CATAPULT Digital

ORAgen:
Emerging Futures for Tokenisation and Digital Media Rights

DECaDE Field Lab

A Digital Catapult report
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In collaboration with:

UNIVERSITY OF SURREY

THE UNIVERSITY of EDINBURGH

Authors

Dr Frances Liddell
Post-Doctoral Researcher

Natasha Velasco
Head of Innovation Consultancy

Catherine Schreeve
Innovation Delivery Manager

Dr Chris Elsden
Chancellor's Fellow in Service Design

Dr Robert Learny
Head of Technology

Dr John Collomosse
DECaDE Centre Director

Kar Balan
PhD Student

Jennifer Cheung
Technology Ethicist

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Welcome note

DECADE DLT Field Labs

DECaDE is the UKRI Next Stage Centre for Decentralised Digital Economy that explores how emerging data-centric technologies such as Distributed Ledger Technologies (DLTs) and Artificial Intelligence AI) could transform our future digital economy through decentralised platforms. Catapult's DLT Field Labs are part of DECaDE's approach to open innovation; they a mechanism co-creating fine-grained research questions around rapidly translating iterating at higher Technology Readiness Levels TRLs) by enabling evaluation outcomes within 'living lab'.

An essential component of the particular DLT Field Lab model employed within DECaDE is the development and application of a Responsible Innovation Framework led by independent experts in the field of Technology Ethics. The purpose of the Responsible Innovation workstream is to embed ethical practices within project teams and hold space for deep and reflective discussions about the ethical implications of the innovations being developed.

DECaDE DLT Field Lab convenes multiple demand-side parties simultaneously around a shared industry challenge. Here they will draw upon expertise from the academic, innovator, and regulatory communities to create practical solutions and trial them in near-real-world conditions. The primary focus is identifying and solving coordination problems requiring shared, decentralised digital infrastructure; pushing the boundaries for solutions with novel socio-economic underpinnings, and refining academic knowledge through experience.

It is, in essence, a demand-side accelerator with a heavy emphasis placed on convening, educating, supporting, and guiding industry challenge owner(s).

For the second DECaDE Field Lab, the University of Surrey, University of Edinburgh and Digital Catapult set out to explore how DLTs might offer new understandings around ownership, licensing, and attribution via a technical framework known as ‘ORA’ (Ownership, Rights, and Attribution), and an online demonstrator ‘ORAgen’ that employs this framework.

Through the DLT Field Lab, we aimed to reflect on ORA’s value proposition for key stakeholders by exploring its use cases, challenges, and future opportunities within the industry and in the context of reuse practices, remix cultures, and the emergence of Generative AI.

Executive summary

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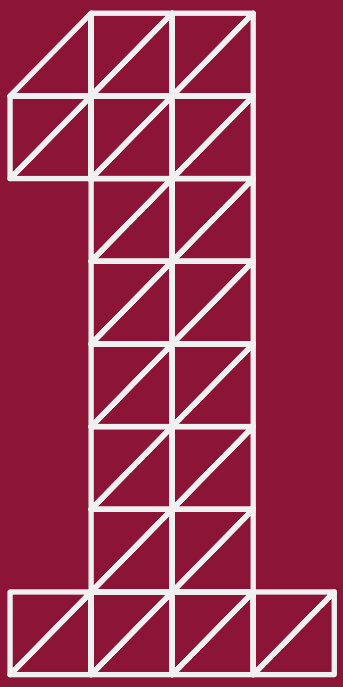
The opportunities ahead? 08



Executive summary

What we learned?

The DECaDE DLT Field Lab structure presented a unique opportunity to bring advanced socio-technical research face-to-face with potential end-users in a setting designed to maximise research translation and learnings for all participants.

This Field Lab demonstrated how advanced digital technologies, combined with design thinking, can overcome challenges faced by the creative industries in areas of asset management, ownership, rights, and value attribution in an increasingly diverse and accelerating creative economy.

The outcomes of the Field Lab include further research avenues as well as opportunities to partner and further develop a range of use cases in this area.

The valuable insights gathered from this format have informed and tailored future research avenues including opportunities to partners and develop a range of use cases in this area, as well as consider future explorations of advanced digital economy themes within DECaDE.

The opportunities ahead?

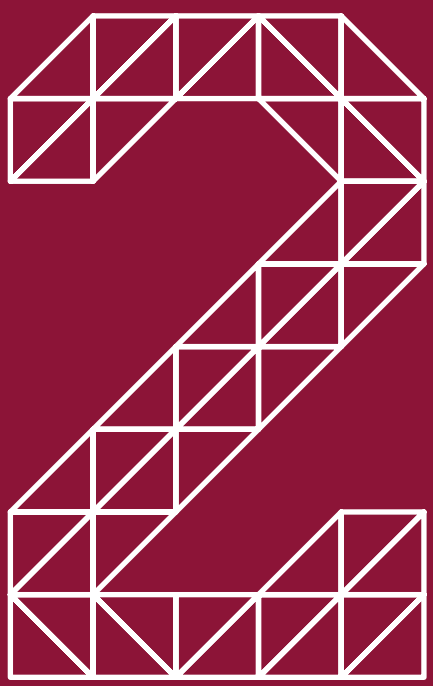
Nine potential use cases were co-developed and elucidated with the help of creative industry participants from a wide range of backgrounds and employment.

Three of these were considered high priorities for future research that could benefit the creative community. These include the automation of copyright and licensing management, encoding and embedding specific permissions within media, and enabling new economic interactions between stakeholders. The DECaDE team have presented ORA and ORAgen to the public in order to encourage others to adopt and develop these concepts further.

DECaDE remains open to future collaborators and partners coming forward to express their interests in this work and further Field Lab activities.

Challenge

Today’s challenge 10



Challenge

Today's challenge

Maintaining attribution, rights management, and ownership of creative media are prevailing challenges across the cultural and creative industries[1]. For example, in today's access to digital services and platforms, ownership has shifted to an 'access-based consumption' model[2], where ownership is reconfigured as a continuum of access with licences and terms of use/service restricting and shaping how users can engage with digital content. This is exemplified in platforms such as Netflix which uses a subscription-based model to provide users access to a range of digital content.

While this fluid nature of digital ownership has provided new opportunities via the 'sharing' economy, such fluidity also has implications on user value, the surveillance of users as they engage with media, and user attachment to digital media[3]. The latter of these implications is further complicated by the experiences of digital ownership and possession and the challenge of understanding the complex material and temporal qualities of digital content[4]. Writing in 2012 on cloud computing, Odom et al[5] speculated about properties of digital systems that could support more profound experience of ownership. Their suggestions included better digital rights and digital identity management solutions (without over-burdening users), files and digital assets that have greater 'permanency', and the ability to withdraw ownership rights and give up access.

DLTs are often promoted as offering several of these qualities. DLTs are immutable distributed databases that record time-stamped and irrevocable information on transactions, including the issuing (minting) and exchange of tokens. These tokens can be of two types – 'fungible' tokens which are identical and interchangeable (e.g. cryptocurrencies), and 'non-fungible' tokens (NFTs) which are unique and indivisible (e.g. digital artworks). These tokens hold a referential scarcity[6], made possible via the references in the distributed ledger, which enable users to independently prove ownership over their assets.

Given these qualities, in this Field Lab, we set out to explore how DLTs might offer new understandings around ownership, licensing, and attribution via a technical framework known as 'ORA' (Ownership, Rights, and Attribution) developed by DECaDE and Adobe in[7]. Leveraging ORA, an online demonstrator 'ORAgen' that employs this framework was developed at the Institute for Design Informatics in collaboration with the University of Surrey, and used to introduce ORA during the Field Lab.

Through the Field Lab approach, we reflected on ORA's value proposition for key stakeholders, exploring its use cases, challenges, and future opportunities within the industry and in the context of reuse practices, remix cultures, and the emergence of generative AI.

ORAgen

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The ORAgen demonstrator 14

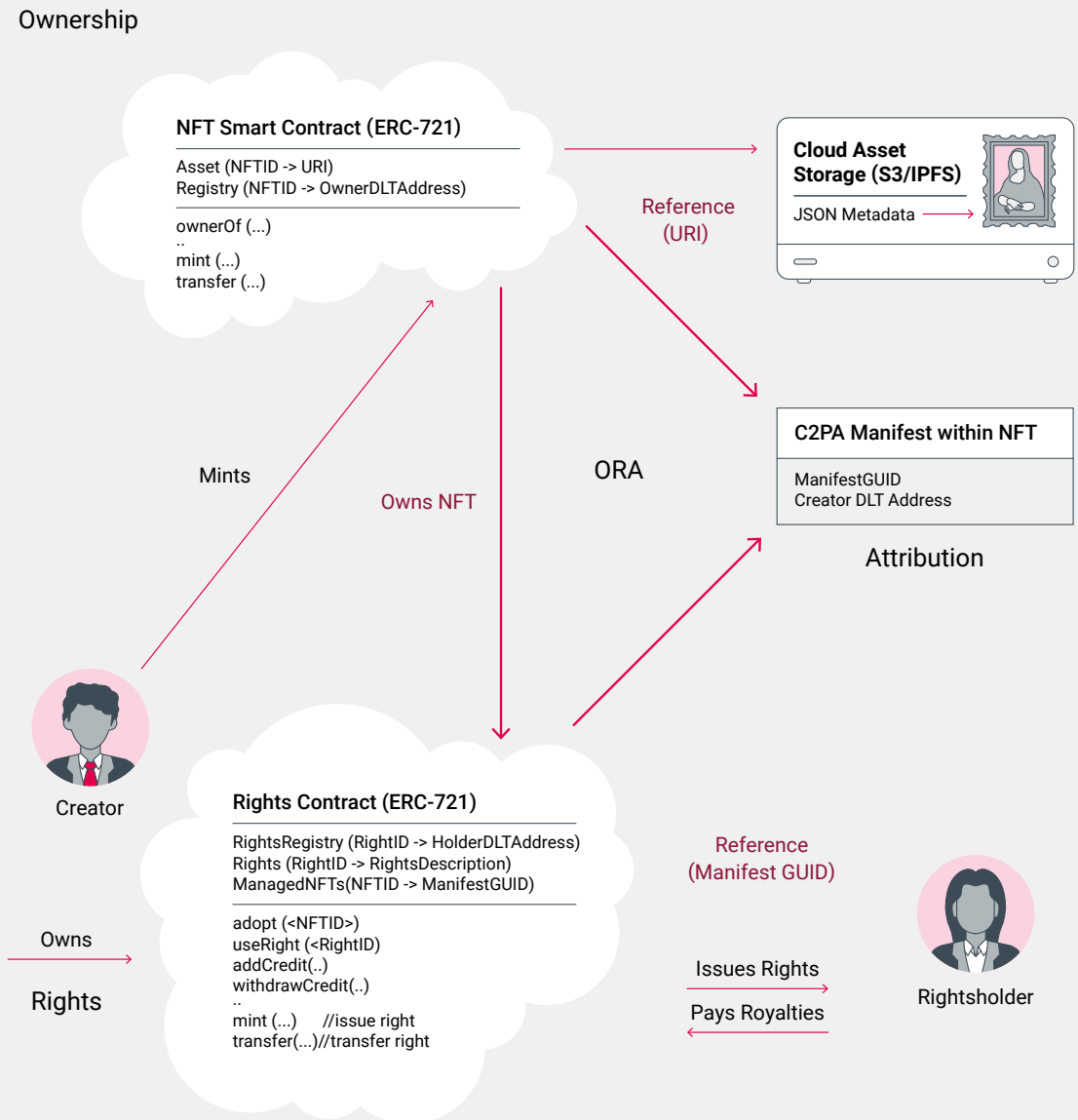
ORAgen: Design of attribution through media tokenisation executive

What is it?

ORA (Ownership, Rights, Attribution), is a novel technical framework[7] that employs DLTs and the C2PA standard[8] for content authenticity to provide creators with a way to prove ownership over their creative assets and associated licences, create bespoke and unique licences for their creations, and embed metadata into media in a way that cannot be easily stripped or taken away. This includes provenance data which is a record of a media's origins[9].

Specifically, ORA uses 'media tokenisation' – where media and related metadata are recorded and associated with an NFT – to create an alternative media ecosystem where two distinct NFTs are used to first represent an authentic media asset, and second as means to exchange 'tokenised rights' as licences, which can be tracked through associated smart contracts to identify how works are subsequently reused and engaged with.

Figure 1.
Ownership-Rights-Attribution (ORA) Triangle. ORA ties together an NFT image and its ownership provenance (who owns/owned it), with its creation provenance (how it was created, and what was done to it described via the C2PA attribution standard), and tokenised rights that may be granted by the creator to rights holders. Reproduced from[7].



Developed in a collaboration between the University of Edinburgh and University of Surrey, ORAgen is a web application that instantiates and demonstrates the technologies underlying the ORA framework by allowing users to create, tokenise, licence, and remix simple colour collages. ORAgen serves as a technology probe[10] – a form of prototype to stimulate discussion on potential uses. ORAgen is designed to communicate and prompt open discussion on media tokenisation and ORA by enabling users to reflect on how this technology might relate to their own context and experiences. ORAgen is also understood as 'unfinished software'[11] as it provides a simplistic experience of a complex system, surfacing infrastructural qualities, which may be integral to the type of practices and the values it embodies.

To access the demo: https://oragen.designinformatics.org.

Figure 2.
Screenshot of the ORAgen web application, showing re-use in the production of a tile-based coloured collage.

Value proposition hypothesis

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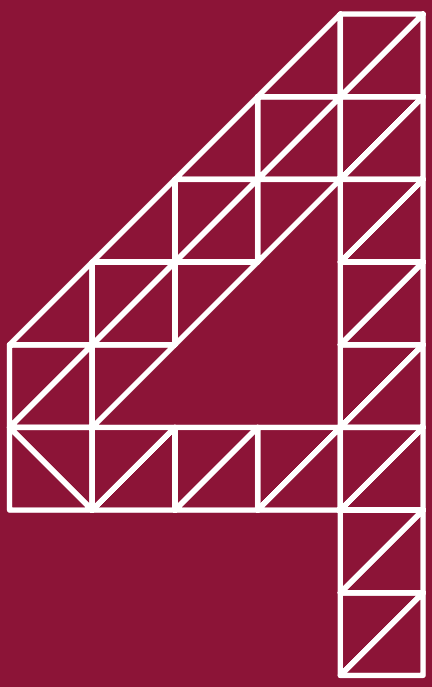


ORA's value proposition hypothesis

Approach

As part of the Field Lab, Digital Catapult conducted a Value Proposition Readiness Assessment to identify the proposed framework's potential value, users, and markets.

This assessment allowed us to understand the baseline value proposition, context awareness, value identification, definition and assumed desirability, feasibility and viability across University of Edinburgh and University of Surrey Teams.

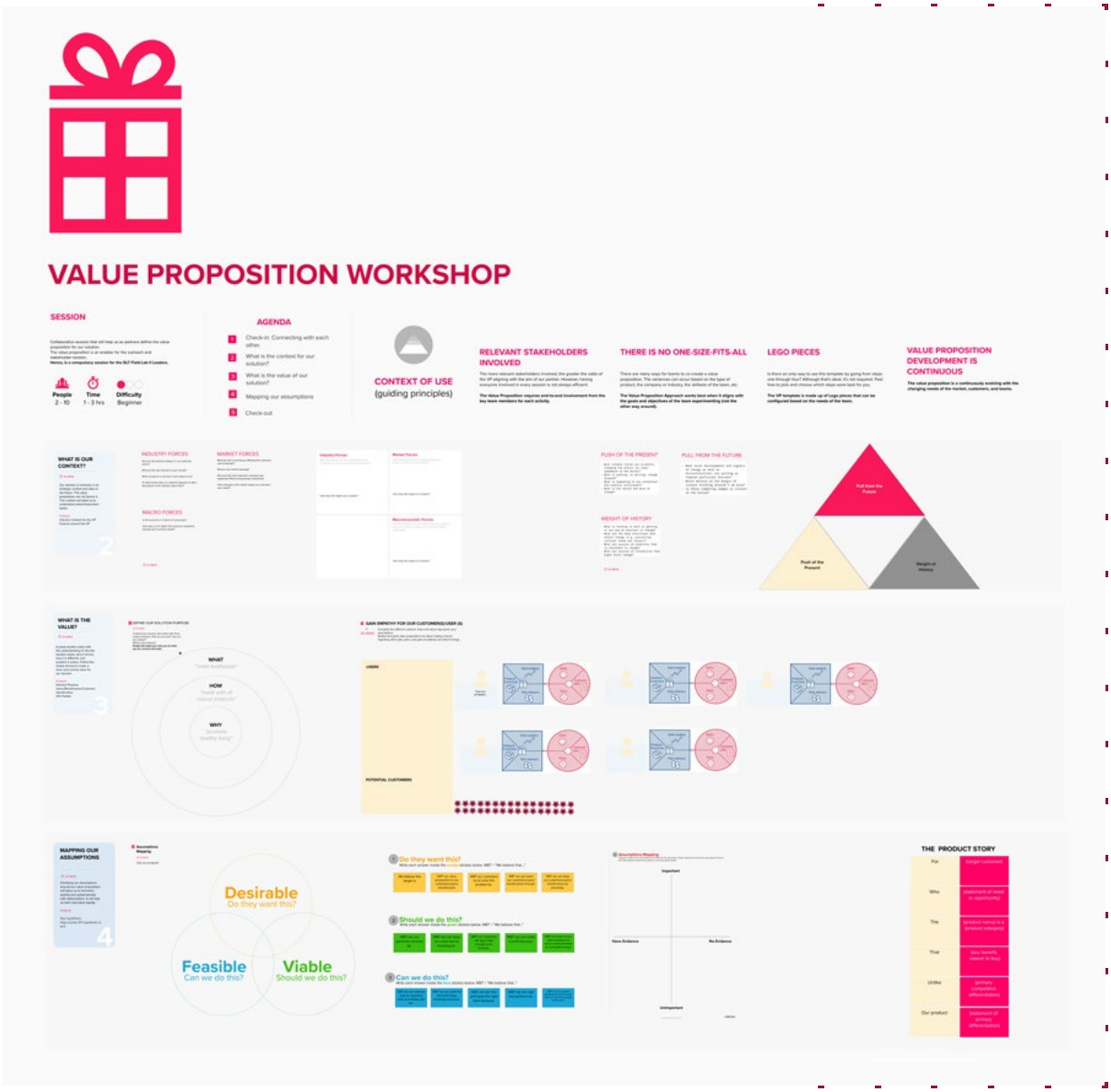
Moreover, we conducted a two-hour cross-organisational value proposition workshop that used business analysis, WW, design thinking, and product management tools to explore and map ORA's value proposition.

Finally, we analysed and played back the findings to the Edinburgh and Surrey teams to integrate feedback and agreed the value proposition that we could test with selected stakeholder communities.

The following sections identify the key takeaways around the industry forces, the market forces, and the future. Furthermore, they introduce the value proposition hypotheses we articulated as partners.

Figure 3. Overview of the value proposition workshop

Figure 3.
Screenshot from ORAgen's value proposition workshop, featuring context analysis, futures thinking, purpose identification, and the value proposition canvas.



ORAgen industry forces

Some of the industry forces around ORA that Digital Catapult technologists and University of Edinburgh and University of Surrey teams identified in the Value Proposition workshop were:

- **Dependency on Rights Management Software:** Digital creative communities are increasingly relying on rights management software to ensure proper attribution and licensing.
- **Content Remixing Interests:** There is a strong emphasis on the ability to remix content, reflecting the creative community's collaborative and innovative spirit. Remixing is recognised as a valuable practice in creative work and essential for innovation and collaboration.
- **Need for Open Protocols and Ecosystems:** There is a pressing need for protocols that go beyond proprietary technology or 'walled gardens' to ensure open and accessible digital ecosystems.
- **Creation of New Digital Content:** There is keen interest in creating new digital content by reusing and remixing existing content.
- **Demand for User-Friendly Approaches:** There is a demand for user-friendly approaches to describe the dynamic relationship between creation provenance, ownership, and licences.
- **Demand for Clear Attribution:** Ensuring clear attribution of digital content is crucial to these communities as it supports fair use and recognition of creators.

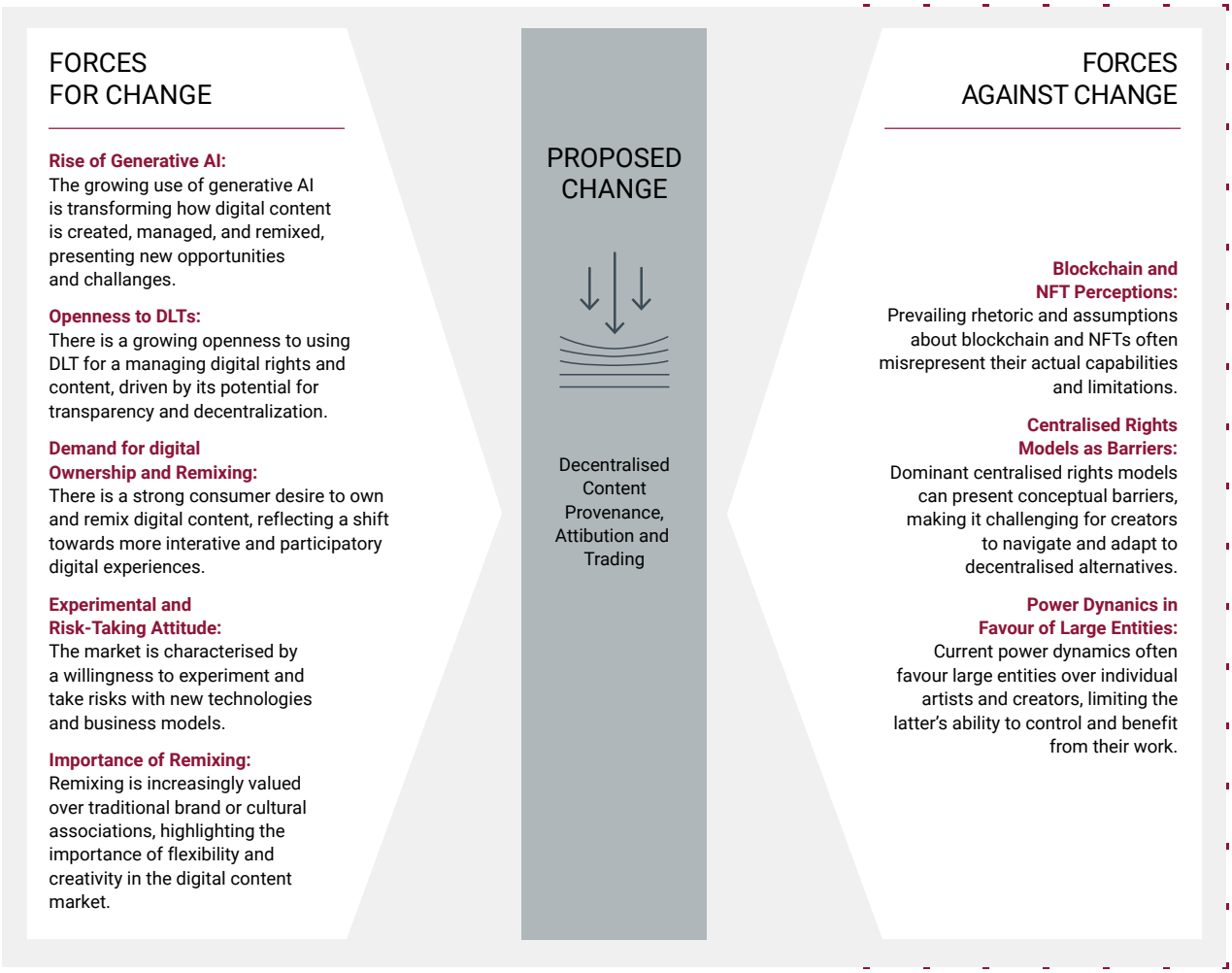
- **Focus on Artist Protection and Empowerment:** Without proper attribution and provenance artists risk being exploited, underscoring the need for robust rights management systems.
- **Focus on Rights and Ownership:** Digital cultures have growing concerns about the management of rights and ownership of digital content.
- **Growing Understanding of the Difference between Attribution vs. Provenance:** The distinction between attribution and provenance has become increasingly clear and relevant, highlighting the need for precise terminology and practices.
- **Focus on Provenance Understanding:** There is a growing desire to understand asset provenance and its relevance to concerns around AI and digital content.
- **NFT Limitations:** Current NFT models primarily reference ownership, which may not always be recognized or enforceable, indicating a need for more comprehensive solutions.
- **Direct Audience Engagement Pull:** Individual creators benefit from the ability to engage directly with their audiences, facilitated by open source and decentralized platforms.
- **Misconceptions and Variable Trust in DLT Tools:** Access to and trust in DLT tools are highly variable, affecting adoption and usage. There are prevalent skewed views and misconceptions about blockchain technologies and other distributed systems within creative communities.
- **Artist Control Over Re-Use:** Artists seek more control over how their work is reused, aiming to enforce royalties and moral rights effectively against both human and non-human actors.

Source: Industry Forces exercise, Value Proposition Workshop, Digital Catapult.

ORAgen market forces

Some of the market forces around ORA that Digital Catapult technologists and University of Edinburgh and University of Surrey teams identified in the Value Proposition workshop were:

Figure 4.
Proposed Change.

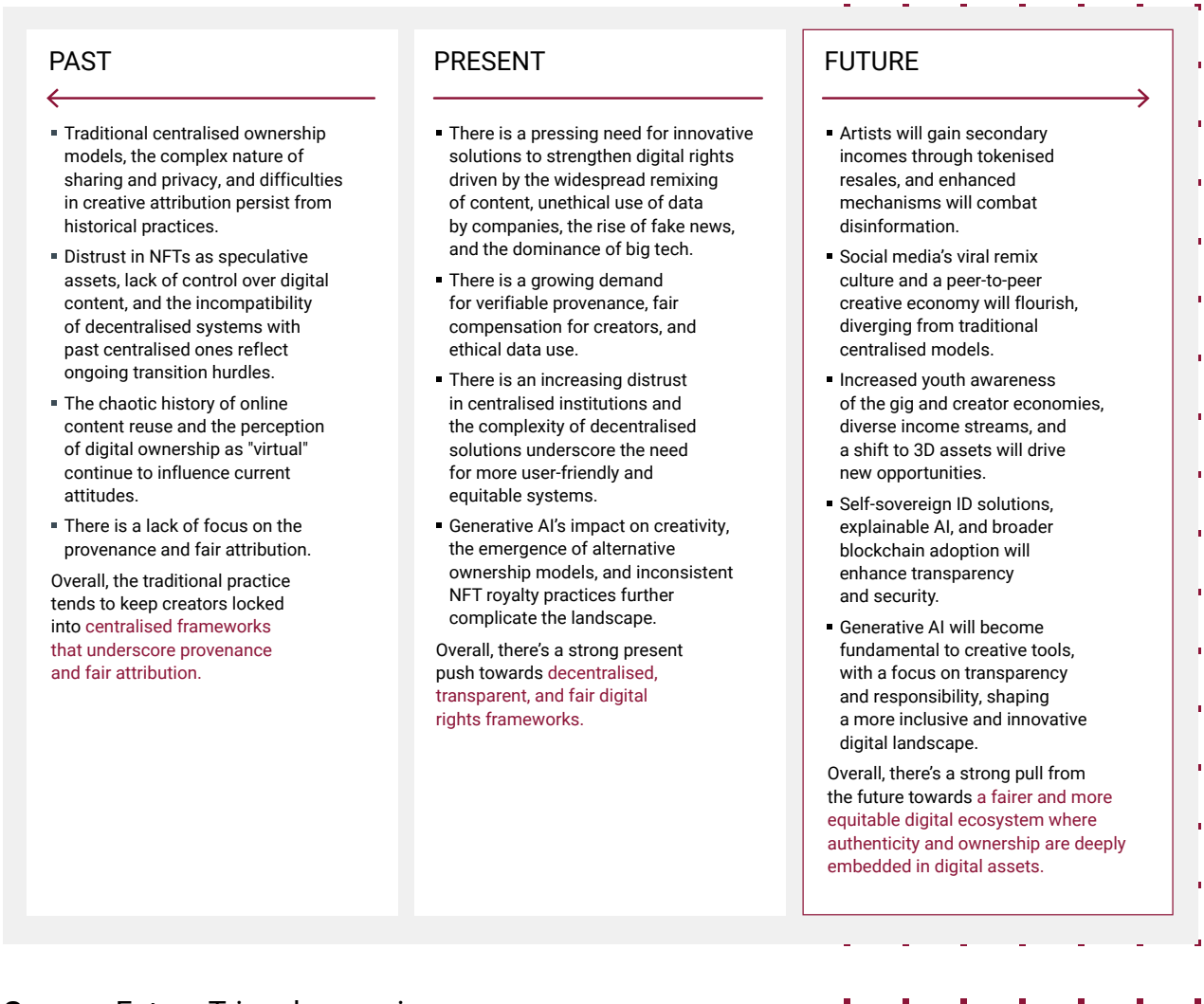


Source: Industry Forces exercise, Value Proposition Workshop, Digital Catapult.

Futures appraisal

Finally, Digital Catapult and Edinburgh and Surrey teams explored the ideas around the future that could be taken into consideration as ORAgen is deployed and further developed:

Figure 5.
Futures Appraisal.



Source: Future Triangle exercise, Value Proposition Workshop, Digital Catapult.

Value proposition hypothesis

To identify the value propositions we reflected on the **WHY** (purpose or cause), the **HOW** (how we wanted to be different), and the **WHAT** (the solution or solutions). The **value propositions identified** were:

Figure 6.
Value Propositions.

WHY

Decentralised Attribution and Recognition

Better attribution and recognition for creators is an essential part of a sustainable creator economy.

Decentralised technologies can enable wider-reaching, fairer and more transparent recognition of creative work and access to opportunities.

Value Creation through Ownership Design

Greater awareness and participation in ownership design, and decentralised management of licences associated with creative content can empower creatives to generate the most value through their work and protect them from unexpected ownership and policy shifts.

Clear Links between Ownership, Licensing, and Remixing

More clearly defined and bespoke ownership rights, via bespoke licensing agreements, could enable new relationships between creators, producers and their audiences.

This could foster increased peer-to-peer collaboration and content remixing in digital spaces.

HOW

Business Requirements

Creating Ecosystem Incentives:
- Developing mechanisms to incentivise content creators and consumers to join and actively participate in the ecosystem.

Fostering Market Adoption:
- Creating a compelling value proposition that attracts a diverse range of users and addresses fair compensation and rights management.

Creating User Engagement:
- Fostering a collaborative environment where users can easily share and remix content.
- Implementing features that enhance user engagement, such as community building tools and interactive content elements.

Technical Requirements

- Exploring DLTs.
- Leveraging Content Provenance Standards.
- Creating Provenance Visualisation.
- Integrating NFTs and Generative AI.
- Creating a Friendly User Interface for Users.
- Guaranteeing Security and Privacy.
- Guaranteeing Interoperability.

WHAT

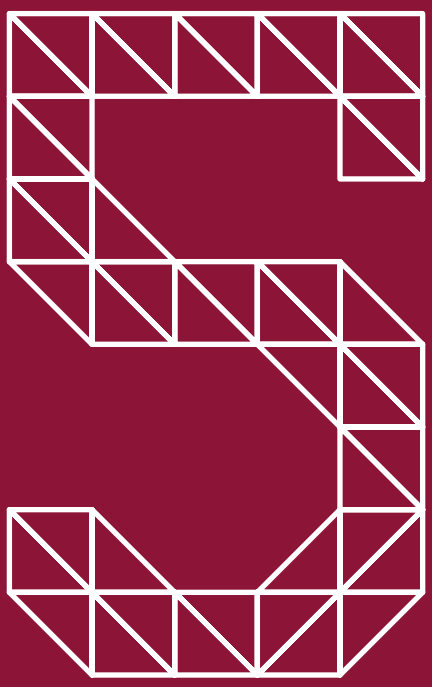
Decentralised rights and royalties model for the use and re-use of digital media – and more generally, of data.

A tool that leverages, displays, and manages the dynamic relationship between creation, ownership, provenance, and licences.

Educational and engagement tool forunderstanding the embedding of the form of rights and provenance through time.

Stakeholders map

Business ecosystem stakeholders map 25



ORAgen's stakeholders map

Business ecosystem stakeholders map

We used an advanced visual business modelling method called **value flow mapping for ecosystems** to identify the business ecosystem stakeholders. It is a systemic representation option that goes beyond a service ecology map by identifying the value across the network of stakeholders.

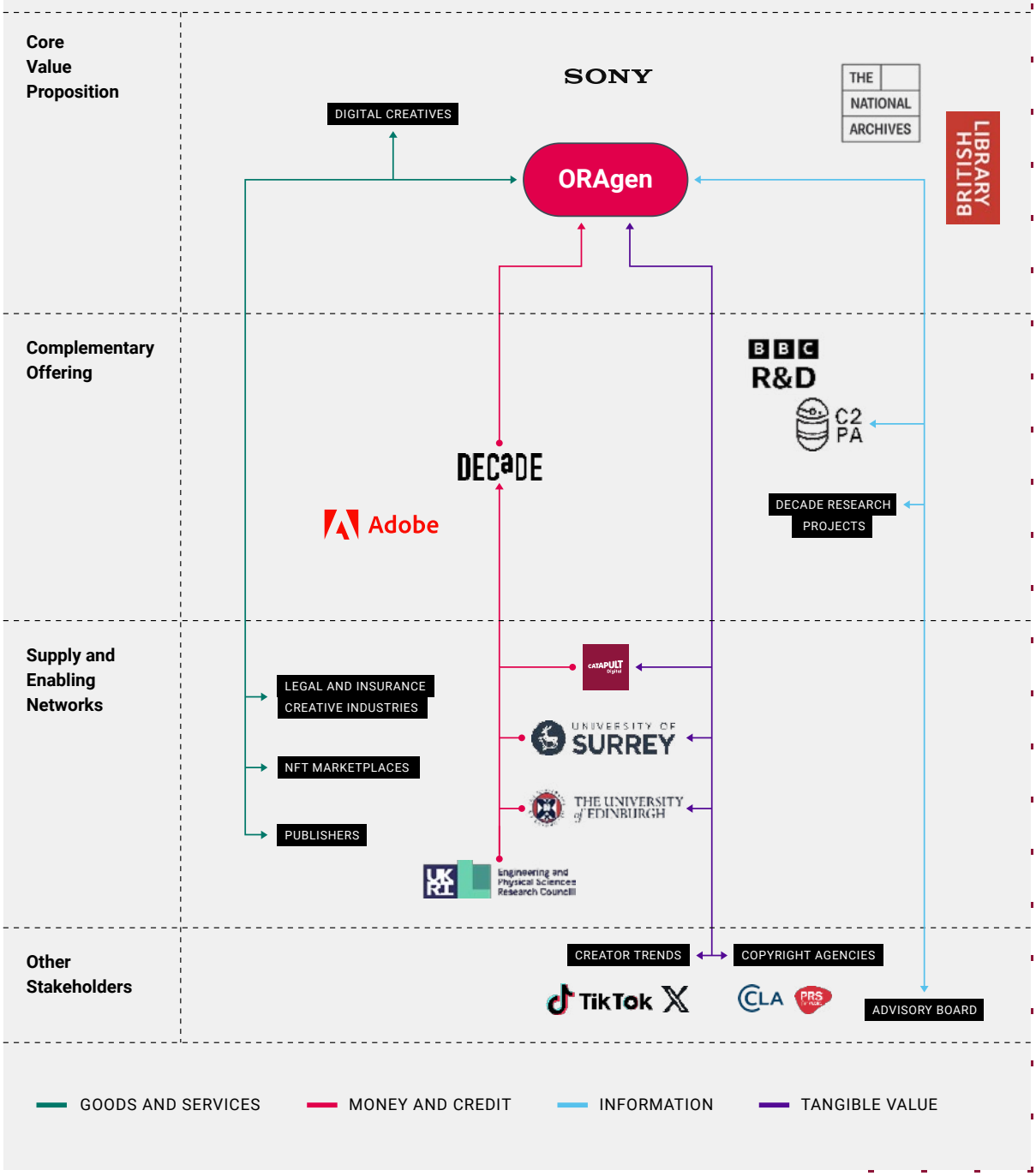
The **steps taken** were:

- **Collecting the actors/stakeholders** while identifying the function of the actor, role, primary motivations, the compatibility of the value proposition hypothesis, influence, and time horizon.
- **Group the actors/stakeholders** according to their role in supporting the core value proposition, a complementary offering, or supplying and enabling the network the value proposition seeks to tap into.
- **Defining the value flows** around goods and services, money and credits, information, and intangible value.
- Finally, as partners, Digital Catapult, Edinburgh, and Surrey teams **analysed, curated, aligned and balanced** the final stakeholder and value flows.

We learned that the key stakeholders directly associated with ORA's core value proposition were digital creatives and providers of content from media repositories. Stakeholders associated with complementary offerings were research and development projects around the creatives as well as standards and media bodies. Finally, stakeholders associated with supplying and enabling the value proposition were NFT marketplaces, research councils, creative industry legal and insurance entities, universities, publishers, and technology organisations.

Other stakeholders identified and associated to the ORA value proposition were advisory boards, trend creators, and copy right agencies. Examples include Tiktok, PRS for Music, and the Copyright Licensing Agency (CLS).

Figure 7.
ORA's Business Ecosystem Stakeholders Mapping.



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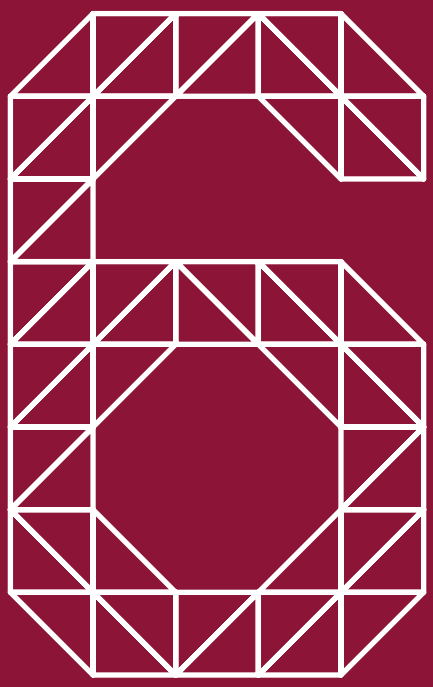


Industry engagement

To test our value hypothesis and introduce ORA to the creative industries, we organised a workshop in January 2024 which included a hands-on demonstration using ORAgen, and a media ecosystem mapping activity that enabled participants to learn and explore how a tokenised rights framework might affect their work without having to directly engage with the underlying technologies (**Appendix 2.**).

We aimed to target this workshop at organisations and individuals who could be **early adopters**, and who might derive significant benefits from engaging with ORA that could positively impact the UK creative economy.

We identified and prioritised organisations based on the following key characteristics:

- **Content Collection:** Organisations that gather, organise, and supply diverse forms of content.
- **Engagement with Digital Content Creators:** Organisations that actively interact and collaborate with creators in the digital realm.
- **Accountability in Data Management:** Organisations that ensure accuracy and responsibility in handling both data and metadata.

Additionally, ORAgen was shared with 21 further participants working in the creative industries, as part of short interviews to establish the opportunities and challenges ORA presents (see also 01). These detailed conversations supplemented the Industry Workshop.

Organisations identified

The organisations that registered or participated in the workshop are shown in **Figure 8,** this includes organisations such as the **British Library, BBC R&D, Guardian, Flickr, Shutter stock,** and **Creative UK.**

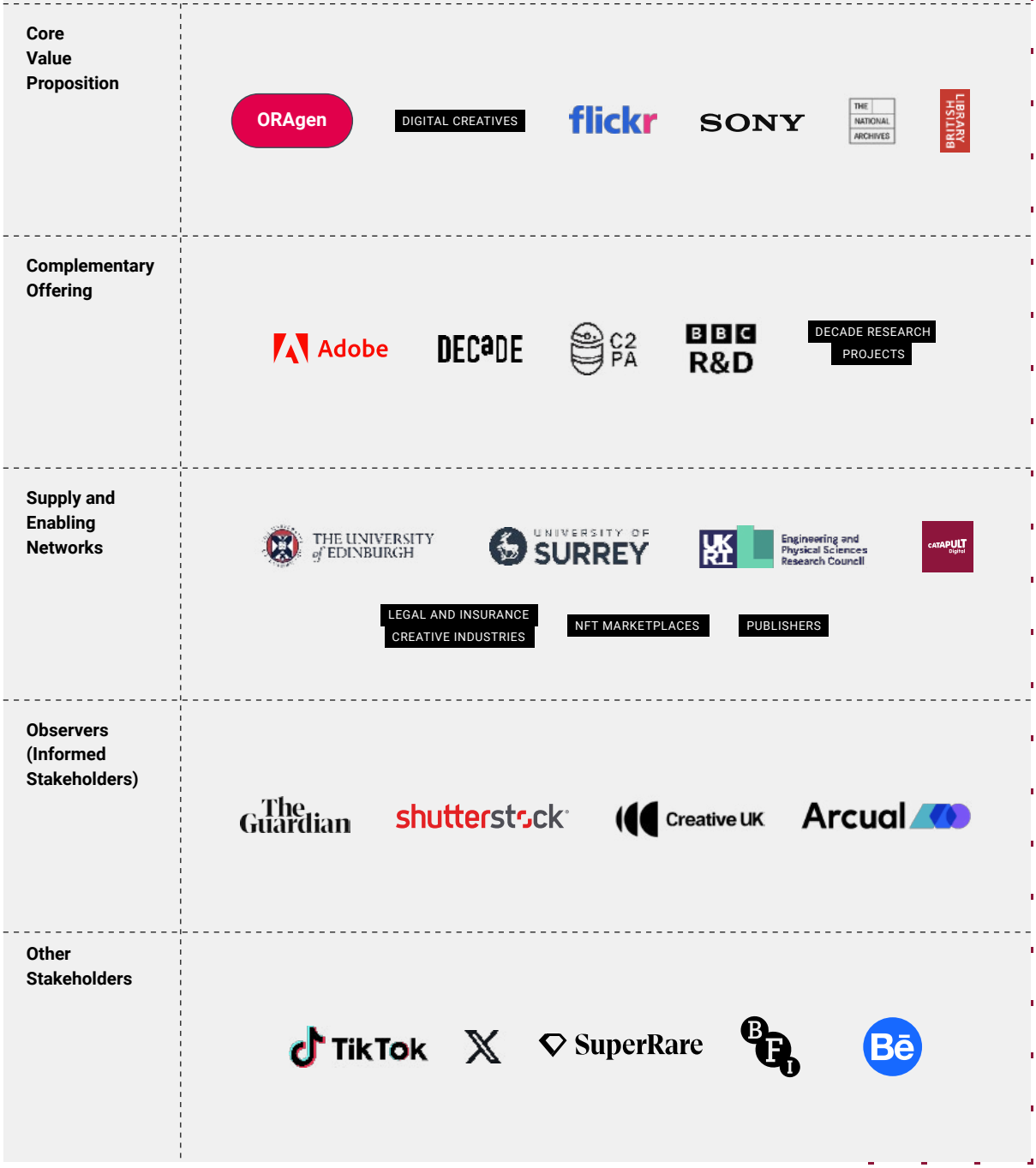
Lessons learned and results

The workshop had a total of 48 registrations of which 30 participants attended. Of these 30, 50% reported they were interested in learning more about ORA, with 13% organising a follow-up conversation to discuss different ORA features and 10% agreeing to a follow-up on responsible innovation.

What worked well:

The promotion of the workshop highlighted a clear interest and engagement with ORA with 48% of registrations achieved within the first three weeks of promotion. We were also able to achieve targeted social media outreach based on our refined focus for participation, meaning that the group of participants who attended were clearly focused and interested in the project. During the workshop, we organised a media ecosystem mapping activity designed by the University of Edinburgh team which enabled participants to understand and experience the challenges and opportunities of engaging with ORA. After the workshop, we engaged with follow ups with the industry that focused on sharing the learnings, building connections, and exploring further opportunities for ORA. The insights gathered through the workshop and follow-up conversations highlighted nine potential use cases for ORA which we plan to develop and explore further in our next stage of research.

Figure 8.
ORAgen Workshop Participants



What could be further integrated:

Additionally, our own reflections on the workshop identified areas that were not evident in participant discussion. These included a specific focus on decentralisation, exploring further ways ORA could enable new services and monetisation for the creative industries, and exploring further conditions that could apply to content licences.

30	Participants
10%	Follow-ups on Responsible Innovation
50%	Interested in learning more about it
09	Use Cases
13%	Follow-ups on ORAgen feature

Use cases

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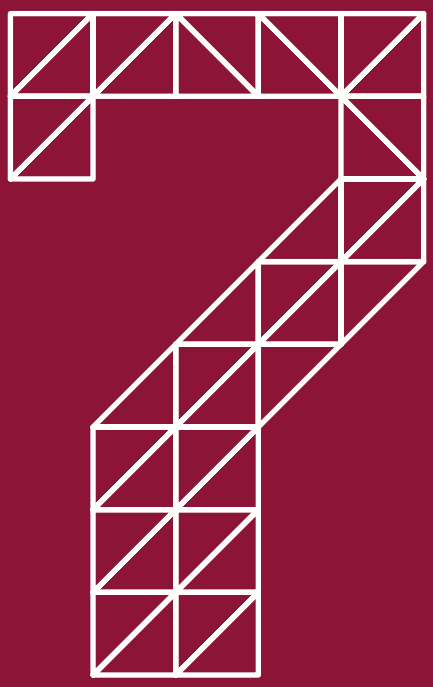


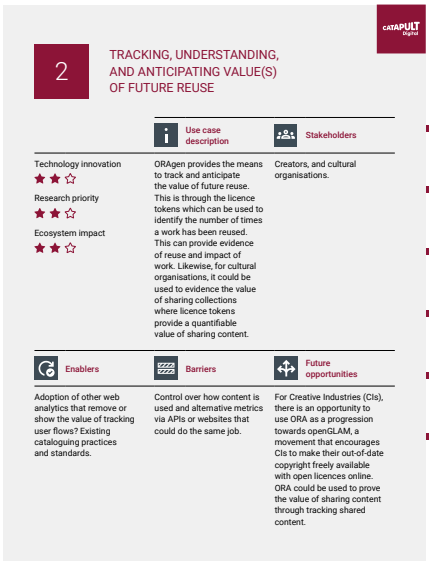
ORA use cases

Use cases identified

The industry engagement allowed us to gather inputs and insights from industry stakeholders which we analysed through keyword analysis, thematic analysis, ecosystem analysis, and value proposition refinement, to identify nine use cases. Each use case highlights ORA's potential to enhance digital media's management, attribution, and economic interaction for creators, organisations, and the creative sector.

The use cases are presented in **Figure 9** and can be reviewed in detail in **Appendix 3**. In the next pages, we will focus on the top three use cases prioritised given their technology innovation, research priority, and social impact. The prioritisation approach is available in **Appendix 4**.

Figure 9.
ORAgen Industry Use Cases.



High-priority use cases identified

Enabling new kinds of economic interactions between stakeholders was a use case identified as a high priority given its high technology innovation, research priority, and ecosystem impact.

ORA could support new economic systems between different stakeholders in the creative industries which could include creating transparent and open markets to exchange licences or support resale royalties in the exchange of digital assets. The latter of these systems could replicate current royalty models used in NFT platforms, but could also consider distributed models of remuneration such as the collector royalty model on SuperRare or the financial distribution framework used in the Pieces of Me (2021) exhibition. However, ORA would extend these systems, firstly through smart contract ownership as creators own the two underlying smart contracts that manage the tokenised media and the tokenised associated licences. Secondly, the visible and embedded provenance data opens new opportunities to identify, quantify, and experiment with compensating contributions and reuse.

We believe that this use case could have an impact on how a wide range of stakeholders interact with one another, from individual creators, audiences and spectators, to digital intermediaries such as NFT platforms, commercial galleries, or social media platforms.

Current legal systems in place could additionally support this use case such as the Artist Resale Right Regulations 2006. Although such legal systems are quite restrictive in their conditions, they could provide the foundations that ORA supports economic interactions such as royalties.

However, the key barriers of this use cases include payments via cryptocurrencies which might have legal ramifications for creators and may also be too unstable in value to support creators in the long-term.

To conclude, future opportunities detected around this use case were: How might ORA create new equitable structures for creatives? How might ORA support more complex economic structures?

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4 ENABLING NEW KINDS OF ECONOMIC INTERACTIONS BETWEEN STAKEHOLDERS

Use case description

ORA could create more transparent systems of financial exchange for licensing and asset exchange as well as support resale royalties. This might include current models of royalties used in NFT platforms but could also consider more distributed models of remuneration.

Stakeholders

Creators, NFT platforms, galleries and other intermediaries.

Technology innovation ★★★

Research priority ★★★

Ecosystem impact ★★★

Enablers

The legal systems are already in place to support artist resale rights in the form of the Artist Resale Right Regulations 2006, although this is quite restrictive in its conditions.

Barriers

Payments via cryptocurrencies might have legal ramifications for artists and may also be too unstable in value. There also needs to be a clearer distinction of how this differs from existing NFT marketplaces.

Future opportunities

How might ORA create new equitable structures for creatives? How might ORA support more complex economic structures?

Automating aspects of copyright and licensing management was another use case identified as a high priority given its high technology innovation, research priority, and ecosystem impact.

ORA could support copyright and licensing management; this is particularly relevant for cultural organisations, media companies or other media and collection repositories such as multicollection platforms such as Art UK or stock image platforms such as Unsplash. For example, a platform that contains multiple collections from different sources requires a complex management system to support different copyright agreements. ORA could provide an automated system, helping to reduce labour time by automating licenses to users. Similarly, it could offer support in layered licence logics where a work may hold different conditions sourced from different organisations or artist estates. Additionally, ORA could be deployed as part of current approaches to copyright management, for example, 'safe dates' are often used if the death of the author is not known for a work, meaning that past that date the work is available for reuse, ORA could extend this practice by deploying time-based licences for content with ambiguous copyright, making ORA adoptable to current collection management systems or digital asset management systems will be key in this use case. However, the lack of flexibility in smart contract technology and literacy skills are barriers to this use case. Furthermore, orphan works and other works where copyright permissions are yet to be fully identified will remain an issue even if ORA were to be deployed.

To conclude, future opportunities detected around this use case were: How might ORA reshape copyright and rights management work? How might it encourage further reuse/sharing?

CATAPULT Digital

6 AUTOMATING ASPECTS OF COPYRIGHT AND LICENSING MANAGEMENT

Technology innovation ★★★

Research priority ★★☆

Ecosystem impact ★★★

Use case description

ORA could provide an automated system, helping to reduce labour time by automating licenses to users. Similarly, it could offer support in layered licence logic, and could also be deployed as part of current approaches to copyright management.

Stakeholders

Large collections such as British Library, and multicollection platforms such as Art UK or stock image platforms such as Unsplash.

Enablers

Current efficacy methods for copyright and licensing could be combined with ORA and are therefore opportunities for the application and adoption of ORA.

Barriers

Orphan works and other pieces where copyright permissions are yet to be fully identified, ORA cannot be deployed on this and requires human effort to source correct permissions.

Future opportunities

How might ORA reshape copyright and rights management work? (shifting human labour) How might it encourage further reuse/sharing?

Embed-specific permissions to account for personal, social, or cultural values associated with media was the final use case identified as a high priority given its high technology innovation, research priority, and ecosystem impact. ORA can embed bespoke conditions into how content can be used, meaning that creators can explore licensing agreements that go beyond legal scope. For example, a performer who would like to protect the unique sounds of their voice may want to embed specific conditions about how this can be reused by others, or even place time limits to when it can be used. Or an author may want to encourage the reuse of their writing but might be concerned about the tone of the messaging being lost if misquoted and therefore use ORA to apply conditions that encourage reuse that maintains the context of the work.

Some stakeholders identified were creatives using personal or culturally significant media, authors and writers, and cultural organisations with culturally significant/restricted collections. However, ORA is not a digital rights management (DRM) tool which may limit its adoption in this area as it cannot directly stop others from misuse unless works are shared within the same ecosystem.

To conclude, future opportunities detected around this use case were the extent to which cultural and social values could be easily translated into licences and conditions and exploring how creators could be supported in defining that process.

CATAPULT Digital

3 EMBED SPECIFIC PERMISSIONS TO ACCOUNT FOR PERSONAL, SOCIAL, OR CULTURAL VALUES ASSOCIATED WITH MEDIA

Technology innovation ★★★

Research priority ★★☆

Ecosystem impact ★★★

Use case description

ORA can embed bespoke conditions into how content can be used, meaning that creators can explore licensing agreements that go beyond legal scope.

Stakeholders

Creatives using personal or culturally significant media, authors and writers, cultural organisations with culturally significant/ restricted collections.

Enablers

Organisations such as Equity and DACS offer resources on the basics of artist rights and contracts, these could similarly offer a starting place to think about conditions that go beyond these basic requirements.

Barriers

ORA is not a DRM tool which may limit its adoption in this area as it cannot directly stop others from misuse unless works are shared within the same ecosystem.

Future opportunities

To what extent can cultural and social values be easily translated into licences and conditions? How do you support creators in defining that process?

Responsible innovation considerations

As identified in the use case examples, ORA has significant potential to empower creators. However, solving ownership, rights, and attribution via technical solutions presents several challenges. These include risks to privacy and data protection, issues of accessibility and the growing digital divide, as well as vulnerabilities to malicious exploitation.

Immutability vs privacy

The use of blockchain technology means that digital files or records are immutable and therefore difficult to delete. This conflicts with the practice of data erasure (also known as the "right to be forgotten"), which is enshrined in regulations such as the EU General Data Protection Act (GDPR) and the California Consumer Privacy Act of 2018 (CCPA). Although records can be updated with additional conditions or transactions, this does not delete previous data. Therefore, any information embedded into the content, metadata, associated contracts, and manifest remains permanent. The risk of information breaches is particularly problematic if the token contains sensitive information (for example, in works by human rights defenders, journalists, and activists) and if such information is released accidentally or maliciously, leading to harassment and abuse. Such was the case of Vice's accidental doxing of John McAfee via photo metadata in 2012, as well as several incidents where geotagging has led to national security concerns in the US[10].

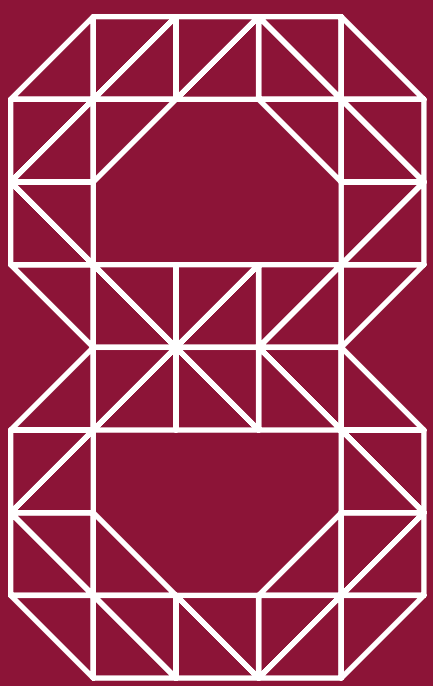
Accessibility and the digital divide

The complexity of the associated technologies and the digital literacy required can contribute to the furthering of technological and epistemological divides. As mentioned in the use cases, facilitating the digital literacy of media practitioners and creators is necessary to realise the benefits of ORA. For example, creators looking to tokenise their work need to be aware of the security risks of using blockchains, especially as there is no intermediary party to offer assistance or redress. They also need to be informed of the volatile nature of cryptocurrencies and NFT platforms, as well as associated blockchain transaction fees and NFT marketplace fees. Additionally, most NFTs tend to rely on third-party file storages, meaning that users need to keep these links and file storages secure, as once they are uploaded to the blockchain they cannot be changed[11]. The steep learning curve may exacerbate inequalities in what content is tokenised, by whom, how/where it circulates, and potential issues of price discrimination[12].

Mitigating the potential ethical challenges of ORA may include more education and training for users, audits and guidance on NFT contracts linked to ORA, as well as guardrails and checkpoints when inputting and linking information[13]. By addressing these challenges, ORA can ensure more equitable, safe, and responsible use so that creators can exercise better control over the use and minting of their content.

Industry learnings

Key learnings from the DLT field labs 45



Key Learnings from the DLT Field Labs

We had **multiple and diverse learnings across the DLT Field Labs** as partners. Most relevant for the industry were the learnings around tokenised digital media rights as technology innovation, the research priority areas for industry, and responsible innovation in this space.

TECHNOLOGY INNOVATION LEARNINGS

1. A **key recurring industry challenge** is the protection of intellectual property and copyright against digital asset plagiarism, reproduction, and misuse.
2. A **key industry concern** was their work/media being exploited by generative AI and not being aware or credited, gaining the correct recognition for their work, and protecting their work from web scraping.
3. The **main points of interest** were to have more control over derivative works, to enable more consent and permission formedia use; and to experience new ways to interact with the consumers and monetise their work.
4. At least **nine use case opportunities** were identified. All the use cases highlighted ORA's potential to enhance the management, attribution, and economic interaction of digital media for creators, organisations, and the creative sector.
5. The **top three industry use cases prioritised** were enabling new kinds of economic interactions between stakeholders, Automating aspects of copyright and licensing management, and embedding specific permissions to account for personal, social, or cultural values associated with media.

RESEARCH PRIORITY LEARNINGS

1. **Key learnings** were around how to enhance the management, attribution, and economic interactions around digital media for creators, cultural institutions, and other stakeholders in the digital ecosystem.
2. **18 future research opportunities were identified** across the nine use cases. The opportunities often focused on leveraging further the associated data, improving transparency and trust, as well as creating new frameworks for collaboration and economic exchange.
3. **Key themes areas for further research** were attribution and reputation building, tracking and proving the value of remix/reused media, provenance data utilisation, customised licensing and permissions, economic interactions and structures, media interaction with artificial intelligence, automated copyright and licensing management, collectives rights management, user mapping certification, and content authenticity.

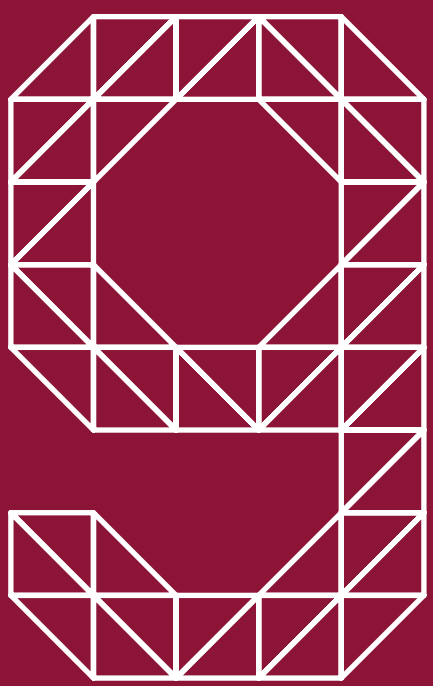
RESPONSIBLE INNOVATION LEARNINGS

1. **Ethical challenges associated with ORA** include ensuring privacy, data protection, and addressing the digital divide. Mitigation strategies could explore comprehensive education and training for users, audits and guidance on NFT contracts, and implementing guardrails and checkpoints to ensure safe and responsible use of the technology. These measures will help creators better control the use and minting of their content.
2. Responsible innovation requires a balance between leveraging new technologies and adhering to regulatory requirements. **ORA's potential must be harnessed in a way that respects privacy laws and ensures user protection.** This involves updating records without compromising the permanence of previous data and carefully managing the embedding of sensitive information.
3. **To ensure the equitable use of ORA, support systems must be established to assist users in navigating the complexities of the technology.** Building these support systems will help bridge the digital divide and promote inclusive innovation.

Roadmap

Key recommendations with the roadmap 47

Industry piloting 50



Roadmap

Key recommendations with the roadmap

We collaborated with industry, through the Field Lab II, to foster awareness of decentralised attribution and recognition, value creation through ownership design, and share the links between ownership, licensing, and remixing. ORAgen at its core allows this understanding and facilitates these insights. However, achieving a fairer and more equitable digital ecosystem – where authenticity and ownership are inherently embedded in digital assets – requires the development of a supportive and enabling environment.

The roadmap in **Figure 10** outlines a vision, highlights key opportunities, and proposes innovation interventions that can guide the industry in embedding authenticity and ownership into digital assets by:

1

ENHANCING ATTRIBUTION AND PROVENANCE TRACKING

WHY?	HOW?
Attribution and provenance are critical for ensuring creators get recognition and credit for their work. This has broad applications, from improving the visibility of artists to preserving the integrity of creative work when reused or shared.	ORA facilitates this by embedding metadata and smart contracts into digital content. This helps track the origin of the work, links to the creator's profile, and even the physical location of a reproduced piece. ORA can provide a structured and verifiable way to ensure proper attribution.

2 ENCOURAGING NEW ECONOMIC AND LICENSING MODELS

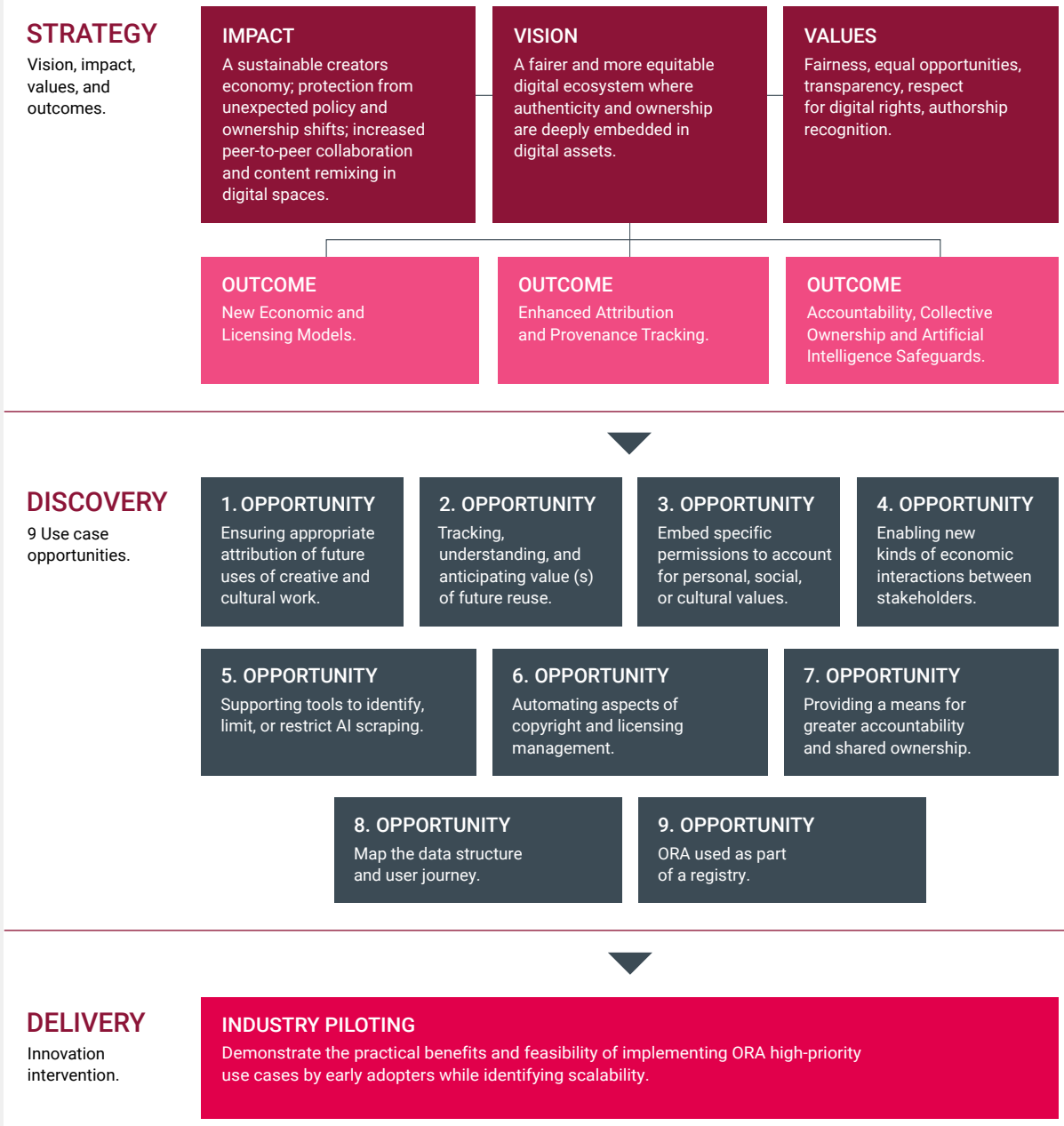
WHY?	HOW?
The ability to track reuse, licensing, and value distribution offers creators and cultural institutions new opportunities for monetisation and financial transparency. It allows them to maintain control over how their works are reused and provides them with data on the impact of their work.	ORA could introduce a new way of engaging in economic transactions through transparent and automated systems. This could include royalty tracking via license tokens, enabling resale royalties, and introducing bespoke licensing conditions.

3 DEVELOPING ACCOUNTABILITY, COLLECTIVE OWNERSHIP, AND ARTIFICIAL INTELLIGENCE SAFEGUARDS

WHY?	HOW?
In a collaborative, AI-driven, and digital-first environment, maintaining accountability for shared ownership and protecting creators from exploitation or misuse is crucial. ORA ensures creators' contributions are recorded and managed in a transparent, automated way.	ORA could assign specific permissions to creative works and track contributions in collective projects. Provenance data could help ensure accountability in collaborative efforts supporting ethical reuse and safeguarding personal and cultural values embedded in media.

Each of these outcomes is a direct result of ORAgen's ability to integrate metadata, track reuse, and enable transparent licensing; offering creators, cultural institutions, and media repositories robust tools for managing creative work in a digital ecosystem.

Figure 10.
Roadmap Read from top to bottom. ORAgen's vision, impact, values, and outcomes generated at least nine opportunities for the industry to explore.



Industry piloting

Scaling innovations can be challenging specially when disrupting use cases are being explored. To increase the speed and quality of the experimentation and learning that ORA's team and industry could achieved and aligned with the roadmap, we proposed in **Figure 11**, **Figure 12**, and **Figure 13** pilot implementations around the three use cases prioritised.

Each pilot implementation identifies the early adopter archetype prioritised as well as the phases and key activities and questions to address.

Figure 11.
Pilot Implementation: Enabling new kinds of economics interactions between stakeholders.

INDUSTRY PILOT IMPLEMENTATION

Stakeholder Prioritised: Galleries
Timeframe: 3 to 6 months

SCOPING AND PLANNING

- Market analysis.
- Stakeholders mapping and control group selection.
- Identification and definition of the context, objectives, requirements, data, hypothesis and key metrics.
- Definition of the legal and financial agreements.
- Deployment plan.

TESTING AND VALIDATION

Proposed and non-exhaustive areas of inquiry for industry:

- Market **demand and traction**
- New **forms of remuneration agreements**.
- Alternative finance models.
- Alignment with sector **standards** for contracts and agreements.
- Exploring more **sustainable business models and proof of revenue generation**.

BENEFITS REALISATION ASSESSMENT

- Identifying, defining and quantifying initial value for potential users including creators, collectors, and gallerists.

SCALABILITY ASSESSMENT

- How will ORA's infrastructure support high transaction volumes across a growing number of users, assets and platforms?
- How sustainable is it as business model?
- What organisational structure would be required?
- Would a new IP and rights strategy be required?
- Are we having the desired impact?
- Are we ready to deploy at scale and how?
- What is our cost to impact?

Industry Pilot Benefits

- Improved efficiency in distributing economic value among stakeholders.
- Enhanced transparency and trust between stakeholders.
- Streamlined, automated legal support that strengthens and simplifies the protection of generated value.

We hope each of the proposed pilot implementations allow the industry to identify the concrete steps that could be explore to further understand the applications of the ORA framework and be the first to realised the value of the learnings from it.

Figure 12.
Pilot Implementation: Automating aspects of copyright and licensing management.

INDUSTRY PILOT IMPLEMENTATION

Stakeholder Prioritised: Large collections (e.g. British Library)
Timeframe: 3 to 6 months

SCOPING AND PLANNING

- Market analysis.
- Stakeholders mapping and control group selection.
- Identification and definition of the context, objectives, requirements, data, hypothesis and key metrics.
- Definition of the legal and financial agreements.
- Deployment plan.

TESTING AND VALIDATION

Proposed and non-exhaustive areas of inquiry for industry:

- Identify and define different **licenses approaches or forms,** components, and opportunities.
- Identify and define where ORA could complement or improve current systems.

BENEFITS REALISATION ASSESSMENT

- Exploring new/improved methods for licensing management.

SCALABILITY ASSESSMENT

- How might ORA increase its ability to handle multiple, complex copyright agreements across various collections and repositories with differing licensing conditions?
- How sustainable is it as business model?
- What licensing systems are already in place and can ORA be easily integrated?
- How scalable is this across collections and different IP/copyright agreements?
- Are we having the desired impact?
- Are we ready to deploy at scale and how?
- What is our cost to impact?

Industry Pilot Benefits

- Streamlined management of licensing and licensing models for greater efficiency.
- Significant time and cost savings in license administration.
- Enhanced user experience through improved discoverability of works and their associated licenses.

Figure 13.
Pilot Implementation: Embed specific permissions to account for personal, social, or cultural values associated with media.

INDUSTRY PILOT IMPLEMENTATION

Stakeholder Prioritised: Creators and Artists
Timeframe: 3 to 6 months

SCOPING AND PLANNING

- Market analysis.
- Stakeholders mapping and control group selection.
- Identification and definition of the context, objectives, requirements, data, hypothesis and key metrics.
- Definition of the legal and financial agreements.
- Deployment plan.

TESTING AND VALIDATION

Proposed and non-exhaustive areas of inquiry for industry:

- Explore the **limitations** of current copyrights and legal systems.
- Consider **creator-specific conditions and values** around content sharing.
- **ORA effectiveness** as a method to identify personal, social, and/or cultural values
- **Opportunities** to automate. agreements between different stakeholders.

BENEFITS REALISATION ASSESSMENT

- Support in developing a better understanding for creator agreements and contracts.

SCALABILITY ASSESSMENT

- How might ORA handle the embedding of highly personalised and culturally specific licensing conditions, while ensuring that these values are consistently applied across a growing number of media and creators?
- How sustainable is it as business model?
- How interoperable are these contracts across the digital ecosystem?
- Who else needs to be involved to ensure these contracts are recognised?
- Are we having the desired impact?
- Are we ready to deploy at scale and how?
- What is our cost to impact?

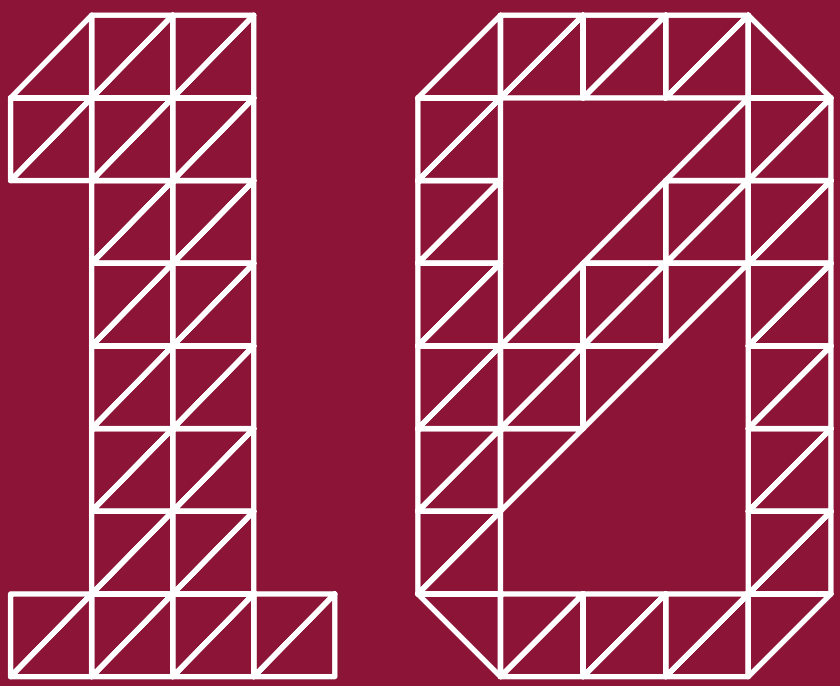
Industry Pilot Benefits

- Increasing creators' control and influence on how their media and creations are used and engaged with.
- SEnhanced contractual terms for creators, ensuring better protection and clarity.
- Guidance in simplifying intellectual property (IP) rights and ownership conditions, providing clearer understanding and support.

Research limitations

Key recommendations with the roadmap 54

Learn more! 56



Research limitations

Key recommendations with the roadmap

Our research demonstrates various opportunities to leverage ORA to explore alternative futures for media rights. However, we also recognise that this research has its limitations.

Firstly, our workshop was in-person only due to the nature of the activities, meaning that our participants were limited to those who could be available in London on that day. The outcome is that data collected from this workshop has a UK focus rather than providing a global picture. Further research could provide in-depth insight into to what extent the media rights landscape differs across geolocations.

Second, our findings provide initial scope into what ORA could achieve in creating alternative futures for media rights but has been limited by time and resources. We hope the insights provided in this report can offer new avenues for further in-depth study.

Lastly, our work has focused on the ORA framework and identified challenges around ownership, licensing, and attribution in relation to ORA and the ORAgen demo. Therefore, our work is limited its scope in order to attain results specific to this technology. Further research could broaden the scope by examining ORA as part of a broad spectrum of current and emerging technologies and tools that could equip creators in embedding attribution and other kinds of usage rights when sharing, reusing, or remixing media online.

Learn more!

If you want to learn more about the work done, learnings or explore opportunities, don't hesitate to contact us!

Dr Chris Elsden
Chancellor's Fellow in Service Design
chris.elsden@ed.ac.uk

Dr Frances Liddell
Post-Doctoral Researcher
fliddell@ed.ac.uk

Dr Robert Learny
Head of Technology
robert.learney@digicatapult.org.uk

Natasha Velasco
Head of Innovation Consultancy
nastasha.velasco@digicata pult.org.uk

Dr John Collomosse
Decade Centre Director
j.collomosse@surrey.ac.uk

Kar Balan
PhD Student
k.balan@surrey.ac.uk

Appendix

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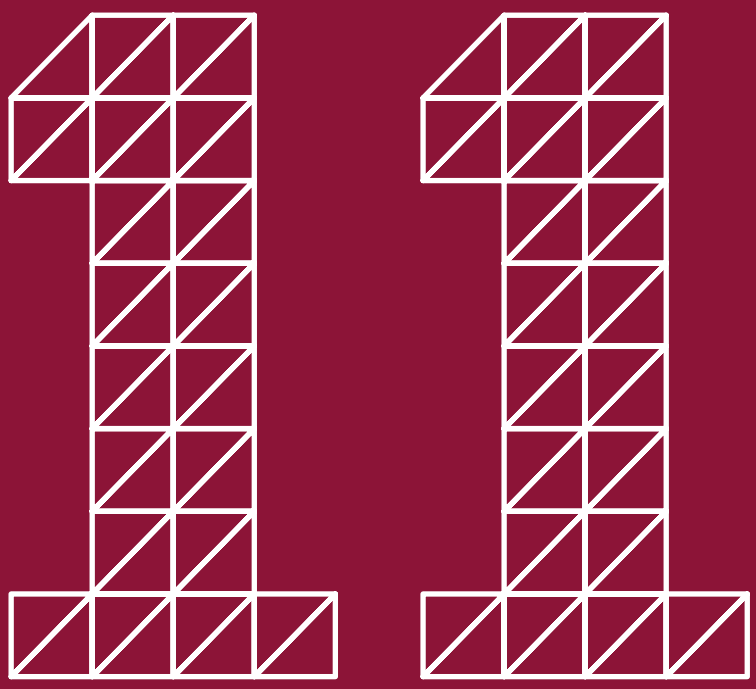
APPENDIX 2. Edinburgh simulation cards 59

APPENDIX 3. Use cases 60

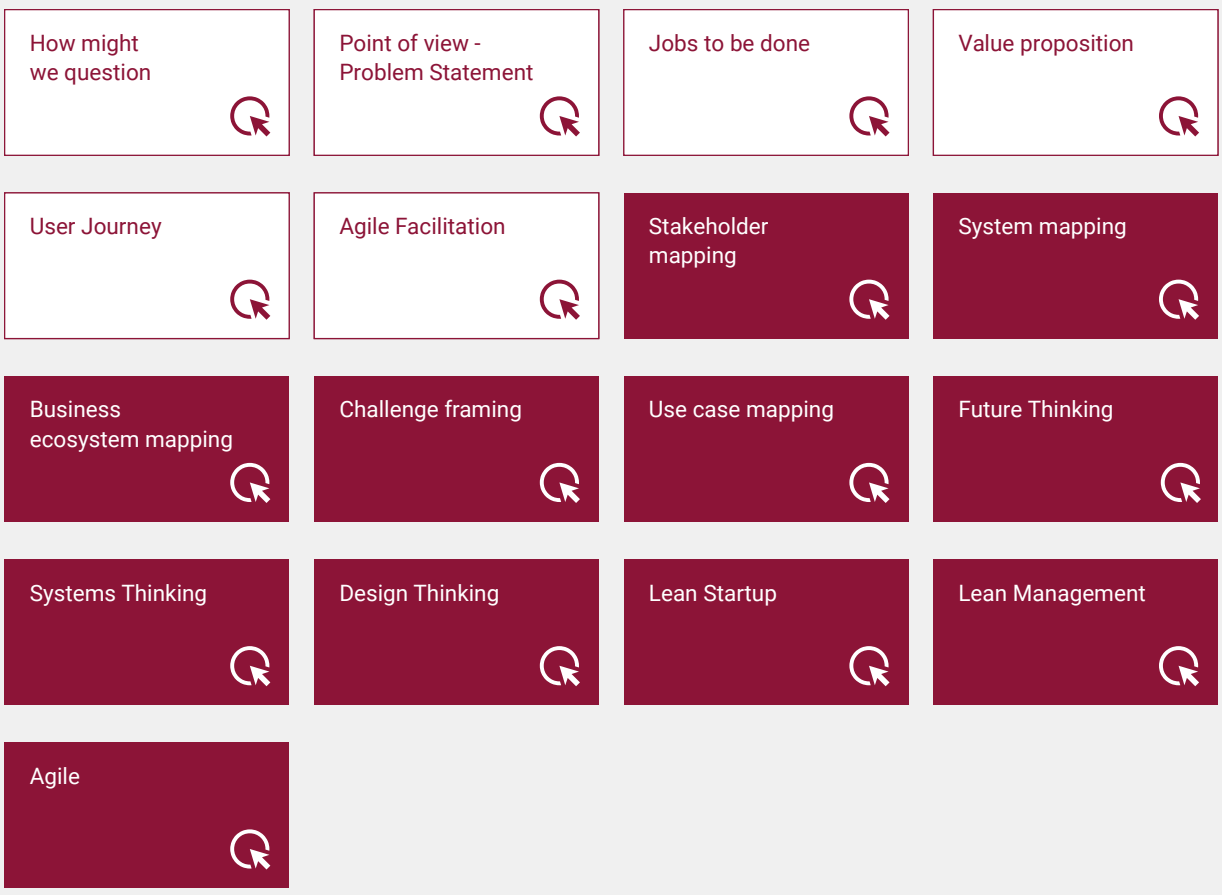
APPENDIX 4. Prioritisation 69



Appendix

Appendix 1.
Value Proposition
Method and Tools.

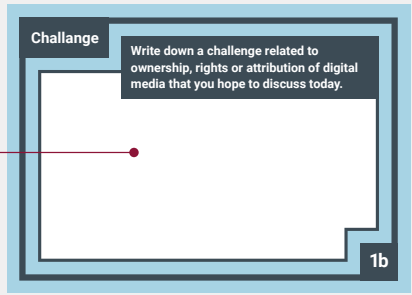
DLT Field Labs II | NON-EXHAUSTIVE METHODS AND TOOLS

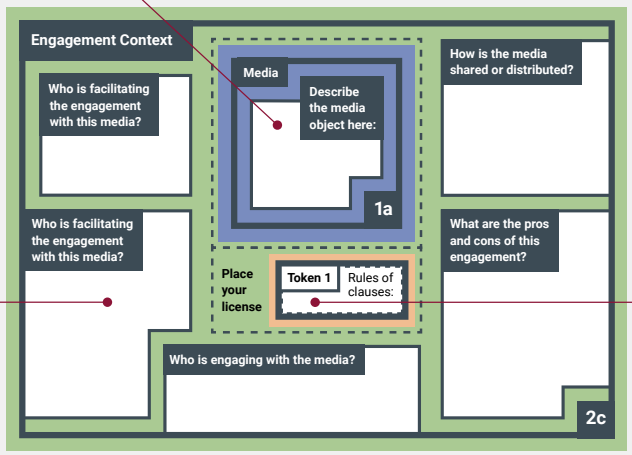


Appendix 2.
Edinburgh Simulation Cards.

Media card
Participants describe a media object that they work with, to explore how it could fit within a system using the ORA framework.

Challenge Card
An existing problem with (or wish for) using the chosen media object (reflecting to ownership, rights or attribution) is selected, acting as a brief that the system being designed aims to solve.

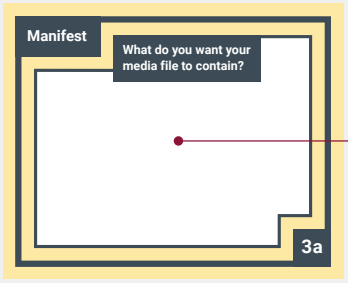




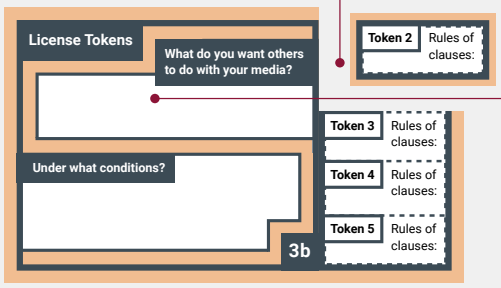
Context Sheets
The media object gets cycled through three different contexts (Creation, Re-use and Engagement) to describe how it would be interacted with, within each context.

Licence Tokens
Licenses tokens are torn off and used for both the Re-use and Engagement contexts. Each token can have its own rules for what it can be used for.

Licence Token Card
Deciding who gets to re-use or engage with the media object, and under what constraints.



Manifest Card
Metadata that attached to the media object is defined (e.g. title, timestamp, location, author etc).



1 ENSURING APPROPRIATE ATTRIBUTION OF FUTURE USES OF CREATIVE AND CULTURAL WORK

Technology innovation

★★☆

Research priority

★★☆

Ecosystem impact

★★☆

Use case description

Opportunities ORA could embed attribution into digital content. This is through (1) the metadata which can provide detailed and bespoke information about the work including links to original webpages or the artist's online profile (2) through the smart contract which can be used to prove authorship of the original work.

Stakeholders

Creators, media repositories wanting to share work such as stock image platforms, digital commons platforms such as Flickr, as well as initiatives such as DACS (design and artists copyright society).

Enablers

Creative commons licences are an established legal framework used to support attribution online, this could be used as part of ORA licences.

Barriers

ORA creates additional processes to sharing content which may inhibit the effectiveness of this use case.

Future opportunities

What is the value of attribution for creators? And what more nuanced forms of data/attribution can be embedded (beyond simply recording authorship)? How might this support the reputation of creatives? Could ORA be used to track reputation building over time for creators?

2 TRACKING, UNDERSTANDING, AND ANTICIPATING VALUE(S) OF FUTURE REUSE

Technology innovation

★★☆

Research priority

★★☆

Ecosystem impact

★★☆

Use case description

ORAgen provides the means to track and anticipate the value of future reuse. This is through the licence tokens which can be used to identify the number of times a work has been reused. This can provide evidence of reuse and impact of work. Likewise, for cultural organisations, it could be used to evidence the value of sharing collections where licence tokens provide a quantifiable value of sharing content.

Stakeholders

Creators, and cultural organisations.

Enablers

Adoption of other web analytics that remove or show the value of tracking user flows? Existing cataloguing practices and standards.

Barriers

Control over how content is used and alternative metrics via APIs or websites that could do the same job.

Future opportunities

For Creative Industries (CIs), there is an opportunity to use ORA as a progression towards openGLAM, a movement that encourages CIs to make their out-of-date copyright freely available with open licences online. ORA could be used to prove the value of sharing content through tracking shared content.

3 EMBED SPECIFIC PERMISSIONS TO ACCOUNT FOR PERSONAL, SOCIAL, OR CULTURAL VALUES ASSOCIATED WITH MEDIA

Technology innovation

★★★

Research priority

★★☆

Ecosystem impact

★★★

Use case description

ORA can embed bespoke conditions into how content can be used, meaning that creators can explore licensing agreements that go beyond legal scope.

Stakeholders

Creatives using personal or culturally significant media, authors and writers, cultural organisations with culturally significant/ restricted collections.

Enablers

Organisations such as Equity and DACS offer resources on the basics of artist rights and contracts, these could similarly offer a starting place to think about conditions that go beyond these basic requirements.

Barriers

ORA is not a DRM tool which may limit its adoption in this area as it cannot directly stop others from misuse unless works are shared within the same ecosystem.

Future opportunities

To what extent can cultural and social values be easily translated into licences and conditions? How do you support creators in defining that process?

4 ENABLING NEW KINDS OF ECONOMIC INTERACTIONS BETWEEN STAKEHOLDERS

Technology innovation

★ ★ ★

Research priority

★ ★ ★

Ecosystem impact

★ ★ ★

Use case description

ORA could create more transparent systems of financial exchange for licensing and asset exchange as well as support resale royalties. This might include current models of royalties used in NFT platforms but could also consider more distributed models of remuneration.

Stakeholders

Creators, NFT platforms, galleries and other intermediaries.

Enablers

The legal systems are already in place to support artist resale rights in the form of the Artist Resale Right Regulations 2006, although this is quite restrictive in its conditions.

Barriers

Payments via cryptocurrencies might have legal ramifications for artists and may also be too unstable in value. There also needs to be a clearer distinction of how this differs from existing NFT marketplaces.

Future opportunities

How might ORA create new equitable structures for creatives? How might ORA support more complex economic structures?

5 SUPPORTING TOOLS TO IDENTIFY, LIMIT, OR RESTRICT AI SCRAPING

Technology innovation

★★★

Research priority

★★☆

Ecosystem impact

★★☆

Use case description

ORA provides creators with the ability to be attributed work if used as part of generative AI models. For example, creatives could use ORA when working/training generative AI models as collaborators. ORA would be a way of documenting the shared process of making between human and non-humans but could also be a means to distribute rights across human and non- human actors (through tokens).

Stakeholders

Creators interested in working with generative AI in their work. Collectors and users of media.

Enablers

There has been previous work in this area of training AI as collaborators (e.g. Imogen Heap or Robert Laidlow).

Barriers

Is it possible to embed ORA into established datasets or would this only function for new AI datasets?

Future opportunities

Could ORA help to make AI and its underlying processes more visible for different users?

6 AUTOMATING ASPECTS OF COPYRIGHT AND LICENSING MANAGEMENT

Technology innovation

★★★

Research priority

★★☆

Ecosystem impact

★★★

Use case description

ORA could provide an automated system, helping to reduce labour time by automating licenses to users. Similarly, it could offer support in layered licence logic, and could also be deployed as part of current approaches to copyright management.

Stakeholders

Large collections such as British Library, and multicollection platforms such as Art UK or stock image platforms such as Unsplash.

Enablers

Current efficacy methods for copyright and licensing could be combined with ORA and are therefore opportunities for the application and adoption of ORA.

Barriers

Orphan works and other pieces where copyright permissions are yet to be fully identified, ORA cannot be deployed on this and requires human effort to source correct permissions.

Future opportunities

How might ORA reshape copyright and rights management work? (shifting human labour) How might it encourage further reuse/sharing?

7 PROVIDING A MEANS FOR GREATER ACCOUNTABILITY AND SHARED OWNERSHIP IN COLLECTIVE RIGHTS MANAGEMENT SYSTEMS

Technology innovation

★★★

Research priority

★★☆

Ecosystem impact

★★☆

Use case description

ORA allows, in collectively made works, to identify specific contributions to a work and distribute remuneration accordingly. For example, an artist might work with the community to produce participatory artwork, and ORA is used to track and disseminate contributions in an automated way. This reduces the accountability of the artist to manage rights while providing participants the means to be recognised for their work.

Stakeholders

Community curators, artists, and community groups, artist collectives and cooperatives.

Enablers

Similar work is already being done, see Serpentine and Radical Xchange work on partial common ownership.

Barriers

Pre-determine agreements on how to manage and share responsibilities to facilitate collaboration by stakeholders, technical literacy, and community adoption.

Future opportunities

To what extent could ORAgen support efficient collaborations? What specific groups would this work for?

8 MAP THE DATA STRUCTURE AND USER JOURNEY

Technology innovation

★ ☆ ☆

Research priority

★ ☆ ☆

Ecosystem impact

★ ☆ ☆

Use case description

ORA could collect and document a user journey where tokens are used to validate stages in that journey. For example, an arts college may want to use ORA to track students' journey through their courses with tokens used as certificates to verify qualifications via blockchain.

Stakeholders

Boards such as Associated Board of the Royal Schools of Music, students, industry associations, and creators.

Enablers

Prior efforts to use DLT for certification.

Barriers

Trusted input and certification, acceptance and adoption, and technical scalability of the infrastructure.

Future opportunities

Exploring the validation of qualifications in the creative and cultural industries, where training and credentials are directly linked to specific works or media.

9 ORA AS ART OF A REGISTRY

Technology innovation

★ ☆ ☆

Research priority

★ ☆ ☆

Ecosystem impact

★ ☆ ☆

Use case description

ORA could be used as part of a registry which users can engage with as a trusted source. For example, a large collection institution may use ORA in their collection and if a user is uncertain of a work they would like to use, they can refer to the collection and use of ORA to identify if the content that they have is authentic. This eliminates the issue of bad actors as it no longer focuses on the individual file and instead uses the reputation of the collection combined with ORA to provide proof.

Stakeholders

Large media repositories and collections, and platforms.

Enablers

Trusted repositories, growing need for content verification, and media provenance success cases.

Barriers

Technical integration, user awareness and adoption, scalability and performance, regulatory compliance, and interoperability.

Future opportunities

This would build on previous work in media provenance e.g. Archangel.

Appendix

Appendix 4.
Prioritisation

Prioritisation of the use cases

Method

We are looking to prioritise use cases on how they compare to each other in terms of **Technological Innovation and Research priority,** to focus on use cases most relevant for a "real world" pilot of ORA.

This is not a definite decision but an opportunity for you to reflect on what you think about each use case in more detail. We'll use these markers and results to guide our future decisions and development of the roadmap.

Step 1

Quick Vote

Please use the markers to vote on the use cases below,

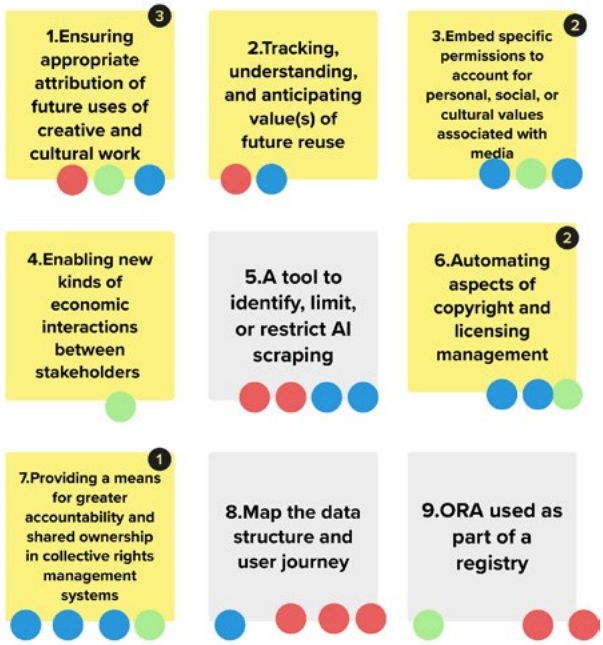
Which use cases do you think have the most value to be explored through further academic research aimed towards a paper? — X2 dots

Which use cases would you dismiss? — X1 dot

Which use cases excites or inspires you? — X1 dot

1.Ensuring appropriate attribution of future uses of creative and cultural work

Use case titles



Appendix

Appendix 4.
Prioritisation

Step 2

To assess the use case titles, please position the corresponding numbers in the matrix looking at , each choosing one colour.

Please elaborate on any examples you are using as a point of reference in the context and feedback area to the right and provide your name for future reference.

1. 2. 3. 4. 5. 6. 7. 8. 9.

Example

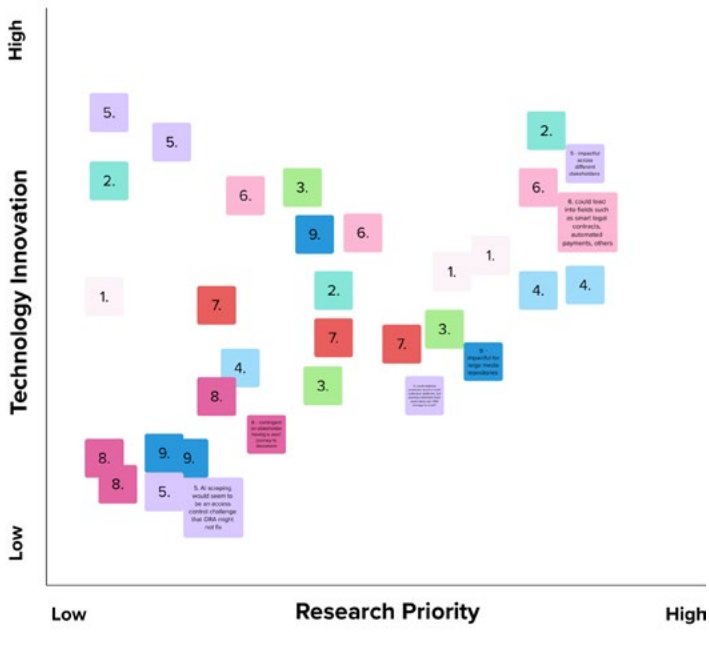
1. 2. 3. 4. 5. 6. 7. 8. 9.

Step 3

Feedback and Context

Use the purple post it notes to provide feedback

- How does your use case assessment compare to others already on the board?
- What would you challenge?



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Contact

For more information or to discuss the role of digital technologies within your environment, please contact:
fabian.barrett@digicatapult.org.uk

digicatapult.org.uk

@DigiCatapult

/digital-catapult