

# **Blockchain: Disrupting the Creative Industries**

**Enablers, Barriers and Utilization through Persuasive System Design**



## **Dissertation**

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## Preface

Blockchain technology enables the automated recording of information and execution of contract content – utilizing so-called Smart Contracts – without relying on trusted intermediaries (Beck et al., 2016). A blockchain is best described as a decentralized digital ledger (Atzori, 2015). The decentralized data storage on the blockchain makes the recorded information tamper-proof and creates transparency along the value chain. Therefore blockchain changes fundamentally the way data and information are processed (Al-Jaroodi & Mohamed, 2019; Avital et al., 2016). This has given rise to numerous use cases for blockchain in a wide range of industries.

Fundamentally, blockchain technology can be used at any time when information needs to be stored in an automated and tamper-proof manner (Crosby et al., 2016). In the financial industry, blockchain helps to automate peer-to-peer transactions. This makes middlemen obsolete, which can reduce transaction costs (Cai, 2018). In the public health sector, blockchain is primarily used for decentralized storage of patient records. By using blockchain technology, these patient records are secured against manipulation and unauthorized access by third parties (Mettler, 2016). Another interesting use case can be seen in the electricity market. Blockchain technology makes it possible to integrate micro producers of electricity, such as private households, into the power grid in a cost-efficient way (Cheng et al., 2017). However, blockchain technology also offers several applications in the creative industries to support the daily work of professionals.

The term creative industries encompasses industries and sectors which hold intellectual property at the core of their value creation (Caves, 2000). According to DCMS (1998), creative industries include not only classic art sectors such as fine art, painting or crafting, but also areas such as marketing, game developing, film and video or music. As the main drivers of innovation, the creative industries have a steadily increasing influence on the overall economic impact. Often, ideas, products and services from the creative industries ultimately flow into other areas, such as the automotive sector, and support them in achieving their entrepreneurial goals (Banks, 2010; Jones et al., 2004). In order to continuously maintain the position as an innovation driver, a certain form of organization has prevailed in the creative industries.

For the creative industries to react flexibly to new requirements and a constantly changing environment, work is usually carried out as project-based (DeFillippi, 2015). For this purpose, the teams of the project-based organization are predominantly formed using freelancers who

are specialists in the required field. As a result, many recurring organizational activities arise, such as contracting, team finding or onboarding (DeFillippi, 2015; Eikhof & Haunschild, 2006). Therefore, professionals from the creative industries have to spend significant time on activities that do not serve their core task of creating intellectual property. These tasks not only reduce the efficiency of their work, but also hinder their creative flow (Foord, 2009; Hennekam & Bennett, 2016). In this regard, blockchain represents a promising technology to support professionals in the creative industries.

For the creative industries, blockchain is primarily used to automate formal processes and secure intellectual property rights (O'Dair, 2018). Blockchain technology enables artists and creatives more freedom for their own creative activities. By automating repetitive activities, professionals from the creative industries are freed from typical management tasks (Arcos, 2018; Cong & He, 2019). Furthermore, for the first time, intellectual property can be secured in a cost- and time-efficient way by utilizing blockchain technology. This is made possible by the decentralized nature of the blockchain, which makes subsequent manipulation of the contents of the intellectual property impossible (Avital et al., 2016; Beck et al., 2016; Regner et al., 2019). Ultimately, the use of so-called Non-Fungible Tokens (NFTs) create the opportunity for artists and creatives to sell unique digital art (Regner et al., 2019). Thus, blockchain generates entirely new ways for creative industries to organize their projects and opens new markets to sell their work. While several use cases of blockchain technology can be identified in the creative industries, the widespread use of blockchain is still lacking.

So far, no Blockchain service or blockchain application has managed to take a dominant market position in the creative industries. At first sight, this seems surprising since artists and creatives could fundamentally benefit from this technology. At the same time, professionals from the creative industries would not be dependent on middlemen or central entities. This circumstance gave the impulse for the research presented in this thesis. I was able to identify that professionals from the creative industries are still underutilizing blockchain technology for three main reasons: (1) When using blockchain technology, professionals from the creative industries experience strong resistance from their stakeholders, who want to prevent the use of blockchain. (2) The perceived constraints by artists and creatives in using blockchain still deter many from using this technology extensively. (3) Several blockchain applications lack a persuasive design, resulting in many artists and creatives continue to prefer conventional services and products.

## Research Questions and Dissertation Outline

The first paper titled: Initial Coin Offerings for Funding Artists? - Uncovering barriers hindering the financing of artistic projects<sup>1</sup>, explores the barriers professionals from the creative industries face by their stakeholders when using blockchain technology to finance their projects. With the help of blockchain technology, the possibility of financing projects through so-called Initial Coin Offerings (ICOs) is emerging. Initial Coin Offerings work similarly to Initial Public Offerings (IPOs), whereby tokens (a special form of cryptocurrency) are distributed as countervalue instead of stocks. ICOs are especially carried out for high-risk projects. Since the success of projects in the creative industries is difficult to predict, projects of the creative industries are considered as risk investments. Therefore, ICOs are a promising way for artists and creatives to finance their projects. However, only a few ICOs are successfully carried out by the creative industries. Thus, this study explores the question: *Which barriers arise for funding artists' projects when using Initial Coin Offerings?*

To answer the research question, qualitative expert interviews were conducted with artists and creatives that use blockchain technology and were at least planning or, in the best case, already successfully carried out ICOs. We also conducted interviews with software developers of blockchain services and products for the creative industries who at least planned or, in the best case successfully carried out ICOs. A total of 35 interviews were conducted, including eight interviews with representatives of the photography industry, seven interviews with representatives of the art industry, six interviews with representatives of the music industry, three interviews with representatives of the video and film industry, three interviews with representatives of the fashion industry, and one automotive designer for exterior design. In addition, seven software developers of blockchain applications for the creative industries were interviewed. In total, 27 men and 7 women were interviewed. The interview participants were from Argentina, Belgium, Germany, England, Mexico, Poland, Portugal, Romania, Slovenia, United States, and Singapore. The interviews were coded and analyzed according to Mayring, (2004).

Four barriers that hinder the funding of artistic projects through ICOs were revealed: legal shortcomings, investment restrictions, absence of consumer support and resistance by middlemen. This study provides a theoretical contribution to the general academic discourse on ICOs. It is argued that ICOs do not minimize risks. Rather, financial risks are associated

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<sup>1</sup> This paper was submitted to the Journal of Cultural Economics and is under revision at the time of dissertation submission

with this form of financing for investors due to coin – and token volatility. Furthermore, a practical contribution is made by agreeing with the view of O’Dair (2019) that a regulation of ICOs is necessary. In doing so, we also reject the claim of Amsden and Schweizer (2018) that the lack of regulation increases investor interest.

The second study, titled: *Overcoming Constraints for Blockchain Adoption in Creative Industries*<sup>2</sup>, examines the perceived constraints of artists and creatives while using blockchain technology. By using blockchain technology, artists and creatives are able to conduct business processes without being dependent on intermediaries. At the same time, the use of Blockchain results in increased transparency, reduced transaction costs and improved coordination. It also creates the possibility of securing intellectual property in a cost- and time-efficient manner. However, artists and creatives are not yet using this technology extensively. Therefore, this study explores the questions: *which constraints do professionals in the creative industries face when using blockchain applications and how can these constraints be overcome?*

To answer the research question, a total of 35 qualitative expert interviews were conducted with representatives from the creative industries, who use blockchain technology or developing blockchain applications for the creative industries. The interview sample is composed as follows: eight representatives of the photography industry, seven representatives of the art industry, six representatives of the music industry, three representatives of the video and film industry, three representatives of the fashion industry, one automotive designer and seven software developers of blockchain applications for the creative industries. In total, seven women and 27 men took part in the interviews. Interview participants were from Argentina, Belgium, Germany, England, Mexico, Poland, Portugal, Romania, Slovenia, United States, and Singapore. The interviews were coded and analyzed according to Webster & Watson (2002).

Through this practice-oriented study, financial constraints, performance constraints, time constraints, and privacy constraints were uncovered that artists and creators experience. Those perceived constraints ultimately slow down their extensive use of blockchain technology. Financial constraints arise due to income fluctuation caused by coin volatility, faulty coding and increasing transaction costs. Performance constraints arise because of the lack of self-promotion through blockchain-based services and products, as well as the lack of widespread

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<sup>2</sup> This paper is a joint work with Anne-Sophie Mayer, Dr. Franz Strich and Prof. Dr. Marina Fiedler. The paper was submitted in slightly modified form to the MIS Quarterly Executive. At the time of the dissertation submission, the paper is under review.

adoption of blockchain along the value chain of creative goods. The study gives a total of four recommendations on how these constraints can be overcome. First, payments on the blockchain should be made using stable coins that are not exposed to currency fluctuations. Second, the development of blockchain applications should have a user-centric focus rather than a technology-centric focus. Third, machine learning should be utilized for data preparation and processing. Fourth, a combination of centralized and decentralized data storage should be used instead of solely relying on a decentralized system architecture.

The third paper, titled: Increasing User Engagement on Blockchain Applications Through Persuasive Design<sup>3</sup>, examines how blockchain applications should be designed to generate significant user engagement. The findings are based on a self-developed use case in the form of a blockchain-powered iOS app for artists and creatives. In particular, the influence of the persuasive design principles of Fogg (2009) on blockchain applications and their user engagement is investigated. While blockchain technology is used in many areas such as finance, logistics or healthcare, its use in pure end-user applications is still underdeveloped. One reason for this seems to be that the perceived complexity of this technology continues to deter end-users from engaging with blockchain. Interestingly, in contrast to blockchain application providers, conventional market competitors reduce the complexity of their applications by utilizing the persuasive design principles by Fogg (2009). To find out more about the influence of persuasive design on blockchain end-user applications, the in-house developed iOS app was designed according to the principles of persuasive design by Fogg (2009).

The assumption of the present study that missing persuasive design leads to insufficient blockchain usage by end-users was substantiated by 35 qualitative interviews that were conducted in this context. The interviews were held with artists and creatives who use blockchain applications. In addition, interviews were also conducted with software developers of blockchain applications for the creative industries. Subsequently, the iOS app named ProLabArt was developed based on the principles of persuasive design. According to Fogg (2009), users must have sufficient motivation, the necessary skills, and an appropriate trigger to use an information system (IS). ProLabArt extensively applies these principles during the integration of the *Ethereum* blockchain. To generate appropriate insights from the use case, a

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<sup>3</sup> This paper is a joint work with Anne-Sophie Mayer, Dr. Franz Strich and Prof. Dr. Marina Fiedler. The paper is submitted to the 2022 Hawaii International Conference on System Sciences. At the time of the dissertation submission, the paper is under review.



design science research approach (DSRP) was chosen for investigation. DSRP enables the generation of sound knowledge for academia and practitioners on novel design solutions in the IS domain. DSRP provides a process model for the design and development of IT solutions in the IS community.

This study makes several theoretical contributions to blockchain technology research. It answers the open questions of Halaburda et al. (2019) for future research. First, it is argued that the use of blockchain for transactions is only useful if the processes are to be automated. Second, a comprehensive assessment is given on Halaburda et al.'s (2019) question about the impact of different smart contract implementations on user adoption. In addition, a contribution is made to Sadhya et al.'s, (2018) research, which leaves open the question of how to increase trust in blockchain technology. Recommendations including several ways of building trust of users towards blockchain technology are given in this context. In addition, seven practical recommendations for developers of blockchain applications are given: (1) Focus on your value proposition, (2) not everything has to run on the blockchain, (3) choose the right blockchain for your use case wisely, (4) Do not reinvent the wheel, (5) customer support is key to success, (6) be transparent and credible, (7) convey the right experience.

The fourth study, entitled: Persuasive System Design for Blockchain End-user Adoption - Evidence from the Creative Industries<sup>4</sup>, examines how the implementation of the concepts of Persuasive system designs by Torning & Oinas-Kukkonen (2009) in the development of blockchain applications have an impact on the adoption of blockchain technology by end-users. Specifically, we address the question of *how blockchain applications need to be designed to increase their user engagement*. To answer the research question, I developed a blockchain-based project management tool called *ProLabArt* according to the principles of persuasive system design theory. The fundamentals of persuasive system design provide a comprehensive framework for the successful design of applications to facilitate user engagement (Torning and Oinas-Kukkonen 2009). Torning and Oinas-Kukkonen (2009) provide four support categories, namely primary task support, dialogue support, system credibility support and social support with several design principles.

Using *ProLabArt*, project-based organizations in the creative industries can automate their formal processes. For this, the *Ethereum* blockchain, as well as *Ethereum's* own cryptocurrency

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<sup>4</sup> This paper is a joint work with Dr. Franz Strich, Anne-Sophie and Prof. Dr. Marina Fiedler. The paper is submitted to the Journal "Computers in Human Behavior". At the time of the dissertation submission, the paper is under review.

*Ether*, is used. The perceived persuasiveness questionnaire (PPQ) was implemented and adapted to blockchain technology in the App to evaluate the persuasive system design of our app. The app is intended for use to all sectors of the creative industries. While between 09/2020 and 01/2021 the app was available exclusively as beta software with prior registration via email, as of January 2021 the app can be obtained worldwide via the Apple AppStore. In total, after data screening for missing data or data with little variance between responses, 222 participants (n=222) were selected as the final sample.

The paper makes several theoretical contributions. First, it is argued that it is not only important that blockchain only disappear into the backend (Arcos, 2018), but also provides sufficient primary task support and has sufficient persuasive power. Second, the findings of Clohessy and Acton (2019) and Clohessy et al. (2019) on blockchain adoption, which are limited to the organizational level by looking at end users, are extended. Finally, this study demonstrates that blockchain applications must have a high level of system credibility for users to build trust and maintain their intention to continue using blockchain. In doing so, the technology-driven findings of Batubara et al. (2018) that blockchain adoption is influenced by its security, scalability, and flexibility are extended by an end-user perspective. In addition, practical implications are given for realizing blockchain end-user applications from a design perspective. First, when designing blockchain end-user applications, software developers should focus on providing sufficient support for primary tasks. Second, developers should pay attention to provide sufficient computer-human dialogue that encourages users to continue using the application. In addition, blockchain is likely still uncharted territory for some users, and many features and mechanisms may seem unfamiliar and quickly overwhelming. Therefore, developers should provide platforms and opportunities for users to share questions and experiences with other users and developers. Finally, developers benefit from focusing on responsive design, as poor app design will discourage users from continuing to use the application.

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# **1 Initial Coin Offerings for Funding Artists? Uncovering Barriers Hindering the Financing of Artistic Projects**

Manuel Knott

## **Abstract**

Artists provide vital contributions to our society and build the fundament for billion-dollar industries, yet artists consistently struggle to acquire sufficient funding. In recent years, new technology-supported possibilities for funding artists and their projects have emerged. Initial Coin Offering (ICO) is a novel form of reward based tokenized crowdfunding. Although ICOs are a promising way to fund artistic projects, surprisingly they lack widespread application. To uncover the barriers for funding artists' projects when using ICOs, we use the network analysis of stakeholder influence as our theoretical lens. Based on 35 qualitative in-depth interviews, we identified four barriers to hinder the funding of artistic projects through ICOs: legal shortcomings, investment restrictions, absence of consumer support and resistance by middlemen. Our research contributes to the literature on cultural finance and funding by uncovering barriers that impede the implementation of ICOs as a promising form of financing artistic projects and outlining possible solutions to overcome them. We also contribute to the research about ICOs by showing that ICOs do not reduce investment risks, but merely shift them.

Keywords: Initial Coin Offerings, Blockchain Technology, Artists, Cultural Finance, Creative Industries, Barriers

## Introduction

To make a living, artists are essentially forced to balance art and innovation with entrepreneurship (Eikhof & Haunschild, 2006; Parker, 2013). As artists, their creation of revenues and wealth builds on intellectual property (Caves, 2000; Rossello & Wright, 2010). To harness their efforts, artists must also act in a profit-oriented and liable way as entrepreneurs. This is particularly important to ensure ongoing and sufficient funding for their work and projects (Bridgstock, 2011; Dex et al., 2000).

However, artists encounter difficulties in using traditional channels of funding, such as banks or venture capitalists, to finance their projects (Konrad, 2015, 2018). They find it difficult to raise funding, due to the high risk associated with their work (Fraser & Lomax, 2011; Maman & Rosenhek, 2020). Since the value of artistic work consists of intellectual property, artists hardly own any substantial business assets or securities (Caves, 2000). At the same time, the difficult predictability of demand for intellectual property leads to information asymmetries between artists and investors (Fraser & Lomax, 2011; Higson et al., 2007). Consequently, artistic projects are seen as a high-risk investment with minimal collaterals (Higson et al., 2007). Thus, artists struggle to obtain funding through traditional financing channels. Yet, a novel and emerging form of reward-based crowdfunding, the so-called Initial Coin Offerings (ICO), rises as promising new funding alternatives for artists.

During the execution of an ICO, artists can offer a monetary countervalue as tokens for an investment in their projects (Catalini & Gans, 2018; O'Dair & Owen, 2019). In addition, artists can ensure a continuous, non-manipulable and automatic recording along the value chain of their projects (Arnold et al., 2019; Avital et al., 2016; Swan, 2015). Thus, ICOs enable reward-based mass-financing similar to classical crowdfunding campaigns. Yet, the tokenized reward mechanism offers incentives and securities for potential investors and therefore a promising alternative for artists to get sufficient funding for their projects (Beck et al., 2016; Sadhya et al., 2018).

The advantages of ICOs have led to a widespread adoption of this form of financing in various sectors and industries. According to a study by PwC (2019), in the first ten months of 2019, the distribution of tokens raised more than USD 4.1 billion in a total of 380 ICOs. The high volume of investments in recent years shows that investors show great interest in ICOs. However, while the possibilities of financing artists' projects through ICOs are promising, only 5.5% of the generally executed ICOs in 2019 were considered for the funding of artistic

projects, whereby these projects are all related to the media and entertainment sector (PwC, 2019). Because of the compelling advantages for funding artistic projects and the high investment volume in ICOs in general, it seems surprising that this form of financing has not been adopted widely by artists. Yet, it remains unclear which barriers deter artists from financing their projects through ICOs. This leads us to the following research question: *Which barriers arise for funding artists' projects when using Initial Coin Offerings?*

To investigate our research question, we build on the network theory of stakeholder influence by Rowley (1997). This allows us to identify the external barriers that hinder the use of ICOs by artists and to investigate the influence of stakeholders, namely governments, investors, consumers and intermediaries on these barriers as well. This approach is promising as the analysis allows us to highlight not only dyadic barriers and relationships between stakeholders and artists, but also indirect connections (Rowley, 1997). By taking stakeholders and their influence on the adoption of ICOs by artists into account as well, we are able to provide a holistic picture of the barriers hindering the adoption of ICOs by artists.

Our paper contributes to the research on cultural finance and funding. We show that in the specific context of project financing of artists through ICOs, the complex and fragmented legal situation for artists leads to a high effort and error risk in the preparation for ICOs. Furthermore, we recognized that artistic products and services are frequently reallocated by investors into more lucrative industries. We also show that the lack of consumer support for artists, as well as the resistance by influential middlemen, is hindering the widespread adoption of ICOs by artists. While O'Dair and Owen (2019) already identified universal challenges as for the funding of artists' projects through ICOs, the emergence of speculative investment bubbles, missing laws and regulations and an insufficient number of fractional ownerships, we expand their findings by artist-specific barriers. Our paper makes two contributions to the general research about Initial Coin Offering as well. First, we show that ICOs do not reduce investment risks (Fisch, 2019; Yu et al., 2018), but merely shift them. While ICOs can provide security for investors and reduce information asymmetries, (Chen et al., 2017; Cong & He, 2019; Lee, 2019) the lack of regulations can lead to considerable price fluctuations due to coin volatility. Those, can themselves result in extensive financial losses and associated risks for investors and capital seekers, depending on whether the price increases or decreases. Second, by clearly advocating regulations in the debate on whether ICOs should be regulated (O'Dair & Owen, 2019) or not (Amsden & Schweizer, 2018), we are following Adhami et al. (2018) call for research to examine the usefulness of regulations.



The remainder of our paper is structured as follows: first, we provide a brief overview of artists as creative entrepreneurs and ICOs as a novel funding opportunity. Second, we describe our theoretical lens. Finally, after describing our sample design and data analysis, we present the results of our interviews.

## **Artists as creative entrepreneurs**

Artists work predominantly as freelancers (Mould & Comunian, 2015) in project-based organizations (Hotho & Champion, 2011; Gill, 2002). The resulting highly diverse set of individuals work together to accomplish specific tasks in a limited time (Bakker, 2010; Lundin & Söderholm, 1995). These short-term and high-intensity work forms are preferred when artists are confronted with high product complexity, technological uncertainty, cross-functional business expertise and rapidly changing markets (Hanisch & Wald, 2014; Hobday, 2000). Therefore, the daily routine as an artist is also characterized by tasks like self-marketing, self-managing and self-funding (Eikhof & Haunschild, 2006; Shukaitis & Figiel, 2020). As a result, artists are constantly busy looking for new commissions and funding opportunities for their projects (Bridgstock, 2011).

In granting funding for projects, financial service providers are particularly strict with artists due to two predominant reasons. First, investors are risk-averse in their assessment of criteria, even more as intellectual property offers little collateral (Caves, 2000; Fraser & Lomax, 2011). It is therefore disadvantageous for artists, that they are on average younger and have fewer assets than comparable non-creative entrepreneurs (Fraser & Lomax, 2011; Konrad, 2015, 2018). Furthermore, the difficult predictability of demand for artistic work limits the willingness of investors to invest in artists additionally.

Second, the demand for creative goods is usually difficult to estimate in advance. For example, whether a film will be successful or not in the future is difficult to predict. In addition, along value chains, there are hardly any possibilities to truthfully trace back individual value creation processes *ex post facto* since the creative process is difficult to document (Eikhof & Haunschild, 2006; Kompatsiaris & Chrysagis, 2020). This makes it difficult for investors to estimate, not only the success of a project, but also the artist's abilities to achieve that success (Konrad, 2018; Nanda & Rhodes-Kropf, 2017). Consequently, the dominant information asymmetries between investors and artists place a heavy burden on the project-funding for artists (Konrad, 2015). Moreover, financial service providers are generally unable to make an appropriate assessment of an artist's talent (Higson et al., 2007). The prevalent information

asymmetries affect not only the investor interest of classical investors like banks or business angels, but also investors of crowdfunding projects.

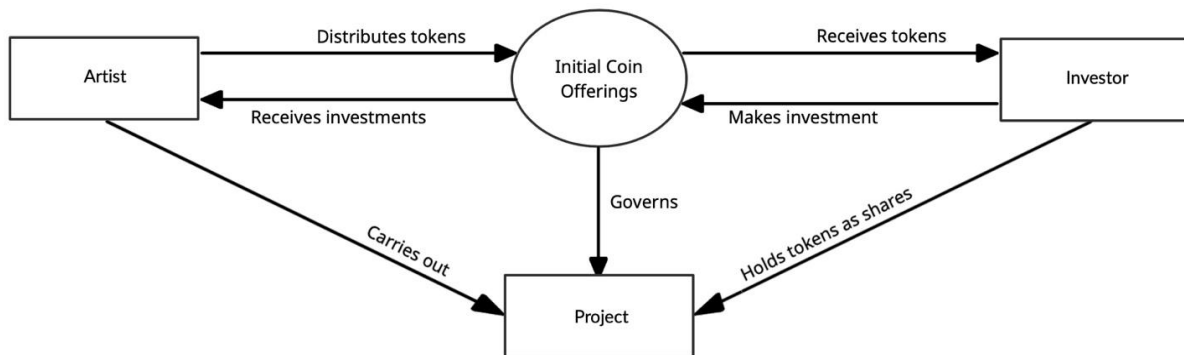
In recent years, artists increasingly explored alternative and crowdbased modes for funding their projects. Through crowdfunding, projects are mostly financed by private investors (Belleflamme et al., 2014). The financing volume is usually achieved due to the large number of investors who provide a comparably small amount of capital (Agrawal et al., 2011). While some researcher consider this as donations (e.g. Allison et al., 2017; André et al., 2017; Thürridl and Kamleitner, 2016), recent studies showed that the funders behavior parallels investors behavior (e.g. Hobbs et al., 2016; Hornuf & Schwienbacher, 2018; Wallmeroth, 2019; Xiao & Yue, 2018). A particularly investment-like funding opportunity that is becoming increasingly popular are ICOs.

## **Initial Coin Offerings**

For the successful execution of ICOs, certain steps and resources have to be considered and provided. The starting point of an ICO is usually the so-called White Paper, which is intended to provide detailed information about the project or idea. The provision of a White Paper also facilitates transparency (Essaghoolian, 2019). The aim of a White Paper is to create confidence among potential investors and convince them to fund a project. In a next step, so-called pre-sales are usually carried out. These provide early investors with the opportunity to procure discounted tokens in a first round of financing. Pre-sales offer the focal organization the opportunity to get a first impression about the general interest for their project (Domingo et al., 2020). Consequently, the actual Coin Offering follows. The coins that can be purchased by investors have a real market value on the cryptomarket and are tradable once the ICO is completed (Amsden & Schweizer, 2018). In order to generate revenues, it is necessary for the investors to exchange the tokens into fiat currency. An illustration of an ICO process is shown in *figure 1*. Although ICOs may appear to be just another form of crowdfunding or a mix between crowdfunding and initial public offerings, they differ substantially from each other.

Through ICOs, mass financing of projects or organizations can be carried out using blockchain technology. Blockchain provides the foundation for a non-manipulable, decentralized recording of information when conducting ICOs (Pazaitis et al., 2017; Swan, 2015). Furthermore, while proceeding ICOs the utilization of blockchain technology enables an automatic decentralized governance mechanism (Beck et al., 2016; Catalini & Gans, 2018; Fisch, 2019). In doing so, a certain number of so-called tokens are distributed during the

financing round (Arnold et al., 2019). Either equity tokens, which represent shares and the associated rights to the funding object, or so-called utility tokens are mainly distributed. Utility tokens are accompanied by a certain right of use for real economic services (Gan et al., 2019). These token-inherent features make ICOs as a novel form of funding particularly attractive for investors.



**Figure 1: Sequence of a possible ICO process for financing artistic projects**

In recent years, the high volume of investments underlines the high investment interest in ICOs. The main advantage of ICOs is the possibility for investors to receive a monetary countervalue to their investment, with simultaneous risk minimization (Fisch, 2019). The distributed tokens as a countervalue for investments serve as a security. In addition, they can be automatically exchanged back into Fiat currency. ICOs therefore offer investors protection against total loss (Howell et al., 2020). Thus, ICOs offer investors a high degree of security when carried out correctly.

ICOs can be compared with crowdfunding campaigns and Initial Public Offerings (IPO) by three major aspects. These concerns (1) the countervalue offered, (2) the access to the market (3) and the trade with the countervalue. Firstly, ICOs offer tokens as monetizable equivalent value. In crowdfunding projects, investors mostly receive rewards such as physical products, discounts or even just an e-card (Jiang et al., 2020; Thürridl & Kamleitner, 2016). In IPOs, shares are distributed to the company as stocks. Shares are functioning similar to tokens. Yet, tokens are not regulated by institutions such as the SEC (Burns & Moro, 2018; Joo et al., 2019). Second, ICOs are not geographically limited, so that equal access can be granted for investors regardless of their geographical location. Crowdfunding campaigns, on the contrary, are geographically limited to the countries in which the crowdfunding platforms operate. As a result, those artists, in whose countries such services do not operate, are excluded from the possibility of project financing through crowdfunding. (Agrawal et al., 2011; Huang et al., 2012; Rohr & Wright, 2018; Thürridl & Kamleitner, 2016). Thirdly, investors in ICOs

speculate on a return of investment on the secondary market, comparable to the goal of investors in IPOs (Adhami et al., 2018; Amsden & Schweizer, 2018; Benedetti & Kostovetsky, 2018; Catalini & Gans, 2018). In crowdfunding projects the rather symbolic rewards are usually not traded on the secondary market (Bretschneider & Leimeister, 2017; Harms, 2007). ICOs therefore show some similarities with other forms of financing such as IPOs and crowdfunding. However, ICOs offer significant benefits for investors due to the monetizable value and the geographical limitlessness.

The reward-based mechanisms of ICOs enable artists to offer investors securities in the form of monetizable counter-values. In return for performing a certain action, the underlying governance mechanism of ICOs can automatically reward an actor with tokens (O'Dair & Owen, 2019; Swan, 2015). Therefore, artists have the opportunity to make their work processes available to potential investors without the need to commit significant time or human resources (Lipusch, 2018). As a result, artists have the possibility to offer shares in their work in the form of equity tokens in return for investments. Hence, investors are not rewarded with a predefined advantage with a fixed value, but they profit from the later increase in companies' value (Adhami et al., 2018). In addition, utility tokens provide investors with extensive opportunities to participate in decision-making, to access exclusive content or resources, or any other function that may be taken by exchange or working capital (Gan et al., 2019). Moreover, the governance mechanism of ICOs can simultaneously reduce information asymmetries.

During the execution of ICOs, information asymmetries between investors and artists can be reduced. Through the automated recording mechanism, all contracting parties are granted equal access to the recorded data (Lee, 2019). Due to the immutability of the governance mechanisms of ICOs, the information cannot be changed by any of the contracting parties (Puthal et al., 2018). This counteracts negative effects of information asymmetries such as moral hazard and adverse selection (Cong & He, 2019). Ultimately, ICOs contribute to the prevention of market failure since undesirable and non-pareto-optimal results on the market can be effectively counteracted. In conclusion, it became clear that ICOs are a promising alternative for the funding of companies, projects and above all, artists. ICOs are interesting for investors especially because they (1) offer a monetizable counter value for investments and (2) reduce uncertainties of demand and success forecasts and thus also information asymmetries between investor and capital taker.

## **A Stakeholder Perspective to funding artistic projects**

When groups, individuals, institutions, or organizations have the capability to influence the achievement of another organization's (focal organization) goals, they are referred to as stakeholders (Freeman & McVea, 2001). Stakeholders can represent either internal or external interest groups of the focal organization. While typical internal stakeholders consists of employees, board of directors or labor union, external stakeholders include groups such as investors, environmental organizations, suppliers, governments and customers (Friedman & Miles, 2002). Each of these interest groups represents its own values, goals and ideas in relation to the focal organization (Clarkson, 1995; Freeman & McVea, 2001). Consequently, these stakeholders find themselves in a mutually influencing social network.

Social networks represent a mutual interaction network of several individuals. According to Mitchell (1969), social networks further represent "defined set of persons, with the additional property that the characteristics of these links as a whole can be used to interpret the social behavior of the persons involved" (p. 2). Therefore, different kinds of network structures can be uncovered and made tangible (Friedman & Miles, 2002). This enables a differentiated view of the possible influence of actors and the barriers that arise in a social network.

By examining stakeholders from a social network perspective, it prevents investigating the influence of stakeholders and the barriers that arise in a purely dyadic relationship. In this way, possible consequences of relationships, patterns and structures in a social network of stakeholders (Freeman & Evan, 1990) can be derived. At the same time, social network analysis, in this context, offers the necessary freedom to sufficiently evaluate the mechanisms of action in network structures on different levels (Rowley, 1997). Thus, it is possible to create a profound, holistic picture of the causal relationships and the resulting consequences in a social network of stakeholders. In sum, social network analysis of stakeholders is a suitable instrument for investigating stakeholder relationships along with their reciprocal influences and the resulting barriers.

## **Methodology**

We used a qualitative approach to investigate our research question. This allowed us to learn more about the improvements this technology has brought to the artists, and the motivations that have driven them to use funding through ICOs. In addition, we were able to gain meaningful insights on what is currently preventing the broader use of ICOs and what

enhancements need to be done to achieve widespread funding of artistic projects through ICOs. We were able to show that the promising opportunities that ICOs offer for financing projects for artists cannot be fully exploited due to external barriers hindering the extensive adoption.

## **Sample Design**

We conducted 35 semi-structured interviews with artists who conducted or tried to fund themselves through ICOs and with software developers who are developing blockchain applications for artists or realized funding through ICOs as well. On average, our interviews lasted 47 minutes. We conducted eight interviews with representatives of the photography industry, seven interviews with representatives of the art industry, and six interviews with individuals representing the music industry. Furthermore, we conducted three interviews with participants from the video- and film industry, as well as three interviews with artists from the fashion industry. In addition, we conducted one interview with an automotive designer. Lastly, we also conducted seven interviews with blockchain software developers, who are focusing on developing products and services for artists and (tried to) conduct at least one ICO (please see *table 1* for a detailed description). For each artist, their creative output was their main source of income. Similarly, software developers' work on blockchain applications for artists was also their main source of income.

Our questions regarding the artists focused on enhancement through ICOs, motivators for using ICOs, desired adjustments of ICOs, and challenges in adopting and funding through ICOs. This allowed us to learn more about the improvements this technology has brought to the artists, and the motivations that have driven them to use funding through ICOs. In addition, we were able to gain meaningful insights on what enhancements current ICO solutions need for extensive funding of artists, and what is currently preventing broader use of ICOs. Regarding the software developers, our questions focused on motivators for developing blockchain applications, challenges during the development of those applications, as well as the funding of their blockchain-based companies and projects for the creative industries through ICOs. This enabled us to identify the circumstances that prevent the funding of blockchain-based products and services for artists.

By specifically interviewing these two groups, focusing on desired adjustments, challenges in funding projects through ICOs, and challenges during the development of blockchain applications, we were able to obtain a comprehensive view of the underlying mechanisms of barriers hindering the funding of artistic projects through ICOs. All interviews were recorded,

anonymized, and transcribed verbatim. To identify the relevant barriers hindering the funding of artistic projects through ICOs, we conducted a qualitative content analysis according to Mayring (2004). We coded relevant text passages and used a category system to reduce data complexity. We chose a deductive approach for the formation of the superordinate categories, and thus created the categories based on the previous theoretical knowledge without analyzing the data. Using an inductive approach, we derived subcategories from the material to be analyzed. For this type of analysis, the individual written interview statements from the transcripts were first moderated to a reduced form. Aspects that relate to each other or are similar in content were summarized and represented by a new statement (category). Corresponding passages in the material were then assigned to the newly formed category, i.e. coded. During the coding process we repeatedly performed iterative steps of analysis.

After we evaluated 30% of the material, we reviewed and revised our categorization. The data material was coded by three independent researchers. After this step, the categories were continuously refined. Once no new categories could be created, the final category system was built. The final data structure of our interview results can be seen in *table 2*.

**Table 1: Overview of the survey sample**

Industry	#	Ø age in years	Ø work experience in years	Gender	Nationalities
Photography	8	32	7	0 female	DE, MX, PL, US
				7 male	
Art	7	38	11	3 female	DE, MX, PT, US
				4 male	
Music	6	27	5	2 female	BE, DE, SP, US
				4 male	
Video and Film	3	39	9	0 female	DE, EN, SL
				3 male	
Fashion	3	41	15	1 female	AR, PAT, US
				2 male	
Automotive Design	1	26	8	0 female	US
				1 male	
Software development	7	34	6	0 female	EN, RO, US
				7 male	

*Note:* AR = Argentina; BE = Belgium; DE = Germany; EN = England; MX = Mexico; PAT = Patagonia; PL = Poland; PT = Portugal; RO =Romania; SL = Slovenia; US = United States of America

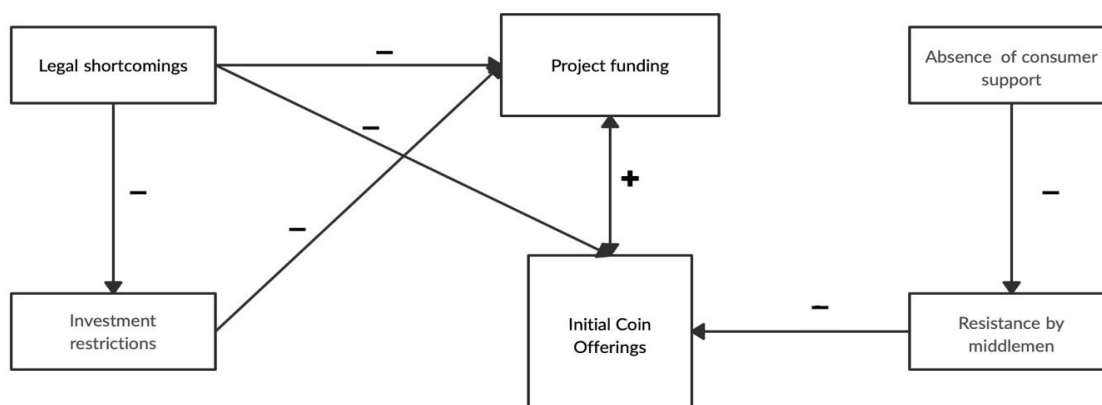
**Table 2: Data structure**

1st Order Concepts	2nd Order Themes	Aggregate Dimension
Complex legal situation	Legal shortcomings	Barriers hindering the utilization of ICOs for funding artistic projects
Lack of regulations		
Low investment volume	Investment restrictions	
Reallocations of products and services		
Lack of awareness	Absence of consumer support	
Inertia for change		
Resistance against transparency	Resistance by middlemen	
Fear of losing power		



## Results

Our interview participants were either (a) artists or (b) software developers who develop blockchain-based products and services for artists. This enabled us to identify the barriers hindering the project funding for artists through ICOs, as well as the barriers to financing the development of products and services for artists through ICOs. This allows us to create a holistic picture of the barriers that prevent the funding of artistic projects through ICOs. Our conceptual model of these barriers is shown in *figure 2*.



**Figure 2: Conceptual model of the barriers hindering the funding of artistic projects through ICOs**

### Legal shortcomings

We note that due to the (1) complex legal situation for artists and the (2) lack of regulations of ICOs, governments have a negative influence on the decision of artists to conduct funding through ICOs.

First, due to the complex legal situation for artists, they have to deal with a large volume of organizational work with the preparation of data and implementation of ICOs:

*“There is a hard thing of making it mainstream. [. . .] the complexity is still behind, and there is something that I didn’t tell before but you also have to consider that there are collecting societies no matter what. So like, like, per-forming artist. For instance, in Spain, I mean, it’s also the complexity of Europe. We have 27 or 28 different right laws.”* (Artist, Music Industry)

As experts have noted, the underlying reason for this is the absence of uniform regulations regarding ICOs:

*“You cannot waive your Performing Rights, no matter what if you are a singer, you can pay whether you want or not. So even if you make that application, if the money doesn’t go through the collective society of the performing artist, you’re not doing it lawfully. I mean, you’re not going to be sued. But you are not on the side of whatever the law says. And now those laws are going to change in France. It’s already been changed. And it will change in Poland and it is going to be different in Germany, it’s going to be different.”* (Artist, Music Industry)

The lack of uniform national and international regulations leads to a high organizational effort in the execution and preparation of initial coin offers:

*“So, there’s all kinds of brand-new complexities and problems we ran into just because, you know, we’re kind of on the front lines so, you know, like, we have to think of all kinds of like when we deployed the blockchain the first time what are the different tests, we should run ahead of time to make sure that there’s not going to be conflict between the notes and then the blockchain stops and then no one earns tokens.”* (Software Developer, Video- and film industry)

The different national regulations increase the organizational effort and therefore the human error rate when data is being prepared for license processing. Therefore, artists fear legal consequences while pursuing ICOs:

*“If you do this wrong, and there are a lot of companies doing this wrong, they are recording private information of people. And that’s a massive mistake. And because you can be liable in case of somebody claiming that they want that public persona information away of the service.”* (Software Developer, Music Industry)

The immutability of ICOs makes it difficult to adapt data. This could lead to legal action against the affected organization for breach of rules on an ongoing basis for as long as wrong or incorrect data provided are not changed:

*“Now you can read articles of lawyers talking about this. So this is something that will happen in the future if you’re a company and you just imagine that I register the code of work, okay, and the title of the work and the name of it and registered in security then this person comes and wants to get their information deleted but we cannot delay that unless we have the power of computing power and you know, depending on the topology of the blockchain, and the thing is that you can get a fee from the protection agency for not removing it. And if you don’t remove it, they will continue to charge you these. So, you will continue to find that information every day that you can imagine the problem that you can have there if you have this public information, name, address, whatever. If you record that on the blockchain, that information is not going to disappear. So you’re going to be fined over and over again.”* (Software Developer, Video- and film industry)

Many intellectual property rights are afflicted by having insufficient metadata, i.e. data containing important information about the copyright holders. If contract details contain incorrect information about authors or take the wrong national regulations into account, executing the funding can be jeopardized. This represents an existential financial risk for artists. As a result, ICOs which are not geographically restricted cannot reach a common consensus on the application of the proper laws. For example, data protection guidelines or copyright rules that apply in the country of the investors may not apply to the artists, so that legal inconsistencies may arise when conducting ICOs.

Second, software developers widely criticize the absence of national and international regulation of ICOs:

*“I mean, yeah, they are not reluctant to learn one thing they have no motivation in this. And then you see like how a Senate was asking Mark Zuckerberg about the*

*Libra coin, for example. It's a high level and those guys are stupid. I mean, this is not going anywhere, anytime soon. You can do all the technology; you can prepare all the technology. But before the right people who are willing to accept blockchain technology and will see use for it in the government levels, nothing's happening."*

(Artist, Photography)

The lack of regulation of ICOs results in artists being exposed to volatility regarding the raised crypto-currency also referred as coin volatility when being funded:

*"It's really hard to say because over the last three years, it's kind of like it's gonna happen very quickly and then really slowed down. Yeah. So I think that part of the problem is about where investment in the blockchain comes from. Yeah, lots of it at the moment is obviously from private investors. And they're very cautious at the moment because of general issues in the world economy, all of the volatility of the Bitcoin, blockchain, etc. So the speed of adoption is really an immediate sense, it's been quite difficult to calculate"* (Software Developer, Photography)

*"[...]one theory on which really is going to facilitate solving a lot of the early problem is that that if the in depth developers have encountered with volatility being a major deal breaker for these things to actually run smoothly and for them to be reliable instruments of conducting business you know, so that's something that we can get to but yeah, that's a mouthful for me to get started."* (Artist, Music Industry)

Furthermore, they also fear legal consequences when using the collected capital through Coin Offerings:

*"The other thing is that largely usually tokens are used for transaction right? Yeah. So there you are an artist and you're selling your songs. Let's say the project is really good people are buying your music and all things and your music is listed and*

*has value and all and now you have to cash out those tokens. And the bank will usually just close your account”* (Software Developer, Music Industry)

Due to the lack of legal regulations for cryptocurrencies, they are particularly affected by volatility. This leads to unpredictable funding ranges, as the value of the cryptocurrencies can often fluctuate daily in high double-digit ranges. Legal barriers resulting from governmental shortcomings thus influence the funding of artists in two ways. On the one hand, different national regulations and laws result in a high organizational effort for artists with a strong susceptibility to errors on, e.g., incorrect allocations and the emergence of legal grey areas and inconsistencies, which can significantly restrict investment intentions. On the other hand, the lack of regulations of ICOs is slowing down its continuous development. This is significant, as the use of ICOs for artists is at an early stage, where errors and mistakes are more likely to happen and the correct use of ICOs evolves through experience in the market. It is therefore inevitable and actually self-evident for companies to operate within a legally protected framework that does not endanger their own business existence.

### **Investment restrictions**

In financing their projects through ICOs, artists face barriers of (1) low investment volume and (2) reallocations of products and services for artists by investors.

First, the lack of governmental regulations of ICOs, results in a significant underinvestment of artists through ICOs:

*“You cannot invest in tokens, as the shareholders of that VC, usually there are many private investors. As VC when you invest they are asking questions and you cannot account for the token, like no reports and auditors will not audit you because it’s crypto because everybody is afraid.”* (Software developer, Music industry)

The underlying reason is that investors in the classical sense, such as banks or VCs, have no legal foundation for investments with the use of ICOs:

*“And all of that comes back to legislation from the government. Governments should put out the guidelines and say, guys, you are good to use under these conditions, the tokens, you can sell them on this and this exchange, we need reporting live and listen*

*to that. And the government should be pressing commercial banks [...]. And the real VC cannot actually kind of like invest into blockchain itself right now because it has to buy shares and stocks and then invest in per capita. They can do with it actually, but it's a shady area. And since most of the VCs are like big and based in the United States, they don't want to risk their reputation to get involved with the blockchain right now, because again, there is no legislation on that. [...] I'm warning my company partners because of legislation because I can be put under the magnifying glass from the government asking what I do here? What are those tokens? How did you invest in tokens?" (Software developer, Music industry)*

Moreover, due to the inadequate regulation of the crypto-currencies companies are only allowed to use them to a very limited extent:

*"The problem is again, you raise all that money and now you need still you need to pay your developers and all that. Yeah. You raise that cryptocurrency and you cannot exchange it to normal money. Let's say you raised all that money and you want to pay your people the bank will put it in the whole saying y'all look, this is some kind of freaking stuff. Where did the money come from?" (Software developer, Music Industry)*

For example, depending on national regulations, crypto-currencies may only be used to pay wages to a certain extent. As a result, it is difficult for companies to use those accumulated investments to maintain their business operations. However, since these investments usually provide the financial basis for the companies, it is actually essential to use this capital for current expenses.

Second, in addition to the already mentioned problems of funding by classical investors like Banks or VCs, one of the interview partners highlighted that products or services developed for artists and finances by ICOs continuously disappear from the market again:

*“It’s always the same with all those projects that have been started, no matter by whom they were started. You haven’t heard anything more about them and that is relatively frustrating. But from what I hear from conversations with people from the music industry. It’s really always the same questions that come up.”* (Artist, Music Industry)

Another interview partner makes the reallocation of products and services for artists by shareholders responsible for this kind of disappearance:

*“What I’ve heard from all of the companies I have spoken with is very deeply rooted in the whole area of the creative industries [...] is that a lot of ideas are just something in photography or art or things trying to make the creative industry better. And then investors often come and say like ‘Hey good idea, we’ll take it over, though we won’t raise it in creative industries, but we need it in another industry because it brings in more money’ and then there’s just not enough money in the creative industries themselves - less than the investors are investing.”* (Software developer, Photography)

Once potential investors have been found, there is a risk that they will withdraw the product or service for artists. The reason for this, in the view of investors, is the lack of monetary incentives to develop and offer products and services for artists. Consequently, investors with a majority share recognize the potential of products and services originally developed for artists and then settle them in more lucrative industries, such as finance or health care. Therefore, the extensive use of ICO for artists are not only (1) slowed down through the general restrictions on investments in ICOs, but also through (2) opportunistic investor behavior regarding artistic projects.

### **Absence of consumer support**

Due to a (1) lack of awareness and an (2) inertia for change by consumers, additional barriers to the financing of artistic projects by ICOs arise.

First, opaque activities in the work surrounding of artists make it difficult to raise awareness for shortcomings in this regard:

*“Now, I think that in this moment, all the fashion industry is very contaminating and very obvious with in human terms. Yes. Also, these big companies that they make a lot of like advertisement through a sustainable practice. I think that they, they do just very legal basics and they do a lot of advertisements around this more to act like sustainable out of fears. You know, because of their value chain.”* (Designer, Fashion Industry)

Due to complex organizational structures and internationally connected value and supply chains, the individual work steps and processes are difficult for consumers it is difficult for consumers to comprehend and assess them:

*“I think they are just following the minimum legal requirements and doing a lot of advertising on this to distract from the real issues. Again, their value chain. [...] the industry doesn't want it to be traceable, and now they are just using all these opportunities for more greenwashing.”* (Designer, Fashion Industry)

Influential companies use the scope for interpretation of their ethical and ecological obligations to their own advantage. For example, products are advertised as being ecologically sustainable in their entirety, although in reality this often only applies to individual work steps or parts of the products. It is therefore difficult to get a clear picture about sustainability and justifiability of a campaign, product or company.

Second, the interview partners also stated that the consumer himself has an inertia for change:

*“Well, at this moment I feel that we are in a very difficult moment, let's say because most consumers and societies have a very distorted view. They don't want to take the problem that is going on in the world into their own hands, even though each of us is the main actor in all these problems.”* (Artist, Painting)



Thereby consumers do not realize that they can cause a change, however their decisions and preferences have an impact on the artistic landscape:

*“These problems do not exist outside us, they come from us. [...] that is why they want to renew the whole collection worldwide every four days. Every four days! This is the next step. For example, every Latin American country you know is improving the living conditions and the quality of life, and at the same time they are starting to buy fast fashion that makes them look like crazy for the girls and that they never use. So we, the consumers, are a big part of that problem.”* (Designer, Fashion industry)

Although the abuses in the work surrounding artists have been prevalent for some time and attempts are being made to draw attention to them, consumers ignore these abuses and prefer to take advantage of the current situation due to personal interests, such as buying cheap fashion. The lack of understanding of the abusive processes, together with indifference in acknowledging the abuses in the work surrounding artists, leads to a lack of pressure for change from consumers to market participants to change existing conditions. Consequently, this means that intermediaries in the social network of artists have little incentive to support the funding through ICOs that could constraint their position in the social network.

### **Resistance by middlemen**

Influential middlemen fear an (1) increasing transparency along the value chain of artistic production, as well as the (2) loss of at least some of their power, when artists are going to use ICOs in a frequent way.

First, middlemen are careful and reluctant to use this new technology:

*“And a lot of times, these are large corporations. They’re just like, blockchain is often new to them. And sometimes they are conservative in their approach to technology. So, you know, you’re talking to a bunch of folks that don’t have a lot of familiarity with the technology and we’re trying to convince them to, you know, take a big leap in their minds, you know, they, they don’t they barely even know what Bitcoin is, and we’re in here trying to teach them about why they should integrate*

*blockchain technology. It's a lot of education on our part, and a lot of explaining why it's useful. Why it's not scary, even though it's new.*" (Software Developer, Film- and Video-Industry).

One of the underlying reasons for this is that intermediaries try to prevent ICOs, as they would lead to continuous monitoring and thus to more transparency along value chains:

*"Stopping on the music industry, you don't know who's paying You don't know the amount you are paid, you know that you didn't know anything, you just receive a check. I don't know if that was right or not, or if you have to complain or whatever now, so having it in a place where you could trace all the transactions now, for example, accessing to a system where you could see where your music has been broadcasted, and it's locked in the blockchain, for example. So that could bring a lot of transparency."* (Software Developer, Music Industry)

The music industry illustrates quite vividly the consequences of increased transparency for the intermediaries in the social network:

*"But there is a point that it's not in their interest. And not in their interest in many ways. Because of course, I mean, we know that basically, blockchain is the big equalizer. And there's a lot of I forgotten what the term is called, but I call it blind money. In the music industry, money that publishers particularly the big guys, Universal, Sony BMG, they get a lot of money that's just goes into this black box."*  
(Artist, Music Industry)

An increase in transparency in the music industry, for example, results in record labels, managers or music platforms losing significant revenues. This is due to the fact that royalty payments can often not be paid out due to missing IP-right holder information and end up in a so-called black box. Those black box royalties have become a collective term for money that is earned but never paid out to the artist, songwriter or rights holder. If after a certain period of time the right copyright holder cannot be found, these payments remain with the intermediaries.

In the fashion industry, strong middlemen are afraid that by increasing transparency, information damaging to the company can be uncovered, especially in the areas of sustainability, fair pay and restocks against occupational safety measures:

*“So, if you want to implement today blockchain with all these, you cannot it is the same in in Europe, that’s why I mentioned this program from United Nation and blockchain is there but the industry doesn’t want to go for traceability” (Designer, Fashion Industry).*

Another artist describes a similar experience from the art market, where interest in blockchain for tracking to payments was discarded:

*“There’s always the music consciousness thing to me it’s about whether we want to evolve as a human race, like whether we want to become more truthful, transparent. I was working with this project called glass and it’s for financial transparency, and they wanted to offer their own blockchain and then to offer to nonprofits, the capability to use their software for free to show publicly where the money is going for their nonprofits. And they didn’t even want to do it, because they said that they don’t have that much control over where the money goes, even though they want it to be good and transparent. There’s really antiquated infrastructure of, you know, like managers and all these people getting paid, like the infrastructure is outdated and it’s broken. And until that’s fixed, there’s no one to blame for, like the inefficiency of the system and where the money’s going, you know. So it’s really complicated.”*

(Artist, Painting)

Furthermore, one of the interview partners also points out which factors contribute to preventing an increase in transparency through ICOs:

*“I think it’s several things in one, it’s, lots of resources for them because they are operating at a very large scale. And not only as resources in money, but its resources in training people to change their mindset in the way they operate. And also, second*

*thing is they have a premium on the market because they have the big studios with the big content owners when people will be more willing to pay them more when the actual value of what we are selling and then they don't want to lose that premium that they are gaining by levelling up with the rest of the market. And lastly, it's very political environment. These companies especially the studios are just lazy everything changes very slowly [...]” (Software Developer, Film- and Video-Industry).*

The resistance against increased transparency by middlemen results in them profiting financially at the expense of the artists. The influence of the middlemen coupled with their inertia as an organization makes it possible to maintain opaque activities.

Second, regarding fears of losing power, these intermediaries could become superfluous or lose important influence in the social network in managing financial matters, administrative tasks, and as a trusted third party:

*“First of all, in my company I have one, two no I have three people who are devoted to searching for performances now. Yes, they use online sources. But, I mean, like my company is very low margin. I mean I'm happy when we make money, because there's so much labor that's involved in finding these performances. The potential of blockchain is that labor could be drastically reduced, or, you know, there's no need for it for that particular kind of labor. There may still be a need for my company, but that particular kind of labor [...] and, and it's okay, so you just want to look at the bigger picture.” (Software developer, Music Industry)*

One interviewee shows that strong middlemen are particularly afraid of competition- relevant data being made public and thus also accessible to competitors:

*“Mainly because of political issues, I would say, because with a classical approach, you need somebody to control to cut the control of this database. Yeah. So this means that you had several players like collective management and organizations and big*

*industry players in there. But then at one moment, the question is who's going to own the system that allows us to produce these and, of course there are lots of gross interest in here and so it is mainly on probably on political issues. Nobody wants to give away their data because this is an asset that it's important to the collective monitor religion, for example.” (Software Developer, Music Industry)*

Furthermore, influential middlemen can use their market-dominant position to engage the consumers and furthermore to attract and retain artists to maintain their power:

*“Unlike the space where we're at, but so right now, in the current state, people go to twitch for example because that's where all the viewers are, it's kind of a, you know, it's a network effect of having the biggest platform as you get more viewers, therefore, more streamers go, and so on and so on. But if you make a apples to apples comparison here, and there's twitch making a lot of money in the middle, or you have a platform that's just like it, except the face of like the mechanism for content creators to get paid direct, and no one's in the middle taking a cut, then, you know, definitely the decentralized version will reward content creators more fairly, that's not the only thing twitch does. They still, you know, centralized platforms like that do provide a lot of value in marketing in onboarding streamers, so you know, I think don't make it seem like they're just criminals here stealing innocent content creators money but same time twitch makes a significant amount. So there's probably a good margin a healthy profit margin in there for them. That is basically their rent seeking that can be eliminated. Same thing with record labels. Like Yeah, they have a reputation for terrible deals and getting rich off the backs of musicians. They do provide some value. It's definitely they do a lot. You know, it's a lot easier to get booked. It's a lot easier to get the right studio and everything and the promotional value and all that radio airplay, they do provide value. It's just is there*

*a way that they you can kind of like unbundle the value they provide and get that those services without them acting as the gatekeeper and enforcing deals on people.”*

(Software Developer, Film- and Video-Industry)

Through the philosophy of peer-to-peer networking, the distributed technology underlying ICOs theoretically eliminates the need to maintain auction houses, record labels, or film distribution as intermediaries between consumers and artists. The reason for this is that trust in technology eliminates the need for intermediaries as trusted third parties. Yet, influential middlemen find themselves in a situation where the size and reach of their products give them such a dominant market share that they can significantly influence consumer behavior and exploit their size to maintain their power.

We can show that intermediaries have little incentive to use or support the development and adoption of ICOs for the funding of artists. As a result, artists lack the necessary support from strong intermediaries, as opposed to, for example in the Fintech Industry, where classical investors are driving the utilization of ICOs. Thus, the adoption of ICOs in this industry is already more advanced than in the case for artists.

To answer our research question, we developed a conceptual model of the barriers hindering the funding of artistic projects through ICOs. We identified four categories of stakeholders that influence the realization of ICOs for artists, namely: (1) government; (2) investors; (3) consumers; (4) intermediaries. Our results indicate that governmental behavior influences investor behavior, leads to a lack of investment incentives for creative ICO projects. Furthermore, it can be shown that consumer behavior influences the decision-making behavior of influential intermediaries in the social network of artists, which leads to the suppression of alternative funding opportunities, namely ICOs.

## **Discussion**

We identified barriers that limit artists in using ICOs for funding. In this context, we have also shown where these barriers originate, how stakeholders react to them, and what impact these barriers have on the funding of artists' projects through ICOs. By identifying (1) the complex legal situation for artists and the (2) lack of regulations of ICOs, (3) low investment interest and a (4) reallocation of funded projects by investors, (5) missing consumer awareness and their (6) inertia for change as well as (6) fear of increased transparency and the (7) fear of

losing power by influential middlemen, we have shown how they determine the amount being raised through ICOs (Ahlers et al., 2015; Allison et al., 2017; Fisch, 2019). By doing so, we also followed up on Fisch's (2019) proposal to draw network ties between artists and their stakeholders. This enables us to identify government, investors, consumers and intermediaries as influential stakeholders with an influence on the barriers mentioned.

The lack of uniform laws regarding ICOs leads to a situation of complex, fragmented regulations, which causes confusion and a high organizational effort for artists. In addition, there is an increased vulnerability to legal consequences in the implementation of ICOs, which can result in considerable financial damage for artists. The lack of regulations regarding ICOs leads to a high coin volatility. As ICOs essentially build on cryptocurrencies and are not effectively replicable with physical currency, the coin volatility additionally increases the investment risk of ICOs. Therefore, ICOs do not reduce risks for investors under the current lack of legal regulations, but merely shift them. Thus, we provide a theoretical contribution to the general academic discourse on ICOs by arguing that ICOs do not minimize risks, but that financial risks for Investors due to coin volatility are associated. Ultimately, these barriers end in an insufficient legal framework which does not provide artists and investors the needed legal foundation to conduct funding for artists through ICOs. In doing so, we can provide a practical contribution by agreeing with O'Dair and Owen's (2019) view that regulation of ICOs is necessary and thus reject Amsden and Schweizer (2018) claim that the lack of regulation increases investor interest. In order to overcome these barriers, we believe that firstly, artists need to be educated about ICOs, their implications, legal basis, implementation and potential risks. In our interviews, we have repeatedly been able to see that even artists who use ICOs do not have a complete picture of the consequences of their specific actions. Many of the artists we interviewed admitted that they believe they are in a legal grey area but cannot confirm this with certainty. Secondly, we believe that a global solution is needed for the regulation of ICOs for artists. We argue that the global, seemingly limitless nature of creative work requires a global approach for the regulation of ICOs. As the results have shown, the individual national regulations, such as those in the music industry, for example, are creating a patchwork of legal frameworks. Since ICOs are not subject to geographical restrictions, investors and artists therefore must be able to agree on a uniform, international standard.

As we have shown, the lack of uniform regulations for ICOs also leads to low investment interest for artists' projects. As our interview partners have pointed out, investors fear legal consequences when investing in artistic projects due to the missing legal framework for ICOs.

Consequently, the investment interests in financing artistic goods through ICOs is low and therefore important opportunities for artists are missing. In addition, we showed how investors pull ICO-funded products and services away from artists as soon as they have the necessary shares in a project to use them in and for more lucrative industries. Artists are therefore "penalized twofold" as promising ideas or projects, which are in the development stage for artists, will be deducted. Together with the lack of investment these circumstances lead ultimately to a stagnation of innovation and art. As a result, we argue that even if a legal framework cannot counteract the reallocation of ideas, it does increase the number of possible investors and thus also the chance that promising products will remain in the vicinity of artists. In addition, barriers are created by the lack of consumer awareness and their inertia to change. It was made clear that the lack of consumer awareness about shortcomings for artists is mainly due to the complex environment in which artists find themselves and the opacity regarding the added value of their work. Furthermore, consumers lack the necessary incentives to overcome their inertia and to initiate change. We therefore suggest that utility tokens are a good way to give consumers an incentive to change. Whereby utility tokens can be used in any form. For instance, we can imagine that utility tokens can be used to provide access to the value chain, so that consumers get a holistic and unbiased picture of the processes behind a creative work. In this way, it is possible to draw attention to grievances and give an unfiltered picture of the artists' work.

Intermediaries have monetary advantages due to the opacity along the value chain of artistic work. Therefore, they fear increasing transparency through ICOs, which would expose the misallocation of funds, opportunistic behavior and the concealment of dubious decisions. As a result, they are not driving forward the widespread adoption of ICOs. Nevertheless, this situation leads to considerable financial losses for the artists. Another goal of influential middlemen, such as record companies or film studios, is to maintain their own position of power over the artists and thus hindering the artists from using ICOs to fund their projects. As central actors and therefore brokers or gatekeepers (Freeman, 1979; Scott 1991) strong middlemen are able to manipulate information and distort or prevent communication in the network. The central position of the influential middlemen thus gives them a comfortable position where their opportunistic actions go unnoticed (Rowley, 1997). From the viewpoint of the influential middlemen, this is particularly important, since some would become obsolete through ICOs. Therefore, middlemen use their influential position in their social network to maintain their power resulting in no space for artists to freely develop. The behavior of



influential middlemen leads to stagnation of innovation and art. In our opinion, it is then necessary that the ones who perform ICOs should not try to substitute certain institutions and organizations, and rather work together with them to generate a successful outcome for all participants involved. Furthermore, we propose that cooperation between different institutions in the social network of artists requires a neutral body to coordinate the flow of information. Even if it goes against the principles of ICOs – since a central actor appears in the decentralized network – an independent institution could counteract the fear of losing power of some middlemen when collaborating with others.

### **Limitations and future research**

Our research has some limitations that must be taken into account in future research. First, we tried to cover artists from all the creative industries. It would also be useful to look at artists from various fields separately, as they sometimes differ greatly in the way artists conduct their daily working routines. Second, we cannot rule out the possibility that other influential groups or barriers might have an impact on the realization of ICOs for artists. We therefore call for future research to quantitatively examine the possible barriers hindering the extended utilization of ICOs for artists.

### **Conclusion**

ICOs offer new and promising opportunities for funding artist's projects. In this paper we have focused on the barriers that hinder the utilization of ICOs for artists. We have found that lack of regulations has a negative impact on investor interests. We also found out that complex and fragmented laws lead to a high organizational effort for artists to implement ICOs. We were also able to show how investors often move artists' work and projects to more lucrative industries once they have sufficient influence as token holders. Finally, we have also shown that an inertia for consumer change and lack of awareness strengthens the position of influential middlemen in the artists' social network. These middlemen take a proactive stance against the excessive use of ICOs. This is due to their fear of increased transparency and loss of power. Through the present work we contribute to research on cultural finance and funding by uncovering barriers that impede the implementation of ICOs as a promising form of financing for artistic projects and outlining possible solutions to overcome them. We also make several contributions to the general research on ICOs. Among other things, we have been able to fill the research gap on whether or not ICOs should be regulated and have shown that in the absence

of regulation, the risk minimization associated with ICOs is not achieved as new risks arise from exchange rate fluctuations.

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## **2 Overcoming Constraints for Blockchain Adoption in the Creative Industries**

Manuel Knott, Anne-Sophie Mayer, Franz Strich, Marina Fiedler

## **Abstract**

Blockchain enables actions and activities in businesses and industries to be automatically recorded and stored securely in a decentralized manner, without being dependent on intermediaries. Particularly in creative industries, blockchain technology helps to counteract challenges such as the lack of transparency, informal joint collaboration, or the lack of support in handling intellectual property rights. Although blockchain technology is promising and several applications exist, they have not yet been widely adopted. Therefore, our study focuses on revealing constraints that prevent the adoption of blockchain technology. Based on qualitative in-depth interviews with 35 professionals and software developers from 11 countries, we provide recommendations on how to overcome these constraints to enhance the use of blockchain technology.

**Keywords:** Blockchain, DLT, NFT, Creative Industries, Artists, Constraints

## **The growing need for blockchain technology in the creative industry**

Professionals in the creative industries are pioneers of innovation and development in the overall economy (Lampel & Germain, 2016). By creating intellectual property (IP), they generate new ideas, possibilities, services, and products that find appeal and are adopted beyond the creative industries (Rosselló & Wright, 2010). For this purpose, they mostly engage in project-based tasks with other professionals in the creative industries. These kinds of cooperation are predominantly carried out on a freelance basis in contexts where various professionals are needed for a specific project (Bakker, 2010; Castañer & Campos, 2002; Lundin & Söderholm, 1995).

Professionals in the creative industries are forced to integrate two opposing identities in their daily work. On the one hand, as entrepreneurs they have to defend their own market position, and on the other hand, as artists, they have to design and produce creative output (Menger, 1999). Consequently, their daily work is constrained by recurring organizational activities such as contract negotiation, contract preparation, or invoicing, which inhibit their creative exploration (Blair et al., 2001; Storey et al., 2005; Turner & Müller, 2003). Importantly, professionals in the creative industries regularly experience profound tension between their need for artistic freedom and the pressure to be cost efficient (Eikhof & Haunschild, 2006)..

Attempts to resolve these tensions by relying on classical management approaches such as functional or hierarchical management styles to date have been unsuccessful. These management approaches work best in four kinds of conditions: (1) a predictable and rational environment (Bilton & Puttnam, 2007; Turner & Keegan, 2001), (2) with homogeneous groups in terms of attitudes, beliefs, or personal values (Chaston & Sadler-Smith, 2012; Howkins, 2005), (3) with employees who prioritize economic growth rather than creative self-realization (Eikhof & Haunschild, 2006), and (4) when tasks are standardized and stable (Hanisch & Wald, 2014). Owing to the nature of work in the creative industries that differs from other industries, the classical management approaches do not succeed, yet they continue to affect the already informal and insufficient coordination strategies. Thus, professionals in the creative industry constantly strive to find alternative approaches for maintaining their creative freedom, while simultaneously managing their administrative processes.

A recent and very promising approach to relieving professionals from the tension between their creative and entrepreneurial activities lies in engaging blockchain technology. A blockchain is broadly defined as a transparent, non-manipulable, and decentralized ledger of digital events

(Swan, 2015). Blockchain technology enables the automation of recurring processes without dependence on intermediaries by means of self-enforcing contracts, so called smart contracts (Beck et al., 2016; Sadhya et al., 2018). For example, in the music industry blockchain technology is used to automatically pay out a sold song's shares to the individual shareholders. Due to the decentralized peer-to-peer structure of a blockchain, intermediaries such as service providers, record companies, or artist managers are not needed and, therefore, do not intervene (O'Dair et al., 2016). Thus, professionals can free up time resources, which enables them to concentrate on artistic core activities such as creating intellectual property or new innovations. Overall, blockchain technology offers professionals in the creative industries a promising opportunity providing support in their role as entrepreneurs.

In spite of offering a wide range of benefits to professionals in the creative industries, blockchain technology not widely used in this context (PricewaterhouseCoopers, 2018). Taking blockchain technology's promising benefits for the creative industries into account, we believe we need more insight regarding the reasons why these industries have not widely adopted this technology yet. Therefore, we investigate:

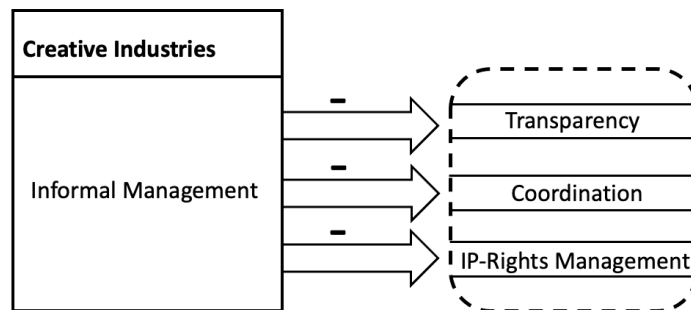
1. Which constraints do professionals in the creative industries face when using blockchain applications?
2. How can these constraints be overcome?

As we explain in detail in the Appendix, our findings are based on a qualitative analysis of 35 semi-structured interviews with professionals in the creative industries who have used or developed blockchain-based products and services for the creative industries.

## **Challenges in the creative industries for professionals**

The work of professionals in the creative industries is characterized by them generating wealth through creating intellectual property. Their work gives rise to the aforementioned tension between creative freedom and cost efficiency, leading to several challenges in the professionals' entrepreneurial activities. Due to the high product complexity and rapidly changing markets, uncertainties arise to which professionals in the creative industries have to react flexibly (Hanisch & Wald, 2014; Hobday, 2000). To maintain this flexibility, professionals working together on a project tend largely to take on an informal management style in response to the market uncertainties. Informal management is characterized by loose organizational structures, which are supported by a common vision rather than hierarchical structures. This ensures rapid communication between the individual actors (Hotho &

Champion, 2011; Mould & Comunian, 2015). However, informal management fosters a lack (1) of transparency, (2) of coordination in joint collaboration (Bresnen et al., 2005; DeFillippi, 2015), and it entails (3) difficulties in handling intellectual property rights (O’Dair et al., 2016), all of which significantly impede professionals’ work in the creative industries. *Figure 1* illustrates the challenges professionals face in the creative industries.



**Figure 1: Challenges in the creative industries**

First, the lack of transparency leads to decreased work efficiency, creates unclear work structures, and hinders the ability to effectively monitor work process (Boldrin & Levine, 2002; O’Dair et al., 2016). It also means that creative processes can only be documented with difficulty. Further, the structured organization of projects represents a high cost and time expenditure (Eikhof & Haunschild, 2006). The lack of transparency in the creative industries often leads to financial damages for professionals, because contractual agreements and remunerations are insufficiently documented and secured (Hennekam & Bennett, 2016; Potts et al., 2008; Powell, 2008). Unfortunately, women and minority groups in the creative industries are disproportionately affected by these circumstances. Then such lacking transparency leads not only to financial loss and discrimination, but also makes coordinating in joint collaboration difficult (Eikhof & Warhurst, 2013).

Second, the lack of coordination in joint collaborations results in unclear task assignment and increased error rates, which in turn impact the projects’ time and cost efficiency. Coordinating professionals in a wide network is challenging, due to most being freelancers in a predominantly project-based organization (DeFillippi, 2015). Coordination in the creative industry lacks standardized, reliable, and established processes, even though they regularly involve recurring tasks such as finding suitable teams, compensating freelancers, or defining project goals (Potts et al., 2008). This in turn reduces the underlying potential benefit of creative work, since a large part of the available time is spent on formal organizational processes rather than on actual creative tasks (Eikhof & Haunschild, 2006).

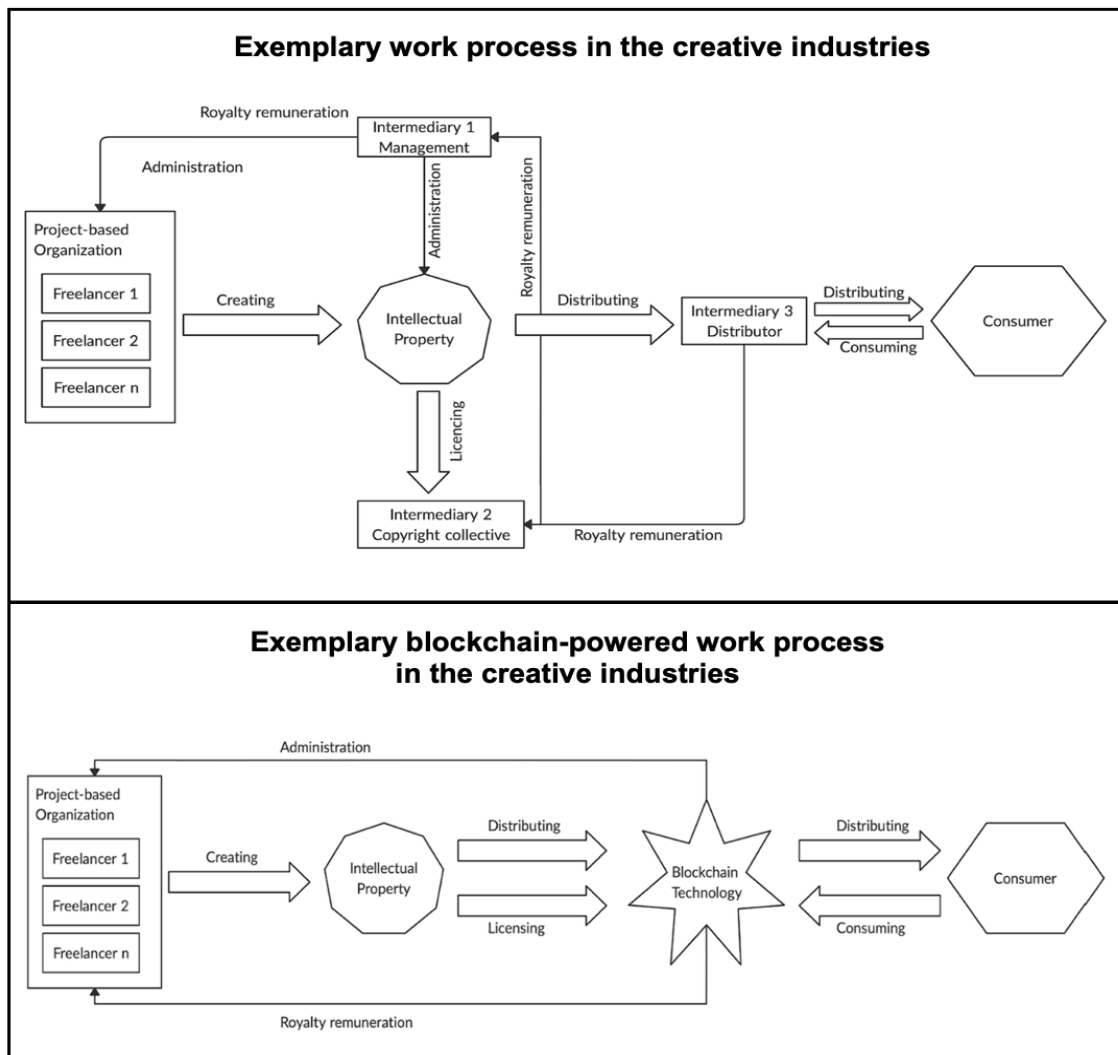
Third, professionals' challenges with handling intellectual property rights in the creative industries often restrict their everyday work. This is because of the difficulty to assign and quantify partial sections of a creative process to intellectual property rights. For example, phases in which apparently nothing has been created can still be productive in generating ideas and brainstorming (Kelley, 2001). Further, it is difficult to make the actual contribution measurable in a given form, which limits the possibility of evaluating the individual contributions and measuring them against one another (Cropley, 2009). Therefore, to efficiently authenticate and evaluate individual contributions to intellectual property in a collaboration poses a major challenge to professionals in the creative industries (O'Dair, 2018). Documenting each artist's contribution can take tremendous additional effort, often disrupting the creative process. Both the process of recording and the process of subsequently evaluating the individual contribution of each professional consume resources (De León & Gupta, 2017; Hargreaves, 2018; O'Dair et al., 2016).

### **Blockchain technology's potential to overcome artists' challenges**

To sufficiently support professional business processes in the creative industries so that artists can fully exploit their creativity, we need a novel adaptation of the current procedures. This can be done by applying blockchain technology (Nærland et al., 2017). Blockchain technology can be installed to secure any kind of automated process, such as exchanging information, stock shares, or reservations. Blockchain makes it possible to automatically record the actions and activities of individual participants, and to store them in a decentralized manner (Kewell et al., 2017). This technology ensures that power is not assigned to a single actor and misuse of the information becomes nearly impossible (Ciriello et al., 2018). This feature has changed the way people treat central institutions, which in turn can have positive effects for professionals in the creative industries. Illustratively, *figure 2* shows some work processes in the creative industries with and without the engagement of blockchain technology.

Blockchain technology can potentially improve the challenges professionals face in the creative industries in three ways. It helps to eliminate the lack of transparency in the creative industries, through an automated decentralized, non-manipulable monitoring mechanism, which efficiently stores any information flow on the blockchain (Hobday, 2000; Hotho & Champion, 2011). Blockchain also holds the potential to facilitate joint collaboration between professionals in the creative industries as it helps to record each participant's contribution. In addition, blockchain technology supports the handling of intellectual property rights through

continuously monitoring digital assets in online transactions (Beck et al., 2016; Cai, 2018; O’Dair, 2018).



**Figure 2: Exemplary work process in the creative industries with/ without using blockchain**

First, by engaging blockchain technology, it is possible to gain more transparency along the value chain in the creative industries (Francisco & Swanson, 2018).. An automated decentralized, non-manipulable monitoring mechanism, which efficiently stores any information flow on the blockchain can ensure this. Each participant thus has an overview of the complete history of a value creating event and the individual shares in a project of which the terms cannot be manipulated by other actors in the value chain (Korpela et al., 2017). The fashion industry provides a pertinent example. Initial attempts have started to engage blockchain technology to monitor this industry’s supply chains. In this way participants can ensure that the various suppliers and stakeholders comply with the contractual and legal



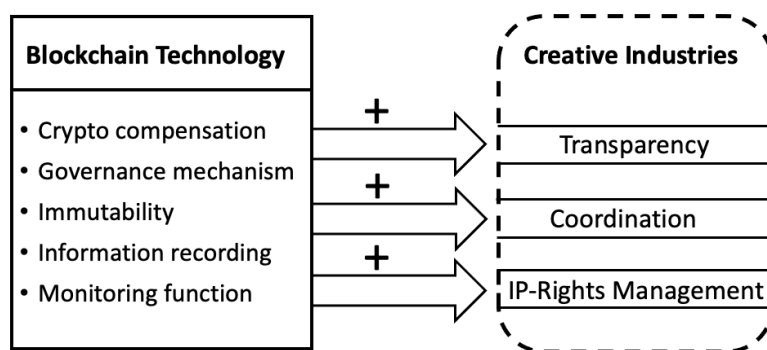
agreements throughout the entire value creation process (Francisco & Swanson, 2018; Fu et al., 2018).

Second, by using blockchain technology, the individual actors can improve their cooperation on joint projects and enhance fairness (Avital et al., 2016; Scholz & Stein, 2018). The proportionate value added by each team member in a project can be recorded within the blockchain. Each individual can be compensated for the value they contribute in the form of crypto-coins that represent their contribution to the project (Lee, 2019). These coins represent crypto-currencies such as bitcoin and thus serve as a monetary equivalent, which can be paid out via so-called crypto-wallets that serve as a digital purse. Smart contracts can automatically ensure this compensation is paid out on an ongoing basis. The first attempts to compensate team members in this way are already in progress, as the example of the UK Games Talent and Finance (UKGTF) shows. A pilot project investigated the extent to which transactions can be recorded in a shared ledger in order to record the founder shares continuously and cost-effectively (O'Dair, 2018).

Third, blockchain technology can improve the protection of intellectual property, while allowing digital assets in online transactions to be continuously monitored (Beck et al., 2016; Cai, 2018; O'Dair, 2018). In engaging blockchain it becomes possible to automatically record the individual contributors' actions and activities. The stored information can then be accessed at a later point in time, in a comprehensible way (Kewell et al., 2017). In addition, the properties and events cannot be changed after having been captured, as the information is stored securely. Further, the records are stored decentralized, so that the power of controlling the information does not reside with a single actor, but is distributed across the entire network (Ciriello et al., 2018; Kolb et al., 2018). The most prominent recent example of securing and monetizing intellectual property for professionals in the creative industries is the use of so-called non-fungible tokens (NFTs). The aim of an NFT is to offer unique digital products such as digital paintings, while ensuring buyers secure sole ownership of the original product (Regner et al., 2019). This makes it possible for professionals in the creative industries to sell their digital art as a scarce commodity on a digital online market for the first time in the history of art. Due to a broad mass showing increasing interest in blockchain, the recent past has seen several successful sales of this kind (Chohan, 2021), as the sale of the NFT "Everydays: The First 5000

Days" for USD 69.3 million<sup>1</sup> shows. *Figure 3* illustrates how blockchain technology can help to overcome the aforementioned challenges professionals in the creative industries encounter.

Despite blockchain technology's promising potential to overcome the identified constraints professionals face in the creative industries, the existing products and services are rarely engaged. To reveal the constraints that withhold professionals from using blockchain technology, we conducted a qualitative study in the creative industry. This gave us more insight into how professionals in the creative industries engage and develop blockchain for their use cases in the creative industries, what constraints arise in this regard, and how they can be overcome.



**Figure 3: Eliminating Challenges Through Blockchain**

## Constraints hindering blockchain adoption

### Financial constraints

Financial risk in this context refers to the fear professionals have of incurring financial loss by using blockchain technology. Professionals expressed concern regarding three matters, namely income fluctuation due to coin volatility, faulty coding, and increasing transaction costs.

First, lacking regulations for crypto-currencies (i.e., crypto-coins), make them particularly volatile. Volatility describes fluctuation in the value of a security, an index, currency, including crypto-coins, or similar. With the sharp rise of interest in cryptocurrency as a high-risk speculative asset, individual investors can earn high profits from this fluctuation. However, these conditions harm the planning security of all who use crypto-currency to remunerate business processes on the blockchain. Thus, high coin volatility weakens confidence in crypto-

<sup>1</sup><https://www.christies.com/features/Monumental-collage-by-Beeple-is-first-purely-digital-artwork-NFT-to-come-to-auction-11510-7.aspx> [accessed: August 10, 2021]

currency for other than speculation. Therefore, as long as unpredictable remuneration ranges prevail – since the value of the crypto-coins can change in a multi-digit percentage range daily – professionals in the creative industries can hardly use blockchain and crypto-coins as their main source of income:

*“I’ll just give you one very painful, in fact, heartbreaking, example. A guy who was a very early adopter in the Bitcoin space had a project in Africa to bring African villagers on board regarding Bitcoin investment. He came in with really high hopes and the desire to help unbanked people get into banking. During the time of his outreach project intended to provide this technology and make it accessible to unbanked people in Africa, thus while he was rolling out the project, the bitcoin price that was relatively high, fell by 50%. You know, I can only imagine the look on his face and on those of all the people whom he had really gotten excited about it. Then, just like that, he had to explain what had happened, what people then had to do. It was really dreadful. I wouldn’t want to be in that position.”* (Artist, Video and Film Industry)

The high coin volatility creates a tremendous need for stability and regulation:

*“[...] one theory about what would really make it easier to solve many of the early problems, is that we must find a solution to volatility, which is an important deal-breaker for these things to actually run smoothly...”* (Artist, Music)

As long as high coin volatility continues, professionals will prefer the methods already used for remuneration. Although most professionals realize that they could receive fairer and better remuneration through blockchain applications, they still find the risks of coin volatility in remuneration too high since original intermediary fees remain their responsibility.

Second, a faulty code can cause lasting financial damage to service providers and professionals:

*“The downside of our blockchain fingerprinting is that it’s not always reliable in picking up arrangements of compositions. So, for example, our system does not pick*

*up everything across the world. It picks up major digital feeds to the media. But actually, there's a lot that counts as non-major. So, in the US, it's picking up the national cable networks, but it's not picking up the local cable networks. But guess what, there's actually a lot being performed on those stations. So that's one of the downsides for, for the actual companies that are using the technology. In terms of the downside of the technology itself.” (Software developer, Music)*

At the same time, due to the immutability of entered codes, it is difficult to adapt information on a blockchain, which leaves little room for adjustment:

*“...and that's where all the questions that exist with regard to a blockchain arise again. For example, we wonder why a blockchain must be GDPR compatible. That is, the funny thing is, the great advantage of a blockchain being unchangeable, might then no longer apply in that some things have to be deletable. You can do that, of course, but then you have one less big advantage of the blockchain, and that simply doesn't work. And that is sometimes a big problem. The immutability. In many areas, we benefit quite strongly from that, of course. But in others, it really gets to us.”*

(Software developer, Video and Film)

While being fixed and unchangeable is a distinct advantage of the blockchain technology in terms of validating information, it also makes it almost impossible to subsequently make changes to the blockchain's underlying code. In theory, this is only possible through an immense amount of computational power or by convincing at least 51% of the nodes in the network to change data. However, in practice it is almost impossible to implement either of these options, which means that we need to pay a great deal of attention to proper programming and sufficient testing. A dramatic example of the far-reaching consequences a faulty code can have, is given in the DAO-hack, in which unknown suspects discovered a security vulnerability in the DAOs-blockchain's programming and were able to steal crypto-coins worth the equivalent of USD 60 million undisturbed (Mehtar et al., 2019). Thus, service providers have to put high effort into considering possible vulnerabilities thoroughly, in advance:

*“The biggest difficulty is that the technical set is still very early-stage technology. So, there are all kinds of brand new complexities and problems we ran into just because, you know, we're kind of at the forefront, you know, like ... we have to think of all kinds of matters, like when we deployed the blockchain the first time. We had to ask what the different tests are, whether we should run pilots ahead of time to make sure that there's not going to be conflict between the nodes, as this could stop the blockchain and then no one would earn their coins.”* (Software developer, Music)

Third, although blockchain can reduce transaction costs due to its architecture, this does not imply that transactions are entirely free of cost:

*“Well, I guess it depends entirely on the use case, I would say we're still ... let's say we're considering the transaction price on the Ethereum blockchain; it's the gas price that users have to pay in order to do a number of computations. Basically, the more complex the smart contract is, the more money goes into its execution.”* (Artist, Video and Film)

Blockchain technology has enabled professionals in the creative industries to generate cost-effective revenue with far-reaching effects through microtransactions. This introduced the possibility of a whole new business segment dealing with units referred to as NFTs. This possibility especially offered value to small artists and creators in the lower price segment, who could not economically realize the sale of their products and services on their own. Blockchain technology's growing popularity is increasingly eroding the possibility of micro-transactions, as the network requires more and more monetary incentives to validate transactions. At the same time, the large number of requests to the network leads to a rapid increase in transaction time, which massively jeopardizes the ongoing execution of business processes on the blockchain:

*“So, if you have a micro-payment you want to make, like, you want a peer to peer transaction. Let's say Alice wants to pay Bob one penny as a tip for being able to listen to or contribute to whatever kind of service, like ... let's say I want to release a*

*track for free and I just want donations for it, you know, and somebody wants to give me a five cent donation. Well, unfortunately that's going to cost, you know, \$1, to compute on the Ethereum virtual machine, and it's going to have to be synchronized and gain consensus on all the nodes in the network. Well, you know, really, we've not reached a point where those kinds of micro-payments are being facilitated yet.”*

(Artist, Photography)

In sum, taking current blockchain applications into account, professionals are cautious about using this technology due to several associated financial risks. They are concerned about the high coin volatility that makes a predictable income almost impossible, and the economic consequences that can arise from programming errors. Further, many blockchains are currently at a crossroads due to the increasingly high transaction costs that accompany the blockchain's growing popularity.

### Performance Constraints

Performance risk is understood as the possibility of incurring losses due to faulty or bad innovations. In particular, we understand performance risk in the current context as any potential deterioration in professionals' personal performance due to poor or incorrectly programmed blockchain applications. Performance is defined as the achievement of set goals. For professionals in the creative industries, performance risks arise due to, first, the lack of self-promotion through blockchain-based services or products, and second, the absence of blockchain adoption along the entire value chain of creative goods.

First, professionals in the creative industries recognized that while blockchain technology and the platform or service they were using offered them added value, their self-marketing opportunities on the platform fell short in terms of widespread engagement:

*“But at the same time, you have hundreds of photographers applying for the same shoot while you cannot explain anything about yourself. So, they can only rely on the photos they are going to receive from you and I apply against hundreds of photographers, but on my other platforms I can write why I am the best photographer for the job. I can write extra information on a site where I have more*

*photos and my portfolio and whatever more I have to show. I can show more value and then apply for a job.” (Artist, Photography)*

The interviewees also mentioned the lack of opportunity to maintain customer relationships due to the automation of business processes through blockchain:

*“I mean, we are a relatively small company. We don't have resources to meet every buyer regularly if they have a limited budget. So, they often just pay a small fee, and then we have very limited interactions which saves time. However, at the same time it's a business where you want to work more collaboratively. Without the ability to explain the scope of a collaboration things become much more confined. So yeah, that's how the communication flow with the blockchain site works: it doesn't increase, it decreases.” (Artist, Video and Film)*

*“So, I see the results and there is very little communication outside of the deal. I mean, it's just, it's automated – you just select the button, you keep returning until there is an offer. There is no dialogue with the customer, no trying to understand what each needs. So, if from a seller's point of view, you want to emphasize what would be interesting to them, that's not possible. So, it all comes down to a lack of communication and interaction, various kinds of human interaction are now managed by smart contract.” (Artist, Music)*

Many blockchain services fail to provide a comprehensive B2C-service for professionals in the creative industries, therefore the necessary prerequisites for widespread distribution of their products and services are not ensured. In particular, the blockchain services concerned mostly focus only on the core function of offering the marketplace, without providing sufficient marketing and analysis tools for the creative artists to leverage customers' awareness. As a result, these professionals, as well as the platforms themselves, remain in a niche that cannot generate sufficient reach for a broad mass. This results in insufficient opportunities to monetize the products and services of professionals in the creative industries.

Second, shortcomings arise along the value chain of creative products due to the fact that many blockchain services and products only cover a part of the whole value chain.

*“I am quite flexible regarding contractual terms. I don't have premium content related to studio content. So, I'm quite flexible. However, if it's content worth a multi-million, for which there are many restrictions and ways of protecting assets, and these companies don't have the power to create assurances, or they lose that power – so that's, I think that's a disadvantage for them. But for me, I can see the benefits for now. But yeah, as I say, just the fact that I can sign on new clients, smaller companies, this is great, because I don't have these resources. On the downside, it is just a fact that the bigger companies are not there. And it's, it's frustrating because it still requires the traditional way of selling.”* (Software developer, Video and Film)

Since business processes on the blockchain thrive on running through a holistic and fully automated lifecycle, it is imperative to avoid barriers at interfaces. Therefore, the use of blockchain along a value chain can only be designed efficiently if all interfaces and nodes are integrated in the blockchain. The lack of comprehensive adoption of blockchain along an entire value chain could lead to professionals in the creative industries doubting the entire business model and the usefulness of blockchain technology:

*“If you look at the use cases, imagine people in the music industry are working in blockchain. There are these direct payments now. You create like a network where consumers and producers are in the same network, and you have a wallet, and some money; you use the music and then you pay them. Well, this is a bit different to the real value chain idea and it's far removed from the reality. Basically, it won't happen because it depends on where you're going to find the content you are interested in. It wouldn't be in the in the blockchain. So trying to make this real, it's not very realistic. Let's wait and see.”* (Software developer, Video and Film)



Thus, we can show that for blockchain applications to be widely adopted and efficiently used, it would be essential to utilize these applications holistically along the value chain:

*“The problem is not only to have the technology; in the end, the programmatic advertising company also needs to use the blockchain platform. Otherwise, it's not going to work and it can't be done without them, but they could be ... I mean, I'm not saying it's definitely the case. It needs to be experimentally tried out, to find ways to save costs in terms of making it more scalable and getting it to run by itself with a loyalty program and the likes.”* (Software developer, Music)

*“So, because of all this lack of transparency I feel the necessity of having this on a public ledger. But on the other side, the implementation of a blockchain system especially requires engagement from the major partners, otherwise it will not work.”*  
(Software developer, Video and Film)

In this context, however, there should be increased effort from various actors along the value chain, as correctly executing business processes on a blockchain requires that actors seamlessly provide information and metadata:

*“You know, because so many people are not ready, the blockchain doesn't work on this. Everybody's on it, you know, and so I can have a piece trademarked, but then if the next person buys it they might not update the details because for them it doesn't matter, you know. And then the whole sense of having everything transparent is gone. So, I'm more in it due to the message, because it's too early, too hot to ... for me to benefit from this as an artist, you know.”* (Software developer, Music)

Performance risks arise as many blockchain applications are focused more on the technology than on the users and their needs. For professionals in the creative industries, blockchain is a promising way to improve their working conditions. Yet, if they cannot market themselves sufficiently, they will lack the purchasing power necessary to even experience the potential of blockchain technology. Further, automating business processes through blockchain only

becomes meaningful if it is done along the entire value chain. If there are bottlenecks at the interfaces, this can ruin the entire automation process as it would require additional personal and time resources of the users and of those who receive the data transmitted through the blockchain.

## Time Constraints

Time risk in this context refers to the fear that adopting an innovation will take too much time. Professionals in the creative industries see time risks, especially during meta data preparation and transactions.

First, to sufficiently prepare data for the blockchain is highly time-consuming in many areas of creative industry. Mainly, the predominant opacity in the creative industries, makes the complete recording of information and data along the value chain unfeasible. In the music industry, for example, the correct metadata of all collaborators of a composition is often missing. The blockchain service provider *Paperchain*, which specializes in the holistic remuneration of artists in the music industry estimates that currently more than 46 million unidentifiable artists have unclaimed entitlement totaling \$2.6 billion in royalty payments.<sup>2</sup> This illustrates the insufficient data basis in many areas of the creative industries, which means there is missing information and leads to a number of uncertainties that hamper error-free execution of business processes using blockchain technology. To avoid this, the efficient full automation of business processes with the help of blockchain technology is preceded by laborious and time-consuming data preparation that relies on human capital. This makes the utilization of blockchain appear questionable under these conditions:

*“And then with blockchain you can enforce the contract terms automatically, but the correct meta data needs to underpin it. If it doesn't work, it could be due to a participant having random data because the software spat out random meta data and there was no-one to do the work to cross check. So yeah, for me that's why it is a niche because that's only for those who can afford to spend hours on experimenting and maybe getting a return.”* (Artist, Fashion)

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<sup>2</sup> <https://paperchain.io/press/in-the-news/> [accessed: August 10, 2021]

Therefore, engaging in blockchain needs additional employees who can process the required data in a trustworthy manner so that conflict does not arise due to the immutability of the blockchain:

*“In our case, a large part of what is, or was, in the archives simply could not be used because this data was not available. This means that you don't just need blockchain; you also need the ability to check the metadata itself, as that also adds value. But then again, you have to be sure that you know how reliable the person is who writes the data. That is where controlling the data over several entities or several times in the network, comes into play. That is a relatively important component of blockchain which could also help in the course of data preparation.”* (Software developer, Video and Film)

In addition, contractual agreements with professionals in the creative industries are characterized by exceptions, because their work is also characterized by exceptions and the creative process, as well as creating new intellectual property, is difficult to capture and scale a priori. Thus, standardized processes and reusability of information and contract content hardly ever occur:

*“I mean, like currently, most companies operate on the customized contracts they have for their own operations in the older regime. Then, with blockchain smart contracts, man, a lot of all these exceptions are missing. In Atlanta, for example, it's obviously challenging so I think it's good for smaller businesses if they are doing long tail revenues, as smoothly selling reduced amounts to many small companies is very straightforward. We don't have the resources to legally review contracts and then to re-negotiate parts of the things that require specific skills. So, outside of a blockchain art industries escape certain difficulties, and on the other hand it just ... it doesn't give you freedom to control what terms you can offer your client and implement.”* (Software developer, Music)

*“And the drawbacks are basically related to the fact that blockchain does not carry the final truth. I mean, it's a system and mechanism. But it does not function on its own; on its own it's not going to solve anything. So, you need efforts and smart ways of entering the data in a common space and solving the conflicts that you already know happen. So, we kind of rely on a system that can bring the conflicts of interest to the surface. When, for instance, we have a claim conflict, there's no mechanism to solve these efficiently. So finally, the data is the key. It has to be there if it has to work. Success does not come because of blockchain itself, as if it is a magic technology.” (Artist, Music)*

In summary, we find on the one hand preparing the meta-data for the execution of transactions to be correctly done, currently means an additional expenditure of professionals' time in the creative industries. On the other hand, the same applies for preparing the metadata to ensure intellectual property protection. Therefore, in either case, there is a need for more efficient data preparation.

## Privacy Constraints

In this context we understand privacy risks as the possibility of losing control over one's information. Professionals in the creative industries fear privacy risks due to the immutability of the blockchain and potential hackers' leaks or attacks.

First, creating a service or product entirely on the blockchain means that all the entered information is truly immutable, whether it is personal information, business data, or product-centric information. Therefore, once any information on a blockchain based platform is stored by any professional in a creative industry, it cannot be deleted or modified. As a result, these professionals complain that they are not even able to obscure or delete their intellectual property or personal profiles to withhold blockchain service providers' access:

*“Yeah, I said to myself, okay, it's not only another gallery unless it works to show my stuff, because I can always benefit from having my pictures out there. But let me tell you, I can't even take down what I already have on there.” (Artist, Photography)*

This poses a significant concern for professionals in the creative industries since they have no control over their intellectual property, which leads to reluctance to use these platforms:

*“I don't think that art should be treated like a commodity. It's so personal. It really has so much to do with the art satisfying the customer's taste. You know, the customers are really trying to express themselves through their purchases. And you act almost like a medium for the other. Then people who are producing the work as a creator, you know, it's like to succeed, the artist should simply try to be as honest ... you know, as honest as possible and on a personal level as expressive as possible so that you have a connection with those customers. And yet, it doesn't really require you to connect with other people in order to do it.” (Artist, Photography)*

In this context, far-reaching damages due to online piracy can also arise for professionals in the creative industries, especially when unauthorized third parties make artists' and creators' intellectual property available on the blockchain:

*“And this is the approach of the big companies. When we talk about, you know, Sony and Spotify, they realize very well that the problem lies with the private information and the amounts that are shared between various creators, but that has to be private because imagine if you put everything in the public domain. Imagine if somebody put a BitTorrent link in the blockchain for movies. There will be no way to remove that ever from the internet. So, we're talking about piracy and all this stuff, okay? Anybody can have their own opinion, but this is a big issue with a blockchain when somebody realizes that possibility. So, those with the funds to put unauthorized content in the blockchain could do so. Then, the industry would try to remove that, because they want to or should have to remove the whole blockchain from danger. So, if there is a decentralized view and this information is out in public, you have to be sure that there is no private information of anybody at all.” (Artist, Music)*

This circumstance leads to customer doubt, which often makes it difficult to communicate the far-reaching benefits of blockchain technology convincingly:

*“...Blockchain is often new to them. And sometimes they are conservative in their approach to technology. So, you know, you're talking to a bunch of folks that are not very familiar with the technology and we're trying to convince them to, you know, take a big mental leap, you know. They barely know what Bitcoin is, and we're in here trying to teach them about why they should integrate blockchain technology. It's a lot of education on our part, and a lot of explaining its use. We have to convince them it's not scary, although it is new.”* (Software Developer, Video and Film)

Second, fears of possible future hacking attacks on blockchains are increasing. Although blockchain technology is considered non-hackable, which might in theory be true, hacking attempts have increased, and in the recent past a few individuals have already managed to hack blockchains. One of the most feasible ways to do so is a so-called a 51% attack, which can happen when an "individual" controls more than 50% of the total nodes in the network. This allows any decision for the blockchain to be determined by a single individual, without those in control of the other nodes having any influence. A 51% attack can be a problem for private blockchains with only a few nodes (Sayeed & Marco-Gisbert, 2019). Assuming that the nodes in a private blockchain are usually known, the actual threat and a possible motivation for an individual posing it, remains questionable. In public blockchains, such as the Bitcoin or Ethereum blockchain, such an attack can be ruled out due to the size and number of nodes in the network. Rather, potential threats to the security of blockchains in the near future are posed by the further development of quantum computer technology, which, for example, can solve the encryption of the Bitcoin blockchain in a few seconds with a computing power of 4000 qubit. According to current trends, quantum computers could be capable of such computing power as early as 2022 (Stevens, 2020):

*"When it comes to the encryption of data, with the algorithms that are currently used, these are mathematically decryptable according to a study by Fraunhofer. So theoretically, at least for the time being, it depends on the capacity of the current computer technology, and it's basically a question of when people will be able to*

*hack it. [...] Sure, it could be safe right now, but the question is what do you do if the probability grows to the point that someone then actually breaks in and can use the data." (Artist, Music)*

According to the interview partners, should hacking occur in the future, there are very few possibilities to counteract it:

*"And that's where the problem comes up again: you've written things in an encrypted manner, but what do you do then? You can't just change the encryption or then change the algorithm because that means you have to change the blockchain. You can of course kick the whole blockchain to the curb, but that wouldn't be very sensible either depending on how much has already been written by then." (Artist, Music)*

In sum, professionals in the creative industries face perceived privacy risks due to their data entries being immutable, and future hacking attacks becoming possible. Both cases entail the fear of losing control over data. Especially from a proper data protection perspective, we urgently need solutions to combine the advantages of blockchain with the necessary data flexibility. Such a solution could ensure blockchain utilization in areas such as the creative industries, where people and their (intellectual) capital are affected by every transaction being made.

### **Recommendations for a successful blockchain acceptance**

Our findings indicate that blockchain technology offers various kinds of potential that can contribute to overcoming the challenges professionals in the creative industries face. However, due to four main constraints – financial, performance, time, and privacy constraints – professionals in these industries rarely engage the promising blockchain technology. Based on our analysis, we provide four recommendations that could help to overcome the identified constraints, and thus to fully exploit blockchain's potential.

## Recommendation 1: Payment and remuneration with stable coins

Significant fluctuations in the exchange rates of utilized crypto-coins increase the risk of financial loss when payments are made via the blockchain. As a result, trust in the blockchain and its capabilities suffers, limiting the widespread use of blockchain applications. As our interview partners suggested, creating blockchain-based remuneration opportunities that are not affected by volatility can help to increase the wide adoption and benefits of blockchain for the creative industries::

*“I want to just put this on the table to discuss later. This could herald the evolution of stable coins and of the USDC ERC 20 tokens, following a theory about what will really facilitate solving many of the early problems that the in-depth developers encountered with volatility. Stable coins could be a major deal breaker in getting the blockchain to actually run smoothly and be a reliable instrument in conducting business, you know. So that's something that we can get to, but yeah, that will be challenging for me to get started.” (Artist, Music)*

Therefore, we recommend that designers develop blockchain applications with a remuneration function that avoids using crypto-coins with exchange rate fluctuations. Professionals in the creative industries finance their livelihood by selling their intellectual property, therefore they are generally less interested in using their income to speculate on the crypto market. To plan business transactions and ensure their predictability, the use of exchange rate resistant coins as a means of payment is indispensable to strengthen trust in blockchain and consequently ensure widespread creative artists' engagement. In this context, given the immense current interest in blockchain and crypto-currency and the associated rising transaction costs, we have the following advice.

When choosing a specific stable crypto-coin, designers have to ensure that the use of these coins carries low transaction cost and high transaction speed. Since many professionals in the creative industries charge comparatively low prices and then generate their income selling to a broad mass, it makes no sense to pay high transaction costs on every sale. Although transaction costs on many blockchains have risen so exorbitantly due to their growing popularity, that does not mean there are no alternative blockchain frameworks. Various blockchain developers



recognized this problem early on, so that they increasingly developed new blockchains, which realize low transaction costs while simultaneously achieving high transaction speeds.

## Recommendation 2: Focus on the user rather than on the technology

When applications are not user-focused in design, performance constraints related to increased effort in handling them, occur. Since blockchain applications are designed to support creative industry professionals' activities and to simplify their goal achievement, the additional skills required to use blockchain applications must be kept low. Unfortunately, many blockchain applications are not user-centric; rather, they focus on the technology and its capabilities. However, simply touting the advantages of a supposedly best, even if disruptive, technology for the creative industries as use case is not enough to convince users to adopt it. Instead, for widespread adoption of blockchain applications, a change in perspective is necessary. Designers have to focus on the potential users' needs, and then create a framework that will enable blockchain to satisfy these needs. As several interviewees clearly described, designing an application must clarify how blockchain can be adapted to user needs and not the other way around:

*“But one thing I would like to see on that platform is an affiliate program, okay, you know, where I could represent an artist, and if the artist sells stuff through my website, then I would get like a commission. Secondly, a lot of people are using, like, Amazon, you know, posting ads for Amazon on their websites. If somebody buys something through their website, Amazon is in a position to pay good money. I think that’s it. So, I think that would give ... that would give curators an incentive to promote articles, you know, because there they will be making a commission on their artwork. So basically, the community likes to, to represent artists’ community feeling in the product.”* (Artist, Video and Film)

*“I think that I've been solving that problem myself. And the real solution comes in the form of people being able to own the access to their customers. I think the solution to that comes in places like Instagram and Squarespace and Patreon and Kickstarter, where there is a direct relationship between the content providers and the customers.*

*You know, the tools have become powerful enough for a creator also to be a marketer, without having to really learn that much about the technology. And even without having to learn much yourself, you can hire freelancers to do things like marketing and web design which brings products directly to customers without an intermediary. And it's, there is room there for [...], you know, about hundreds of thousands or millions of artists worldwide to support them making a living with these tools, assuming that they are also able to, like, take on some of the business owner responsibilities, I mean, or collaborate with people who can work with them directly ... so that they're not being taken advantage of by intermediaries.” (Artist, Fashion)*

Blockchain applications that provide professionals in the creative industries with a platform for self-promotion should help them more to reach their audiences. Many applications focus too much on the blockchain technology as the main selling point of their product, but the technology itself is not a sufficient reason for potential customers to adopt it. Rather, in the creative industries, the personal benefit a potential application has is measured in terms of the actual added value. The most promising technology is of no use if professionals in the creative industries cannot sell their intellectual property via blockchain applications in the first place. Therefore, it is necessary that future blockchain applications for the creative industries focus on the professionals and their needs first, and adapting the technology and its potential promises to fit the artists/ needs.

### **Recommendation 3: Machine learning for data preparation**

Preparing data for the blockchain can give rise to time constraints. The informality of work in the creative industries often leads to incomplete contractual terms and information required to execute transactions. These industries have developed methods to prepare incomplete or erroneous data for individual use cases, yet mostly by using cost-intensive human capital. In many current use cases possible changes or errors discovered after the first agreement can still be changed. However, those considering to engage blockchain in this regard, have to consider this technology's immutability, and therefore they have to thoroughly review and prepare any contractual content and information. Especially in the case of fully automated information transactions, erroneous or incomplete data can cause a chain reaction of incorrect transactions

with irrevocable damage. The need for meticulously preparing compliant data therefore offsets many of the achievements of blockchain's full automation of processes, as human effort precedes the main process of data processing. With the increasing capacities of machine learning regarding data preparation, combining machine learning for data preparation with blockchain technology for data processing is a suitable mechanism to increase the utilization of blockchain:

*“So, it's like for instance, I have 100 titles and it takes me many days to physically prepare all the meta-data for integration into the time systems in which this data needs to be processed. All this, just to tell you that even blockchain implementation needs to be backed by other technologies like artificial intelligence machine learning, because there is still a traditional side to the business which operates in the old way. It's so much work and then you have to take the risk as well. So, I'm sure bigger companies already have machine learning to assist in preparing all their content, but in my case I cannot take the time to do it because I'm quite a small company. But, the bigger companies can afford to spend the time doing that.”*

(Software developer, Music)

Consequently, it appears that preparing the meta-data for correctly executing transactions and securing intellectual property rights currently means professionals in the creative industries have to invest considerable effort to overcome their difficulties. The rapid developments in machine learning capabilities, if properly integrated and linked to blockchain technology, could lead to a decrease in the amount of time spent on preparing data, and thus increase the perceived benefits of blockchain technology

#### Recommendation 4: Combine centralized and decentralized data storage

The immutability of the blockchain, despite its aforementioned advantages, poses potential privacy constraints. First, individuals relinquish sovereignty over their own information as soon as it is stored on a blockchain, since it is not possible to change or even delete it. Second, this data can hardly be protected in the event of potential hacker attacks, as it is not possible to

intervene in the blockchain. Blockchain applications should therefore rely on a hybrid model which can store private data and the actual intellectual property centrally:

*“And you can have hybrids with different degrees of centralization or decentralization. Looking at it in a more traditional way, it’s called a technology stack, you know, you could have a base layer that is an Ethereum blockchain or a Bitcoin blockchain, then you could have private protocols running on top of that and anchoring back into that so that you have a layer of privacy that is somehow obscured through your code, but then that eventually anchors back into to a an immutable blockchain for a certain level of ability to verify internal transactions.”*

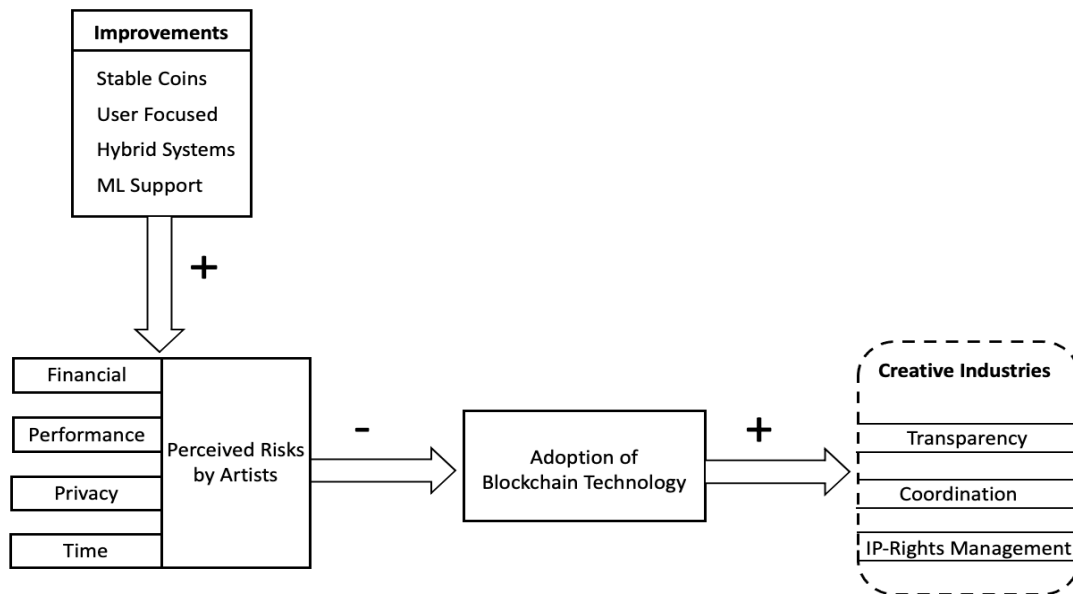
(Software developer, Music)

This could address several problems encountered with the use of blockchain in the creative industries at once. On the one hand, the potential damage caused by faulty coding can be reduced, as sensitive data that continues to be stored centrally can be accessed and changed at any time. Further, this could bring another level of personal data protection in the event of any future hacker attacks on blockchains:

*“I mean, if we are talking about blockchain we have to be very clear about that. There’s a part that can be public. And probably when we’re talking about tracking the provision of food, or parts of machinery, and weapons, drugs, whatever, it is very clearly valuable to have that information in the public domain, because we always need to be able to track where these things come from. But you need to have some storage which is not decentralized, a centralized place where all the other private information is kept. That’s the whole value.”* (Software developer, Video and Film)

At the same time, this would allow professionals in the creative industries to maintain authority over their personal data, which is clearly essential – also considering possible data right protection claims – if blockchain applications are to be widely used in the creative industries. Therefore, having a hybrid IT-architecture where sensitive or third-party data are stored centrally, could decrease privacy constraints in two ways: data can still be manipulated or

deleted, and data can be secured against potential future hacking attacks. *Figure 4* presents a comprehensive model of the opportunities blockchain technology offers the creative industries, the perceived risks of using blockchain, and necessary improvements that can minimize those perceived risks.



**Figure 4: Improvements to overcome the perceived risks of using blockchains**

## Concluding Comments

Blockchain technology is promising in terms of its functions and features, such as increasing transparency, supporting cooperative work, and efficiently securing intellectual property rights. For professionals in the creative industries and the project-based forms of organization that are ubiquitous in these sectors, this technology offers opportunities to improve collaboration among all participants. In this paper we have focused on the constraints that withhold professionals in the creative industries from adopting blockchain technology. We have shown that the decision to adopt blockchain technology is influenced by perceived financial risk, performance risk, time risk and privacy risk.

Building on these findings, we have made several recommendations that could profoundly minimize the perceived risks associated with blockchain engagement. First, the use of stable coins such as USDC can contribute to more planning certainty in the payment process. This could immensely increase trust in blockchain technology as a payment mechanism. Second, we appeal to designers of future blockchain applications to consistently focus on the users and their needs. Based on the user needs, designers should consider how blockchain can satisfy

them. Blockchain alone as a selling feature will not be enough to convince users to adopt blockchain; rather, the holistic system must add value for user in creative professions. Third, we strongly advise reliance on a hybrid system architecture and – depending on the specific use case – consideration of when data can be permanently written on a blockchain and when it would be more reasonable to store the data centrally to prevent data loss and guarantee data sovereignty. Finally, in cases with incomplete data, using machine learning for data preparation should be considered. For transactions on the blockchain to be carried out smoothly, the seamless availability of data is indispensable. Since a degree of human capital required in this respect calls the usefulness of blockchain into question, the use of machine learning could significantly support these trivial activities of data while reducing transaction costs. Based on our insight from real-world cases, our recommendations ensure that blockchain systems can realize their full potential while mitigating risk. We offer our insights and recommendations as a resource for organizations developing blockchain applications in and for the creative industries, hoping that we can contribute in facilitating blockchain adoption.

## Appendix: Research Methodology

This article is based on a qualitative study. We conducted 35 semi-structured interviews with professionals in the creative industries who are using blockchain technology and with software developers who are developing blockchain applications for the creative industries. On average, our interviews lasted 47 minutes. We conducted eight interviews with representatives of the photography industry, seven interviews with representatives of the art industry, and six interviews with individuals representing the music industry. Further, we conducted three interviews with participants from the video- and film industry, as well as three interviews with professionals in the fashion industry. In addition, we conducted one interview with an automotive designer. Lastly, we also conducted seven interviews with blockchain software developers who focus on developing products and services for the creative industries (please see *table 1* for a detailed description). For each artist, their creative output was their main source of income. Similarly, software developers' work on blockchain applications for the creative industries was also their main source of income. By specifically interviewing these two groups, a focus on desired adjustments, challenges in adopting blockchain technology, and challenges during the development of blockchain applications, enabled us to obtain a comprehensive view of the mechanisms underlying constraints that hinder blockchain technology adoption in the creative industries. All interviews were recorded, anonymized, and transcribed verbatim.

To identify the relevant constraints to blockchain technology adoption in the creative industries, we conducted a qualitative content analysis according to Gioia et al. (2013) framework. We coded relevant text passages and used a category system to reduce data complexity. We chose a deductive approach in forming the superordinate categories, and thus created the categories based on previous theoretical knowledge before analyzing the data. Using an inductive approach, we derived subcategories from the material to be analyzed. For this type of analysis, we first moderated the individual written interview statements from the transcripts to arrive at a reduced form. We summarized aspects that related to each other or were similar in content, and represented them by a new statement (category). Corresponding places in the material were then assigned to the newly formed category, i.e., coded. During the coding process we iteratively performed the steps of analysis. Three independent researchers reviewed the data. After this step the categories were continuously refined. Once no new categories could be created, we built the final category system. *Table 2* gives the final data structure of our interview results.

**Table 1: Overview of the survey sample**

Industry	#	Ø age in years	Ø work experience in years	Gender	Nationalities
Photography	8	32	7	0 female	DE, MX, PL, US
				7 male	
Art	7	38	11	3 female	DE, MX, PT, US
				4 male	
Music	6	27	5	2 female	BE, DE, SP, US
				4 male	
Video and Film	3	39	9	0 female	DE, EN, SL
				3 male	
Fashion	3	41	15	1 female	AR, PAT, US
				2 male	
Automotive Design	1	26	8	0 female	US
				1 male	
Software development	7	34	6	0 female	EN, RO, US
				7 male	

*Note:* AR = Argentina; BE = Belgium; DE = Germany; EN = England; MX = Mexico; PAT = Patagonia; PL = Poland; PT = Portugal; RO =Romania; SL = Slovenia; US = United States of America



**Table 2: Data structure**

1st Order Concepts	2nd Order Themes	Aggregate Dimension
Income fluctuation due to coin volatility	Financial Risks	Perceived risks of blockchain adoption by artists
Damage caused by faulty code		
Increasing transaction costs		
Lack of self-promotion	Performance Risks	
No holistic adoption along the value chain		
Long transaction time	Time Risks	
Time consuming data preparation		
Loss of control over one's own data	Privacy Risks	
Potential hacker attacks		

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### **3 Increasing User Engagement on Blockchain Applications through Persuasive Design**

Manuel Knott, Anne-Sophie Mayer, Franz Strich, Marina Fiedler

## **Abstract**

Blockchain gives rise to many new applications and use cases and has already markedly changed several industries, such as financial services, energy and utilities, or healthcare. Although blockchain could potentially be used disruptively for end-user applications as well, utilizing it remains poor. It appears that the unconvincing design of many end-user blockchain applications leads to insufficient user engagement. To investigate the influence of design aspects on users' engagement of blockchain end-user applications, we developed a blockchain application for the creative industries based on the principles of persuasive design. Hereby, we aim to contribute to research in the blockchain context on how end-user applications need to be designed to increase user engagement. By using a design science research process, we can ultimately provide a total of seven recommendations for developing persuasive blockchain applications for end-users.

Keywords: Persuasive Design, Blockchain, User Engagement, Creative Industries, Artists

## Introduction

Blockchain is one of the most promising technologies of the future which has already given rise to many disruptive applications and use cases (Puranam et al., 2014). While the general interest in blockchain technology is steadily increasing (Swartz, 2017), the widespread use in end-user applications is surprisingly underdeveloped. To date only a number of niche products and services for end-users rely on blockchain technology (Schlegel et al., 2018). This is surprising considering the tremendous progress this technology has made in the past few years (O'Dwyer & Malone, 2014; Zheng et al., 2018). It seems that the perceived underlying complexity of blockchain and difficulties in handling existing applications prohibit users from engaging with the technology (Fogg, 2009).

Despite the promising technological advantages blockchain has over centralized applications, recent uses cases in the creative industries provide further evidence that blockchain applications' design, does not allow for sufficient user engagement (Arcos, 2018; Fogg, 2009; PricewaterhouseCoopers, 2018; Wieck & Cuomo, 2019). For instance, the music streaming platform *UJO-Music* follows a business model on the blockchain, which allows royalty payments automatically to be paid out after a song has been streamed (O'Dair, 2018). In this way, by relying on blockchain technology, *UJO-Music* manages to shorten the period between a user's music consumption and royalty payments to the artists from several months or years to a few seconds (De León & Gupta, 2017; O'Dair, 2018). Nevertheless, since its launch in 2015, *UJO Music* has not managed to tap into a mass market. In contrast, between 2015 and 2020, *Spotify* has increased its number of monthly active users from 91 million listeners to 345 million (Sitonio & Nucciarelli, 2018; Spotify Technology S.A., 2020). In the meantime, *UJO Music's* service has become unavailable. In trying to determine the reasons underlying this ambivalent market position of both suppliers, *Spotify's* extensive utilization of persuasive design principles becomes apparent as a main distinguishing factor between the two platforms (Grześ, 2013; Ichihara, n. d.).

The principles of persuasive design focus on changing users' behavior through persuasion and social influence (Fogg, 2009). Persuasive design provides a comprehensive framework for successfully designing applications that can facilitate user engagement (Torning & Oinas-Kukkonen, 2009). *Spotify*, *AirBnB*, *Tinder*, or *Netflix* are prominent examples of persuasive design principles in end-user applications being successfully realized. All of these applications benefit significantly from a steadily high user engagement which results from utilizing persuasive design (Adaji & Vassileva, 2016; Dann et al., 2018; Knights, 2018). Blockchain



applications, can widely benefit from persuasive design as well; however, at least in our understanding, no blockchain application has applied the principles of persuasive design in an all-encompassing manner yet. Our assumption about the missing consideration of persuasive design principles in the development of blockchain applications was supported by qualitative interviews we conducted with 35 professionals in the creative industries who utilize blockchain applications in their daily work.

We therefore developed an end-user blockchain application for the creative industries using the principles of persuasive design. This custom blockchain application is designed for professionals in the creative industries to automate formal processes such as contracting and remuneration. The creative industries provide a perfect environment to explore the realization of persuasive design principles on blockchain applications. On the one hand, blockchain offers quite a few benefits for professionals in the creative industries, giving the necessary intrinsic motivation to at least try our application. On the other hand, the blockchain's predominantly project-based activities and the accompanying recurring formal processes lead to the app being highly utilized. Therefore, we believe that our use case provides the foundation for a necessary and promising research direction for *the impact of persuasive designs on blockchain applications and their user engagement*.

Our paper is structured as follows: First, we address the potential blockchain technology holds for the creative industries. Then, we present the persuasive design framework. Next, we present our design science research (DSR) approach. Building on this, we make recommendations for future blockchain application development, taking our experience with persuasive design into account. Lastly, we end the paper with a brief conclusion.

## **Blockchain technology's untapped potential in the creative industries**

The creative industries are the leading drivers of innovations and can widely benefit from blockchain technology (Kontrimienė & Melnikas, 2017; O'Dair, 2018). These industries encompass a wide set of concerns, including sectors like advertising, architecture, film-production, or software development (DCMS, 1998). The range of industries are generally characterized by a project-based organizational structure (Blair et al., 2001). With their predominantly project-based organization and intellectual property as the core of their value creation, creative industries can benefit from blockchain in several ways (O'Dair, 2018). First, formal processes such as contracting or team finding can be automated by blockchain using automatic contracts, so-called smart contracts. Here, transactions can be executed efficiently

without having to rely on third parties, as trust in middlemen such as lawyers or banks is replaced by trust in technology (Beck et al., 2016; Halaburda et al., 2019; Sadhya et al., 2018). Second, intellectual property rights, whether physical or digital intellectual property, can be stored efficiently and cost-effectively on the blockchain, for example in the form of so-called non-fungible tokens (NFTs) (Regner et al., 2019). Third, transaction costs can be drastically reduced in intellectual property sales on the blockchain, as trusted intermediaries between buyer and seller, who act as third parties, become redundant (Shahab & Allam, 2020). Despite these promising possibilities of blockchain for creative industries, widespread use of the technology remains unfulfilled.

### **Increasing user engagement through persuasive design**

Persuasive design provides a framework for developing user-oriented and persuasive information systems (ISs). Persuasive design aims to *"form, alter or reinforce attitudes, behaviors, or an action"* (Oinas-Kukkonen, 2013, p. 1225) towards an IS without coercion or deception. It therefore seeks to induce behavioral change through technology interaction without compulsion (Schneider et al., 2016). For example, behavioral change can be seen as the change occurring when users transfer from not using blockchain-based applications to using them. Ideally, the concept of persuasive design achieves a cognitive or emotional transformation of a certain mental state toward a specific action (Adaji & Vassileva, 2016; Grześ, 2013). Fundamentally, behavioral change requires individuals who are (1) sufficiently motivated, (2) able to change their behavior, and (3) have a sufficient trigger for changing their behavior (Fogg, 2009).

First, individuals must be sufficiently motivated to change their behavior. Fogg (2009) identified three two-sided motivators that function in this way, which are pleasure/pain, hope/fear, and social acceptance/rejection. The feeling of hunger that needs to be satisfied, for example, represents pain and can provide sufficient motivation (Schneider et al., 2016). In the specific use case of blockchain end-user applications, a possible pleasure could be the possibility of streaming digital content without country-specific restrictions. Next, the hope/fear motivator type is preceded by an expectation that something good (or bad) will happen as a result of a behavioral change (Fogg, 2009; Schneider et al., 2016). Finally, the motivator pair social acceptance/rejection relates to a behavioral change that depends on an expected societal reaction (Fogg, 2009; Ichihara, n. d.). Nevertheless, being motivated on its

own is not enough. At the same time, the individual must have the appropriate ability to change their behavior (Fogg, 2009).

Therefore, second, an IS must by design be simple enough to maintain the necessary abilities for behavioral change (Oinas-Kukkonen, 2013). Systems that require the user to learn new skills to use them correctly usually fail due to user resilience. Fogg refers to simplicity as a "function of a person's scarcest resource at the moment a behavior is triggered" (Fogg, 2009, p.7). Thus, the aim cannot be to help users increase their ability to use an IS. Rather, ISs must have low complexity, even intuitively relying on the power of simplicity (Oinas-Kukkonen, 2013; Tørring & Oinas-Kukkonen, 2009). Fogg (2009) asserts that a system is simple only if it simultaneously requires a low level of effort regarding time, monetary resources, physical features, and cognitive input. Additionally, an IS should not deviate from social norms and routine activities (Tørring, 2008). End-user applications should therefore be intuitive to use and specifically align with the end-user's routines. Yet, in addition to sufficient motivation and requisite abilities, behavioral change will not occur without a suitable trigger.

Thus, third, if individuals are sufficiently motivated and able to change their behavior, a particular trigger can ultimately lead to the desired behavioral change. To appropriately prompt users to change their behavior, there are three types of triggers: sparks, facilitators, and signals (Fogg, 2009). First, sparks use one of the three two-way motivators (i.e., pleasure/pain, hope/fear, social acceptance/rejection) as an initiator. Sparks can, for example, be texts that evoke fear or videos that convey hope (Fogg, 2009; Kotthaus et al., 2016). Second, facilitators can be decisive triggers if individuals lack motivation. For instance, one-click purchase options that indicate a desired behavior is easy to achieve (Fogg, 2009), can facilitate change. Finally, signals can serve as reminders for an individual to change behavior if motivation and ability are already sufficiently present (Fogg, 2009; Langrial et al., 2012). Thus, as triggers, signals do not motivate or simplify, but rather – like a green light – indicate to an individual that a given behavior can now be changed (Adaji & Vassileva, 2016; Schneider et al., 2016). However, not the mere presence of the triggers, but rather the interplay of sufficient motivation, the necessary ability, and a suitable trigger can lead to a behavioral change.

To successfully change users' behavior, the three factors (motivation, ability and trigger) must occur simultaneously and without coercion (Fogg, 2009; Tørring & Oinas-Kukkonen, 2009). Fogg (2009) further argues that systems achieve faster behavioral change by focusing less on motivating users and more on making the desired behavior easier.

In sum, persuasive design helps to design compelling ISs that induce a desired change in the user's behavior. This framework also provides the necessary tools to identify problems that prevent a desired behavior in a system. For this purpose, persuasive design combines technological design principles with insights from behavioral psychology (Oinas-Kukkonen, 2013). Combining the two fields enables unconstrained aspirations for a change in behavior, based on users' own fundamental convictions (Oinas-Kukkonen & Harjumaa, 2009). Thus, persuasive design offers an excellent framework for motivating users to change their behavior regarding blockchain technology.

### **A DSRP for persuasive design in blockchain applications**

A design science research approach enabled us to generate sound knowledge for academia and practice on novel solution design in the IS domain (Hevner & Chatterjee, 2010). These novel solutions, called artifacts in the DSR context, can include new kinds of software, methods, models, or concepts (Peppers et al., 2012). In our case, relying on DSR, we structurally investigated how persuasive design impacts user engagement of blockchain applications. The design knowledge gained through DSR can help researchers in future projects to design artifacts in a systematic and scientifically sound manner (Hevner & Chatterjee, 2010). This requires not only describing the design of the artefacts while conducting a DSR, but also investigating its broad impact on the application domain (Pries-Heje et al., 2008). This specific research approach allows us to holistically discuss the effective use of artifacts in the real world, as well as their impact and influence in scientific theory, specifically in using a design science research process (DSRP) (vom Brocke et al., 2020).

The DSRP provides a process model for the design and development of IT artifacts in the IS community (Peppers et al., 2007). It is based on six activities, which nominally follow a sequence, even if not always stringently: (1) problem identification and motivation, (2) objectives of a solution, (3) design and development, (4) demonstration, (5) evaluation, and (6) communication (Offermann et al., 2009; Peppers et al., 2007). The entry point for research that uses a DSRP can be of various origins. Besides a problem-centered approach, other possibilities are an object-centered solution or a design-and-development centered approach (Hevner & Chatterjee, 2010; Pries-Heje et al., 2008). A problem-centered approach recommends starting with the problem identification and motivation, insofar as the idea for the IT artifact evolves from previous research or observation (Peppers et al., 2007, 2012). Since the

idea for our IT artifact emerged from qualitative interviews, we begin our DSRP with the problem identification and motivation, using the problem-centered approach as our entry point.

### Problem centered approach

We used a qualitative approach to find out why blockchain applications are insufficiently used in the creative industries. We conducted 35 semi-structured interviews with professionals in the creative industries who are using blockchain applications. An overview of our interview sample is given in *table 1*. Our questions focused on desired adjustments of blockchain applications, and on challenges in adopting blockchain technology. This allowed us to gain meaningful insight on what enhancements current blockchain solutions need to suitably engage the creative industries, and on what is currently preventing sufficient blockchain technology use. We coded the transcribed interviews and analyzed them according to Webster and Watson (2002).

**Table 1: Overview of the survey sample**

Industry	#	Ø age in years	Ø work experience	Gender f/m	Nationalities
Art	7	38	11	3 / 4	DE, MX, PT, US
Design	1	26	8	0 / 1	US
Fashion	3	41	15	1 / 2	AR, PAT, US
Music	6	27	5	2 / 4	BE, DE, SP, US
Photography	8	32	7	0 / 7	DE, MX, PL, US
Software	7	34	6	0 / 7	EN, RO, US
Video and Film	3	39	9	0 / 3	DE, EN, SL

*Note:* AR = Argentina; BE = Belgium; DE = Germany; EN = England; MX = Mexico; PAT = Patagonia; PL = Poland; PT = Portugal; RO =Romania; SL = Slovenia; US = United States of America

Professionals in the creative industries complained about many blockchain applications lacking user-centricity. In particular, users missed much needed flexibility they require on the platforms to perform their primary tasks adequately:

*“But at the same time, you have hundreds of photographers applying for the same shoot, you cannot explain anything about yourself. So, they can only rely on the photos they receive from you, but on the other platforms I can write why I am the best photographer for the job, and so on.” (Artist, Photography)*

In addition, interviewees consistently criticized blockchain applications for providing user interfaces that are hardly intuitive. As a result, many find it difficult to use these applications comprehensively and efficiently:

*“So, I felt from my point of view this site doesn't work. Yeah, you know, no matter what item they are asking or whatever I have to do, I don't know how it works. I don't know, the visual platform you kind of need to have a professional background to use it.” (Artist, Music)*

Further, participants criticized the User Interface and User Experience (UI/UX) of different platforms. Especially, they mentioned the lack of design aesthetics:

*“This display for the users, you know, the user experience here is really rough.”*  
(Artist, Film, Video & TV)

When blockchain applications integrated payment functions, they were often criticized for being too inflexible and unintuitive. For a blockchain application to rely on a payment mechanism a so-called crypto wallet must be accessed by the application itself. Only then can payments be made on the blockchain. Those wallets serve to manage crypto assets and the necessary keys for sending and receiving crypto currencies (Haigh et al., 2018). However, many blockchain applications do not satisfactorily implement integrating and handling these wallets:

*“Yeah I would want my wallet to do a bunch of stuff. Yeah. But once you access your profile through the wallet and run the profile, it would be good to have some statistics to see what kind of traffic one has.” (Artist, Music)*

Therefore, professionals in the creative industries are hopeful that blockchain applications will improve their design in the future:

*“Now I think people are going to find better user interfaces for it. It makes things more transparent and simpler than to use light gray. Currently this a little too difficult to use, and it's difficult for artists to use. You know, just like the old*

*smartphones, you know, till the iPhone came along with an easier interface, you know, people struggled with them.” (Artist, Graphic Design)*

Our qualitative survey revealed that common blockchain applications lack a persuasive design. In particular blockchain applications for the creative industries seem to be unintuitive, inflexible, and unappealing. Thus, as the first DSRP step, the lack of user orientation and the associated unconvincing design are the foundations on which we did the problem identification and motivation.

### Problem Identification and Motivation

The interviews we conducted revealed that professionals from the creative industries need a persuasive design feature when they use blockchain applications. Our results agree with the assessments research and practice have produced. Arcos (2018), for example, has already stated that the functionality of a blockchain should only be embedded at the back end of the software architecture, and in such a way that it does not interfere with the common user experience. This view not only goes hand in hand with our interview results, but also with IBM's (Mills, n.d., p. 1) assessment: *“Despite all the euphoria about blockchain technology, when designing applications, the focus must be on the human as the user and not on the machine as the technology driver.”*

Based on the above, we find that many blockchain applications lack a persuasive design, which results in potential users not engaging with those applications due to them missing the necessary abilities and motivation. Therefore, it is important to develop blockchain applications with a persuasive design that focuses on the users and their needs.

### Objectives of a solution

To investigate whether a persuasive design can lead to increased user engagement on blockchain applications, we designed *ProLabArt* according to the persuasive design principles. *ProLabArt* is a user-centered blockchain-powered project management tool for project-based organizations in the creative industries, which facilitates formal organization and coordination. It provides support for typical organizational tasks in project-based organizations. In particular, *ProLabArt* automates team management and contracting, by relying on the *Ethereum* blockchain.

## Design and development

*ProLabArt* brings the *Ethereum* blockchain and its' cryptocurrency *Ether* in a native *SWIFT* programmed iOS app that was developed for mobile devices with an *iOS* operating system. *Firebase* is used as the main database. However, for data protection and security reasons, the talents' (i.e. team members) public keys are only locally stored on the devices. Communication with the *Ethereum* Blockchain is established via a custom node using the *Infura* API. The *Web3Swift* API is used as an interface between the *Ethereum* blockchain and *SWIFT*. The app is available in the *Apple App Store*.

Our application has two main motivator functions. First, *ProLabArt* motivates users to engage with blockchain technology by automating the team management aspect of projects in the creative industries. Usually, project leaders assemble the teams through social networks and informal recruitment. *ProLabArt* automates these processes by relying on algorithms we developed for this specific purpose. Consequently, *ProLabArt* relieves project leaders from the tedious and time-consuming task of team management.

Second, *ProLabArt* motivates users to engage with blockchain by enabling blockchain-powered contracting. For this purpose, all contract-relevant content is automatically stored in a legally binding contract on the *Ethereum* blockchain. Upon completion of a project, team members can be compensated via cryptocurrency within the app. Through this function we relieve project leaders and team members of the tedious and time-consuming repetitive processes of contracting and properly compensating contract workers by essentially automating them through the *Ethereum* blockchain.

On considerations of ability, *ProLabArt* tries to keep the skill requirement for using the app low, to encourage the end-users to positively change their behavior toward blockchain. To support the primary task, content is provided tailored for individual users. For example, information is prepared individually for the project leaders as well as the remaining talents by addressing each user by name. In addition, in the project execution process the user is continuously tunneled through the entire lifecycle of the app. Among other things, functions and areas of the app are only enabled in compliance with a project's lifecycle. For example, the payment option is only enabled once the project has officially been completed. Further, we tried to break down complex tasks into smaller ones as far as possible to avoid superfluous information in the sense of reduction. Therefore, the app is made up of several intermediate steps such as "defining the project specifications," "determining the number of talents needed,"



or "selecting the teams". This reduces the perceived effort users experience in performing their primary activity.

*ProLabArt* also relies on self-monitoring, giving each user the ability to constantly monitor their progress and assess the performance of their talents. For example, as the project evolves progress indicators are displayed in the app, and talents' performance data is visually presented in a bar chart. Thereby, we strengthen users' possibility of observing their own potential target behavior, which motivates them toward a potential behavior change. With extensive onboarding, an explanation video, and a graphical representation of *ProLabArt's* cause-and-effect relationships, we enable users through simulation to see the immediate link between the cause and effect of their potential activity.

Finally, to achieve the primary task, the end users are given the possibility of sufficient practice. First, *ProLabArt* suggests dummy talents for users to familiarize themselves with the app, and second, when we reward talents with cryptocurrencies, we offer the project leaders the possibility of sending fake cryptocurrency via the *Ropsten testnet*. Through this, the project leaders can comprehensively familiarize themselves with the app in general, and with blockchain as well as cryptocurrency in particular. Thus, they can practice their target behavior without fearing financial loss. With this function we motivate the users to change their attitude toward using blockchain in the real world. Additionally, we use various principles of dialogue support.

Within *ProLabArt* we facilitate a computer-human-dialogue by implementing comprehensive dialogue support. Users get text alerts that give positive feedback after each task completion. At the same time, we use text alerts for other communications, e.g., when opening the app, as a reminder function to achieve the primary goal. Therefore, we make users more open to persuasion through praise. In addition, we achieve a high level of dialogue support by giving users the greatest possible freedom in the team selection process. Instead of simply determining a team to collaborate with the project leader, we propose different teams from which the user can ultimately choose. Subsequently we also suggest suitable replacements for vacant positions. In this way, we increase the app's persuasive power at opportune moments, rather than just determining the team solely through the app. Additionally, we worked closely with experienced UX/UI designers, who assisted us in designing a visually attractive app so that the persuasion would be enhanced by how the interface looks and feels. Finally, within the app we also want to embrace our social role toward more diversity, equity, and inclusion (DE&I) in the creative industries. It was important to us that the app would proactively embrace DE&I.

The app provides no images, information on talents' ethical background, age, religion, etc. Thus, we can avoid stereotypic behavior based on external characteristics. We also communicate our self-image as a role model for more DE&I in the creative industries in detail and transparently at various points within the app, not least to increase our system's credibility.

To increase our blockchain application's system credibility, we have continuously communicated *ProLabArt's* academic background. We found it important to comprehensively explain that we do not gain any monetary rewards with the app. We also emphasized that any information we provide is unbiased, truthful and shows expertise. In addition, all available content and information is verifiable and further supported by endorsements from respected third-party sources. We also added a comprehensive "about-us section" in the app, explaining the individual roles of those involved and providing a sufficient real-world feel through background information on the responsibilities of the app. In addition, there are several opportunities for establishing direct contact on a variety of platforms with each of the people responsible for the app. Knowing about the urgency of a high surface credibility, we focus strongly on a holistic competent look and feel from onboarding to the settings area. Finally, we used a cross-platform approach to achieve the highest possible social support through the app.

Through a comprehensive online presence, we can leverage social impact that motivates users for a behavioral change toward blockchain. *ProLabArt* has an extensive website with background information, motivation, goal, roadmap, and explainer videos about the app and its functionalities. In addition, we implemented a blog on our website to educate readers about blockchain for creative industries. Further, we keep our followers up to date via our own *Twitter* and *Telegram* account. Finally, we set up a *Discord* channel with various subchannels where the community can interact directly with us and with one another. Among others, we opened a subchannel where users can describe their experiences and use cases. In doing so, we want to reinforce social learning by allowing users to observe their own target behavior based on what other users do. Thereby, we intend to increase artists' motivation to perform the primary task. In addition, the website's different channels, and especially the interactive exchange via *Discord*, allows us to leverage the app's normative influence. Within *Discord* the communication between users can increase peer pressure on different individuals, increasing their willingness to adopt the target behavior, i.e., extensive use of the blockchain application.

Next, we show our approach to generating a sufficient sample, and explain how we analyzed the data.

## Demonstration

We used a cross-platform approach to achieve the highest possible outreach for the app. *ProLabArt* has an extensive website with background information, motivation, goal, roadmap, and explainer videos about the app and its functionalities. In addition, we started a blog on our website that educates about blockchain for creative industries. *ProLabArt* was made available to interested parties and selected testers as a beta version between September 2020 and January 2021. In total, 19 project leaders gave us feedback using either the various channels such as *Twitter*, *Telegram*, *Discord* or the in-app feedback function. In addition, the app was presented to several UI/UX designers, as well as to product designers with several years of experience. The feedback we collected in this way was exclusively in written form.

## Evaluation

The evaluation of the collected feedback was divided into three areas of interest, namely design, team finding, and contracting. First, we evaluated the feedback regarding the design. The testers' feedback showed us that a significant proportion of app users engaged with *ProLabArt* using iPads. Since our design was primarily focused on iPhone usage, we adapted it for common iPad resolutions. In addition, we improved our UX by eliminating redundant steps and reducing the number of intermediate steps to achieve the primary goal. We also changed some parts of the font for better screen readability.

Second, we addressed the feedback of the team finding system by extending it in significant parts. A fundamental improvement was the function to replace individual team members from a proposed team. This gives users the necessary flexibility in their team configuration in case one of the team members is unable to participate in the project.

Third, feedback from testers indicated that a display of current exchange rates (Ether/USD, Ether/EUR) and the user's cryptocurrency balance within the app can help to reward team members more efficiently and conveniently.

Finally, we received minor improvement suggestions from the Apple Developer Program Support before the app was released in the Apple App Store. These were graphical bumps that occurred on iPhone 8. Specifically, there was an overlap of text content on the onboarding screen. This has also been fixed, so that the app is available to the public for free in the *Apple* App Store since January 26, 2021.

## Communication

We circulated information on the app's official launch and triggered users to engage with *ProLabArt* via the *ProLabArt* website, and the associated *Twitter*, *Telegram*, and *Discord* channels. In addition, we contacted 2458 companies from the creative industries in the DACH-region, thus triggering them with a request to use the app.

## **Recommendations for building persuasive blockchain applications**

### Focus on your value proposition

Users will measure the benefit of an application primarily by its perceived value proposition. The fact that an application relies on blockchain does not on its own provide sufficient motivation to engage with it. Therefore, blockchain has to contribute with the rest of the system to the value proposition, and as Arcos (2018) already stated, it should best disappear in the back-end of the software architecture. When communicating blockchain as part of the value proposition, we highly recommend that users do so in a generally understandable and comprehensible way. Many potential users will not fully understand blockchain, which would result in them feeling rather overwhelmed by the app and therefore not motivated to use it. Moreover, users will feel they are insufficiently skilled to use the app properly. The principle of persuasive design, which determines that ISs must be designed simply to fit the necessary skills for behavioral change, equally counts for communicating their value proposition.

### Not everything has to run on the blockchain

Blockchain's unique strengths are also its greatest weaknesses. Blockchain is primarily used to achieve immutability, transparency, automation of processes, or to eliminate middlemen in various processes. This is where blockchain technology's full potential lies. However, its immutability makes it almost impossible to react flexibly to different influences and situations. Further, it is virtually impossible to delete data from a blockchain. This can result in legal and financial consequences in the event of data protection violations or security breaches if incorrect data transmission occurs. Furthermore, with blockchain's increasing popularity, the costs per transaction or contract execution are steadily rising. Therefore, only the most necessary information should be stored on the blockchain. Also, blockchain's immutability significantly complicates subsequent changes in the service. However, if a hybrid system of centralized and decentralized data storage is used, the service can be adapted at any time and

if at all, only small changes need to be made to the blockchain itself. Then, there are less concerns if the users' motivation or their abilities are not sufficient to use the app comprehensively. With a hybrid system considerable operating costs can be saved if it is not necessary to run every data transfer on the blockchain.

### Choose the right blockchain for your use case wisely

Just because *Ethereum* is currently the talk of the town doesn't mean it's the best solution for every use case. There are probably hundreds, if not thousands, of different blockchains each with its own strengths and fields of application. Therefore, it makes sense to choose the right blockchain based on requirements rather than on popularity. When we started developing the app, a transaction using our app cost about USD 0.000047. In March 2021, the cost of a transaction peaked at USD 13. The high computational cost and the ever-increasing demand for *Ether* almost caused our project to fail, because such high costs meant the *Ethereum* blockchain was no longer suitable for our use case. Users are not motivated to pay unprecedentedly high transaction costs for comparatively small transaction gains. In our case, using the Free TON blockchain platform instead might have been smarter, as it offers millions of transactions per second at a price of less than USD 0.01. However, we were tempted to select Ethereum, the top performer in decentralized applications, without considering other alternatives.

### Do not re-invent the wheel

There are many highly talented programmers pioneering blockchain technology and offering strong frameworks, API's, and third-party services that will save a lot of work when developing new blockchain use cases. *Ganache, Truffel, Infura, Ropsten, Rinkeby, or web3* are all projects programmers and developers initiated on a voluntary basis to make blockchain applications accessible to a wider audience. These projects rely on a large community that offer extensive support in the form of instructions, tutorials, or forum threads. In our case, we were very grateful to be able to draw on these resources. We are convinced that without such help, the project could not have been realized. There is still a great deal of movement and development in the blockchain world, so we strongly recommend reliance on well-established frameworks, APIs, and third-party libraries to build solid and stable applications. In-house development of already well-developed and tested interfaces and services is usually redundant and therefore not worthwhile, especially since the vast majority of third-party services are free of charge anyway.

## Customer support is key to success

Especially during startup, most of the financial and human resources will go toward R&D and marketing. However, it is at least as important to maintain and cultivate solid customer support services. For many blockchain is what the internet was in the 1990s. Cryptocurrencies, decentralization, or wallets are still unknown to most end-users. The terms and technologies are hardly understood and have yet to be mastered. Therefore, comprehensive customer support will motivate the end-user to continue using the app and can make a significant contribution to end-users' long-term engagement with the application. Specifically, it is useful to provide extensive educational material regarding the application and blockchain technology in the form of videos, blog posts, or tutorials in order to provide users with the necessary abilities to engage with the app. Also, giving users different channels and possibilities to get in contact with a customer care unit or community can greatly increase the customer retention.

## Be transparent and credible

Since the emergence of blockchain technology, it has been associated with a flimsy connotation as a technology of the dark net. The fact that in the past the funding of several blockchain-based companies turned out to be frauds with bogus products does not facilitate the credibility of blockchain and its applications either. In addition, there has been consistently a lot of change in the blockchain sphere regarding company or product transformation, which has led to many blockchain applications going out of service from one day to the next. This makes it even more difficult to eliminate doubts and persuasively convince the end user of the blockchain application's value. The developer's job is therefore to persuade the user to trust and value the application. In this regard users highly value comprehensive information about the product and the people behind it. Ultimately, publishing the source code is a common practice used by many successful companies and developers to significantly build trust in the application with minimal effort.

## Convey the right experience

Developers should not overload their users with too much, but rather provide them with an intuitive user interface by relying on previous user routines. This includes creating an experience for the users by guiding them through the lifecycle of the application. Thereby developers should rigorously eliminate redundant steps and information from the app design. Also, trying to eliminate avoidable interfaces will strengthen the application flow and lower

the kinds of abilities necessary to use the app. Especially if an application offers a payment function, we recommend integrating this function fully into the application. In doing so, the user does not have to rely on another program to access the wallet, which would mean longer engagement with your application. In addition, users should be provided with customized and individual content and information, as this would make users feel personally valued. Further, giving users the ability to try out and explore the application will help them to feel more comfortable in engaging with the application. This includes creating space for tutorials, demonstrations, and opportunities for users to familiarize themselves with the app's individual functions. However, excessively restricting the functions for the users could be patronizing. The right balance between giving guidance and allowing flexibility is therefore the key to an application's success.

## **Discussion**

In this paper, we considered how user engagement on blockchain applications can be increased by relying on the principles of persuasive design. In developing our own blockchain-application with the help of persuasive design, we realized, that developing a user-centric blockchain app would be the key to success for future apps. Relying solely on blockchain or cryptocurrency as buzz words to generate revenue turned out to be insufficient for many applications in the past and will continue to be so in the future. Therefore, it is important for future blockchain developers to understand that which technology is used, whether it is blockchain, machine learning or IoT, is not a selling point for products and services. The decisive factor regarding an application's quality is the question of what added value it offers its users. In this case, "how" the value is added, is irrelevant.

With this in mind, we would like to contribute to theoretical research in the blockchain context by answering Halaburda et al.'s (Halaburda et al., 2019) open questions for future research on several levels. First, using the blockchain for transactions is only useful when processes need to be automated. However, rather any kind of information is transacted over the blockchain by many applications, which could still be stored centrally without significant drawbacks. This in turn implies the answer to addressing the second research gap, which was established by Halaburda et al. (2019), trying to determine the extent to which different implementations of smart contracts influence their adoption. Usually, every transaction on a blockchain involves fees, and the transaction as well as its associated information on the blockchain is irreversible. Following persuasive design principles, any transaction using information which does not

diminish the application's value proposition if done outside of the blockchain, does not have to be carried out through the blockchain since it would be superfluous for the users and how they perceive a particular application's persuasiveness. If such transactions are carried out centrally, it supports the user's continued control of their own data sovereignty.

We further contribute to Sadhya et al.'s (2018) research on how trust in blockchain technology can be increased, giving recommendations that highlight several ways of building trust in this context. First, due to ambiguous impressions of blockchain and to quite a few scams in the past, it is necessary to provide transparency and the greatest possible flow of information to users about the application, the technology, and the people and companies behind it. Additionally, extensive customer support is an important part of increasing trust in the blockchain technology. In addition to theoretical contributions, the strength of our paper lies primarily in the practical implications, which we share in the form of six recommendations for future blockchain application developers.

## **Conclusion**

Blockchain is one of the most disruptive technologies currently in use, bringing several new opportunities for end-user applications. Yet, the absence of persuasive design in many blockchain applications inhibits a breakthrough of blockchain technology for end-user applications. To help future blockchain application developers in their design, we developed a blockchain-powered project management tool for the creative industries, using the principles of persuasive design. By evaluating our project through a DSRP, we were able to provide seven recommendations for developers of end-user blockchain applications, summarized as (1) focus on your value proposition, (2) place only essential information on the blockchain, (3) choose the blockchain that fits your use case best, (4) leverage existing third-party services, (5) focus on comprehensive customer support, (6) be transparent and credible, and (7) convey the right kind of experience.

Through our recommendations, we contribute to research in the field of blockchain technology by providing measures that can increase user engagement for end-user blockchain applications. In addition, we contribute to persuasive design research by extending this promising framework to the use case of blockchain technology. Finally, we also provide comprehensive practical implications for a persuasive end-user blockchain design.



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## **4 Persuasive System Design for Blockchain End-User Adoption – Evidence from the Creative Industries**

Manuel Knott, Franz Strich, Anne-Sophie Mayer, Marina Fiedler

## **Abstract**

*Blockchain technology has the ability to disrupt end-user applications by automating business processes while reducing transaction costs. Blockchain refers to a distributed ledger on which information can be stored in a decentralized manner. Despite its disruptive potential, its use for end-user applications remains underdeveloped. One reason for this seems to be the lack of persuasive system design in the development of blockchain end-user applications. Therefore, we developed a blockchain end-user application based on the Ethereum blockchain following the principles of persuasive system design. Our research aims to find out more about how persuasive system design can increase user engagement on blockchain end-user applications. Our app, called ProLabArt, automates formal processes for the creative industries. Based on a sample of 222 survey questionnaires, we provide in-depth insight regarding the adoption of blockchain technology. Further, through our results we derive practical implications for developers of future Blockchain end-user applications.*

**Keywords:** Blockchain Technology, Persuasive System Design, User Engagement, Smart-Contract, Ethereum, Creative Industries

## Introduction

Blockchain technology enables the decentralized coordination and execution of business processes without the need for intermediaries as trustworthy entities (Puranam et al., 2014). A blockchain can be characterized as a distributed public ledger, where transactions can be stored and executed, without the need for a trusted third-party (Swan, 2015). It therefore alters the treatment of central institutions and provides an environment for disruptive mass collaboration (Tapscott & Tapscott 2017). Further, blockchain creates the opportunity for self-enforcing digital contracts, so-called smart contracts, decentralized marketplaces, or communication platforms without depending on a centralized power entity (Wright & De Filippi, 2015). Therefore, blockchain applications strengthen collaborations (Madsen et al., 2018), reduce human capital tied up in formal processes (Scott et al., 2017), and significantly decrease transaction costs (Halaburda et al., 2019; Schmidt & Wagner, 2019). However, the widespread implementation of this technology is largely underdeveloped.

While the general interest in blockchain technology is steadily increasing (Swartz, 2017), so far, only a limited number of niche products and services for end-users rely on blockchain technology (Schlegel et al., 2018). Up to now, no blockchain application has managed to gain mass-market adoption (Schlegel et al., 2018). Considering the immense progress this technology has made in the past years, this is somewhat surprising (O'Dwyer & Malone, 2014; Zheng et al., 2018). For blockchain to be adopted, prior research emphasizes the importance of organizational factors such as top management support, organizational support and readiness (Clohessy & Acton, 2019; Clohessy et al. 2019), as well as technological factors such as security, scalability, and flexibility (Batabura et al. 2018). However, previous research lacks an end-user focus and does not explain why current blockchain applications are underutilized. It seems that the perceived underlying complexity of the blockchain technology and difficulties in handling existing applications withhold users from engaging with the technology (Fogg, 2009). More precisely, the cluttered visual presentation of many blockchain end-user applications and their perceived complexity might be hindering broad mass utilization (Schlegel et al. 2018).

Current use-cases in the creative industries also give evidence that design flaws are responsible for the lack of mass adoption of blockchain applications (Arcos, 2018; Fogg, 2009; PricewaterhouseCoopers, 2018; Wieck & Cuomo, 2019). Artists in the creative industries utilize the internet and its platforms extensively to market and sell their intellectual property. Thereby, blockchain applications benefit from (1) very low commissions (De Filippi, 2015;

Rückeshäuser, 2017), (2) real-time and transparent compensation (O’Dair, 2018), and (3) the unique opportunity to distribute exclusive digital art (McConaghy et al., 2017; Zeilinger, 2018), protected by the blockchain. Interestingly, even though blockchain applications exist with comparable functionality to centralized applications and have been on the market for many years, they are underutilized. For example, *Theta.tv* is pursuing a business model based on blockchain technology, where consumers generate tokens by simply streaming content, which in turn can be donated to the individual streamers.<sup>1</sup> This creates an unprecedented ecosystem of its own that gives streamers an unprecedented opportunity to generate revenue. Nevertheless, *Twitch* with its traditional centralized business model remains the undisputed market leader in the streaming sector, with a constantly growing audience (Barman et al., 2020). Comparing the two streaming providers, it becomes clear that unlike *Theta.tv*, *Twitch* extensively implements the principles of persuasive system design. While both service providers offer good primary task support by allowing content creators to stream and viewers to watch the streamers in an easily accessible way, it is clear that Twitch goes a step further by utilizing additional principles of persuasive system design. Among other things, *Twitch* facilitates user engagement on their platform through unseen streamers’ suggestions, or reminding users to watch their streamers through notifications, therefore leveraging the human computer interaction. Also, *Twitch* creates a medium of mutual exchange for the community via, e.g., their chat function and possibilities like "squad streaming" where different users can stream together. This creates mutual social support between viewers and streamers, which has a persuasive effect on the further use of the platform. Thus, it appears that through extensively and efficiently implementing persuasive system design measures, users continue to rely on centralized services even when more lucrative alternatives for artists and creators appear to exist. Therefore, we see an urgent need to disclose *how blockchain applications need to be designed to increase their user engagement*.

To answer our research question, we developed a blockchain-based project management tool according to the principles of persuasive system design theory. Persuasive design focuses on changing the behavior of users through persuasion and social influence (Fogg, 2009). The fundamentals of persuasive system design provide a comprehensive framework for the successful design of applications to facilitate user engagement (Torning & Oinas-Kukkonen, 2009). Professionals from the creative industries designed our custom blockchain application to automate formal processes such as contracting and remuneration. The creative industries

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<sup>1</sup> <https://legacy.theta.tv/about> [accessed: August 10, 2021]



represent an ideal research sample, as they already make extensive use of commercial applications such as *Twitch* or *Patreon* for funding and marketing. Additionally, as mentioned earlier, blockchain offers quite a few benefits for creative artists, giving the necessary intrinsic motivation to at least try our application. We contribute to the literature on blockchain technology by extending the current adoption research with an end-user perspective.

Our paper is structured as follows: First, we address the potential and challenges of blockchain applications in the creative industries. Second, we present the persuasive system design theory with its impact on user engagement. Next, we present our blockchain use-case called *ProLabArt* for the creative industries and the implemented persuasive system's design elements. We explain our sample and data, as well as the measures and measurement model evaluation. After presenting our findings, we elaborate on the theoretical and practical implications, refer to the limitations, and point to avenues for future research.

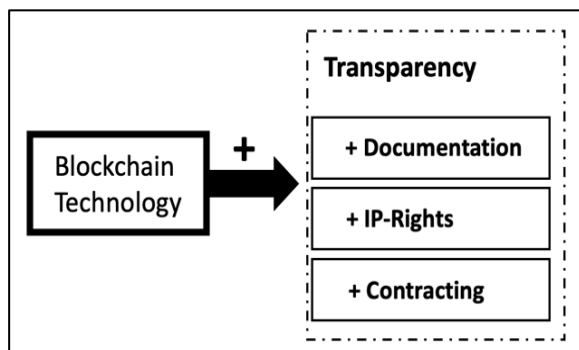
## **The Potential of Blockchain Technology in the creative industries**

The creative industries are the leading drivers of innovations, business models, and consumer trends (Kontrimienė & Melnikas, 2017). They rely on individuals' creativity, skills, and talent to harvest wealth from intellectual property (Ross, 2009). Creative industries are constituted by activities with the "potential for wealth and job creation through generation and exploitation of intellectual property" (Rosselló & Wright 2010, p. 16). Defined in this way, the creative industries clearly encompass a wide set of sectors, including for example advertising, architecture, film-production or software development (DCMS, 1998). These sectors are generally characterized by a predominantly project-based organizational structure.

Project-based working in the creative industries entails fast decision-making under a tight cost schedule with constantly changing requirements and projects (Hennekam & Bennett, 2016; Powell, 2008). Consequently, contracts are usually of limited duration (Gill, 2002), due to which workers in the creative industries often experience unstable income, unpredictable workloads, and only a few possibilities of foresighted planning (Cunningham et al. 2010; Hennekam and Bennett 2016). In order to function as a project-based organization in this environment, the individual participants must be able to communicate on a common basis, share information, and trust each other (Hanisch & Wald, 2014). Implementing these prerequisites should, however, not be foregrounded, as rules and regulations impair the creative process (Bresnen et al., 2005). Thus, informal management practices generally evolve,

maintaining the project-based organization through role coordination (De Toni & Nonino, 2010; Hanisch & Wald, 2014).

The prevalence of informal management brings limited transparency which is an enduring challenge in the creative industries. In almost all areas of these industries, from salary negotiation to task distribution and communication, we come across opaque activities (Boldrin & Levine, 2002). Blockchain technology can help to counteract these issues by replacing complicated, informal relationships between actors with secure and holistic records on a distributed ledger (Avital et al., 2016). This is possible since blockchain serves as a transparent, trust-free, and immutable database (Atzori, 2015; De La Rosa et al., 2017; Folkinshteyn & Lennon, 2016). These features enable blockchain not only to provide more transparency in the creative industries in general, but specifically also to (1) automate the documentation of processes and information, (2) secure intellectual property rights, and (3) revolutionizes the remuneration process, as *figure 1* shows.



**Figure 1: Added value of blockchain technology for creative industries**

First, blockchain can realize the automation of any information documentation process. The cryptographical documentation of repetitive tasks and processes refutes unauthorized manipulation by making the documentation secure, transparent, and immutable (Gomber et al., 2018; Kewell et al., 2017). The continuous documentation of processes within a supply

chain can be ensured (Rückeshäuser, 2017), so that each participant has an overview of the complete history of a value creating event (Crosby et al., 2016) and the individual shares in a project of which the terms cannot be manipulated by other actors in the value chain (Francisco & Swanson, 2018). Thus, blockchain technology enables formalizing and automating administrative activities, which also sets the foundation for blockchain-based IP-Rights protection.

Second, blockchain can be used to tackle the unbounded challenge of protecting intellectual property cost-effective and allocating IP-rights in the creative industries (O'Dair, 2018). Blockchain technology offers the possibility of securing and transferring intellectual property, such as music or songs, by means of smart contracts (Beck et al., 2016; Cai, 2018; O'Dair, 2018). The records are stored in a decentralized way, so that no single actor holds all the power; rather, the entire network carries it (Ciriello et al., 2018). This not only secures intellectual

property, but also increases trust between the participants (Davidson et al., 2016). Therefore, blockchain technology can reduce the administrative costs associated with the protection, licensing, and remuneration of intellectual property (Belle, 2017).

Third, blockchain can revolutionize the remuneration processes in the creative industries. Due to opacity, informality, and high commissions for middlemen (O'Dair, 2018), current remuneration procedures can take several years before pay-out, with the final amount often not precisely traceable (O'Dair, 2016). Blockchain support and smart contracts make direct peer-to-peer remuneration between client and costumer possible in real time (Nakamoto & Bitcoin, 2008). This allows for completely transparent remuneration being directly executed between the contracting parties (Atzori, 2015; Beck et al., 2016) without commission to intermediaries and with considerable transaction cost reduction (De Filippi, 2015; Rückeshäuser, 2017). Despite the promising benefits, many potential users are reluctant to use blockchain applications extensively.

Successful blockchain use cases are usually not intended for end-user application. Blockchain technology is still used almost exclusively as a support technology to automate formal processes and value chains (Al-Jaroodi & Mohamed, 2019). While 46% of blockchain use cases have so far occurred in the financial sector, 12% in industrial production, as well as in the energy sector – therefore predominantly at the back-end of business operations – only 1% of the blockchain use cases were based in the entertainment and media sector (PricewaterhouseCoopers, 2018). Thus, the entertainment and media sector is the sole representative of the creative industries. Also, it predominantly uses blockchain technology to automate formal processes and value chains. In fact, potential end users lack sufficient incentives to engage with blockchain technology (Al-Jaroodi & Mohamed, 2019; PricewaterhouseCoopers, 2018). Following a comprehensive survey, Deloitte (2019) revealed that 23% of respondents gave a lack of a compelling application of the technology as a reason for not engaging. Therefore, if blockchain is not only to be used in the background to handle formal processes, through persuasive application design, users have to be provided with the necessary ability and motivation to use it.

### **Increased user engagement through persuasive system design**

To understand why users are resistant to blockchain applications and how we can increase their engagement on those applications, we draw on persuasive system design theory (Lehto et al., 2012). Persuasive system design theory helps to conceptualize and develop persuasive systems.

It is intended to encourage behavioral change in users toward accepting Information Systems (IS) by persuasion and not by pressure or manipulation (Torning & Oinas-Kukkonen, 2009). In our case, we aim to achieve a positive behavior change towards blockchain usage of end-user applications. Torning and Oinas-Kukkonen (2009) explain various activities embedded in four support categories that, if properly integrated into the system design, can foster this very persuasion. *Table 1* summarizes the four support categories of persuasive system design.

First, Primary Task Support aims to support an IS user in completing the main task for which the IS is primarily used. The persuasive design model provides a set of principles for the design of a persuasive IS. The design principle *tailoring* offers users tailored information, which is more persuasive than generic information (Torning & Oinas-Kukkonen 2009). In line with this is the principle of *personalization*, which claims that personalized content has extensive potential to persuade users to change their behavior (Oinas-Kukkonen & Harjumaa, 2009). With the help of *tunneling*, users should be consistently guided through a process, whereby they are facilitated in completing their primary task (Torning & Oinas-Kukkonen, 2009). In this context, using *reduction* is also suggested. this entails breaking down complex tasks into separate steps and omitting non-mandatory information (Kraft et al., 2008). These complex tasks should be demonstrated through *simulation* that gives users the opportunity to observe cause-and-effect relationships and thus think more persuasively about a potential behavior change (Oinas-Kukkonen & Harjumaa, 2009). In addition, to adjust their attitude and behavior in practice, *rehearsal* allows users to try out their own behavior in different ways (Oinas-Kukkonen & Harjumaa, 2009). Finally, users should also have the possibility of *self-monitoring*. Through the users' ability to self-monitor, they can recognize their own behavior and, if necessary, change it to achieve their goals (Oinas-Kukkonen & Harjumaa, 2009). Through the aforementioned principles, persuasive ISs are designed to reduce the cognitive effort during the performance of primary tasks, thereby increasing the potential of behavioral change regarding the IS.

**Table 1: Design Principles of Persuasive System Design**

<b>Design Principle</b>	<b>Definition</b>
<b>Primary task support</b>	
Tailoring	Increased persuasiveness of information through customized content.
Tunneling	Guiding the user through the primary task.
Reduction	Simplicity by omitting non-essential information and breaking down tasks.
Self-monitoring	Recognizing and assessing one's own behavior.
Personalization	Increased potential for behavior change through individual content.
Simulation	Potential behavior change by visualizing cause-effect relationships.
Rehearsal	Behavioral adaptation through practice.
<b>Dialogue support</b>	
Remind	Increased goal completion by reminding of primary goal.
Praise	Increased motivation to change behavior through positive feedback.
Suggestion	Suggestions for specific behavior increase persuasiveness.
Liking	Visual appeal of an information system increases its persuasiveness.
Social role	Adopting a social role increases the persuasive purposes.
<b>System credibility support</b>	
Trustworthiness	Increased persuasiveness through truthful and unbiased information.
Expertise	Increased persuasiveness through qualified information.
Authority	Increased persuasiveness through role-specific contact persons.
Verifiability	Increased credibility through verifiability of information.
Third-party endorsements	Increased system credibility through respected third-party sources.
Surface-credibility	Increased system credibility through competent look and feel.
Real-world feel	Increased credibility through background information.
<b>Social support</b>	
Social learning	Increased motivation to change behavior by observing third parties.
Normative influence	Peer pressure for behavior change by providing a shared platform.

Second, Dialog Support is intended to increase and enhance human-computer communication. The principles of dialog support encourage users to engage more with the IS (Oinas-Kukkonen & Harjumaa, 2009). The following principles have been designed discreetly so that they do not restrict users in their routine activity. The system should always *remind* users of their primary goal and give feedback on their system behavior through *praise* (Oinas-Kukkonen & Harjumaa, 2009). Further, different potential behaviors should be *suggested* for using the system (Torning & Oinas-Kukkonen, 2009). Finally, through the principal of *liking*, a system can take a social role, using an appealing appearance and good handling to supports the desired behavior change (Langrial et al., 2012). These principles support trust in the system, thereby triggering positive feelings and the desire to change behavior.

Third, the credible and authentic design of IS describes the System Credibility Support category and increases individuals' trust in the system. If individuals trust an IS, convincing them to accept the system's advice to change their behavior, is more likely (Langrial et al., 2012). ISs earn trust by providing *trustworthy* and unbiased information. In addition, the information should signal a high level of *expertise* and be presented competently. Such presentation is also referred to as *surface credibility* (Oinas-Kukkonen & Harjumaa, 2008). Further, information about the organization or people behind the IS should be available (*real-world feel*) and their *authorities* should be clearly delineated (Torning & Oinas-Kukkonen, 2009). Finally, information should be *verifiable* and marked by respected *third-party endorsement* (Langrial et al., 2012). The above principles increase the system credibility, which favors the likelihood of users accepting advice the system offers to change their behavior.

Fourth, users of a persuasive IS should be persuaded to change their behavior through Social Support. In doing so, an individual receives community support in handling the IS (Torning & Oinas-Kukkonen, 2009). Thus, a platform or a medium that brings like-minded people together can lead to increased *normative influence*. This creates peer pressure, thus increasing the likelihood of individuals to change their behavior (Langrial et al., 2012). Additionally, such a platform or medium can be used for *social learning* by providing individuals opportunities to observe their own target behavior in others. Enabling social learning and increasing normative influence, increases individuals' self-efficacy beliefs, which in turn has an impact on their competence (Oinas-Kukkonen & Harjumaa, 2009).

In sum, persuasive system design helps to design a compelling IS in order to induce a desired change in users' behavior. This framework also provides the necessary tools to identify

problems in a system that prevent a desired behavior. For this purpose, persuasive design combines technological design principles with insights from behavioral psychology. Combining the two fields enables users to strive for a change in behavior free of constraints and based on their own fundamental convictions. Thus, persuasive system design offers an excellent framework for motivating users to change their behavior regarding blockchain technology.

### **ProLabArt: A Blockchain Use Case for the Creative Industries**

To understand how persuasive system design can increase the use of blockchain end-user applications in the creative industries, we designed an app called *ProLabArt*. Using *ProLabArt*, project-based organizations in the creative industries can automate their formal processes. To do this, we utilized the *Ethereum* blockchain, as well as *Ethereum's* own cryptocurrency *Ether*. In particular, by using our app the team leaders of project-based organizations are able to create and coordinate their teams automatically. Moreover, the app users can also remunerate their talents (i.e., team members) with our app and the *Ethereum* blockchain.

First, *ProLabArt* automates team management of projects in the creative industries. Usually, the project leads have to assemble teams through social networks and informal recruitment. Now, *ProLabArt* automates respective processes by relying on algorithms. Consequently, users save time while receiving team suggestions based on their individual preferences, project requirements, and individual talent performance. Therefore, *ProLabArt* does not select teams based on social capital, but the potential team members' quantifiable performance. To ensure (or enhance) the quality of the team suggestions, project leads have to (1) complete a performance preference survey during registration, (2) provide performance scores for possible team members, and (3) provide a short description of their project based on the project's budget, creativity, and difficulty. Once all data has been entered, the system's algorithm evaluates different optimal team compositions relying on various kinds of performance data and the project leads' personal preferences. Thus, ultimately it provides suggestions based on the absolute best team requirements, selecting the best team available for the given budget, the most efficient team, and the cheapest team. Via email the app automatically informs the team selected by the project lead, about the project offer. After the individual talents have accepted the offer, the project gets started in the app to ensure that after the project has been finished, the subsequent contractual processing will be done correctly – still via the app.

Second, *ProLabArt* enables blockchain-based automated contract processing. For this purpose, all contract-relevant content is stored on the *Ethereum* blockchain. *Ethereum* is the second-largest blockchain after Bitcoin, and it enables the extensive use of smart contracts (Buterin, 2014), making it the leading blockchain for developing decentralized applications. The project and team details are stored on the *Ethereum* Blockchain in a legally binding contract using *Ethereum's* ability for smart contracts. Both the project lead and the talents involved in the particular project, can view and use these contents. Besides, the project's data required for the application on intellectual property rights protection is also stored separately on the blockchain. Consequently, talents and the project lead are protected and in case of misuse or theft they have legally binding evidence of intellectual content rights on the blockchain. Through *ProLabArt*, the talents can be remunerated using *Ethereum's* own cryptocurrency *Ether*. The talents' recipient addresses (also known as public keys) can be stored in the app. Therefore, remunerating the talents has been made quite straightforward:

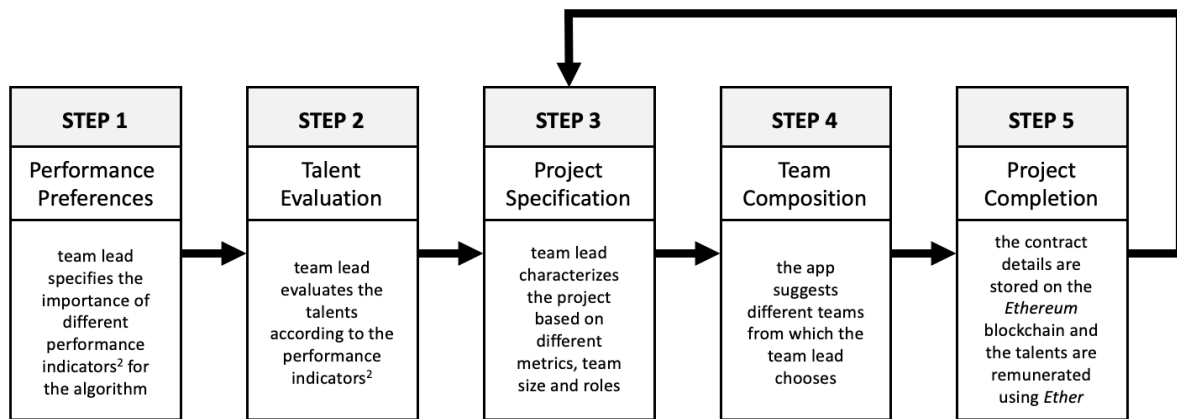
- (1) When creating the talent profiles, the project lead enters the public key of his/her talents.
- (2) After finishing a project, an extra section for the payment process is activated in the app.
- (3) The project lead selects his/ her talent to be paid.
- (4) Afterwards, the Project Lead enters his own private key to access his Ethereum account.
- (5) The talent's public key is automatically obtained by the app, so that the Project Lead only has to enter the amount to be remunerated.
- (6) The transaction is confirmed and executed with a swipe gesture.

Thus, by integrating the *Ethereum* blockchain into the *ProLabArt* app, a complete contracting lifecycle has been created, which seamlessly connects to the team management module. *Figure 2* shows an exemplary project workflow using the *ProLabArt* app. We propose that *ProLabArt* manages to formalize and automate essential organizational tasks of project-based work in the creative industries by combining different IT-infrastructures within one app.

*ProLabArt* brings the Ethereum blockchain in a native *SWIFT*-programmed iOS App that was developed for mobile devices with an *iOS* operating system. However, when using the new generation of *Apple* computers with an M1 CPU, the app can also be executed using *macOS*



software, thus making it usable on all common *Apple* smartphones, tablets, and computers. Data is mainly stored on the *Firebase Database*.



**Figure 2: App life cycle for the execution of the primary task**

With the exception of sensitive information such as talents' public keys, the data collected by the app is stored on the *Firebase* database. Sensitive information is stored locally on the user's phone using *Apple's Core Data* for data protection and security reasons. The App communication with the *Ethereum* blockchain is established through an *Infura* custom node. The *Web3Swift* API is used for communication with the *Ethereum* blockchain. The individual infrastructures are seamlessly coordinated and constantly in mutual exchange and harmony. The app is available via the *Apple App Store*.

### **Method: Persuasive system design in ProLabArt**

*ProLabArt* serves as a blockchain-powered project management tool for professionals in the creative industries. To support the primary task – the automated handling of formal processes in project-based organizations – *ProLabArt* implements several primary task support design principles. On the one hand, it provides information and content to the app's users in a tailored and personalized way. For example, team members and project managers are addressed by their names, and customized content is provided during the lifecycle of the app. This increases the persuasiveness of the information provided (Lehto et al. 2012) and increases the potential for possible behavior change (Torning & Oinas-Kukkonen, 2009). At the same time, the app users are tunneled through the process of the primary task, which is reduced to the bare minimum, and they can self-monitor their behavior. To recognize the necessary cause-effect

<sup>2</sup> Igbaria, M, and J.J. Baroudi. "The impact of job performance evaluations on career advancement prospects: An examination of gender differences in the IS workplace." *Mis Quarterly* (1995): 107-123.

relationship when they use the app, the simulation of the primary-task execution is made available through extensive onboarding. Finally, with the help of a “demo function”, the app users have the opportunity to practice behavioral adaptation through the design principle of rehearsal. This supports users in training their own behavior through fake talents and cryptocurrency without monetary losses. We therefore propose:

H1: Primary task support increases the intention to continue using blockchain technology.

Dialogue support focuses on computer-human dialogues to encourage the realization of the primary task (Torning & Oinas-Kukkonen, 2009). To ensure sufficient dialog support, we constantly reminded the app users about eventually achieving the main goal, i.e., executing their formal processes with the help of the app. At the same time, we provided them with positive feedback on the successful completion of activities through notifications and sounds, thus using the design principle of *praise*. We also used notifications to the user suggesting a specific behavior, which mainly represented the next logical step to achieve the primary goal. Further, we were constantly in touch with different user interfaces and user experience designers (UI-/UX-Designer) to increase our app's persuasiveness through visual appeal. Finally, our app and the underlying team generation algorithms were programmed to be DE&I compliant. For this purpose, we only used performance data to calculate the team member proposals, which means that age, gender, ethnicity, or social capital did not affect the team selection process. We thus took a social role in combating stereotypes and discrimination in the creative industries. Therefore, we derived the following hypothesis:

H2: Dialogue support increases the intention to continue using blockchain.

Credibility support increases the IS's persuasion capacity by facilitating the technology's credibility (Langrial et al., 2012). To use our app without credibility concerns, it was important for us to ensure a high level of credibility regarding the app and the people behind it. To provide sound system credibility support, we particularly emphasized disseminating only truthful and unbiased information that demonstrates expertise and is verifiable as well. In addition, giving information about blockchain, we provided the app users with a variety of well-founded third-party sources on the website and within the app, e.g., in the extensive FAQ-Sector. In this way, we can give users confidence in our information, also ensuring traceability and content accuracy. Further, extensive background information about the app developers, their backgrounds and what academically motivated the app can be found in several places within

the app, on social media, as well as the website. In this way, we also increase the real-world feel of the app. Finally, to increase the surface-credibility, we consulted with several UI- and UX designers again, to give the app a competent look and feel. In doing so we aim to leverage the trust users have in our application leading them to continue using our blockchain application:

H3: The system credibility support increases the intention to continue using blockchain.

Through public recognition of users' achievements, social support increases the persuasiveness of an IS (Oinas-Kukkonen & Harjumaa, 2009). We decided to provide the community with a possibility of exchange via social media, thereby ensuring extensive social support through our app. Primarily via our own *Discord*-server and *Telegram*-channel, the users can exchange information and experiences with each other. This gives users the possibility to observe other users' behavior concerning the app when they are in mutual exchange with others. In the process of social learning, this increases individuals' motivation for behavior change, i.e., to use blockchain end-user applications. In addition, the normative influence provides peer pressure for similar behavior change. This leads us to the following hypothesis:

H4: Social support increases the intention to continue using blockchain.

The extent to which individuals continuously use an IS depends on the degree to which it is compatible with the user's daily routine (Lehto et al., 2012). A crucial factor is whether the ISs integrate unobtrusively and seamlessly into the user's daily routine (Oinas-Kukkonen & Harjumaa, 2008). We have therefore continuously tried to adapt the app to users' routines and habits so that the app will fit easily into the users' daily lives, e.g., by developing the mechanisms of the payment process similar to well-known examples such as *Amazon's* "one-click payment". Among others, Hensel et al. (2006) investigated the importance of unobtrusiveness systems, in their case for the ongoing use of such systems in consumer applications of health ISs. Their study revealed a strong correlation between discretion and intention to continue using. This led us to the following hypothesis:

H5: Unobtrusiveness has a positive effect on Intention to continue using blockchain.

IS users' first impressions are mostly based on the perception of the visual design of the IS (Lavie & Tractinsky, 2004). As Van Vugt et al. (2006) have shown, the user's assessment of a system and their relationship to it is not only influenced by the design at the beginning, but also by the continuous interaction between the system, its visual presentation, and the user as the

recipient of the information the system provides. Therefore, if the information is presented aesthetically, it increases the instrument's perceived usefulness and users' pleasure in using it (Cyr et al., 2006). In addition, a behavioral change is preceded by a certain initial attitude, which is manifested in the end-user due to the processing and evaluation of messages and information (Wood, 2000). In this context, the attitude toward a behavioral intention is characterized by the individually perceived information (Petty & Cacioppo, 2012). The possible use of IS is thus influenced by which information users perceive, and its persuasiveness (Oinas-Kukkonen & Harjumaa, 2008). Since our focus was to make the app impactful and personally relevant to users, we investigated their demands and needs by analyzing their personas with the help of Osterwalder's (2010) Canvas Business Model and Osterwalder's value proposition (2014). Both tools helped us to define the requirements for the app in detail and to guarantee its persuasiveness. In the context of persuasive design, this is referred to as perceived persuasiveness. As Crano and Prislin (2006) stated, the attitude change, which is a prerequisite to an intention to continue using a system, is significantly influenced by the system's perceived persuasiveness of the system to use it. Taking the impact of design aesthetics and perceived persuasiveness on the user's ability to behavioral change into account, we draw the following hypotheses:

H6: Design aesthetics have a positive influence on the intention to continue using blockchain.

H7: Perceived persuasiveness has a positive influence on the intention to continue using blockchain.

In sum, we extensively followed the recommendations of persuasive system design in developing our app by providing sufficient primary task support, dialogue support, system credibility support, and social support to achieve the primary goal.

## **Sample and Data**

We have implemented an adapted perceived persuasiveness questionnaire (PPQ) to evaluate the persuasive system design of our app. When the app is used for the first time, an initial survey asking about the user's former experience with blockchain technology is unlocked within the app for the project lead, and questionnaires are sent to the talent pool via email. Subsequently, after finishing a project, the PPQ is presented within the app and sent via email to the talents who participated in the project. Our app *ProLabArt* is intended for all sectors of the creative industries, meaning that all industries, be it art, music, film, architecture, software

design or any other creative industry, are mapped within the survey. To generate the sample, we first drew on our social network, which has a number of international contacts in the creative industries. This helped to ensure that we would find enough potential users of the app before developing it and conducting this survey. Next, we sent a total of 2458 personalized emails to companies in the DACH-Region and North-America that are located in the creative industries. In addition, our social capital within the creative industries could be used to raise awareness of *ProLabArt* through word of mouth and social media. While between September 2020 and January 2021 the app was available exclusively as beta software with prior registration via email, as of January 2021 the app can be obtained worldwide via the *Apple AppStore* for all who are interested. In total, after data screening for missing data or data with little variance between responses, we selected 222 participants (n=222) for our final sample. We started with a sample of 394 responses, but after excluding dropouts, outliers, and responses with missing answers, 222 remained.

## Measures

To measure the persuasiveness of our app's design, we used the widely applied PPQ by Oinas-Kukkonen and Harjumaa (2009), which we adapted to our context. We adapted the questionnaire merely to fit the fact that items logically relate to blockchain technology. This is also suggested by Oinas-Kukkonen and Harjumaa (2009), thus several studies (e.g., Kotthaus et al. 2016; Langrial et al. 2012, Schneider et al. 2016) have successfully used the perceived persuasiveness questionnaire adapted to their needs. The questionnaire was divided into seven constructs, namely, primary task support, dialogue support, perceived credibility, design aesthetics, perceived persuasiveness, unobtrusiveness, and intention to continue using the system. Our adapted PPQ can be seen in *Appendix A*.

In addition, to get a better understanding of the relationship between the project leads and their talents, we ask the talents in the entry survey: "Have you worked with this project lead before?" and "How many projects have you been involved in with this project lead?" Further, we thought it would be useful to obtain sufficient information about the survey participants' prior knowledge of blockchain technology and cryptocurrency. Accordingly, we ask respondents to indicate with either (1) "yes" or (2) "no" to the following questions:

"Have you ever heard of blockchain technology before?"

"Are you familiar with the concept of blockchain technology?"

"Did you ever actively use blockchain technology?"

“Have you ever heard of cryptocurrency technology before?”

“Are you familiar with the concept of cryptocurrency?” and

“Did you ever actively use cryptocurrency?”

In addition, we wanted to find out what the participants' self-assessment was of their own competences in using technology. Therefore, on a 5-point Likert scale ranging from (1) “strongly disagree” to (5) “strongly agree”, we asked survey participants to assess themselves regarding the statement “I would describe myself as technology-oriented.” Finally, using the same scale, we asked the survey participants to what extent the following statement applied to them: “I feel patronized by the app.” Further, we asked the participants to indicate on the same scale how unfair they found remuneration to be in the creative industries (PRA).

### **Measurement Model Evaluation**

We confirmed validity for the measurement properties of our reflective constructs using confirmatory factor analysis. Specifically, we looked at cronbach’s alpha ( $\alpha$ ), composite reliability (CR), average explained variance (AVE), and convergent validity using standardized loadings for each construct. The results obtained here are given in *table 2*. Subsequently, we examined the standardized Root Mean Square Residual (SRMR = 0.038), the fit index (CFI = 0.965), and the Root Mean Square Error of Approximation (RMSEA = 0.035). The obtained values indicate a satisfactory model. Further, our model undercuts the proposed suggested  $\chi^2/df$  ratio of 3, thereby declaring a good fit ( $\chi^2/df = 1.276$ ). In addition, comparing the dependent variable between the entrance test and the follow-up test, we found a significant difference with a strong effect size of Cohens'D (Cohens’D = 1.023,  $p < .001$ ).

In a next step, we examined our established model for common method biases. Here, we first looked at our model’s correlation matrix. Next, we modeled a common latent factor in the confirmatory factor analysis with equally constrained paths. Finally, we performed a principal component analysis. Our aim here was to examine the extracted variance by a single factor. First, constructs showed little correlations between each other (highest correlation  $r = 0.457$ ). Second, differences between the standardized coefficients of our models with and without a common latent factor showed little differences (highest difference = .1856). Finally, the first factor of our unrotated principal component analysis explains 26.25 % variance. Overall, whereas common method bias cannot be entirely excluded, the results indicate no substantial impact on the results of our study.

**Table 2: Measurement Model**

	Factor Loading	alpha $\alpha$	CR
Primary task support		0.94	0.93
pts1	0.934		
pts2	0.919		
pts3	0.891		
Dialogue support		0.95	0.94
dsp1	0.913		
dsp2	0.930		
dsp3	0.929		
System credibility support		0.94	0.94
scs1	0.878		
scs2	0.796		
scs3	0.846		
scs4	0.924		
scs5	0.903		
Social support		0.92	0.92
ssp1	0.898		
ssp2	0.878		
ssp3	0.906		
Unobtrusiveness		0.94	0.94
utu1	0.933		
utu2	0.877		
utu3	0.850		
utu4	0.915		
Design aesthetics		0.93	0.92
dae1	0.913		
dae2	0.936		
dae3	0.858		
Perceived persuasiveness		0.93	0.92
pps1	0.915		
pps2	0.917		
pps3	0.873		
Intention to Continue Using		0.96	0.96
itu1	0.945		
itu2	0.983		

Note.  $N = 222$ ; CMIN = 345.845

## Findings

In total, we were able to generate 222 completed questionnaires from 37 project leads and talents. *Table 3* shows the industry and country affiliation of the project teams. Of the 222 respondents, 150 indicated that they were male, 69 that they were female, and three that they were non-binary. On average, participants were 32.05 years old ( $sd = 7.389$ ).

**Table 3: Participants overview**

Industry										
Advertising		Design: Graphic		Design: Other		Film/Video & TV		Photography		Other
52		13		21		94		15		27
Country										
Australia	Austria	Canada	Czech	Germany	Italy	USA	Slovenia	Switzerland		
1	6	2	2	12	2	3	7	2		

For calculating our model, we decided to use a multiple regression analysis in R. *Table 4* gives the means and correlations of the research constructs. We included age and gender as control variables in our model, as in *table 5*.

Our results show that Primary Task Support has a positive significant effect (.174,  $p < .01$ ) on the intention to continue using blockchain, as does Dialogue Support (.188,  $p < .001$ ), which supports our H1 and H2. System Credibility Support has a weak significant effect (.170,  $p < .05$ ) on the intention to continue using blockchain technology, but it still supports our H3. Social Support has a moderate positive significant effect (.169,  $p < .05$ ) on the intention to continue using blockchain technology as well, therefore supporting our H4. We must reject our H5 because no significant effect (.063,  $p = .311$ ) can be detected. However, perceived persuasiveness (.259,  $p < .001$ ) and design aesthetics (.281,  $p < .001$ ) do have a positive significant effect on the intention to continue blockchain technology as well, which support our H6 and H7. Lastly we also found that the degree to which a user finds the allocation of income in the creative industries unfair, similarly has a positive significant effect (.231,  $p < .001$ ) on the intention to continue using blockchain technology.



**Table 4: Descriptive Statistics**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>ITU (1)</b>	3.104 (0.864)									
<b>PTS (2)</b>	2.922 (0.849)	.350**								
<b>DSP (3)</b>	3.116 (0.860)	.369***	.171***							
<b>SCS (4)</b>	3.123 (0.718)	.317*	.118	.137						
<b>SSP (5)</b>	3.014 (0.817)	.349**	.188	.019**	.054					
<b>UTU (6)</b>	3.015 (0.752)	.262	.102	.059	.054	.083				
<b>DAE (7)</b>	3.050 (0.826)	.457***	.160*	.156*	.227	.083	.168*			
<b>PPS (8)</b>	3.100 (0.804)	.355***	.181*	.127*	.132	.113	.168*	.091*		
<b>PRA (9)</b>	3.175 (0.903)	.387**	.069	.090	-.114	.090	.092	.189	.084	
<b>AGE (10)</b>	32.504 (7.389)	.061	.052	-.006	-.116*	.024	.092	-.029	.084	
<b>GEN (11)</b>	1.338 (0.501)	.026	-.001	.005	-.005	.116	.018	-.032	-.025	.071

*Note.*  $N = 222$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**Table 5: Multiple Regression Analysis**

VARIABLE	B	$\beta$	SE	FINDINGS
CONSTANT	-1.832		.409	
PTS	.174**	.171	.409	H1 is supported
DSP	.189***	.193	.054	H2 is supported
SCS	.170*	.139	.067	H3 is supported
SSP	.169**	.172	.056	H4 is supported
UTU	.063	.055	.062	H5 is not supported
DAE	.028***	.271	.059	H6 is supported
PPS	.026***	.246	.058	H7 is supported
PRA	.232***	.244	.052	
AGE	.008	.070	.006	
GEN	-.033	-.019	.089	

R<sup>2</sup>: 0.5892    Adj. R<sup>2</sup>: 0.5617    F-statistic: 21.37    df: 149    N = 222    t = -11.275\*\*\*

*Note.* Intention to Continue Using Blockchain (DV); PTS – Primary Task Support; DSP – Dialogue Support; SCS – System Credibility Support; SSP – Social Support; UTU – Unobtrusiveness; DAE – Design Aesthetics; PPS – Perceived Persuasiveness; PRA – Perceived Remuneration Allocation; AGE – age; GEN – gender; \* $p < .01$ ; \*\* $p < .005$ ; \*\*\* $p < .001$ .

## Discussion

Current blockchain applications for the creative industries – despite holding many promises – lack the user engagement necessary to encourage widespread adoption and use. Prior studies predominantly analyzed blockchain use and adoption in an organizational context, revealing that top management support, organizational readiness, and organizational support are strong drivers for blockchain adoption (Clohessy & Acton 2019; Clohessy et al. 2019). For Arcos (2018) blockchain adoption relies on the technology to be implemented only at the back-end of the software architecture. Batubara et al. (2018) discovered in an e-government context that blockchain technology's security, scalability and flexibility capabilities are the features that primarily influenced its adoption. However, since these studies are limited to an organizational/institutional and technical context only, the question of how to improve blockchain adoption by end-users still remains unanswered in an academic context. Thus, we explored how blockchain end user applications need to be designed in order to increase user engagement.

Through the PPQ we could finally determine the extent to which (1) primary task support, (2) dialogue support, (3) system credibility support, and (4) social support influence the intention to continue using blockchain. In addition, we investigated the impact of (5) design aesthetics,

(6) perceived persuasiveness, and (7) unobtrusiveness on user engagement regarding blockchain end-user applications. These results show that blockchain end-user applications can leverage user engagement through persuasive system design. Thus, by providing users of our app with the possibility of managing and remunerating their teams via the *Ethereum* blockchain (Primary Task Support), we were able to convince our study's users of blockchain technology's usefulness, and ultimately could even induce a change in behavior regarding remuneration via blockchain technology. Further, by providing users with appropriate feedback and counselling in the use of blockchain technology our application encouraged users to positively evaluate it. Additionally, through the peers' high social support, as well as the blockchain applications developer, via the different utilized platforms such as *Discord* or *Telegram*, the users' social learning ability was widely supported. This, in turn, fostered the users' intention to continue using blockchain. At the same time, our results indicate that the detailed research and framing of our app's value proposition led to the app being highly persuasive of users, which resulted in an increased intention to continue using blockchain. Furthermore, we could show that beyond blockchain technology's many technical benefits, realizing an appealing app design positively influenced the users' intention to continue using blockchain. The effect of system credibility support demonstrates that with a consistent design of blockchain end-user applications, blockchain technology can be reliable, competent, confident, and trustworthy, despite a sometimes still uncertain image related to a number of fraudulent events and scaling issues in the past. That unobtrusiveness had no marked effect on the intention to continue using blockchain technology is probably explained by the steep increase in transaction costs on the Ethereum platform in the past few months, which in some cases went up to USD 18 per transaction. Surprisingly, through our additional variable PRA, we found that a perceived unfair allocation of income leads to an increased intention to continue using blockchain technology. Through the recorded findings, we can make several theoretical contributions to the science of blockchain technology.

First, we significantly extend Arcos's (2019) insights on blockchain integration in IS architecture. In doing so, we argue that it is not only important that blockchain only disappears in the back-end, but that it should also provide sufficient primary task support and have sufficient persuasive capacity. Second, by looking at end-users, we extend Clohessy and Acton (2019) and Clohessy et al.'s (2019) findings on blockchain adoption, which are limited to an organizational level. We have been able to show that blockchain application users are dependent on a high level of dialogue support in order to use them consistently. In addition,

blockchain applications, like any other, should focus on responsive design. Finally, we also extend Batubara et al.'s (2018) technology-driven findings that blockchain adoption is influenced by its security, scalability, and flexibility capabilities. We go one step further when looking at end-user applications by revealing that blockchain applications must have a high degree of system credibility for users to develop trust and sustain their intention to continue using blockchain. Moreover, we can spell out practical implications for realizing blockchain end-user applications, from a design point of view. First, software developers should focus on providing sufficient primary task support in the design of blockchain end-user applications that will allow users to adequately measure the value of the application in achieving their goals. Awareness of the current user pains and how the end-user application can relieve those pains, would be useful. Such focus and awareness should make achieving the primary task as simple as possible, so that hardly any or no additional qualifications are necessary for correctly handling the application. Second, developers should turn the spotlight on suitable computer-human dialogue, which encourages the user to continue using the application. In particular, users should be reminded of their primary task, provided with appropriate feedback, and be notified about necessary steps, as this will encourage them to use blockchain. Further, for many users blockchain is probably still new territory and many functions and mechanisms appear to be unusual and overwhelming. Therefore, developers should provide platforms and opportunities for users to share questions and experiences with other users and developers. Finally, developers benefit from putting special effort toward appealing design, as poor app design will discourage users from continuing to use the application.

## **Limitations and future research**

Our research does have several limitations. First, we focused primarily on freelancing collaboration in the creative industries, thus giving other work forms in the creative industries little or no coverage. In addition, we looked at the *Ethereum* blockchain's impact on the creative industries, although there are several other blockchains with their own advantages and disadvantages that might be of interest to the creative industries. Further, we only looked at user engagement using contracting and remuneration features (i.e., *smart contract functions*), though other fields of blockchain such as non-fungible tokens (NFT's) are also highly relevant to the creative industries, since NFTs integrate contracting and remuneration via blockchain as well, and in an interesting and promising manner. Thus, our findings should only be transferred to substantially different blockchain applications with special care.

We therefore call for future research to adopt the different directions that still exist in the creative industries in relation to blockchain technology, such as introducing NFTs. Also, we suggest expanding persuasive system design theory on blockchain end-user applications to other industries, such as finance, logistics, or healthcare. Especially, quantitative and qualitative research that deals with blockchain end-user applications not embedded in a project-based context represents a promising and under-researched direction. In particular, the question of how different blockchains besides *Ethereum* can leverage blockchain end-user applications, remains unanswered. In addition, the recent rapid increase in demand for blockchain applications is leading to a significant rise in the cost of maintaining business processes on the blockchain and specifically on the *Ethereum* blockchain. Future research could explore which blockchains can add value to end-user applications while maintaining low transaction costs. Finally, we call for future research to quantitatively address user engagement with NFTs, as we believe this promising and useful technology is still undervalued and represents a significant possibility for value adding, not only for the creative industries.

## **Conclusion**

Blockchain technology represents one of the most influential and relevant technologies of the future and is already changing the way business processes are carried out. Especially in the creative industries, it represents a promising opportunity to support artists and other creative workers in their daily work in project-based organizations. Blockchain applications in the creative industries provide an opportunity to automate the documentation of processes and information, secure intellectual property rights, and revolutionize the remuneration process. This has positive effects for the creative industries in terms of minimal commissions, real-time and transparent compensation, and the unique opportunity to distribute exclusive digital art. Despite the promising possibilities of blockchain technology for creative industries, a major breakthrough has so far remained elusive.

The lack of mass market blockchain technology adoption in the creative industries prompted us to develop a blockchain application for project-based organizations in the creative industries. Using this app, distributing it in the iOS app store under the name *ProLabArt*, formal processes such as contracting, remuneration, and team finding could be automated using the *Ethereum* blockchain in the back-end of the app. The app was programmed according to the principles of persuasive design. Based on this, we used the PPQ and a quantitative approach to

investigate how the principles of persuasive design can increase the intention to continue using blockchain technology.

We found that primary task support, dialogue support, system credibility support, and social support have a positive effect on the intention to continue using blockchain technology. We also found that the perceived persuasiveness of blockchain applications, as well as their design aesthetics, also have a positive influence on the intention to continue using blockchain. Lastly, we found that if professionals from the creative industries perceive their remuneration to be unfair, their intention to continue using blockchain technology is strengthened. Through our findings, we contribute to the literature of blockchain adoption by extending the current literature on organizational or institutional matters and on technical factors influencing blockchain adoption from an end-user perspective. We also make several practical contributions by making several recommendations for developers on how to leverage the persuasive system design measurement to increase the intention to continue using blockchain.

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## Appendix A: Adapted PPQ

Constructs	Items	5 Point-Likert-Scale
Primary task support	1. The offered information provides me with the means to use blockchain technology.	strongly disagree – strongly agree
	2. The offered information helps me to use blockchain technology.	
	3. Blockchain helps me change my habits regarding remuneration.	
Dialogue support	4. Blockchain Technology provides me with appropriate feedback.	strongly disagree – strongly agree
	5. Blockchain Technology provides me with appropriate counselling.	
	6. Blockchain Technology encourages me.	
System credibility support	7. Blockchain Technology is trustworthy.	strongly disagree – strongly agree
	8. Blockchain Technology is reliable.	
	9. Blockchain Technology shows expertise.	

	10. Blockchain Technology instills confidence.	
	11. The offered blockchain service has been developed by IT professionals.	
<b>Social Support</b>	12. I get support from my peers through the blockchain service when I need it.	strongly disagree – strongly agree
	13. Through the blockchain service, I cannot share my experiences with my peers.	
	14. I find learning from my peers' actions to be beneficial for me.	
<b>Design aesthetics</b>	15. The design of the blockchain service (i.e., colors, layout, presenters, etc.) is attractive.	strongly disagree – strongly agree
	16. The general appearance of the provided information is appealing.	
	17. The offered information provides a nice visual experience.	
<b>Perceived persuasiveness</b>	18. Blockchain Technology has an influence on me.	strongly disagree – strongly agree
	19. Blockchain Technology has personal relevance for me.	
	20. Blockchain Technology makes me reconsider my habits regarding blockchain technology	

<b>Unobtrusiveness</b>	21. Using Blockchain Technology fits easily into my daily life.	strongly disagree – strongly agree
	22. Using Blockchain Technology disrupts my daily routines. (Reversed item)	
	23. Using Blockchain Technology, is practical/convenient for me.	
	24. Finding the time to use Blockchain Technology is not a problem for me.	
<b>Intention to continue using the system</b>	25. During the next few weeks... 1. I plan to use Blockchain Technology.	strongly disagree – strongly agree
	26. During the next few weeks... 2. I expect to use Blockchain Technology.	