# Chapter 16

# Playful Design Manifesto for Creative Blockchain Eco-systems

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**Abstract.** What does game design theory offer for efforts to reconfigure social value exchange using emerging blockchain technologies in Scotland's Creative Industries? Blockchain eco-systems are platform co-operatives that combine digital networking systems with blockchain peer-to-peer authentication technologies. While digital networks such as these can successfully co-ordinate self-interest for mutual benefit they are not by their nature public services and need to be designed accordingly in order to help manage their societal impact, while also promoting their public benefits. In this chapter, we present a manifesto for the application of game design principles within blockchain eco-systems for social value transformation. As we argue, game design strategies can help to manage tensions between creativity and sustainability, individual versus collective concerns, and quantified versus priceless values. Such speculative opportunities for playful co-operation are considered here within the context of Scotland's creative collectives. The unique contribution of this study is to develop a preliminary exploration for the playful engineering of crypto-based co-operative economies.

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## 1. Introduction

Blockchain is an emerging, peer-to-peer value transfer technology currently being employed in finance remittance work and also supply chain management. This consensus technology uses a shared database system to check the accuracy of each transaction against a collection of identical ledgers. Such a facility for secure peer-to-peer trade has many potential applications. In this study, we focus on the ways that it is being used to help manage co-operative enterprise within what are known as blockchain eco-systems. That is, systems that combine digital networking capacities with peer-to-peer value exchange and authentication technologies to create platform co-operatives (networked, co-operative enterprises).

Cross-sectoral collaboration is a fundamentally different approach to the more traditional, competitive business culture. For example, a bold, but ultimately fraught collective experiment to pool and store modern art works for later resale in order to re-distribute the sales income between members known as The Artist's Pension Trust, is now struggling to regain the trust of members after controversies regarding the introduction of storage fees by subsequent commercial partners (Jones, 2018). Managing a large crowd of competing interests may well be as challenging as learning a new language.

Blockchain ecosystems "of different stakeholders and their interactions with each other, the system and the outside world" (The Blockchain Ecosystem, 2017) often employ mediated reputation systems (such as reviews from buyers and sellers, or endorsements) and identity verification processes (Roio and Jelincic, 2017) to help govern peer-to-peer interactions between strangers. While these

foundational frameworks promote accountability, they still do not guarantee a co-operative eco-system among potential collaborators. Reputation driven systems can support peer-to-peer exchange practice, but transforming the values underpinning that practice and encouraging a more open and collaborative cross-sectoral approach is likely to require more substantial change.

This challenge is further complicated by efforts to drive social value transformation through the use of digital tokens. In a blockchain eco-system, members generally exchange digital tokens in lieu of money. Digital tokens might represent anything that can be exchanged as a type of currency. Examples of digital tokens include votes, or measures of local trading capacity, or any other form of agreed value that members can trade as part of their participation within this eco-system. These sorts of digital tokens can be earnt during nominated events such as volunteering, or information exchange and their value will change according to the design of each system. As an example, certain types of value might only accrue at certain locations, or when nominated conditions are met, such as eco-friendly production, or when multiple parties are conducting trades at varying times, or over time and in infinitely large and small amounts.

The flexible capacity to link potentially transformative values to digital token transactions can support targeted social enrichment programmes, but it also requires a concerted collective effort. In Scotland at present, for example, Glasgow based artist Ailie Rutherford along with designer and researcher Bettina Nissen, together with the people of Glasgow's diverse Govanhill community are exploring how a crypto-currency might be designed to help support a feminist social agenda. Their hope is that by capturing and rewarding womens' traditional work, so often under-valued by current socio-economic systems, a digital cryptocurrency can help to promote "the diversity and richness of local communities as a form of wealth" (Cheng, 2017). Through a series of community crypto-knitting workshops and discussion groups, Rutherford and Nissen are asking the community, "How do we make sure current gender, race and class biases aren't coded into the currency of the future so it's more fair and equal?" (Riddoch, 2018).

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These are valuable questions and among the challenges that we will also consider in this chapter. Our research study begins with a more detailed review of the challenges of creative cluster management within Scotland, followed by a discussion of eight key principles for gamified blockchain eco-system design identified during this research project. We conclude our manifesto by considering ways that these design principles can be applied to the specific challenges of blockchain eco-systems within the Scottish context.

## 1.1. *Blockchain eco-system initiatives in the Scottish context*

The Scottish creative sector is dynamic and innovative, incorporating such diverse industries as music, theatre, game production, comics, data technologies, media, design, craft, publishing, and the arts. Centered in urban and regional clusters, Scottish creative practitioners often work independently, or in small, flexible, and sometimes dispersed groups that can struggle with limited research and development capabilities (R&D) (Riddoch, 2018). Nevertheless, blockchain themed knowledge exchange events occur regularly in all three urban centers and the number of public enterprise and corporate data-sharing initiatives are growing each year. Given that Scotland is characterized by 99.4% small to medium sized enterprise activity (Scottish Governmnet, 2017) there is significant research interest in the ways that consensus blockchain technologies might be applied to support the networked capacity of creative cluster initiatives. In the 2018 Scottish Digital Design Futures Report (Patrickson, 2018), for example, it was suggested that blockchain inspired data sharing technologies like Corda create the opportunity to build a collective data-bank compiled from the scraped, collated, and analyzed digital production histories that creative practitioners generate across software packages. In order to supplement existing knowledge exchange networks and potentially inform future practice this hypothetical collective data bank could be accessed and shared via a platform co-operative, or blockchain eco-system.

Responding to that speculative design for a cross-sectoral, practitioner led digital data-sharing venture this article explores how a gamified design approach might help digital production communities achieve such a level of collaboration.

## 1.2. *Platform co-operation as creative practice: Creating a positive networked experience for Scotland's creative collective communities*

Creative engagement can help to shape reflective individuals, produce engaged citizens, create interventions to broker divisions, support healthier and more balanced communities, improve health, well-being, and "operate as part of a complex ecology of talent, finance, content and ideas" (Stern and Seifert, 2016; Scotland, 2016).

As such, we welcome Creative Scotland's Creative Industries Strategy (Scotland, 2016), which attempts to acknowledge the social and cultural impact of creative industries in addition to its economic impact. Cultural Enterprise, in their Performance and Impact 2014–15 report, position Scotland's creative economy as a growing sector "dominated by sole-practitioners, micro-businesses and small companies" (Office, 2015; Jones, 2018). However, the risks involved in start-up formation for creative practitioners is often high, with many small creative companies failing early in their formation. For creative practitioners, there is a skills gap in connecting entrepreneurial activities, whether socially driven or commercially driven, with the needs of their developing practice. The UK Creative Industries Strategy (Government, 2018) focuses on business expansion in the creative industries, rather than stabilizing the transition from creative learner to creative practitioner. This serves London's saturated and competitive creative sector but does little to support Scotland's context of a more fractured creative industries.

The creative economy has taken on growing significance in the UK, including Scotland, partly in response to the recent economic

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recession and a slow, austerity-laden recovery, while recognizing the increasing complexity and potential of new technologies, service innovation, ubiquity of digital production and consumption, and the innovative business models sweeping away previous incumbents. Such disruption has influenced working practices across all sectors to a point where innovation is the normative aspirational mode of operation. This demand for continuous innovation has cast the creative industries in a stark light as playing a vital role in providing sustainable innovation and growth.

These recent demands from and for the creative industries have inspired the growing interest and research in the development of varying forms of creative collectives, clusters, hubs, or other organizing models of creative practice. Collectives have existed for many centuries, even millennia, particularly through various artist communities with shared needs, resources, aesthetics, or even politics. Their potential as organizational models across wider disciplinary contexts has taken on growing significance; whereas creative clusters and hubs have emerged as a strategic approach for public funding to stimulate and support the creative economy.

Nesta's 2014 manifesto (NESTA, 2014) acknowledges the systematic support that local policymakers are giving to creative clusters: Investing in people, buildings, and anchor institutions in order to "raise visibility and strengthen networks." This has most recently culminated in the Creative Industries Clusters Programme, led by the Arts and Humanities Research Council and funded through the Industrial Strategy Challenge Fund. The programme is an ambitious research and development investment strategy to establish up to eight Creative R&D Partnerships within existing creative clusters across the UK. To delegate the strategic investment and growth of creative clusters to local policymakers is both encouraging and a potential oversight, as there is a significant gap in knowledge about how creative networks emerge and become established.

In a similar vein, funding invested in new "creative hubs," as places of creative collaborative working, can fall short of their intended impact by not effectively engaging and serving the interests of local creative communities. Partly in response to this, the British

Council commissioned and published the Creative HubKit (Council, 2015), to promote best practice for creative hubs, while acknowledging the diversity of models and challenges such hubs need to overcome. These models cover studios, large building centers, dispersed networks, clusters, online platforms as well as alternative models (Council, 2015; Scottish Governmnet, 2017). The recommendations of the HubKit sets out seven key milestones: from "defining the vision" and "designing the network," to "communicating strengths and impacts" and "sustaining and scaling" (Council, 2015; Scotland, 2016). As a result, this paper acknowledges the pragmatic recommendations for creative hubs, based on key milestones, as a strong format to be extended into wider co-operative contexts in Scotland.

Creative Scotland funded recent research on the future of collectives (Creative_Scotland, 2015), which sought to cultivate collective working and support the development of creative entrepreneurial talent. It aligned with Creative Scotland's strategic intention to support talent hubs for creative practitioners and identified recent initiatives "that reinforced the importance of scale, networking, collaboration and the notion of creative places around the country to support creative industries" (Creative_Scotland, 2015); NESTA, 2014). Through design-led participatory workshops, the research brought together artists and designer-makers from "new and emerging collectives by enabling them to clarify their operating models," 'share their experiences' and "collaboratively identify [...] guiding principles to support the development of collective organisational structures" (Creative_Scotland, 2015; Scottish Governmnet, 2017).

This research project articulated a "no one-size-fits-all approach" to the emergence and development of creative collectives (Creative_Scotland, 2015; Ostrom, 1990), while providing insights into understanding collective ways of working with regard to their business models, support required, and the significance of networks and place (Creative_Scotland, 2015, pp. 41–43) report's recommendations promote the creation of a "Collective of Collectives," developing "an online visual map of collectives across Scotland," "create

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online guidance for setting up and developing a collective" and the "cocreation of online and offline resources to support collectives across Scotland" (Creative_Scotland 2015, pp. 41–45). The project provides strong argument for the ways that collectives benefit their communities of artists and designer-makers and calls for pragmatic steps to help consolidate this development practice.

## 2. Gamification: A Blockchain Eco-system Design Manifesto

Gamification is "the use of game design elements in non-game contexts" (Deterding *et al.*, 2011); Government, 2018) such as work, education, and healthcare. It is now well-documented that games can motivate participatory engagement using a network of structured goals, challenges, and rewards Deterding, 2012; Hamari *et al.*, 2014). For example, popular video games like *Pokémon* (Tajiri, 1996) and its more recent mobile version *Pokémon Go* (Niantic, 2016) motivated hundreds of millions of players to take to the streets, turning urban areas into a type of public social event space. Inspired by this sort of impact, gamification has been widely embraced as a type of generative social practice.

The design of gamified social practice can be approached in many different ways however. At its most socially conscious, gamification can be a humanist design approach that aims to enrich people's lives with play (McGonigal, 2011). At its most profit focused, gamification has been criticized as superficial "exploitationware" (Bogost, 2011) and "pointification" (Robertson, 2010); a manipulative practice linked to corporate compliance strategies that instrumentalize play in the form of points, badges, and leaderboards in order to maximize profits. This latter approach has previously been characterized by a focus upon competency goals, scaffolded by clear achievement recognition pathways. However, a more generally playful approach can be equally engaging. Examples include the playful Bogota Mayor who transformed local driving cultures by hiring mimes to help pedestrians cross the street and mimic

aggressive drivers (Deterding, 2014, pp. 311–312). This humorous campaign helped to halve the number of road fatalities. In other words, gamification is not simply about games.

In this research project, the decision to explore a gamified response to blockchain eco-system design takes inspiration from Deterding's (Deterding, 2018) argument that a more integral, playful, and humanist approach towards gamification is possible. This alternative may be more challenging, but ultimately offers the greatest potential to transform daily life. In the context of blockchain eco-systems, design influences stem from many sources: co-operative game-design theory, as well as research from a large number of sharing networks and commons resource management projects, including social and economic ideas of what functioning collaborative communities could be (Jenkins and Ito, 2015)and how they might best be able to achieve innovation goals and social change agendas. Historic political economy research has also provided an important reference. Elinor Ostrom's (Ostrom, 1990) seminal design principles for effective commons resource management have been particularly influential (clear group boundaries, tiered management structures balanced by equal access to rule modification and systems for effective dispute resolution, internal monitoring, combined with graduated sanctions to help manage transgressions and external validation of those agreements). These principles are complimentary to the networking principles proposed here, which are further informed by gamification principles, as well as the online community management strategies promoted by Jono Bacon (Bacon, 2012) (discussed below) to build networked communities that are engaging, enjoyable, participatory, and empowering.

Drawing upon this foundational thinking we have identified eight key principles for the gamification of blockchain eco-systems. This design guide is thus based on a synthesis of principles specified elsewhere which we review in more detail in the next sections, in combination with our own experiences designing playful teaching and learning experiences, as well as studying networks with co-operative mission statements.

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The literature discussed below focuses upon the concept of game design as the engine of co-operative motivation.

## 2.1. *Design strategies to promote purposeful playfulness*

One of the most popular blockchain games to date has been *Cryptokitties*, which became a craze during the height of the bitcoin bubble in late 2017 (Jang *et al*., 2018). The game applied a playful context — breeding cute virtual cats — to peer-to-peer trading. Cryptokitties encouraged player collectors to breed and trade virtual, meme-styled cats for a fee. Trading Cryptokitties became so popular that it inspired a record sale of over $US100,000 for just one cat (Cheng, 2017). Commentators have argued that the game became so popular precisely because of the appeal that such in-joke silliness has for today's tongue in cheek, creative remix Internet cultures (Dousos, 2018).

Against this backdrop, designing a playful and yet also purposeful co-operative ecosystem for social enterprise initiatives poses challenges. Nevertheless, numerous social game design studies already exist that can support efforts to make co-operative platforms more playful and at the same time, play more social. For example, Belman and Flanagan's (2010) framework for empathetic game design emphasizes the importance of establishing an empathetic stance upfront (such as the opening challenge to sing a lullaby to a virtual baby in order to stop them from crying out and being killed in the game *Hush* set during the Rwandan genocide of 1994) and by continuing to support this stance with clear rules of engagement, that may also benefit from opportunities to walk in the other's shoes through subjective task variance and vicarious emotional affects, supported by clear and ready remedies for any problems encountered.

As Deterding points out, the central feature of what he refers to as a humanist gamification approach is that both games and more informal, playful provocations are "*deliberately designed* (original emphasis) to afford positive experiences" (Deterding, 2018;

Jones, 2018). Here, the aim is not to simply impose formal game elements on social interaction and expect uniform results, but to explore how values normally associated with play, such as the sense of heightened motivation, free choice, joy, safety, active participation, enablement, open-collaboration, goal-orientation, and purpose (Deterding, 2012; Bozionelos and Bozionelos, 1999) can also characterize blockchain eco-systems. This effort takes into account social practice and cultural mores, as much as technologies.

As Deterding has pointed out, "scholars from Johan Huizinga (1955/1938) onwards have stressed, playing games is a voluntary activity" (Deterding, 2014, p. 308) and this voluntariness is a social consideration. Activities feel fun when they satisfy psychological needs for a sense of autonomy, relatedness, or competence (Deci and Ryan, 2012, in Deterding 309). When these needs are met, players are more likely to embrace hard challenges, or seek to make meaningful choices.

Efforts to enable participatory agency (a sense of autonomy and meaningful influence) may appear to invite a smoke and mirrors design strategy — also borrowed from games — in order to create the *sense* of free choice despite the reality of limited options in a finite system. However, it is important to recognize that this is also a political strategy.

> "The software is an actor, one that carries traces of the platform, of the plugins and hacks, of the administrator's decisions … all are simultaneously manipulating me to behave in particular ways and enabling, empowering me to engage in specific behaviors, and suggesting ways others should engage with and treat me." (Owens, 2014, 162–163).

After analyzing 28 different books devoted to the design and development of online communities, digital archive researcher Trevor Owens concluded that all but one promoted techniques to control users like they were commodities (Owens, 2014, p. 105). The notable alternative, according to Owens, was Jono Bacon's 2009 book *The Art of Community: Building The New Age of*

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*Participation.* As the community manager for Ubuntu (an open source Linux operating system), Bacon focused on how a range of open source projects support such a collaborative effort and his language was "fundamentally different from that of just about all the other contemporary Web books" (Owens, 2014; Stern and Seifert, 2016). Bacon was still seeking to generate a community response, but his stance was collaborative. Instead of speaking of *users*, he refers to community members as *volunteers*. Rather than designing for *behavior modification*, Bacon talks in terms of designing *tools to support* the work of the group. He also used the word enable repeatedly, defining that as his role; to enable the community members to achieve their goals and also work with others to achieve a collective vision (Owens, 2014).

Deterding (NESTA, 2014) similarly emphasizes the role that gaming communities play, in partnership with designers, to create and maintain the sort of supportive and trusting environment that can offset the risks of gamified contexts, such as self-focused system gaming (working the system for self-benefit) and the sensitive line that distinguishes appropriate from inappropriate social play.

## 2.2. *Design strategies to promote co-operation*

Game interactions are inscribed by the rules that delineate a game as either competitive, or co-operative (Zagal *et al.*, 2006). Competitive games require players to directly oppose each other in a test of skill, or luck. Co-operative games instead provide opportunities to achieve a mutual win–win result. They don't necessarily guarantee equal results, but they do encourage strategic alliances. Examples include alternate reality games which pose complex problems that are too big for any one individual to solve as a way to force social collaboration. The challenge for participants to gather clues strewn in different locations around the world is an example of this approach. All the participants must work together as a team to achieve the end goal. Other co-operative play structures include theatre games, which guide social improvization practice through a system of interpersonal rules, such as the popular rule to respond openly to partner

suggestions with the motto "Yes and …" rather than block them
with phrases like "Yes, but …."

Strategies to help promote co-operation in multi-player virtual
game worlds may also be helpful references for blockchain eco-
system designers. Such strategies include designed role-play interde-
pendencies (e.g. warrior and healer) and the provision of a variety of
player roles to satisfy different motivations (Bartle, 2004). In order
to give participants a place to come together and form these alli-
ances, it is also important to consider the strategic architecture of a
variety of social spaces like meeting rooms, or group calls. These
spaces are most likely to be inviting when they are also supported by
the provision of a rich variety of interaction mechanics like text,
audio and visual gesture/movement, supplemented by ready rewards
for interaction like reward claps for popular, or valuable social input
(Ducheneaut *et al*., 2007; Ducheneaut *et al*., 2004).

Complimenting these strategies, it appears to be helpful if players
can track their collective enterprise and social interactions over time,
in order to witness and reinforce that they are gaining something
from the experience. Similarly, the provision of different types of
experiences and rewards designed for different stages and aspects of
that journey can also help to create a sense of social enrichment over
time, for example by allowing the occasional competitive encounter
between groups (Rapp, 2017).

Ideally, the real-world relevance (impact/meaning) of digital
interactions to social communities will be apparent at all times so
that participants are clearly positioned as essential and powerful
agents in that impact (Gresalfi *et al*., 2009). In mixed realities, it is
also helpful if virtual feedback privileges conviviality, rather than
battle-noise (such as the provision of like buttons, and the omission
of dislike buttons).

In order to create an evocative visual sense of social co-presence,
it is generally preferable if the virtual interface between players
enables spontaneous self-organization, so that participants can easily
initiate and participate within like-minded special interest groups
(Vogiazou and Eisenstadt, 2005). Even if participants are pseudony-
mous (by using an anonymous avatar, but also agreeing to ID-checks

within the system, for example), they can still be represented by avatars that emphasize points of similarity, rather than status differences (Belman and Flanagan, 2010). This can be achieved by the ready inclusion of personable profiles, and biographies (see the game *Layoff* (Flanagan, 2009)), or by alternatively limiting interactions to gestures rather than talk, to engage the imagination and also ensure that people from different language groups can share experiences together (see the experiential video game for two random collaborators, *Journey* (Thatgamecompany, 2012)).

Supplementing these studies, there are also established design principles for co-operative board games (allow individual decisions, ensure those decisions have clear outcomes, craft a variety of strengths/responsibilities in team roles, and introduce tensions between individual and group utility) (Zagal *et al.*, 2006); cooperative learning (positive interdependence, individual accountability, face-to-face promotive interaction, social skills training, and group processing) (Johnson and Johnson, 1987) and effective group-improvization (non-judgmental approach, physicalization, commitment to sociality, experimentation, and audience participation, combined with direct, fresh, daily and spontaneous contact with the world at large) (Spolin, 1963).

## 3. Eight Principles of Gamified Blockchain Eco-system Design

Drawing upon all of these sources, we have identified eight principles for designing playful and co-operative creative blockchain ecosystems, outlined below. These synthesized principles are chosen for their ability to promote a sense of voluntary engagement, social innovation, and collaborative empowerment.

### 3.1. *Balance individual and group goals*

Tensions between individual and team goals can increase the intensity of interaction. As long as participants are not battling for scarce

resources, enabling the capacity for individual choice, comparative judgment, or even competitive action can highlight tensions between self-interest and common goals. If those decisions are properly informed, then the capacity to co-construct meaning essential to deeper co-operation is enhanced. Highlighting these tensions may require that the entire system is relatively transparent, so that participants have access to a helpful systemic overview.

### 3.1.1. *Example application of principle 1 to the speculative design of a digital data-sharing blockchain eco-system*

This principle highlights the need to balance the collective intelligence goals with individual privacy controls. Privacy considerations suggest that individual participants will need to be able to control over who has access to their personalized data. Yet at the same time, the goal to build a collective data bank is likely to be served by the provision of rewards that make co-operation a valuable and meaningful choice for those participants who voluntarily share their data with others. Such rewards might include access to personal archival progress analytics, coaching and individual work records that automatically update recruiter profiles.

## 3.2. *Encourage risk, as much as accountability*

In order to progress co-operatively, all participants need to build their capacity through a process of relatively safe experimentation, balanced by real world accountability tools.

### 3.2.1. *Example application of principle 2 to the speculative design of a digital data-sharing blockchain eco-system*

Once a collective digital production intelligence is gathered, this data can help to inform the analysis and evaluation of digital craft skills among member organizations. As part of this analysis it will be

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helpful to witness the value of less productive, but more experimental periods, as well as identify the most efficient production methods over time. Structures to encourage experimentation alongside productivity goals might include playful challenges, like design sprints which challenge members to produce a maximum/minimum amount of data in a short amount of time, or the challenge to swap and apply other people's working methods. Such playful social challenges can be supplemented by regular feedback provision such as task completion boards which member organizations can choose to share, or not.

### 3.3. *Provide useful feedback*

Personal and collective data tracking can take many forms. Designers need to work with a community to explore what sort of feedback is most helpful and the concerns that participants might have about that evaluation process. Reputation systems are part of this, but digital data banks may also offer other forms of developmental feedback.

### 3.3.1. *Example application of principle 3 to the speculative design of a digital data-sharing blockchain eco-system*

The facility to track individual contributions (now possible in automated systems) can be informative and this information is helpful if it is also shared in a mutually respectful way. For example, it is also generally beneficial if that facility is contextualized by an inclusive learning and teaching lens, so that players are able to reflect upon past decisions, or performance in a way that is constructive, as well as encouraging. This may require peer-to-peer evaluation and support networks separate to management review structures, as well as some degree of system transparency. Participants should also ideally be able to access all the relevant, legally available information (bearing in mind privacy concerns) required to enable

meaningful evaluation and feedback mechanisms. Where this requires some form of automated data translation, the algorithmic evaluation process should also be flexible and as transparent as possible.

## 3.4. *Encourage collaboration through variety*

When a variety of skills and contributions are valued, enabling complimentary roles and responsibilities, as much as vulnerabilities, can encourage community spirit.

### 3.4.1. *Example application of principle 4 to the speculative design of a digital data-sharing blockchain eco-system*

Fundamentally, this is about ensuring that different subjectivities, contributions and strengths are not only valued, but also seen to be valued. To achieve this requires input into the local rules, or opportunities for engagement (which may include the chance to share, or swap experiences) and rewards structures of each group. In smaller co-operatives, it may be possible to enable all participants affected by the rules to modify the rules, but in larger networks that capacity instead focuses upon nested agencies which enable individuals to self-organize in groups using networking structures that can be personalized in a variety of ways, such as hierarchical or egalitarian, centralized or decentralized, according to changing needs.

## 3.5. *Foster social presence*

Intragroup communication facilities are essential tools for collaboration and will generally thrive from a variety of interaction styles, including text, audio-visuals, or gesture. Similarly, opportunities to perform as well as watch and/or control privacy boundaries are helpful. Rewards for these actions will ideally emphasize the benefits of social bonds, rather than broadcast aggression.

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### 3.5.1. *Example application of principle 5 to the speculative design of a digital data-sharing blockchain eco-system*

Larger, less resourced groups are less likely to be co-operative (Olson, 2009; Buchanan and Tullock, 1962). Where co-operatives do grow, it may therefore be more productive in the long term if they instead follow Mondragon's lead and develop consortia of smaller special interest groups. The more communication tools that these groups can access, the better. Ideally there will be a mix of face to face, as well as more flexible and remote digital communication channels. Each group may need to experiment with their optimum communication methods, which are also likely to change over time, but independence and freedom, balanced by personable and social presence are essential aspects of a functioning co-operative culture that, like empathy and social justice priorities may need to be articulated up front and also regularly reinforced.

## 3.6. *Make it clear why co-operation is the best choice*

To avoid central dominance there needs to be a clear rationale for co-operation, such as the capacity to extend personal resources by sharing the potential yield and burdens of digital assets, or the systematic privileging of team-work — supported by transparent management.

### 3.6.1. *Example application of principle 6 to the speculative design of a digital data-sharing blockchain eco-system*

An example of this principle in action might include the introduction of playful rewards for voluntary creative community enterprise hours (bearing in mind the ecological and financial costs of non-fungible asset registration) to help manage the data-gathering and

sharing enterprise. These reward assets can include compounding procedural animations, or premium digital functions that trigger as the collection grows. This option was suggested in the SGSAH/ Creative Scotland 2018 Digital Design Futures Report (Patrickson, 2018), which explored a range of targeted community interventions for creative culture development and mentorship schemes including volunteer rewards, group creative graduate co-operative release packs, and collective fundraising frameworks for purchase of creative studio space.

## 3.7. *Create meaningful group goals*

Players need to care about the co-operative goal, or outcome, which will ideally be uncertain, to motivate effort. When achieved, this outcome also needs to be satisfying.

### 3.7.1. *Example application of principle 7 to the speculative design of a digital data-sharing blockchain eco-system*

The value of a cross-sectoral digital production data-bank needs to be readily apparent to all member organizations. The supply of useful and meaningful collective production intelligence needs to be updated regularly, interpreted clearly and also easily accessible for members. Access to any shared financial rewards that might accrue from the resale of this information also needs to be distributed back to members in a timely and transparent manner.

## 3.8. *Design a developmental process*

Randomized challenges and a journey experience may be required to engage participant's changing needs over time. For example, visual encouragement and personal response may be more important in the early stages of engagement, balanced by the chance for skill recognition and greater responsibility over time.

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### 3.8.1. *Example application of principle 8 to the speculative design of a digital data-sharing blockchain eco-system*

A variety of reward structures and participation, or membership options can be made available. For example, the degree of available digital production analytics may vary according to the level of contribution. Opportunities to gain public recognition for creative digital skill, or perform mastery in the form of intrinsic knowhow, or skill certificates, or community creativity awards are also likely to help encourage continued involvement over time.

### 3.9. *The holistic application of these playful design principles for blockchain eco-systems*

What these principles highlight is that in order to transform behaviors and ultimately cultural practice, playful and co-operative blockchain eco-systems need to collaborate with their associated communities of practice; a point that is sometimes lost amidst the current enthusiasm for algorithmic governance (Roio and Jelincic, 2017). As such, the optimal deployment of these design principles will vary across different social contexts.

Not every blockchain eco-system will seek to achieve social value transformation, but the opportunity to advance social value transformation through digital value adjustment holds promise for those who choose to pursue such social change agendas. In order for that collective enterprise to generate networked, co-operative exchange cultures the social goals will need to be articulated clearly, however, and these eight principles applied holistically.

### 4. Blockchain Platform Co-operative Design Challenges

For blockchain eco-systems to be successful, members will generally need to be consciously working together to develop the challenge

pathways and shared rewards that can open up as a result of their combined efforts.

In this final section, we explore the ways that these eight design principles respond to the social, cultural, economic, and creative challenges that can arise as part of this sort of co-operative enterprise.

### 4.1. *Limited consumer market*

Why would consumers prefer blockchain ecosystem tokens over cash when cryptocurrency transactions are costly, slow to process, drain resources, and are technically confusing for the uninitiated? This is a fundamental design challenge that blockchain eco-system designers need to consider seriously before they even begin to apply the design principles outlined in this chapter.

### 4.2. *Resource use*

Ironically, despite the appearance of co-operation, blockchain technologies in fact create consensus on the back of self-interest and competition. The first cryptocurrency, bitcoin, is still the most secure of all the cryptocurrencies due to a costly and energy consuming proof of work authentication process driven by the promise of financial reward. Those who compete to be the first to solve a complex, cryptographic puzzle in order to win the allotted bitcoin cash reward are called miners. New bitcoins are created in each new round of this puzzle, along with a new block of authenticated transactions to be added to the chain. Once the puzzle is solved, those problem-solving efforts act like a *de facto* time stamp that proves that these transactions were recorded on this block, in this time period. The new block is given a unique cryptographic hash number ID, which includes the hash of the previous block, and in this way each block in the chain is authorized and linked to the previous block in turn. Those records are regarded as immutable, which means that once authorized those records are extremely difficult to change. Due to the limited number of the bitcoin pool, over time these cryptographic puzzles have

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become harder and demand more computing power to solve. Thus, ironically, the bitcoin protocol also encourages centralization as miners band together to up their chances of computation success. In theory, the genius of this system is that it can co-ordinate a variety of different self-interests into a collective win–win eco-system. In practice, that win–win is still seriously compromised by access issues, as well as the alarming amount of electricity required to sustain it, which reportedly exceeds the electrical footprint of a country the size of Ireland (Hern, 2017). In other words, while digital networks can successfully co-ordinate self-interest for mutual benefit, they are not by their nature public services and need to be designed accordingly in order to help manage their societal impact and also promote their public benefits.

Given the limits of current blockchain technologies we conclude that these two fundamental logistic concerns signal the need for alternative prototyping strategies beyond proof of work authentication technologies like bitcoin. Until the technology develops, alternative blockchain technologies are required that limit the amount of blockchain registration, so that it is a smaller, perhaps voluntary part of a wider digital exchange eco-system. Another option is to promote the faster, lighter impact of blockchain inspired distributed ledger technologies like Corda for data-sharing ventures (such as the hypothetical digital data-sharing initiative discussed in this chapter). These alternative networks do not need to employ proof of work authentication protocols because access to the pooled data is by permission and only available on a need to know basis. This may be a more controlled and less transparent form of data-sharing, but it is also more sustainable, enabling the data-sharing social processes to be established and tested now while the blockchain technology to support it continues to develop.

## 4.3. *Token creativity*

The extent to which digital token alt-currency rewards can transform social value systems is still unclear, largely because social

values incorporate so much more than currency exchange. The open
source movement, for example, began in collaborative technology
development and grew into what has been described as a "genuine
grass roots revolution" (DiBona, *et al.*, 1999; Jones, 2018). It enacts
the idea that culture, remix, creative commons, sharing networks
and individuals acting together without copyright restrictions in
place can outperform corporations. The American (and global)
*gitcoin.co* platform, has recently sought to reward the open source
space, by providing a facility for paid open source ethereum develop-
ment projects. Rather than tokenize those efforts or raising funds via
a speculative initial coin offering (ICO), the platform emphasizes
freedom and choice — all projects are voluntary and participants can
choose who they work with.

These efforts are sensitive because they can also introduce new
tensions between the extrinsic (external) and intrinsic (inherent)
value of historically unpaid work. Social values such as friendship
and caring are not generally monetized, or even formalized. Freedom
of choice is essential because otherwise token based exchange sys-
tems force quantification. The hope of decentralization enthusiasts is
that along the way these newly quantified tokens will also help to
create a more inclusive and self-sustaining society. The challenge is
to ensure that Walter Benjamin's warning about endless copies does
not also apply to tokenization: "That which withers in the age of
mechanical reproduction is the aura of the work of art" (Benjamin
and Underwood, 1998).

As Malik and Butt (Malik and Butt, 2017) have shown in an
extensive review of creativity and rewards literature, theories of
motivation have been dominated by two overarching and contradic-
tory perspectives. The cognitive perspective argues that extrinsic
rewards (outcome focused) detract from (process focused) intrinsic
motivation. Whereas the behavioral perspective argues that external
factors (such as rewards, threats, deadlines, and competition) can
both motivate and enhance creative behavior. The cognitive view is
backed up by numerous empirical studies spanning several decades,
which suggest that such trivializing rewards signal incompetency and

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undermine experimental attitudes. This effect is particularly marked in relation to performance-contingent metrics, which can be perceived as controlling. Creative cultures are characterized by their tendency to value autonomy, free association, experimentation, aesthetic pleasure, and playfulness as a way of working. They also need to embrace risk in order to invent, so while efficiency targets might inspire productivity improvements creativity is likely to drop off. In other words, extrinsic motivations can focus upon utility solutions, while internal motivations are more likely to inspire novelty solutions. In particular, studies show that creative behaviors are challenged by tangible rewards, like financial bonuses.

> "If managers operate on the simplistic "scientific management" notion that extrinsic motivation is always necessary and always positive, they can wander into a hopeless quagmire. It is extremely difficult to establish extrinsic reward systems that elicit exactly the behaviors that are desired; these systems are almost always flawed." (Amabile, 1997; 9).

However, the situation is not entirely clear-cut. Intangible rewards that include task related information and support a sense of self-efficacy like positive feedback and public appreciation have been shown to enhance intrinsic motivation. Furthermore, when performance efficiency and productivity metrics are exchanged for express creativity metrics and expected innovation evaluations they do foster creative behavior. According to these results creativity is not simply a skill, but also a decision or attitude (Sternberg, 2006). From that perspective, any factor which supports people in their efforts to make that choice (financial or otherwise) by setting creative goals or offering meaningful feedback and status rewards also supports creative behavior, with one proviso. These rewards only work as long as participants also have a strong sense of creative self-efficacy, which refers to "the belief (that) one has the ability to produce creative outcomes" (Tierney and Farmer, 2002, p. 1138). Those who doubt their own abilities are more likely to be motivated by the

chance to experiment, or play for its own sake, free of outcome expectations which can then slowly be introduced over time. Similarly, whereas intrinsic rewards foster engagement, extrinsic rewards may be important to help people pass through tough hurdles.

This suggests that any effort to tokenize creative contribution needs to be openly contextualized by the philosophical goal of reconfiguring social value exchange. Rutherford and Nissen's mission to consult with local communities and develop a feminist cryptocurrency is a good example of this sort of conscious, upfront approach. In terms of the design principles articulated here, this includes the need to encourage risk, as much as accountability and create meaningful group goals, as well as balance individual and group goals and also foster a sense of social presence.

Efforts to monetize the value of what are often underpaid, but priceless creative commons are likely to be rejected unless they are designed in a way to emphasize intrinsic motivations. To support this effort it might also be helpful if tokens are designed to afford agency (such as votes, or information access and training, rather than money) and are simultaneously tied to sympathetic values like creativity, sustainability, sharing, and inclusion. In terms of our design principles, this emphasizes the importance of providing useful feedback, as well as the value of a developmental process and the importance of variety alongside clear rewards for co-operation, such as social presence, cultural enrichment, and meaningful group goals.

## 4.4. *Governance*

Automated consensus systems that enable what are called "trustless transactions" (because participants don't need to trust those involved in order to be confident that the transaction is as recorded on the digital ledger) enact the idea that code is law (Lessig, 1999). This metaphor refers to the prospect that code can effectively enforce itself by enacting pre-agreed events without human interference, or intervention. Given the propensity for fraud and exploitation in

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current day markets, the idea of a completely automated management structure that is strongly resistant to corruption, known as a Digital Autonomous Organization or DAO has captured the imagination of alternative economy enthusiasts (Roio and Jelincic, 2017). Nevertheless, just as traditional legal and policing systems have generally evolved for a reason, so too complex disputes inevitably tend to arise in most collective endeavors. For this reason, we argue that automated blockchain eco-systems are more likely to succeed when they collaborate closely with existing communities and provide cautionary structures for human intervention when required.

Social value transformation efforts within Scotland's creative communities are complex. At present, for example, there are growing tensions between the drive to grow the creative industries, versus the concern that these industries are being increasingly impoverished by freelance labor conditions. As a result of the rise of what has been called the gig economy (De Stefano, 2015), many creative practitioners are now facing a potential future creative career without a minimum wage, sickness leave, or retirement plan (McRobbie, 2018). Alternative solutions to income precarity are required. Innovations such as Patreon, crowdfunding, and IP stakeholder sales can help to support creative lifestyle choices which is why Deci and Ryan (1985) proposed that rather than focus upon an extrinsic–intrinsic dichotomy it is ultimately more useful to consider whether the participatory motivation is autonomous or controlled. At the same time, however, whereas crowdfunding can provide sponsorship for those with an established public profile, not all creative practitioners have that sort of social influence. Indeed, a lack of public profile may reflect the desire for autonomy. Equal access to secure practitioner income is an ongoing concern.

Financial ownership, mutual responsibility, and self-autonomy are hallmarks of the successful Mondragon collective in Spain. Mondragon was pioneered in the Basque region in 1956 by a Catholic Priest Don José Maria Arizmendi-Arrieta and a small group of engineering graduates. It has since grown to become a large consortium of different enterprises that together rank as Spain's tenth

largest company with over 70,000 employees. This diverse enterprise is profit oriented, but united by a deep sense of social justice, participation, and solidarity. Their 10 basic Co-operative Principles include Open Admission, Democratic Organization, the Sovereignty of Labor, Instrumental and Subordinate Nature of Capital, Participatory Management, Payment Solidarity, Inter-co-operation, Social Transformation, Universality, and Education. These principles partner four corporate values: co-operation (acting as owners), participation (in a commitment to management), social responsibility (by means of the redistribution of wealth based on solidarity), and innovation (the pursuit of constant renewal) (Hira and Reilly, 2017). As a worker owned organization Mondragon does not allow for unionization or strikes, which means that disputes are governed internally (Latinne, 2014). Ownership in this context might seem like a numbers game, but the consortium is organized into autonomous sectoral divisions.

These concerns speak to foundational playful design principles such as voluntary engagement and the sense of participatory agency. In terms of the design principles articulated here this concern emphasizes the importance of fostering social presence, and encouraging risk as much as accountability, while fostering meaningful group goals, balancing individual and group goals and ensuring that co-operation is clearly the best choice for all those involved.

A direct copy of the Mondragon system is unlikely in the context of Scottish collectives united by their love of creativity, rather than a religious fervor. Nevertheless, creativity is a passionate value and so the prospect of using blockchain technologies to create a third space where creatives, local businesses and communities can co-operate more confidently may deserve further consideration.

## 4.5. *Equity*

Putnam defines social capital as "connections among individuals — social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000; McGonigal, 2011).

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This definition has become emblematic of the idea that connectivity can generate creativity and abundance of its own accord, particularly in the social media era. While blockchain technologies can be tools for extended social capital formation, equity is still an important consideration for blockchain co-operatives. As DeFillippis (2001) points out, when social networking capacity is automatically conflated with the ability to generate social capital, it is also more likely that those networks unable to generate capital are rendered invisible:

> "We need to create social networks that allow individuals to realize capital, while simultaneously allowing these networks to realize the power needed to attract and control that capital (for the benefit of those in the networks).… Only in doing this can individual gains and interests be assumed to be synonymous with group gains and interests." (DeFilippis, 2001).

As this concern highlights, blockchain eco-systems are more likely to be equitable when they encourage variety and accommodate designed interdependencies so that individual and group goals are balanced and all collaborative contributions are publicly accounted for, valued and rewarded. As part of this, we emphasize the importance of an inclusive teaching and learning lens to encourage experimentation and developmental support, as much as reward mastery.

## 5. Conclusion

This manifesto explored what game design theory offers for creative blockchain eco-system design efforts. As we have discussed, consensus data-sharing technologies can automate peer-to-peer, digital value exchange in useful ways. In turn, this capacity can help to streamline efforts to achieve social value transformation through networked, collective actions. The ability to collect, collate, and analyze cross-sectoral digital production histories, for example, a hypothetical community enterprise discussed in this chapter is dependent

upon technologies that can securely store, process, translate, and share that information, but in order to become a useful eco-system, this sort of collaborative initiative must first achieve a significant level of social practice or community engagement. In other words, the blockchain eco-system is only useful when enough people participate to achieve that purpose. The more people who are involved, the more useful that resource becomes. Thus, it is essential that automated networking systems such as this create a social exchange system that is as personally empowering, socially engaging and culturally enriching as possible. We have argued that this is more likely when designers employ a gamified design approach in partnership with existing networking structures.

While automated transactions are helpful, they are not necessarily adequate controls to ensure the success of creative collective enterprise initiatives. Whereas identity verification and peer review reputation systems can promote social accountability, these systems can still reinforce historic social assumptions such as might is right, the winner takes it all, or you can't trust anybody to name just a few. In order to develop a more co-operative and open creative culture eco-system it is helpful if more integral drivers are in place to motivate voluntary engagement, contribution, playful innovation, and community enrichment. This is the sort of social practice that can help creative communities to collaborate and thrive together.

Drawing upon existing co-operative game-design principles, along with proven strategies to help promote co-operative resource management, open networking and online community development we have identified eight design principles for playful and co-operative blockchain eco-systems. These eight principles include: (1) Balance individual and group goals, (2) Build structures that encourage risk, as much as accountability, (3) Provide useful feedback and evaluation, (4) Encourage collaboration through variety, (5) Foster social presence, (6) Make it clear why co-operation is the best choice, (7) Create meaningful group goals, and (8) Design a developmental process. Applied holistically, these eight principles are useful strategies for creative blockchain eco-system design and development.

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This manifesto calls for these potentially transformative design strategies to be applied to the design of future blockchain eco-systems. By making social values more apparent and embedding opportunities for social play within collective endeavors, co-operative design principles for playful/gameful engagement provide a preliminary framework to help articulate and potentially transform creative, co-operative blockchain eco-systems.

## References

Amabile, T. M. (1997). Motivating creativity in organizations: On doing what you love and loving what you do. *California Management Review*, 40(1), 39–58.

Bacon, J. (2012). *The Art of Community: Building the New Age of Participation*, O'Reilly Media, Inc.

Bartle, R. A. (2004). *Designing Virtual Worlds*, New Riders, Indianapolis, US.

Belman, J. and Flanagan, M. (2010). Designing games to foster empathy. *International Journal of Cognitive Technology*, 15(1), 11.

Benjamin, W. and Underwood, J. (1998). The work of art in the age of mechanical reproduction. *Illuminations*, 241(2), 219–253.

Bogost, I. (2011). Gamification is bullshit: My position statement at the Wharton Gamification Symposium. *Ian Bogost Blog*, available at: http://bogost.com/writing/blog/gamification_is_bullshit/ (accessed 3 March 2013).

Bozionelos, N. and Bozionelos, G. (1999). Playfulness: Its relationship with instrumental and expressive traits. *Personality and Individual Differences*, 26(4), 749–760.

Buchanan, J. M. and Tullock, G. (1962). *The Calculus of Consent*, Vol. 3. University of Michigan Press, Ann Arbor.

Cheng, E. (2017). Meet CryptoKitties, the $100,000 digital beanie babies epitomizing the cryptocurrency mania. Available at: https://www.cnbc.com/2017/12/06/meet-cryptokitties-the-new-digital-beanie-babies-selling-for-100k.html (accessed 17 February 2019).

Council, B. (2015). Creative HubKit; http://creativeconomy.britishcouncil.org/media/uploads/files/Creative_HubKit.pdf (accessed May 2015).

Creative_Scotland. (2015). Collective Futures: Cultivating Creative Collectives; http://creativefutureshq.com/projects/collective-°©-futures/ (accessed May 2016).

De Stefano, V. (2015). The rise of the just-in-time workforce: On-demand work, crowdwork, and labor protection in the gig-economy. *Comparative Labor Law and Policy Journal*, 37, 471.

DeFilippis, J. (2001). The myth of social capital in community development. *Housing Policy Debate*, 12(4), 781–806.

Deterding, S. (2012). Gamification: Designing for motivation. *Interactions*, 19(4), 14–17.

Deterding, S. (2014). Eudaimonic design, or: Six invitations to rethink gamification. In Fuchs, M. *et al*., (eds.), *Rethinking Gamification*, meson press: Lüneburg.

Deterding, S. (2018). Gamification in management: Between choice architecture and humanistic design. *Journal of Management Inquiry*, 1(3), 1056492618790912.

Deterding, S., *et al*. (2011). From game design elements to gamefulness:defining "gamification". *MindTrek'11*,Tampere, Finland.

DiBona, C., Ockman, S. and Stone, M. (1999). *Introduction to Open Sources: Voices from the Open Source Revolution*, O'Reilly & Associates, USA.

Dousos, F. (2018). What Cryptokitties can teach us about the success of blockchain; https://dataconomy.com/2018/01/cryptokitties-can-teach-us-success-blockchain/ (accessed 17 February 2019).

Ducheneaut, N., Moore, R. J. and Nickell E. (2004). Designing for sociability in massively multiplayer games: an examination of the "third places" of SWG. *Conference Proceedings for Other Players, Center for Computer Games Research*, IT University of Copenhagen, DK.

Ducheneaut, N., Moore, R. J. and Nickell E. (2007). Virtual "third places": A case study of sociability in massively multiplayer games. *Computer Supported Cooperative Work (CSCW)*, 16(1–2), 129–166.

Flanagan, M. (2009). *Lay-off*, U.S.

Government, H. (2018). Industrial strategy: Creative industries sector deal; https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/695097/creative-industries-sector-deal-print.pdf (accessed January 2019).

Gresalfi, M., *et al*. (2009). Virtual worlds, conceptual understanding, and me: Designing for consequential engagement. *On the Horizon*, 17(1), 21–34.

Hamari, J., Koivisto J. and Sarsa H. (2014). Does gamification work? — a literature review of empirical studies on gamification. *2014 47th Hawaii International Conference on System Sciences* (*HICSS*). Hawaii: HICSS/IEEE.

Hern, A. (2017). Bitcoin mining consumes more electricity a year than Ireland; https://www.theguardian.com/technology/2017/nov/27/bitcoin-mining-consumes-electricity-ireland (accessed 17 February 2019).

Hira, A. and Reilly, K. ( 2017). The emergence of the sharing economy: Implications for development. *Journal of Developing Societies*, 33(2), 175–190.

Jang, M., Yoo, B. and Lee, J. (2018). An empirical analysis of player behavior in blockchain-based game: Is it a game or speculation? 한국경영정보학회 학술대회, 120–123.

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Jenkins, H. and Ito, M. (2015). *Participatory Culture in a NetworkedEera: A Conversation on Youth, Learning, Commerce, and Politics*, John Sons.

Johnson, D. W. and Johnson, R. T. (1987). *Learning Together and Alone: Cooperative, Competitive, and Individualistic Learning*, Prentice-Hall, Inc.

Jones, R. (2018). Artists in battle over modern artwork pension fund; https://www.theguardian.com/money/2018/mar/17/art-pension-trust-investment-legal-action-artists (accessed 3 August 2018).

Latinne, A. (2014). *The Mondragon Cooperatives: Workplace Democracy and Globalization*, Intersentia, Cambridge, UK.

Lessig, L. (1999). *Code and other Laws of Cyberspace*, Basic Books, New York, US.

Malik, M. A. R. and Butt, A. N. (2017). Rewards and creativity: Past, present, and future. *Applied Psychology*, 66(2), 290–325.

McGonigal, J. (2011). *Reality Is Broken: Why Games Make Us Better and How They Can Change the World*, Penguin.

McRobbie, A. (2018). *Be Creative: Making A Living in the New Culture Industries*, Polity Press, Cambridge, UK.

NESTA (2014). A manifesto for the creative economy. Available from: http://www.nesta.org.uk/publications/manifesto-°©-creative-°©-economy (accessed May 2016).

Niantic (2016). *Pokémon Go*, Niantic, San Francisco, US.

Office, C. E. (2015). Performance and impact report 2014/2015; http://www.culturalenterpriseoffice.co.uk/about/our-°©-impact/ (accessed June 2016).

Olson, M. (2009). *The Logic of Collective Action: Public Goods and the Theory of Groups*, Second Printing with New Preface and Appendix, Vol. 124., University Press, Cambridge, London UK.; Massachusetts, US.

Ostrom, E. (1990). *Governing the Commons*, Cambridge University Press.

Owens, T. (2014). *Designing Online Communities: How Designers, Developers, Community Managers, and Software Structure Discourse and Knowledge Production on the Web*.

Patrickson, B. (2018). Digital design futures in Scotland, https://www.sgsah.ac.uk/about/news/headline_624144_en.html?fbclid=IwAR3GYQOXMinMlfdyLWBeEuvSEs9rlOsjyzd5zrWLHqOJSPVdj-B6akSVu3s (accessed December 1 2018).

Patrickson B. and Johnson M. (2019). *Communities and Technologies Conference*, Vienna, Austria, June 3–7.

Putnam, R. D. (2000). Bowling alone: America's declining social capital. *Culture and Politics*, Springer. pp. 223–234.

Rapp, A. (2017). Designing interactive systems through a game lens: An ethnographic approach. *Computers in Human Behavior*, 71, 455–468.

Riddoch, L. (2018). Govanhill's swap market scheme proves a huge success, https://www.thenational.scot/news/17230209.govanhills-swap-market-scheme-proves-a-huge-success/ (accessed 19 February 2019).

Robertson, M. (2010). Can't play, won't play. Hide & Seek, 6: p. 2010.

Roio, D. and Jelincic, I. (2017). Multidisciplinary framework on commons collaborative economy, https://files.dyne.org/decode/D3.3_Data_Privacy_and_Smart_Language_requirements.pdf (accessed 3 March 2018).

Scotland, C. (2016). Creative industries: A strategy for creative Scotland 2016/17, http://www.creativescotland.com/__data/assets/pdf_file/0007/34918/CS-°©-Creative-°©-Industries-°©-Strategy-°©-2016-°©-17.pdf (accessed August 2016).

Scottish Governmnet (2017). Businesses in Scotland — key facts — the scottish government, https://www2.gov.scot/Topics/Statistics/Browse/Business/Corporate/KeyFacts (accessed 15 January 2018).

Spolin, V. (1963). *Improvisation for the Theatre: A Handbook of Teaching and Directing Techniques*, Northwestern University Press, Evanston, Ill.

Stern, M. J. and Seifert, S. C. (2016). Understanding the value of arts & culture: The AHRC cultural value project (2016) by Geoffrey Crossick and Patrycja Kaszynska. *Cultural Trends*, 25(4), 277–279.

Sternberg, R. J. (2006). The nature of creativity. *Creativity Research Journal*, 18(1), 87–98.

Tajiri, S. (1996). *Pokémon*, Nintendo, Tokyo, Japan.

Thatgamecompany (2012). *Journey*, Sony Computer Entertainment, US.

The Blockchain Ecosystem (2017). *myblockchainblog*, https://steemit.com/cryptocurrency/@myblockchainblog/the-blockchain-ecosystem (accessed 3 April 2018).

Tierney, P. and Farmer, S. M. (2002). Creative self-efficacy: Its potential antecedents and relationship to creative performance. *Academy of Management Journal*, 45(6), 1137–1148.

Vogiazou, Y. and Eisenstadt, M. (2005). Designing multiplayer games to facilitate emergent social behaviours online. *Interactive Technology and Smart Education*, 2(2), 117–130.

Zagal, J. P., Rick, J. and Hsi, I. (2006). Collaborative games: Lessons learned from board games. *Simulation & Gaming*, 37(1), 24–40.

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