Revised Domains & Precedents

Domains

Decentralization

Decentralization is an overarching theoretical domain that informs our methodology and focus, specifically the decentralizing potential of emerging technologies in new industries. In essence, it refers to approaches that "...redistribut[e] or dispers[e] functions, powers, people, or things away from a central location or authority" (Wikipedia, Decentralization). While there is no firm consensus on its definition, it can be understood as a systems-level approach to design that seeks to reconfigure traditional power structures across several different communities of practice. It is a philosophy not a practice, a means, not an end.

In terms of this project, decentralization provides an academic and intellectual framework for reimagining how fabrication and manufacturing can work differently in the 21st century and beyond. While decentralization has been touted as a hallmark of the "digital revolution" and has indeed led to massive disruptions in how we communicate and create/understand value online, it has not equally transformed our infrastructure and economy, nor day-to-day consumer lifestyles and collective organization. These decentralizing effects have purposely not been allowed to develop concurrently, with our socio-political infrastructure and economy resisting every step of the way and even the most innovative and transformational digital platforms actually becoming re-centralized as their business models mature. For example, the gradual repositioning of the "sharing economy" as a growing global platform monopoly emerges, creating a digital twin of an established worldwide corporate oligarchy.

While our project is indeed a "business", it is borne from a desire to explore "...a much more interesting and complex transformation [that] is just beginning, one driven by a growing tension between two distinct forces: old power and new power" (Harvard Business Review, 2014). While old power operates like currency, the few who possess it guard it jealously, creating a top-down architecture of wealth and privilege, new power operates like a current, created by many, open, participatory, and peer-driven.

We believe that this new power is real and here to stay. Our project is an exploration of how to harness this new power, creating a business model that capitalizes on supporting "velocities of money" between individuals, instead of capturing and hording their social, economic, and creative capital (David Rushkoff, 2015). By reimagining how emerging technology can be used to "de-center", to build open, participatory, and peer-driven manufacturing and fabrication platforms, we hope to help designers, makers, and consumers exchange value in new ways, create new methods for collaboration, and ultimately build sustainable revenue models that supports the creation of community-based maker centers and the hiring, training, and capitalization of local labor.

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Decentralized Fabrication: The Digital Manufacturing Revolution

Similarly to the “Digital Revolution” the Digital Manufacturing Revolution is currently enabling individuals to not only produce their own virtual information but extends this power to the production of durable goods. As Jeremy Rifkin predicts in *The Third Industrial Revolution*, these types of emerging technologies will allow anyone to become their own creator and manufacturer.

The Internet has already started transforming the reach and success of small-scale manufacturing efforts. Due to the rise of mass-production techniques throughout the 19th and 20th centuries, small-manufacturers and artisans swiftly lost their ability to compete with centralized and scaled production and marketing infrastructures. As a result, large-scale enterprises have dominated the market until recently (IKEA, Macy’s, Pottery Barn). However, we are now witnessing a digitally enabled democratization of manufacturing, what some call the “mass-customization” movement. The beginning of this movement lies in the shrinking marketing costs digital platforms enabled, allowing businesses to move away from centralized and expensive media - newspapers, magazines, radio, and television. The internet transformed marketing from a huge expense to a negligible cost, creating a growing culture of entrepreneurship and allowing start-ups and SME (Small-medium sized enterprises) to compete and even out compete many traditional business enterprises.

This transformation has been continued more recently through an equal democratization of digital design and physical fabrication techniques. Emerging technologies have opened up previously inaccessible production methods, both digital design (Blender, Maya, Rhino) and physical fabrication (3D printing, laser-cutting, CNC, hobby electronics). The combination of these tools allows more and more “unskilled” individuals to design their idea digitally and/or produce multiple copies of digital designs - similar to a photocopier. In addition, it allows for the decoupling of design and fabrication entirely, where a manufacturer can download and produce the digital template of a designers

product, regardless of their distance. For these reasons, digital manufacturing can empower new collaborative and peer-to-peer production methods, distributions of labor, and the local and sustainable fabrication of a global pool of design ideas.

The rise of this ‘just in time’ customized manufacturing will significantly reduce the need for logistics, allowing for an increasing variety of goods to be created by micro-manufacturing centers and distributed regionally instead of globally. Through decentralizing manufacturing and providing opportunities for collaboration and co-creation of goods through local networks, less energy will be used at every step of the process, significantly reducing the environmental cost of global supply-chains and shipment channels. “The energy saved at every step of the digital manufacturing process, from reduction in materials used, to less energy expended in making the product, when applied across the global economy, adds up to a qualitative increase in energy efficiency beyond anything imaginable in the First and Second Industrial Revolutions” (Jeremy Rikfin).

These trends are just starting to converge and in their intersection lies a huge field of possibility for new business and community development models. We seek to create a platform that helps to coordinate and complement these activities, connecting designers and makers in new collaborative processes that support the local creation of global ideas. Our project facilitates these relationships and connects both parties to customers who want to purchase high-end and customizable products but also support local and eco-friendly production. We hope to open new and sustainable revenue models that can support a growing micro-manufacturing sector and provide access to training and employment for a wide variety of individuals, specifically those who are low-income and/or have become unemployed due to the collapse of traditional manufacturing jobs.

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Ensuring Value for Content Created: The Blockchain Protocol

The blockchain protocol is perhaps one of the newest emerging technologies being explored today, its potential uses unknown and unimplemented in most cases. Often compared to the Internet in terms of its transformative potential, it is simply a protocol that facilitates peer to peer transaction without the need for trusted third-party authentication. While many use-cases to date focus on its potential as a cryptocurrency, it also provides a way to reach distributed consensus on a public database not owned by any one person, company, or nation, but many players.

One essential and provocative aspect of blockchain technology is its ability to solve the issue of “double-spending” pervasive on digital networks. Double-spending is a failure of digital cash when it is possible to spend a digital token twice. Since electronic files can be duplicated easily, unlike physical currency, the act of spending a digital token does not necessarily remove its data from the ownership of the original holder without a third party (Venmo, Chase Quickpay etc.) to verify that the value has been moved. The blockchain provides decentralized or distributed solutions to this issue using different schemes such as “proof-of-work” and “proof-of-value” to avoid the need for a trusted

party to timestamp and verify these transactions. Instead these timestamps and verifications are recorded in a public ledger, called a blockchain, preventing anyone from double-spending on the network.

We are interested in extending this idea to the physical production of goods. Right now, there is no way to ensure that digital designs are only fabricated by the designer's consent, once they are made public online. In the past, this same issue has has led to the collapse of traditional content-creation industries that relied on digital reproduction of digital goods (music, movies, TV, gaming, publishing etc.). The blockchain is currently being explored to solve for these types issues and ensure that digital content-creators get paid for their work when it is used. For example, SteemIt, a blockchain based social media platform recaptures the value of user-generated content, now captured by social media companies such as Reddit, Facebook, and Twitter. By using in-system "Steem Dollars", the company can ensure that content-creators are rewarded for access to and the popularity of their contributions by being rewarded with virtual currency that can be converted to cash.

Similarly, the blockchain is being explored to certify and verify artworks and collectibles in real-time. Start-up Verisart uses the distributed ledger technology of the blockchain to build a permanent decentralized and anonymous ledger for the world's art and collectibles. Their first product is an app that lets artists and collectors generate certificates of authenticity for their work.

Another promising new blockchain-based technology is Filecoin, a distributed electronic currency similar to Bitcoin. However, unlike Bitcoin's computation-only (mining) proof-of-work scheme, Filecoin's proof-of-work function includes a "proof-of-retrievability" component, which allows for the platform to prove a particular file is stored on a particular node in the network. The Filecoin network will form a distributed file storage system whose nodes are incentivized to store as much of the networks data as they can, awarding currency for storing and managing files and providing strong monetary incentives for individuals to join and work for the network as well as providing a truly decentralized and anonymous system for storing and verifying the movement of files.

We believe there is potential to either launch our platform on existing blockchain networks (Ethereum, Bitcoin) or to create new blockchains such as those mentioned above, with the goal of verifying the authenticity of physical instances of digital files and ensuring both designers and makers are paid for their created value. In addition, blockchains provide an internalized incentive structure that can replace or complement traditional investment schemes. In system currency and "mining" capabilities can be sold to investors who are incentivized to keep the system running since they gain value just by participating - such as in filecoin's method. By using the blockchain, we can provide a secure, distributed, system for storing and verifying access to digital files supported by a physical "certificate of authenticity" that is embedded in finished goods and tied into the network. We can also explore new collaborative business models by which partners and investors can earn value by participating in the network, incentivizing them to keep it up and running.

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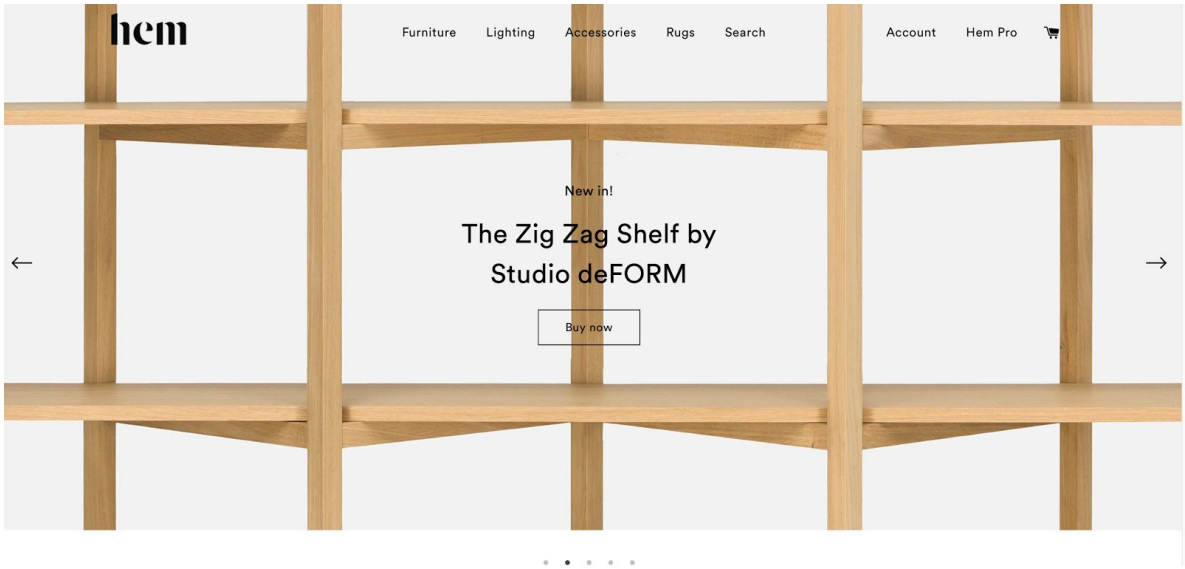
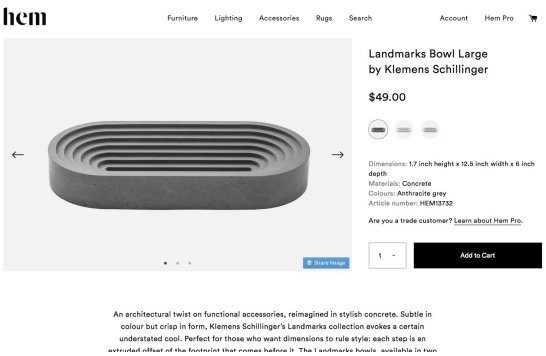
Precedents

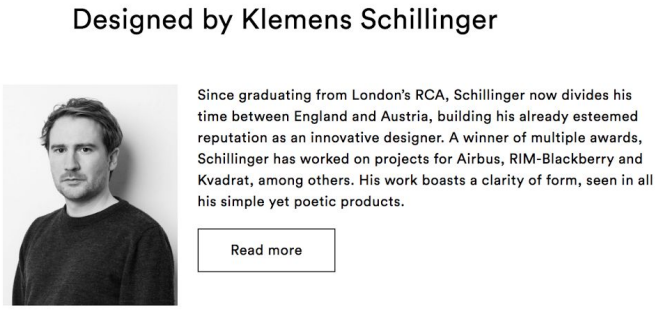
Digital Fabrication & Making (Our Competitive Analysis)

Hem

https://us.hem.com/







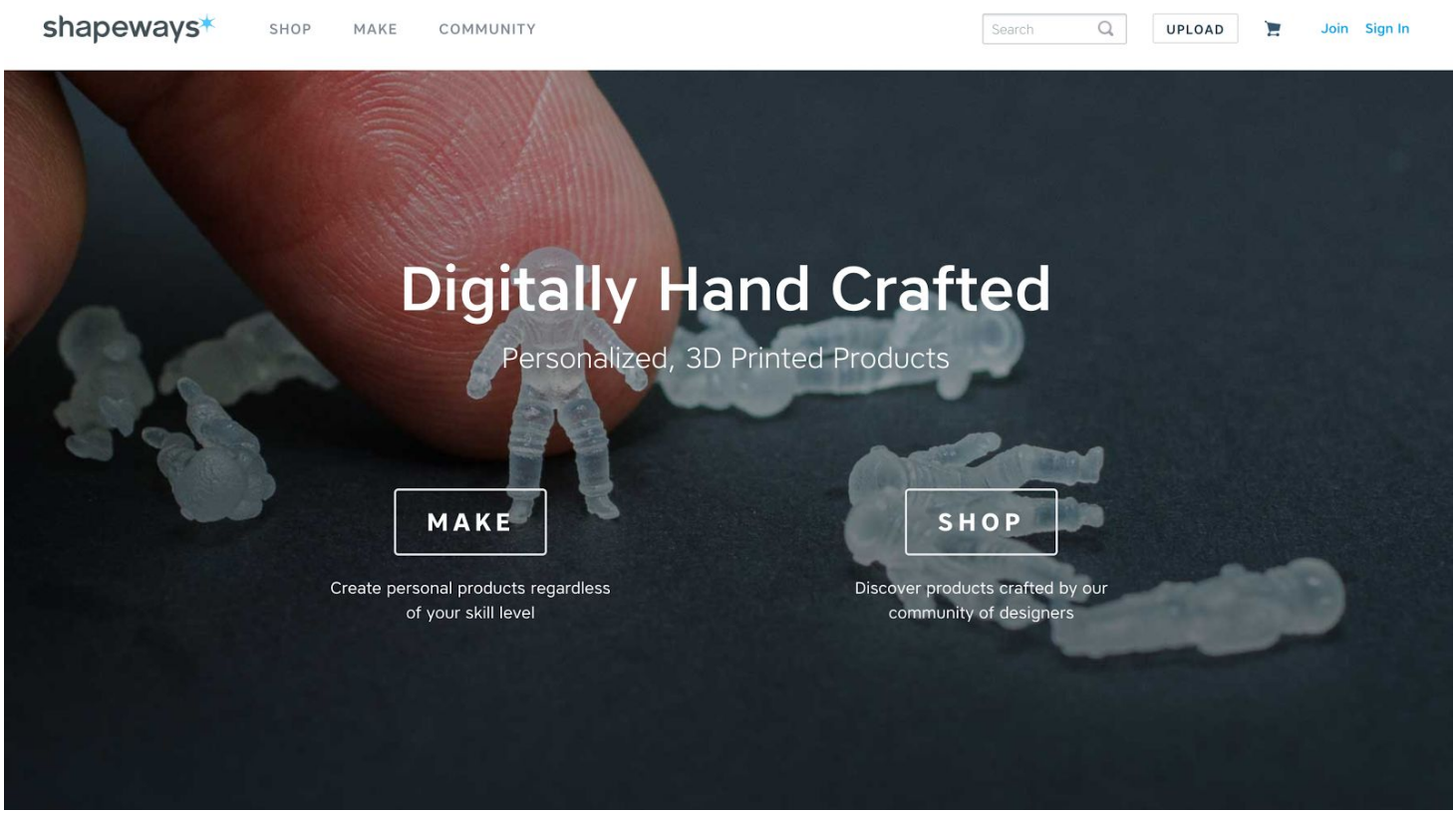
Hem is an online furniture and accessory design company which employs a unique production approach where they hire designers to develop products and then work with a network of regional factories to produce the designs. By only selling products online, they can make products more affordable and attainable than design furniture usually is and can innovate on assembly solutions to make things easier for customers.

Relevance

We believe that hem is beginning the process we would like to accomplish and is an excellent precedent for understanding the online user experience process from a customer's point of view. In addition, they provide important branding precedents such as providing a designer's biography with each design to make products feel more personal, using large-scale and high-color images of their designs both in a studio and in use, and how they talk about their positioning as a new collaboration that saves value for customers. While the technology behind our product is interesting, as is Hem’s manufacturing/design break-down, we similarly need to find succinct and powerful language that describes it and how it makes us unique, without getting overly detailed about the way it works.

Shapeways

https://www.shapeways.com/



Design Your Product

As you create your 3D model, you have access to material guidelines, tutorials and a global community and support team.

Upload to Shapeways

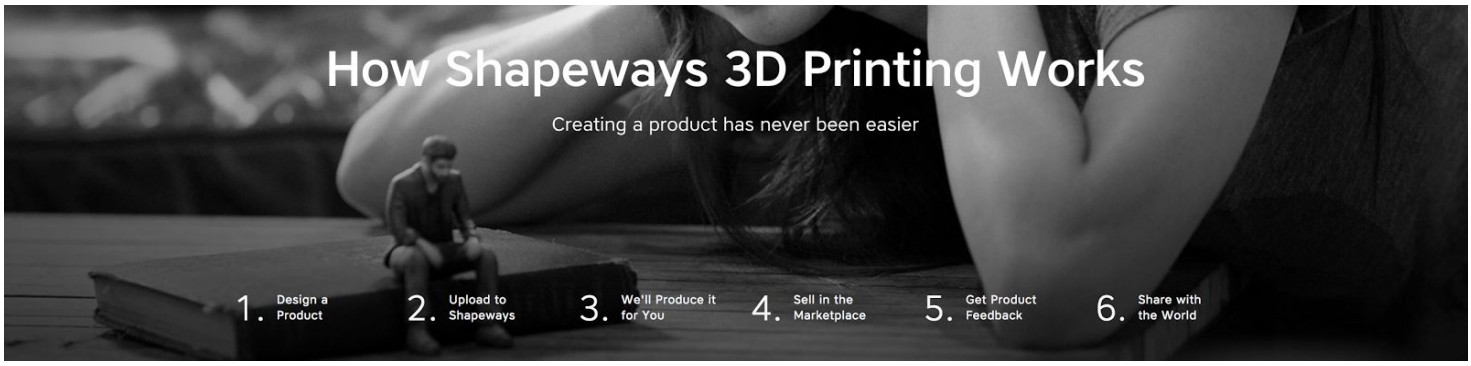
Your 3D model goes through automated printability checks and you get instant pricing in 40+ high-quality materials.

We Manufacture It

We 3D print in your selected material, using the latest industrial 3D printers. It takes 10 people to bring your product to life.

Delivered Worldwide

Fast turnaround time and global shipping, so you can hold your product in your hands as soon as possible.



Shapeways is a Dutch-founded, NYC based digital platform and network of factories that allows for the production of 3D printed objects on demand. Users can design and upload 3D printable files and Shapeways will print the object for them or others in over 55 materials and finishes including plastics, precious metals, steel, and food-safe ceramics/porcelain. They have a local factory in Queens that houses 50 industrial printers and has the capacity to produce millions of consumer-designed products annually.

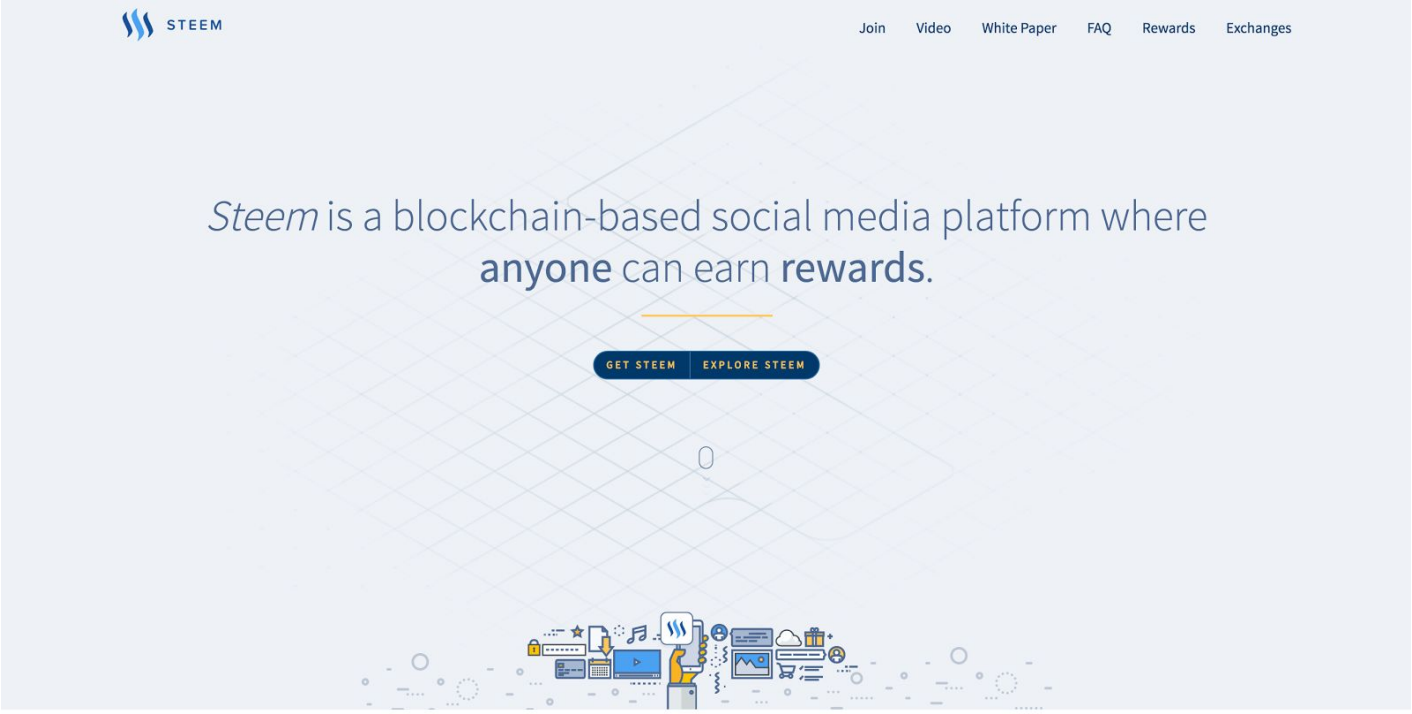
They also allow designers to upload their 3D designed products to a marketplace and will produce the designs in their own factory to fulfill any purchases made, with a wide-degree of customization and strong tools for the designers to track the success of their goods. In addition, they have recently opened up new options for consumers to adapt designs without prior knowledge of 3D design as well as participating in co-creator platforms where the consumers and designers work together.

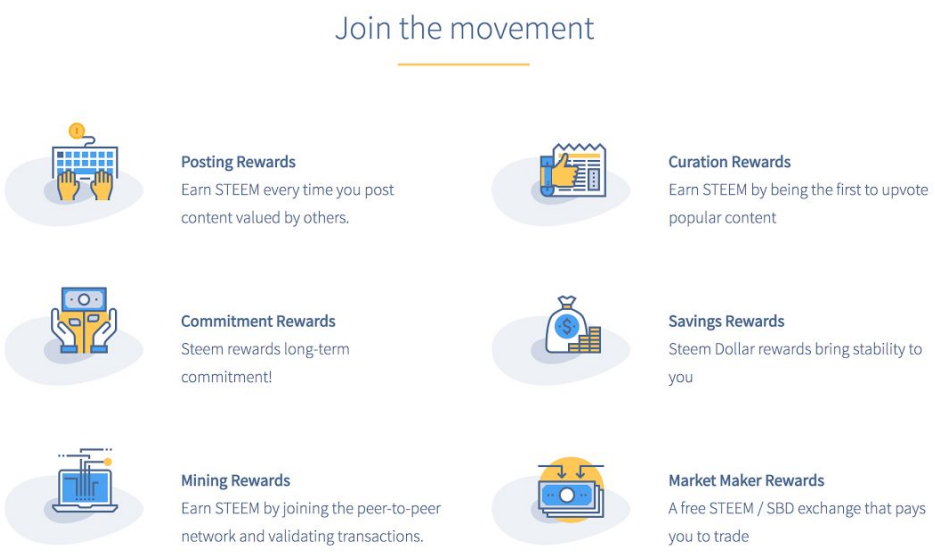
Relevance:
We believe Shapeways is one of our most important precedents and competitors in terms of the use of their digital platform. While limited to 3D printed objects, they provide an excellent service for both designers and customers, similarly allowing for on-demand instantiation and production of a designers idea, where the designer gets paid for each copy created. We are interested in a similar approach to this, although our key difference is that we do not produce the goods ourselves, we network with local maker centers also running our platform, for these purposes. Shapeways can provide important precedents for how we should design our language, dashboards, tools, and upload process for designers, as well as legal precedents for the licensing of the works and any potential liability that could arise. One could say we are aiming for a decentralized shapeways that includes laser-cut and CNC work (in fact we won't aim for a 3D printing market at the outset due to many of the complexities Shapeways has solved in terms of expensive cutting-edge machines and high-skilled production processes for different materials). However we do like the highly-customizable approach they provide to customers as well as the new potential to do "co-creator" type designs.

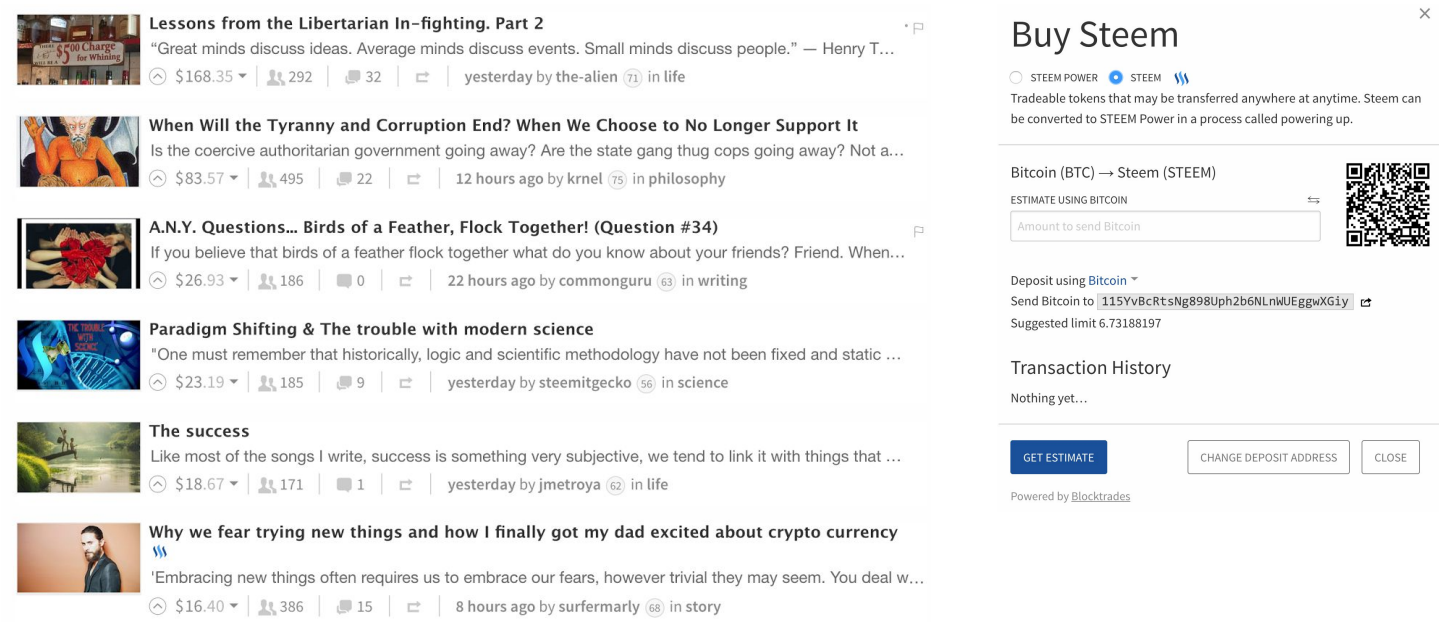
Blockchain Use-Cases (Systems we can Use or Adapt)

Steem

https://steem.io/







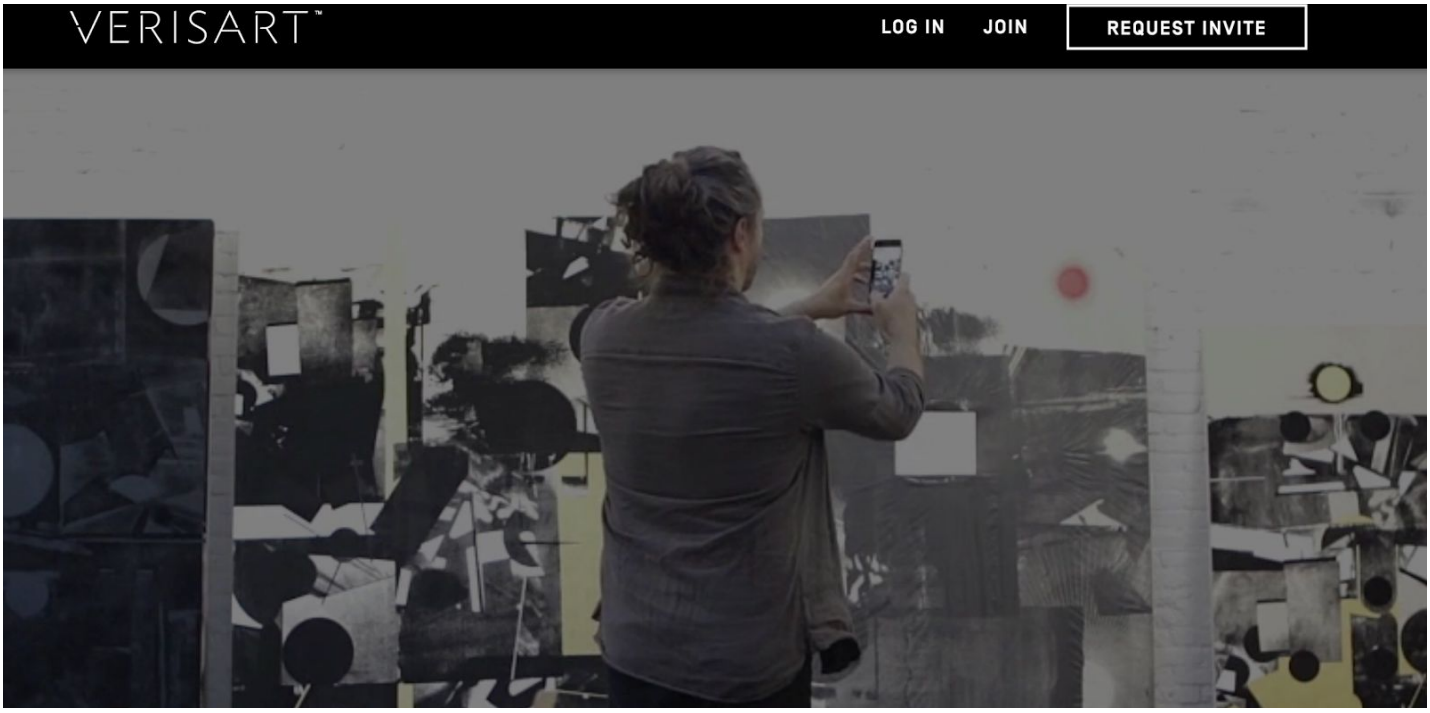
Steem is a blockchain database that supports community building and social interaction with cryptocurrency rewards. Steem combines concepts from social media with lessons learned from building cryptocurrencies and their communities. An important key to inspiring participation in any community, currency or free market economy is a fair accounting system that consistently reflects each person's contribution. Steem is the first cryptocurrency that attempts to accurately and transparently reward an unbounded number of individuals who make subjective contributions to its community.

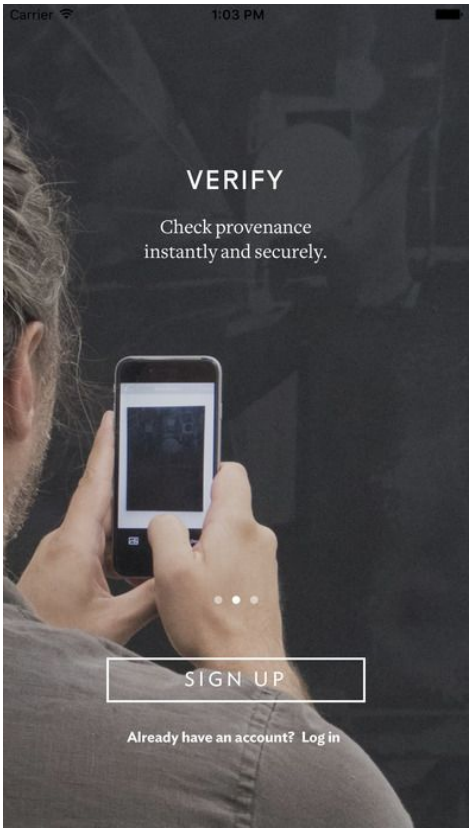
Relavance:

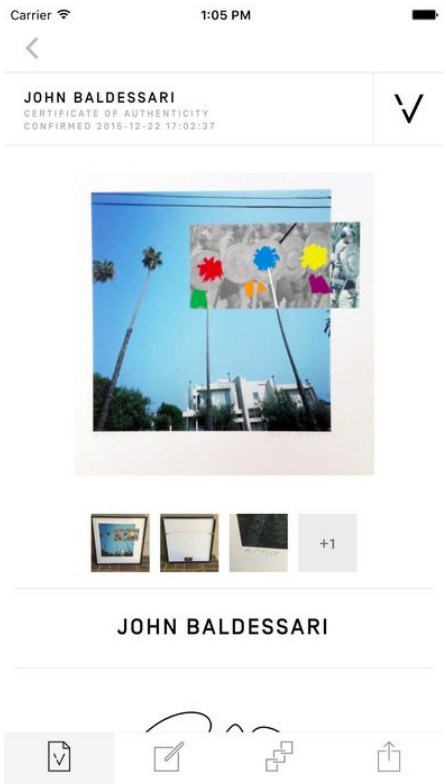
Steem is a great example of how new applications and use cases are being found for the blockchain that capture value for content-creators. By using an in-platform cryptocurrency, they can ensure that individual creators are paid for their work, as well as the popularity of their work. They also operate on a mixed currency model where typical “Steem Dollars” are pegged to the US dollar and traded in-app, while other currencies are used for an investment model to encourage a distributed network of investors with shares traded on a speculative market. The more successful steem is, the more value the Steem investment coins are, and investors can cash out just as they could in the stock market. Steem is a great precedent for considering the variety of ways the blockchain can be used as both an in-platform value-transfer method as well as unique investment model outside of venture-funding or platforms like Kickstarter. Our platform can employ similar schemes to reward investors and can also consider Steem’s voting system as a future method for playing with the price and value of uploaded designs (e.g. the more upvotes a design gets, the more expensive it is on the system). Overall, Steem is one way that the blockchain can allow us to play with users notions of value and contribution throughout the different product releases in our business model.

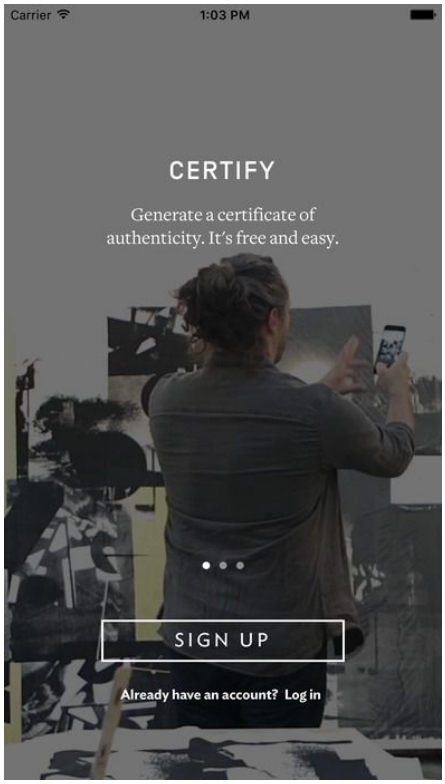
Verisart

https://www.verisart.com/









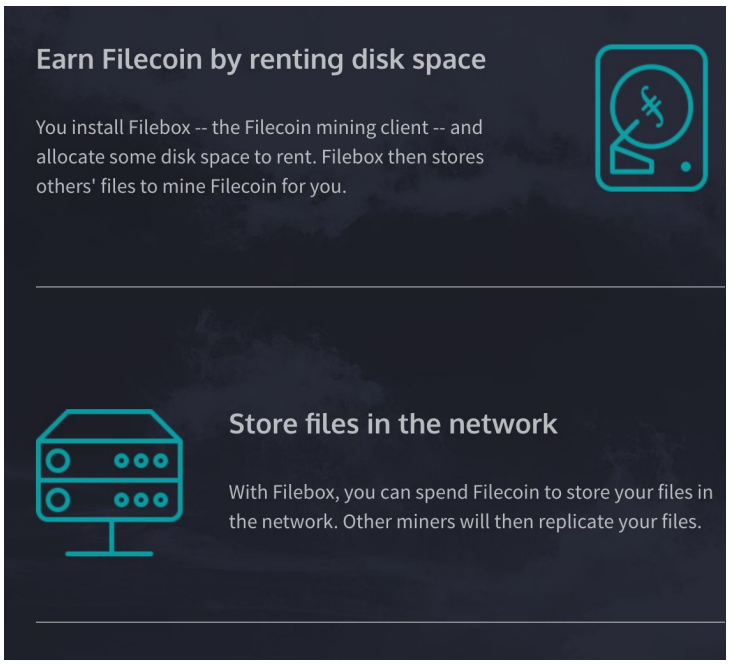
Verisart delivers a new way to certify and verify artworks and collectables in real time. By using distributed ledger technology provided by the blockchain, Verisart aims to build a permanent, decentralized and anonymous ledger for the world's art and collectables. Verisart's first product is a free app for artists and collectors to generate certificates of authenticity in two easy steps. The app is available exclusively for download via iTunes. Verisart was founded by leaders within digital media, contemporary art, and distributed ledger technology and is headed by Robert Norton, formerly CEO & co-founder of Saatchi Online & Sedition Art. Verisart is currently by invitation only.

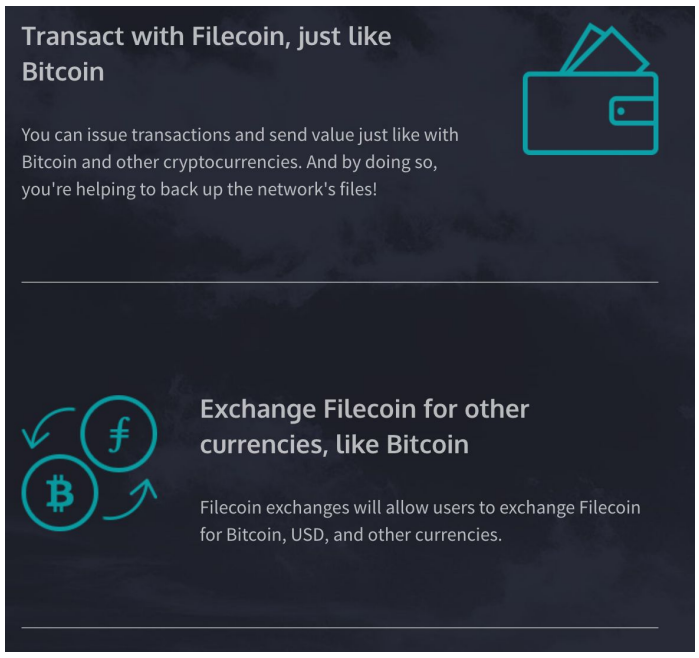
Relevance:

Verisart very much represents a new way to generate "certificates of authenticity" using the blockchain. We are interested in how we could extend a similar approach into fabricated goods, so we are closely following their progress as well as looking at the user experience of their iphone app. It would be great to have a similar app that could scan the embedded certificates in our products, verifying that they are authentic for users and for maker centers if the item needs to be reproduced or sold.

File Coin

http://filecoin.io/





Filecoin is a distributed electronic currency similar to Bitcoin. Unlike Bitcoin's computation-only proof-of-work, Filecoin's proof-of-work function includes a proof-of-retrievability component, which

requires nodes to prove they store a particular file. The Filecoin network forms an entirely distributed file storage system, whose nodes are incentivized to store as much of the entire network's data as they can. The currency is awarded for storing files, and is transferred in transactions, as in Bitcoin. Files are added to the network by spending currency. This produces strong monetary incentives for individuals to join and work for the network. In the course of ordinary operation of the Filecoin network, nodes contribute useful work in the form of storage and distribution of valuable data. Filecoin is only in a 'white paper' status as of yet meaning that the platform has not yet been launched, but it has been announced it will be built on top of the existing Ethereum blockchain protocol.

Filecoin is made to work with the distributed file system IPFS (InterPlanetary File System) which is already in use. A year and a half after its creation, creator Juan Benet is ready to add a blockchain-based currency layer called Filecoin to incentivise data storage on the IPFS network vs. traditional centralized server and storage systems. The goal of IPFS is to add decentralised permanence to data on the web, and to take advantage of many efficiencies lost via the de facto file retrieval system, HTTP, making the latter work more like a peer-to-peer system.

Relevance

FileCoin was recommended to me in conjunction with its parent project, the Interplanetary File System (IPFS), by starter of a blockchain-based donation company, EduDAO. While discussing how we could potentially generate physical certificates of authenticity and a system for only allowing access to a particular instance of a file (say 1 of 100 copies of an available design) it was mentioned that FileCoin might be a good lead to pursue. It allows for tracking access to specific files by generating one coin to access each file. When the file is accessed, the coin is spent, preventing the user from accessing (instantiating) the file again. We think that this currency system in conjunction with IPFS could be a platform we could run our application on top of or if not appropriate, an excellent precedent for creating a similar "proof of verification" type of currency. In addition, if Filecoin can adapt an existing platform like ethereum to run their currency on top of, we might be able to do the same which would open the possibility of working with Ethereum developer groups and funding circles such as Consensys.