Art Ecosystems (FAE)***	Secure data storage and data infrastructure to support AI model development Exhibition infrastructure (e.g. digital audio, data servers). Web infrastructure	IRCAM machine learning software suite	Open choral AI data model Open public guidance on • Collective Data Governance • Legal Rights Collectivisation • GLAM Institutions as Data Intermediaries

Table S7b: Digital Infrastructure

8 Culture Shifts

Table 8 provides an overview of culture shifts across the organisation and project, with author reflection(s) and author position within the organisation.

	Case Study	**Culture shift (organisational) -** **include measures /evidence where relevant**	**Culture shift (author reflection(s)**	**Position of case study author(s) in organisation**
1	***Changing Natures***	Contributes to reconsiderations of the social and cultural dimensions of existing museum collections and a rethinking of the concepts of knowledge transfer in museums. Inspires broader discussions and network between practitioners, scientists of different disciplines and society e.g. Sturm et al. (2022)	Demonstrates pathway for more polyphonic storytelling and the incorporation of local perspectives in museum's collections as well as in scientific practices, thereby allowing more space for subjective representations, critical reflections, and the "decentralized narratives of the Anthropocene" in order to integrate participatory research, transdisciplinary knowledge production and Open Science (Heyne et al. 2024)	Lead research group (U. Sturm), project lead (E. Heyne)
2	***Transcribe Bentham***	Has demonstrated that volunteers are willing and able to complete highly complex tasks in order to contribute to the production of scholarly research, as well as the desirability and viability of involving volunteers in this way. The work of *Transcribe Bentham* volunteers has accelerated the rate of transcription, widened (digital) access to Bentham's vast archive, and contributed to the production of volumes of *The Collected Works of Jeremy Bentham* (Causer and Schofield ed. 2022)		Principal Research Fellow, formerly co-ordinator of *Transcribe Bentham* (2010-15)
3	***National Education Nature Park***	The shift we have designed into this project is moving away from digital tools being used to 'reach people' or for uni-directional data submission or feedback, towards digital tools that serve the purposes, visions and goals of the participants, beyond the boundaries of the project. The digital tools we are creating enable education settings to manage their grounds for nature, plan evidence-based enhancements to their site, track progress towards Climate Action Plan goals, visualise, download and use project data for teaching and learning and for school / Multi Academy Trust and/or Local Authority environmental reporting, and any other goals the settings may	The digital tools have also made project data more transparent and available - all participants can see (and download) all others' habitat maps and biodiversity observations. It is massively increasing the speed at which community science data are made available to participants - in the past, this typically would not have happened until years later when a research paper was published.	Lead for community science National History Museum

		have. In other words, the tools aim to provide a service to education settings, and well as meeting the goals of the project.		
4	***UCL Citizen Science support service***	"Harnessing the advantages of the internet, openly available software packages and combining with local knowledge, embracing citizen science can bring about a change in the way research is conducted – one no longer limited to academic researchers, it encourages active collaboration from groups across society, making members of the public fellow researchers." Wallis 2022. At UCL, the need for central support for citizen science emerged through a careful consideration of the appropriate place for such a function. Based on the analysis form the League of European Research Universities (LERU) (Wyler and Haklay 2018), the need for a single point of knowledge sharing about citizen science became evident. The research library, as a centre of information sharing across the university and the custodian of open science practices (such as open access and data repository) is a natural home. Citizen science is recognised as part of open science, but in addition, it is a practice that can be integrated in any discipline. The research library is one of the only functions across a university that is crossing the full range of academic practices and is capable of interacting with researchers and the public (Kaarsted et al. 2023). As a result, the coordination of citizen science was set up the within the office of open science and scholarship, and it demonstrates how tit can become part of the mission and function of a research library. Wyler, D. and Haklay, M. (2018) 'Integrating citizen science into university', in Hecker, S. et al. (eds.), *Citizen Science. Innovation in open science, society and policy*. London: UCL Press. 10.2307/j.ctv550cf2.18.	The UCL library case demonstrates a service centre for citizen science, instead of citizen science practice. This emphasises that GLAM institutions can go beyond the implementation of participatory projects which are based on citizen science. By providing citizen science services to their internal community (as in research libraries) or as a resource centre to the wider community (as some public libraries do) they can support, facilitate, and accelerate the adoption of citizen science practices.	Head of Research Liaison, UCL UCL Office for Open Science & Scholarship
5	***Davy Notebooks Project***	Lancaster University Library's Towards 2025 vision (www.lancaster.ac.uk/library/towards-2025) outlined an ambition to be "a library that brings our communities together to co-curate, co-create and share knowledge that leads to	Since our involvement in the Davy Notebooks project, the Library has been a partner on another research project (the AHRC Impact Accelerator-funded Women's Iconography in the 21st Century), which led to another digital	Associate Director: Space, Experience and Innovation and member of the Library's Leadership Team

		greater understanding, insight and innovation". Our involvement in the Davy Notebooks project has been a key way in which we have realised this part of our vision.The project involved staff from across the library, utilising skills in metadata, imaging and digital development. We have a Lancaster Digital Collections working group which meets regularly to share knowledge and skills, and plan the next projects for the platform. Our activity in this area has led to the Library becoming a regular member of the University's Digital Humanities Steering Group, and has led to external speaking opportunities.	collection on our LDC platform. We are currently supporting the development of other research bids which would see the Library involved as a co-investigator. This digital collections work, and our direct involvement in the research endeavor, has been a key part of the Library's evolution from service to partner. (digitalcollections.lancaster.ac.uk/ collections/icon)	
6	***Future Art Ecosystem (FAE)***	"A Data Trust experiment allows for the distribution of power between the contributors to the training data and those who use the models." Culture shifts are referenced in: Ivana and Ding (2025)	This groundbreaking experiment yielded valuable insights into developing collective governance for training data, particularly regarding the challenges of participatory decision-making and legal constraints.	Head of Innovation Serpentine Galleries

Table S8: Culture Shifts