APPENDICES

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APPENDIX B
Overview of meetings

CASE STUDY

who	company/Function	when	key insights
Shoe Brand	Kick-off meeting	12/03/2018	-
Shoe Brand	Supply Chain Operations	13/03/2018	-
Shoe Brand	Technology session	13/03/2018	-
Shoe Brand	Business Models	15/03/2018	-
Shoe Brand	Marketplace Strategy	-	-
Shoe Brand	Technology session II	-	-
Shoe Brand	SB Blockchain enthusiast	-	-
Shoe Brand	Store visit	22/03/2018	-
Shoe Brand	SPARK workshop	29/03/2018	-
Shoe Brand	Connected marketplace	11/04/2018	-
Shoe Brand	Tech Finance	18/04/2018	-
Shoe Brand	Business Development	18/04/2018	-
Shoe Brand	End Demo	14/06/2018	-
Shoe Brand	Open Houses	every 2 weeks	-

CONFERENCES

owner	name	when	key insights
Atos	Innovatos Blockchain Seminar	20/03/2018	Blockchain is not trustless, oracles still need to be trusted for providing correct data. Validation of transactions is a prerequisite for participation in a blockchain ecosystem. Blockchain will mature in 5-7 years. Obstacles include: Sustainable energy usage for proof of work, transitioning to managed services and building blockchain ecosystem with partners instead of solo.
Blockchain Expo Ams	Blockchain Expo	27/06/2018	All companies promote through videos and flyers. Not really tangible ways to experience blockchain.

INDIVIDUAL INTERVIEWS/SESSIONS

who	company/function	when	key insights
Rick Ros	Legal Things ∎ Head of Sales	19/04/2018	Human aspect is hard to measure. How are you really sure that an actual/right person signed for a certain commitment∎ Linking blockchain to actual human beings is tricky. Gain trust from clients by explaining

			user perspective, not IT side. Win trust by doing pilots with clients. These have low investment costs. Win trust by making the new blockchain system run on the system of the client.
Mariia Startceva	Cognizant ❙ Associate	15/06/2018	Find a way to measure trust. Maybe variation within group. Compare two groups one where you pitch knowledge and one where you make people experience blockchain. Measure differences. There needs to be an incentive for users to join the experiment/experience. Maybe Share harddisk storage to get money.
Holly Robbins	TU Delft, PhD. Immaterial tech	22/06/2018	Technologies are becoming black boxes, we mask it to make it useful but we overuse it and things go wrong. Complexity needs to become legible. Involve people in the task of the technology. Find the sweet spot between 'value' and 'working code'. For a network it means "engagement with the things it is made up of". Interaction should also result in an understanding. Find a metaphor that displays our role in interacting with the technology. Balance understanding and value.
Guowei Jiang	TU Delft, PhD.	22/06/2018	One of blockchain's value is the clarification of responsibilities. It offers data ownership and permanent control. Blockchain has a wrong narrative surrounding it: either people think it will change the whole world OR 'bitcoin'. We (anyone) need to find a new narrative, move the story away from Bitcoin. Maybe find a metaphor. The client's perception of the technology can affect the experience. Reception and perception of a new technology is based on three components: mass (what it is about), mythology (what others are doing with it) and mediation (indirect effect of a technology).
Rudolf Stefanich	Cognizant ❙ UX Designer	22/06/2018	See notes of 'creative session III'

APPENDIX C
Shoe brand case study

RESEARCH BACKGROUND

The case study was executed over a period of 10 weeks and ran in parallel to the graduation process (see figure 1). During the case study the most influential activities (e.g. workshops, presentations, meetings) were attended (see figure 1). Almost all observed interactions have taken place at the client's office with one exception for an excursion to a nearby retail store of the client. Although discussions were held with numerous people from both Cognizant as well as the client, no formal interviews were executed.

The observations and notes taken were mainly focused on two topics:
- How do people react when being introduced to blockchain technology.
- What trust challenges can be seen when dealing with blockchain technology in practice.

Team and process

Working on the project happened three days a week. Cognizant's on-site core team existed of a project manager, project lead and digital consultant and was supported by a full-time off-shore development team based in India. This team consisted of blockchain back-end developers, front-end developers and two digital consultants. Further support from the Netherlands was given by a blockchain expert, two interaction designers and a creative lead.

From the client's side involvement happened organically. Main roles included a project owner, connected marketplace specialist and a technology lead. Others were involved when needed mainly based on expertise of a particular domain (e.g. finance, marketplace development, new business models) or approval of the concept before building (e.g. vice president operations) or demo.

Figure 1 shows a schematic representation of the process that was followed by Cognizant. The main deliverables were a full working blockchain prototype of the concept combined with mobile applications, a slide deck containing all the insights, decisions and technological background information and an end-demo presentations.
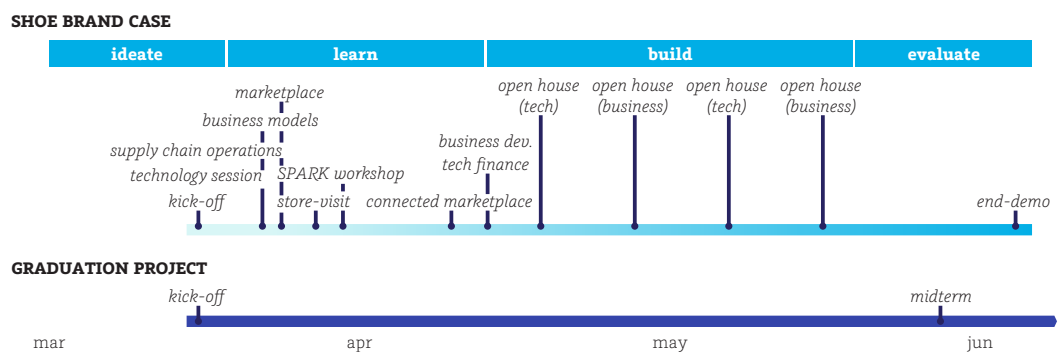

Figure 1: Overview of planning and activities

CONSENSUS ALGORITHM

For a case study to work it is important that the actual case which is studied is relevant to the topics of this research. Therefore some background information will given on the company, the context and the actual concept.

Consensus algorithm

The client of the case study was a multi-national sports shoe and apparel brand (hereafter referred to as the 'Shoe Brand'). At the time, the Shoe Brand was running multiple blockchain experiments in parallel, but the company did not have (much) experience with actually developing blockchain solutions. For this reason the Shoe Brand setup a blockchain experiment together with Cognizant. According to the project lead at the Shoe Brand the goal of the project was as follows:

Find out whether blockchain technology can bring any new capabilities that would or could not be achieved with other technologies.

To proof and learn about this, the technology was being applied to a 'shared inventory case'.

Consensus algorithm

The reasoning behind the case was to "always fulfil the Shoe Brand demand wherever it occurs by creating a connected inventory enabled by blockchain". Basicly, sharing store inventory across retailers (Shoe Brand owned and wholesale partners) could make it possible to always satisfy customers' demand, even when a particular shoe is out of stock in the store which the customer is visiting. In the concept that Cognizant developed with the Shoe Brand, one store requests an item from other stores in the neighborhood (the marketplace), a runner then physically fetches the product from a store that can provide the shoe and subsequently brings it back to the consumer's location in the original requesting store. Blockchain technology is deployed to support the secure 'requesting' of inventory information, track products' movement and manage ownership transactions across the involved stakeholders in a transparent and decentralized way.

Fit with strategy
The case study fits in one of the broader strategies of the shoe brand to create a 'connected marketplace': being able to fulfill consumers' demand using any channel that has the requested item. These channels are currently online (.COM websites) and offline brick and mortar stores of both the shoe brand as well as wholesalers (see figure 2). For the online channel goods reside in a (central) warehouse. The example case and case study focus on connecting the physical stores.
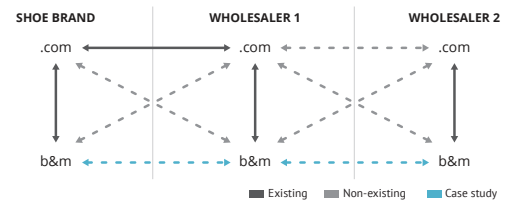

Figure 2: Fit of case study in connected marketplace

RELEVANCE TO RESEARCH

Blockchain specific information

The connected marketplace concept was being build on a private Corda blockchain framework. This implies that parties don't broadcast their inventory information to all the peers in the network, but rather on a need-to-know basis to the peer(s) that one is interacting with for a specific transaction.

Link to the project

The concept mentioned is an interesting case study as it deals heavily with the topics of 'trust' and 'blockchain'. Retail brands normally don't exchange (inventory) information with other wholesalers as both do not trust each other. As both are competing for similar consumers, the risk of the other party misusing the information is higher than the perceived benefits of sharing information. Blockchain technology could potentially reduce these risks and enable this interaction. Next to this, the newness of the application of blockchain for the Shoe Brand made it interesting to see how trust plays a role there.

OBSERVATIONS

PLEASE NOTE THAT MOST OBSERVATIONS WITH REGARDS TO RETAIL BUSINESS/SERVICE DESIGN HAS BEEN LEFT OUT AS THE THESIS PROJECT SWITCHED FOCUS

Opening workshop

Main activities:
Presentations on usecase and planning

People present:

Cognizant team + Shoe Brand team

Observations:
- In the beginning there was quite some unclarity about what the usecase entailed exactly. This was mainly due to the 'in-between' stage of the concept where a central warehouse would be created by Shoe Brand. People felt this was more effort than gain.
- To build trust, build up concept in two stages. In the first there is a neutral inventory pool that is not owned by Shoe Brand as to increase the first trust of retail outlets in the Blockchain concept.
- On power of blockchain: Companies exist because inside there is trust. Outside of your firm there is not trust. Blockchain increases the trust-zone as it expands the boundary.
- Retailers have a trusted relationship with Shoe Brand but not necessarily with each other. However, Shoe Brand does need to build trust for retailers to share what they are selling where.

Quotes:
"It's a catch22, you need to understand the Blockchain technology to make sense of the use case and the other way around" - Cognizant

SPARK workshop preparation

Main activities:
Present usecase findings + discuss planning

People present:
Cognizant team + Shoe brand project lead

Observations:
- Blockchain is not something you choose to use, it's more like it is there, and you can decide if you want to play or not.
- Client question: Does blockchain offer any new capabilities that we could not get any other way (timewise, pricewise, I)I
Proof the usecase with blockchain or proof the future play that Shoe Brand will do in the blockchain paradigm.
Client: first option.
- Client: Discussing the rules holds a level of transparency that is not there today. Everyone holds his cards very close, very transparent what you're driving at. Having conversation with our partners. Contribution of each partner to the consumer is becoming more explicit to each partner.

SPARK workshop

Main activities:

Present usecase findings + decide continuation

People present:
Cognizant team + Shoe brand team + VP

Observations:
- Shoe brand wants to focus on how to set it up and figure out the details later on (liability, responsibility etc.)
- About lab vs. testing with WS partners: Are we staying a lab or involving an account to already test the usecase. Decision: Showcase a complete usecase and lure them in (pitch).
- Shoe brand pushing boundaries of Blockchain technology: Is it possible to collect all the data around these transactions and do predictive activities with themI
- Blockchain in B2B competition poses legal problems: Shoe Brand is not allowed to know the POS data from WS because Shoe Brand is a retailer themselves.
- Shoe Brand main concerns were with consumer acceptace surrounding service + Who will write the rules of the systemI Deciding on these is harder then showing them.

Quotes:
"To really know if this is working or not, should we not involve an accountI" - Shoe Brand
"I love your way of experimenting, but, come back when you have a real capability." - Shoe Brand (about WS reaction to new concepts)
"Are we ready to open the kimono and ready to show what we have" - Shoe Brand (Talking about Shoe Brand showing it's inventory to WS)
"gets distributed, obviously" - Cognizant (on how blockchain is used for a specific set of data)
"How would you react as a WSI" - Shoe Brand (on difficulty of convincing WS to join a new blockchain ecosystem)
"It doesn't matter who writes the rules, because they are transparent." - Shoe Brand

Visit to retail store

Observations:
- Employees stack boxes in piles of 10 so that they trust the RFID scanner more. They can visually see that it's a pile of 10 and recognize that the scanner shows '10' on the handheld.
- Inventory management is balance between intuition and technology 'facts'. Takes some onboarding and interaction before employees trust that the technology is showing the truth.

Supply chain/OPS session

Observations:
- Shoe Brand currently works with WS partners through a 3rd party service. The 3rd party takes a premium over each transaction that the Shoe Brand and WS complete. Shoe Brand prefers not to deal solely with these 3rd parties due to costs but also because competitors can buy a stake in the 3rd party and get closer to the actual data that is being shared. This collaboration with a 3rd party happens through lawyers because the Shoe Brand doesn't trust the 3rd party enough.
- Discussion about whether the project is a business or technology challenge. The willingness of WS partners to join seemed to be left out of the discussion when talking about the desired results of the project.

Quotes:
"Commercially sell them the trust of blockchain." - Cognizant

Tech session

Observations:
- Tech Lead Cognizant and Tech Lead Shoe Brand found it hard to work on the tech as so little was known about the details of the usecase (e.g. what data will be shared, how much data etc). Yet they were trying to choose a blockchain architecture already.

Business model session

Goal: Determine business rules for smart contract
Observations:
- Blockchain usecase requires new type of relationships that have not happened before. The Shoe Brand and WS partners have collaborated in some ways, however WS and WS never collaborate. These WS have similar inventory and fight for the same pool of consumers.
- Key challenge is to convince WS to help customers that are coming to other retailers. This is a different issue than willingness to share information.
- As these new interactions take place in a highly competitive market, all possible scenario's of misuse should be taken into account for making the rules.
- Within the WS partner spectrum there are ones that are forward thinking and more willing to adopt new technology and ones that are less interested in these kind of things. Building an ecosystem with all these partners means they have to approached differently.

Quotes:

- "We should definitively consider that WS will use it to attack other competitors." - Shoe Brand (about Blockchain usecase and WS interaction)

Digital supply chain meeting

Observations:
- WS would need a lot of trust to have the transfer of ownership take place only later at the sale. (Because separation in space and time between WS and shoe creates uncertainty more trust is needed)
- Store employees should make the call when a product can be sold through the marketplace. It's art vs. science. There is no accurate inventory information. > Blockchain technology is supporting and closely related to other technologies. It is still dependent on other input data (e.g. inventory).
- Gaming the system is a key topic for implementing blockchain technology. The technlogy is pushing you into interactions that would normally not take place because of a lack of trust. In order to make these interactions happen, all rules have to be well defined to provide trust to each player that this new interaction is 'oke'.
- Blockchain concept was pushing into physical areas (BoH), where not even normal Shoe Brand employees are always allowed to come, let alone a stranger. Blockchain is not yet seen as a technology that can make untrustworthy physical interactions, trustworthy.

Quotes:
"We have no experience with setting threshold, so let's just see∎" - Shoe Brand
"If that level of trust exists, I wouldn't need blockchain." - Shoe Brand
"You cannot run into someone's back of house, that will never work." - Shoe Brand

Finance meeting

Observations:
- Interviewee had a history of previous interst in blockchain technology. No concerns with the general concept whatsoever, mainly interested in the financial operations surrounding the concept.

Final concept demo

Observations:
- Main discussion focused on how to involve the WS partners. Blockchain technology introduces a completely new way of working together possibly even affecting the cultures of the companies.
- Many people seemed to feel that 'trust' was a key word here but couldn't really put their finger on it.
- First group with VP's and directors was focused

on new type of relationship/culture between partners and the Shoe Brand. Very high level and forward thinking.
- Second group with unit employees were more focused on details of the concept and how it would work operationally.

Quotes:
"How can we engage ws positively to make them see that they not giving away anything and receiving something for it." - Shoe Brand
"How much trust do we want to give at what time" - Shoe Brand
"Start us to open up and the trust factor. Thinking differently about Shoe Brand." - Shoe Brand
"Different piece of the trust." - Shoe Brand
"Culture between partners is key issue" - Shoe Brand

APPENDIX D
Blockchain experiences

PARALELNI POLIS

Paralelní Polis. (n.d.). Bitcoin Coffee. Retrieved from https://www.paralelnipolis.cz/koncepty/bitcoin-coffee-en/

This cafe in Prague is a 'bitcoin-only espresso bar' (Paralelni Polis, n.d.). The goal of the bar is to bring the attention to practical applications of the technology to consumers. The cafe is founded by members of the Ztohoven group and is part of the Institute for Cryptoanarchy.

In the coffee shop users are guided through the process of buying bitcoins (in a bitcoin ATM) and paying for their coffee with bitcoin. As the currency's value is rather volatile, a large screen shows the current exchange rate.

Insights
- People are guided through the process of bitcoin payments
- Purely focused on the application and no explanation about the underlying blockchain protocol.

a)
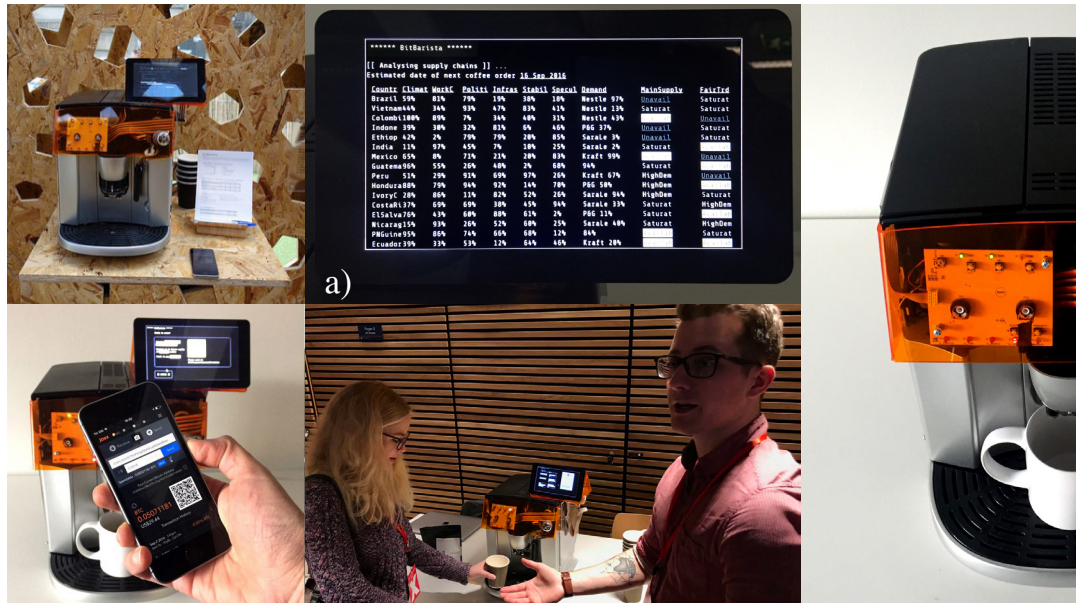
BITBARISTA

Bitbarista is a Bitcoin coffee machine that tries to show people the application and potential of Bitcoin and "explore perceptions of value transactions" (Tallyn, n.d.) with a IoT product.

Users can order coffee and pay with Bitcoin, but also receive Bitcoins by refilling beans and water. Next to this, users can vote what coffee should be ordered next. The machine will search the internet to find possible bean options and supply background information (e.g. climate, country of origin, political situation).

 Insights:
- Direct human to machine interaction
- Purely focused on the application and not the underlying blockchain protocol.
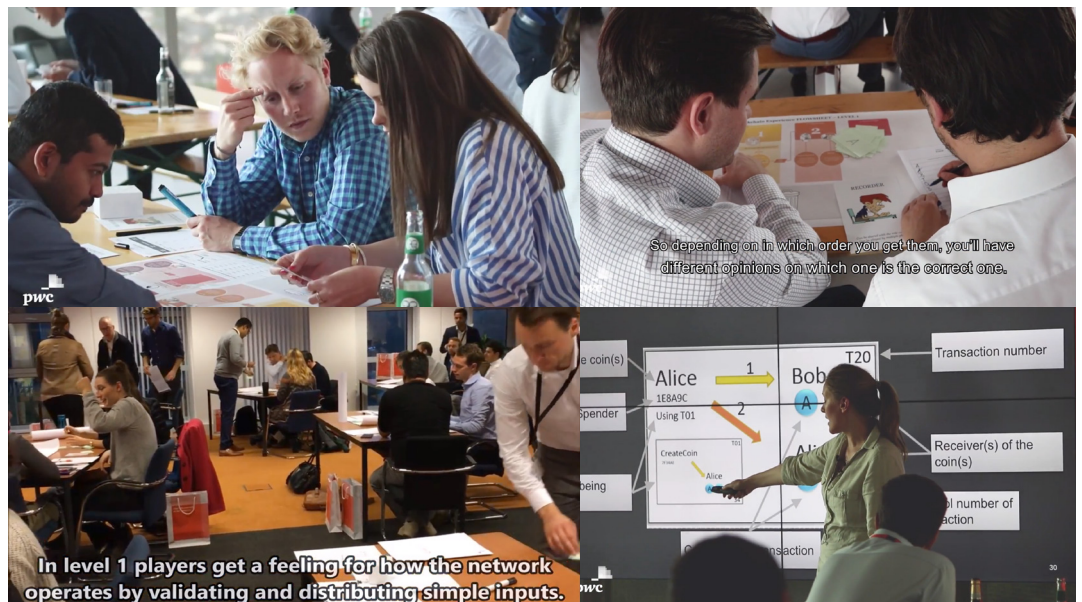
## PWC BLOCKCHAIN EXPERIENCE

Participants pay around 795 euros for a day long workshop. This workshop includes an introduction presentation, three rounds of simulating a blockchain network and activities for thinking about possible applications.

Participants are placed at a table which represents a node in the network. At this table participants have a different role (e.g. recorder, validator, distributor) and they have to check incoming transactions, perform proof of work calculations and determine what the correct transaction is. Tables communicate their answers to other tables. As the rounds progress, rules (smart contracts) are added.
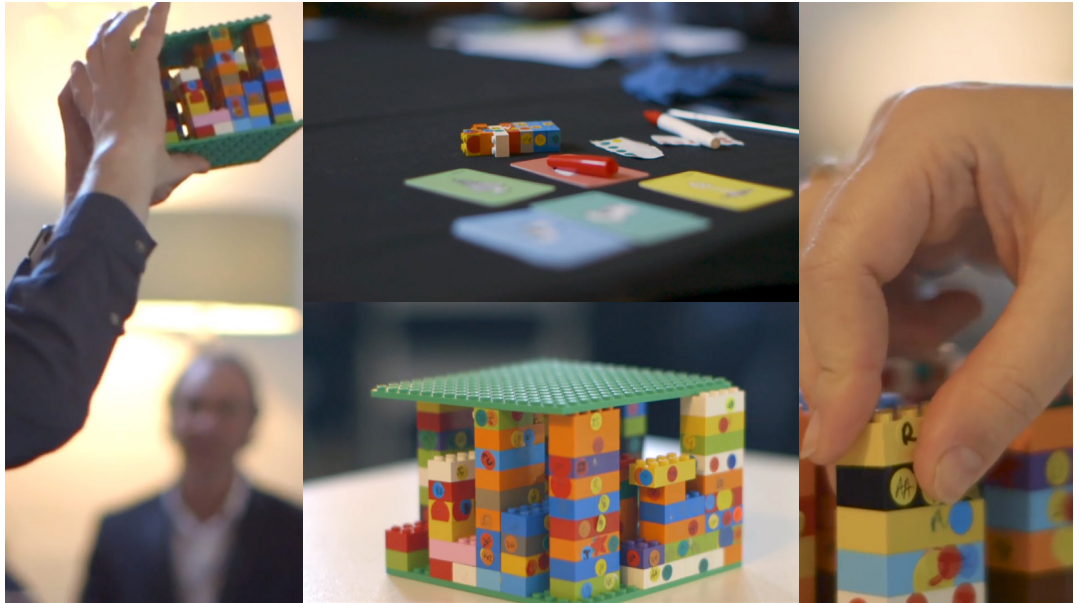
BLOCKCHAIN LEGO WORKSHOP

Speed, C. (2016, May 20). Block Exchange workshop introduction. Vimeo.com. Retrieved from https://vimeo.com/167419271

Workshop of 1 hour. First 20 minutes are an introduction on the basics of blockchain. Then the game activities begin. According to Chris Speed, one of the designers of the workshop, the goal of the workshop is make people "reconfigure what they think value is and the form that it comes and what possibilities there are if you change the mechanism by which we then transact value." (Speed, 2016).

In this workshop the focus is less on accurately simulating how nodes in a blockchain network communicate and more on the ability to exchange any value amongst peers. At the beginning players start with resources (e.g. oil, grain) and some money (in the form of lego blocks). The first two rounds focus on exchanging these material assets. In the final round participants are asked to get rid of the cards and can now come up with and exchange anything they find valuable (e.g. healthcare, education) for bricks. The game is supposed to happen freely and there is way to win or lose the game.

During the game particpants place a lego brick onto a baseplate for each transaction they make and put their initials on the brick. These lego blocks form the public ledger. After each round the ledger is 'sealed' with another baseplate as to simulate a block in a blockchain. Three participants are taken out of the group and are asked to solve mathematical puzzles to enact the 'miners'. The miner that solves the puzzle the quickest will receive 25 lego blocks which he or she can use in the next round of the game.

Insights:
- Good balance between trying to truly simulate the blockchain from a technical perspective and focusing on the value that it brings.
- This workshop has one clear message.
- Decentralized ledger is simulated by a centralized stack of lego blocks that everyone can see.
- No way to win or lose the game, so no risk that needs to be taken by participants which can affect their game.

APPENDIX E

Technology experiences

The design brief that was setup after the case study and literature research was still rather broad. To get a sense of what it means to 'experience a technology' different types of technology experiences were analyzed.

The Incredible Machine. (n.d.). Transparent Charging Station. Retrieved from https://the-incredible-machine.com/charging-station.html

TRANSPARENT CHARGING STATION

This is a design for a charging station for electric cars done by The Incredible Machine agency for ElaadNL and Alliander. By showing how much electricity is available and what is already being used, this station tries to communicate that the electricity net cannot charge all cars in the network at the same time. It reminds electric car owners that they are part of a bigger network that involves other car owners who are also requesting electricity.

Insights
- Translate immateriality of a network of charging cars and limit on electricity supply to a physical representation.
- Shows people that they are part of a bigger network.

THE HEINEKEN EXPERIENCE

The Heineken Experience is museum that showcases the history and production process of Heineken beer in an interactive multimedia experience. People can walk around freely but all experiences end in the same way: with a glass of beer. The museum is set up in different rooms where each room tells a different story in a different way.


TARGET'S OPEN HOUSE

The Open House by Target is collection of rooms where consumers can try out smart home products (e.g. Sonos, Hue). All rooms (e.g. living room, bedroom, garage) contain an interactive control screen and reactive screens. The reactive screens can display product promotions, usecase contexts and product explanations depending on what interactions the user is executing.

Insights
- Freely move around and try at own pace.
- Try products in the context that you will use it later on so you know more that it will work for you.
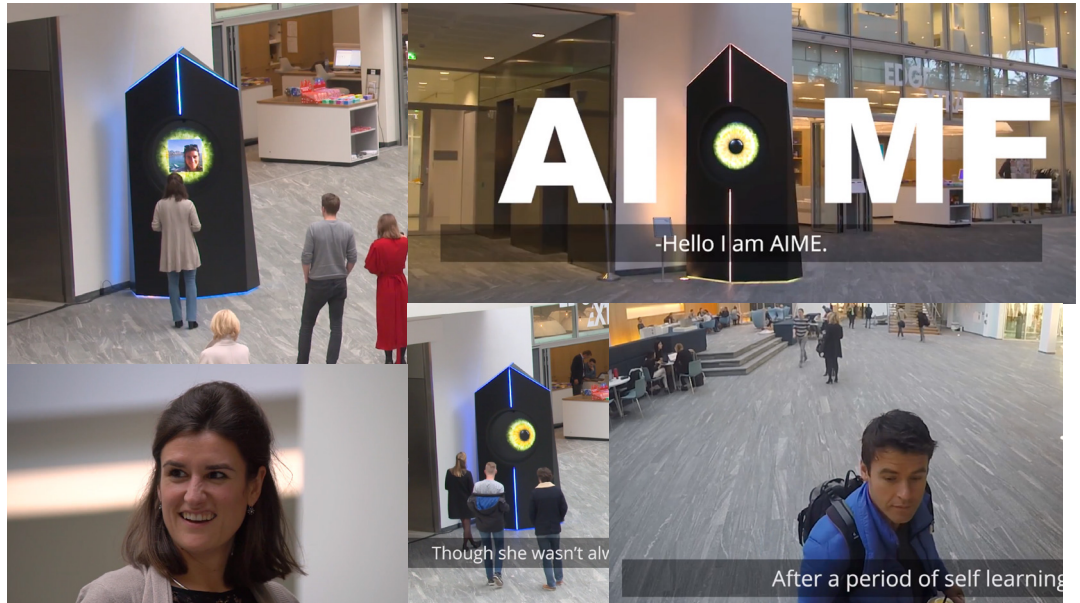
DELOITTE AIME

DeloitteNederland. (2017, November 29). Meet AIME. the tangible, human-like AI experience | Deloitte Nederland. Youtube.com. Retrieved from https:// www.youtube.com/ watch?v=F12PsHxBPhk

AIME is an AI bot with a physical representation that Deloitte placed in one of its' main offices in the Netherlands. The bot can learn to remember the names of people, recognize people and make jokes to show a human side. The goal is not to show how it works but rather to provide people with a first interaction with AI technology and show what it can do.

Insights
-        Having fun and human interactions with a complex and 'black box' technology seems to elicit positive emotions towards it.

IOT TRUSTMARK

ThingsCon. (2017, September 13). A trustmark for IOT.

IoT devices are different from ordinary products in the sense that they are connected to other entities or products. The device collects data, sends data and is updated from a remote location at any time. When using a product this is not always clear, therefore Beyond.IO proposed a design for a IoT trustmark. It is a label that for instance communicates about the product's data encryption, the amount of connect companies and trustworthiness level.

Insights
- Communicate the intangible trustworthiness of an connected object through a label.

JOHN LEWIS SMART HOME EXPERIENCE

The Drum. (2016, April 27). Inside John Lewis' Debut Smart Home Immersive Experience. John Lewis. Retrieved from https://www.youtube.com/watch?v=vA26EOfdrKw

Similar to the Target Open House, the John Lewis Smart Home experience is a open space where multiple smart home products are portrayed in their natural context. This helps customers of the warehouse envision what the value of the product could be for their own house. Customers are welcomed to try products and video simulations support the different functions.

MIZU (INTERACTIVE SINK)

Robbins, H. (n.d.). Mizu. Retrieved from http://hollyrobbins.com/work/#/mizu/

Mizu is an interactive sink that tries to communicate its' task and role in our lives through interactions with different materials. For example, by rubbing the bronze material with the hand, water coming from the faucet is becomes hotter.

This sink is a good example of a way in which immaterial behaviour of technology can become semi visible to its' user.

APPENDIX F
Creative sessions

CREATIVE SESSION I - RISKY EXPERIENCE

Planning
In order to start thinking beyond the most logical ideas a creative session was setup. The goal of this session was as follows:
1.   Get a broader view on what it means to have a 'risky activity', 'an experience' and 'an experience with technology'.
2.   Design some first concepts

The session was led by the author.

Participants
The session was executed with four students from the IDE faculty and one non-IDE student and lasted 2 hours. It took place at a meeting room in the IDE faculty of the TU Delft. All participants were given a very short brief by e-mail to get a sense of the topic.

Setup
In figure on the next page, the planning of the creative session can be found. Due to time constraints and nature of the session, not all planned activities were executed. First the problem was explored through a short briefing and interviewing the problem owner (me). After this three mindmapping sessions were held which led to some thought directions. These different directions were elaborated on to get to some key criteria for a good experience and risky experience. After this a brainstorm was held to get to some

first concepts for an experience.

After the session I clustered the mindmapping results and different ideas to get to useful properties of the experience.

Key insights
EXPERIENCE FLOW
- Show a clear A/B difference between no blockchain and with blockchain is key.
- Experience should slowly build up, not immediately have a high risk.
- For a good experience there should be some surprise or extremity. Something that takes you out of your daily comfort zone.
- Mindset when entering the activity is crucial for a good experience.
- Experience should leave behind a key message. Something confronting, new or memorable.
- Room or setting can be used to build the experience.

RISK ORIGIN
- Risk can be influenced by personal properties, cultural background, previous experiences, perceived risk.
- Find a common ground, something which can be risky for a range of users.
- Risk can be long term or short term. If risk is more 'in reach', perceived risk will go up.

Figure 3: Participants at the creative session

Phase	Activity	Time (minutes)	Comment	Goal	Materials
Introduction	Explain the session plan	2.00			
	Ice breaker 1: mobile phone	1.00			
	Personal introduction	2.00			
	Ice breaker 2: world problem solve with object	2.00	Hunger, global warming,		
	Rules of creativity	1.00			
	Total time	8.00			
Problem definition	Briefing Sebastián	3.00			
	Question problem owner + post-its belangrijkste finding	5.00			
	Mindmaps (3x) (experience) (risky activity) (experience	15.00	activities	Activities where you had to trust tech, personal risky	
	Formulate H2 questions (xN)	5.00		What does a good experience entail? What is risky activity? Belangrijkste onderdelen/challenges van zo'n ervaring	Flipover sheets
	Total time	28.00			
Idea generation	Brainstorming	10.00	Stimulus: all the money in the world, reverse statement		Flipover sheets + po
	H2's	15.00	Nx3 minuten, Stimulus: all the money in the world		A4 papers, postits
	Evaluate and explain + write postits + put on wall	7.00			
	Break	5.00			
	Vote best ideas	3.00			
	Team up and converge to concept	5.00			
	Total time	45.00			
Idea improvement/reflection	Create concept poster	10.00			
	Presenting	10.00			
	Total time	20.00			
Outro	Thanks	2.00			
	Final session time	103.00			

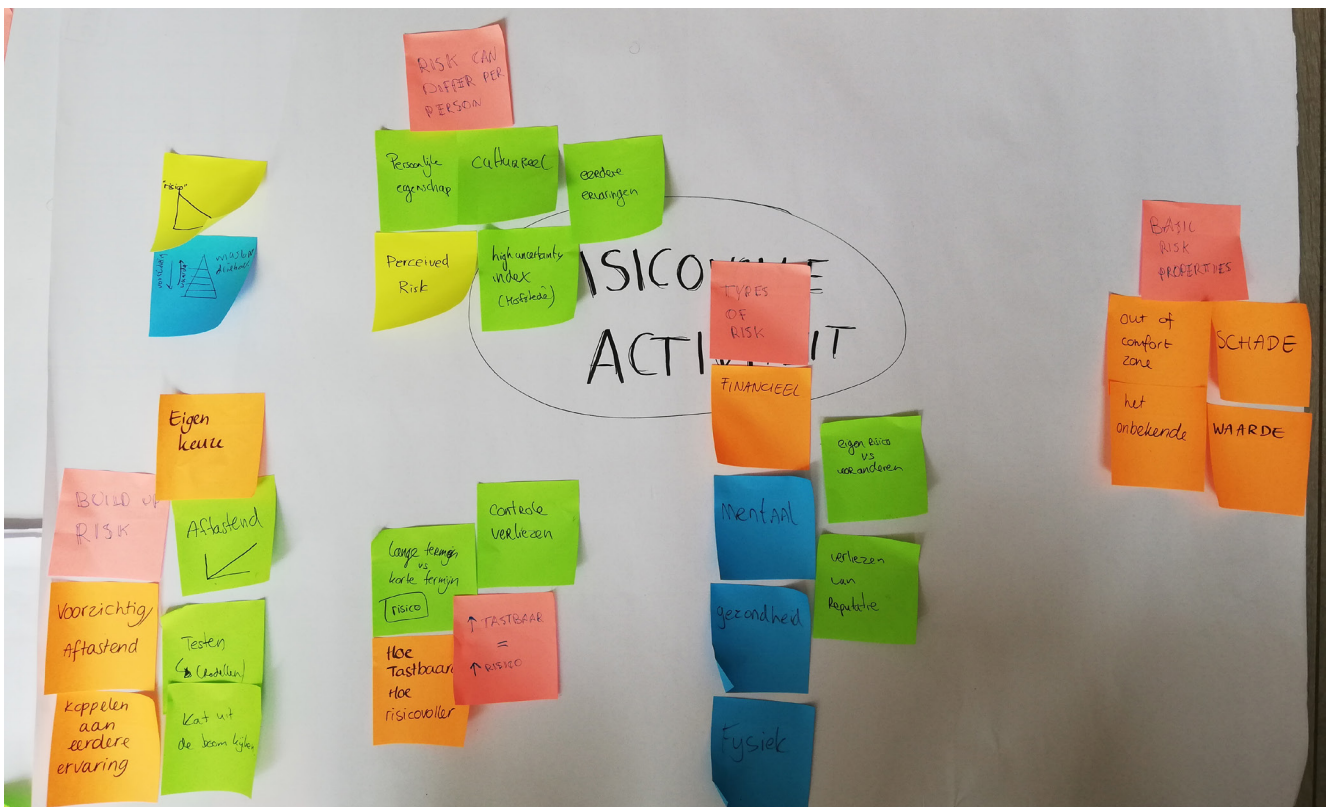Figure 4: First clustering of creative session results.

Figure 5: Second clustering of creative session results.

CREATIVE SESSION II –CONCRETE CONCEPT

A second session was planned with one fellow IDE student. As the first session appeared to stay very abstract, the goal of this session was to force ourselves to get more concrete and come up with a clear concept.

The first half hour was spend on breaking down the problem that is to be solved and mapping the potential users of the concept in a persona canvas.

After this, several brainstorming rounds were held which resulted in the idea of designing a game where clients experience the difference between working in a distrusting way, with a 3rd party and with blockchain.
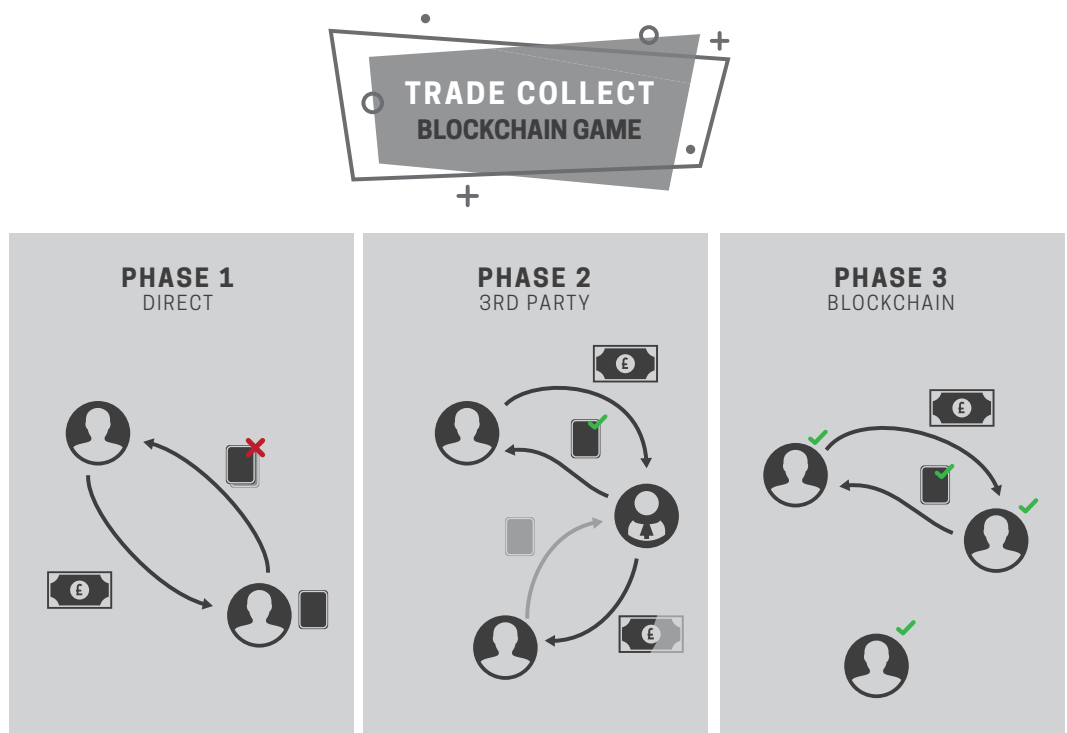

Figure 6: Trade Collect is a game where participants have to collect certain collectables. The game consists of three rounds: In Round 1 players trade directly with each other but soon discover that they can risk receiving a copy of the rare collectible, deeming it invaluable. In Round 2 players have the option to trade through a middleman who can guarantee the originality of the collectible. However, this middleman takes a charge for each transaction making it very expensive. In Round 3 players are introduced to simulating a blockchain. Now they can freely trade collectibles with no extra costs whilst being sure that the items are originals.

CREATIVE SESSION III – BLOCKCHAIN GAMES

In a short brainstorm session with Rudolf Stefanich, an User Experience Designer at Cognizant, some options for a game were explored. Rudolf has quite some experience with blockchain technology and was also part of the Shoe Brand case study.

Besides being a brainstorm session, this session was also partly meant to validate the concept a blockchain game with an employee from Cognizant.

Two concepts can be seen on the next page. These are purely thought of conceptually, game mechanics were not worked out or exact rules were not thought of.

Key insights:

General
- Gamestare fun when there is some uncertainty.
- Blockchain makes everything boring, all is known, no uncertainty about whether the transaction will work or not.
- Super important to work with a key message. What is the 'ah moment you want to provide'
- Don't brief about blockchain beforehand, it will shift the game. Make the game played naturally. Introduce it as a trust game.
- Round 1 should involve some frustration about the old trust paradigm. Round two
- If you are only a node in the network you will never understand the whole concept of blockchain technology. So choose a perspective, or alternate between perspectives.
- Goal of the session is NOT to find out about game mechanics but to get to an 'aha' moment.

Game characteristics / concepts
-            Jointly develop smart contracts to create fairness in the game.
- Hunt game: every player has a different question. This creates different incentives for each of them, making them act distrustfully.
- Mimic transparency: envelopes which are non-transparent and envelopes which are see through to share facts.
- Make people naturally create a blockchain without them knowing it. Then labelling it to show "aaah that's what it is!".
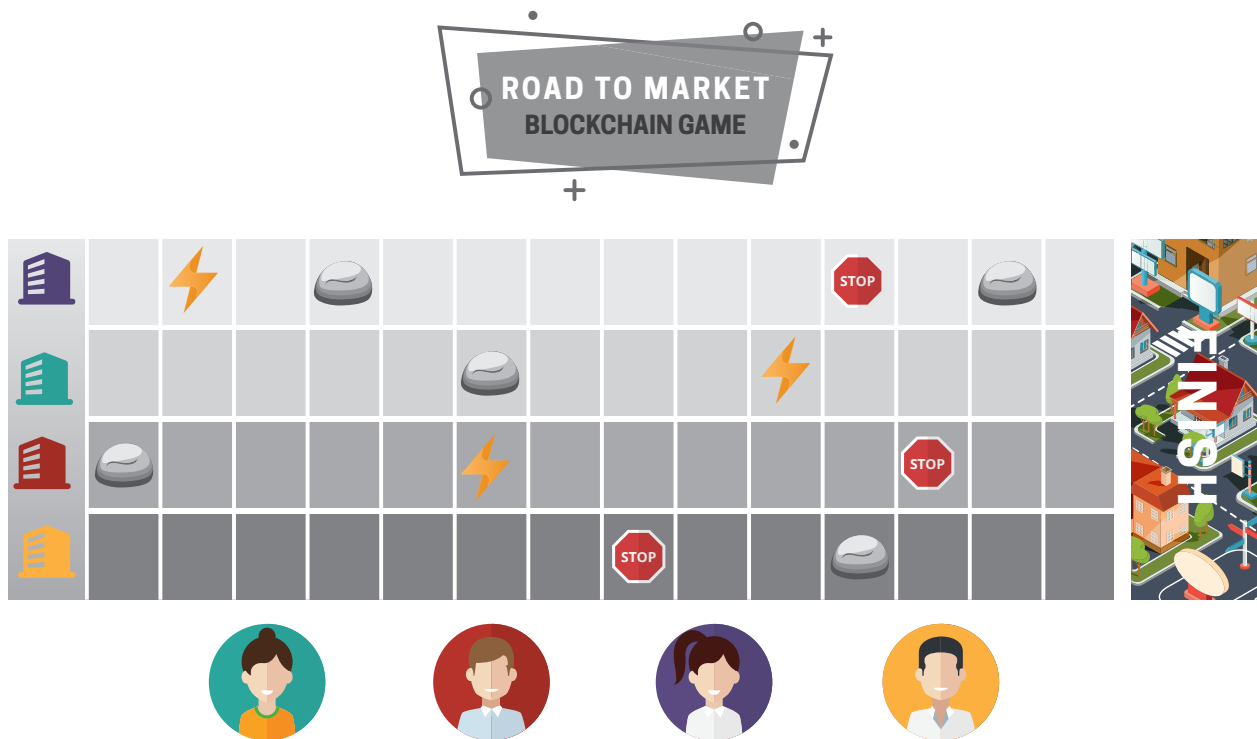
Figure 7: Road To Market game: Goal is to get your product to the consumer market as quickly as possible. But, people try to nudge you off the board, you can't trust them, you don't know when they will do it. With Blockchain you can establish smart contracts and rules and go through without risk. Key message: With blockchain technology you can focus your resources on the right things.
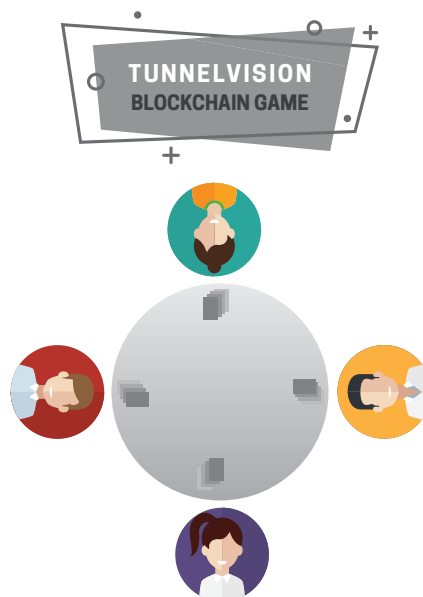

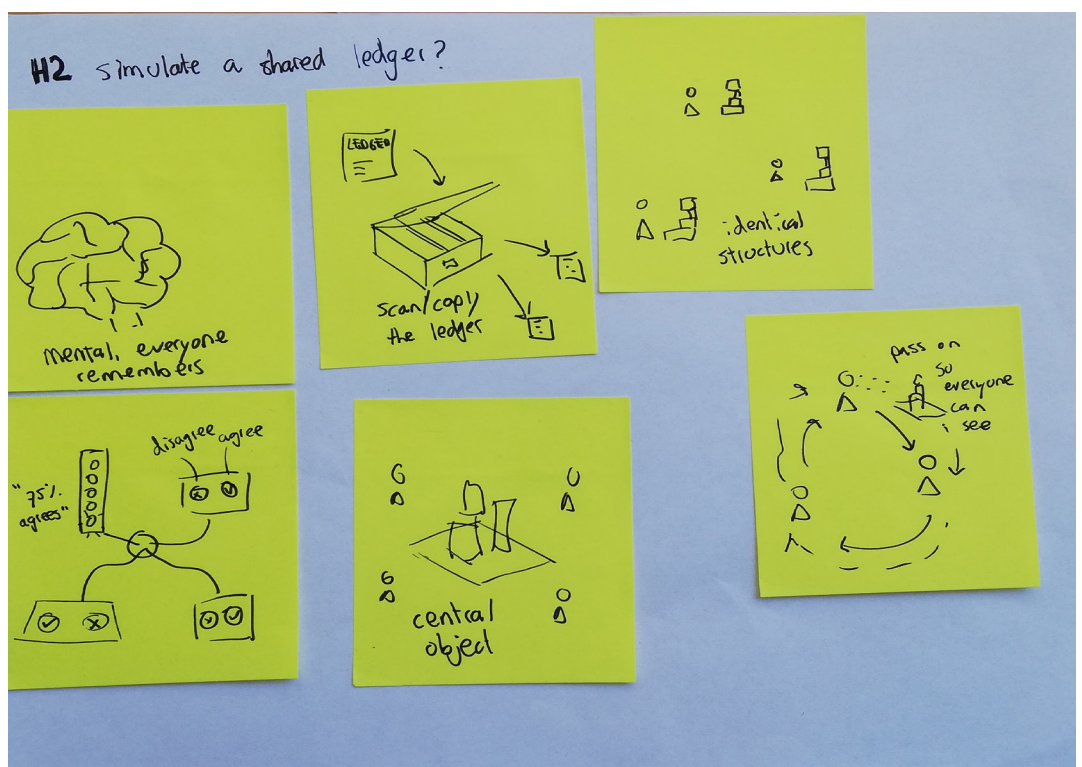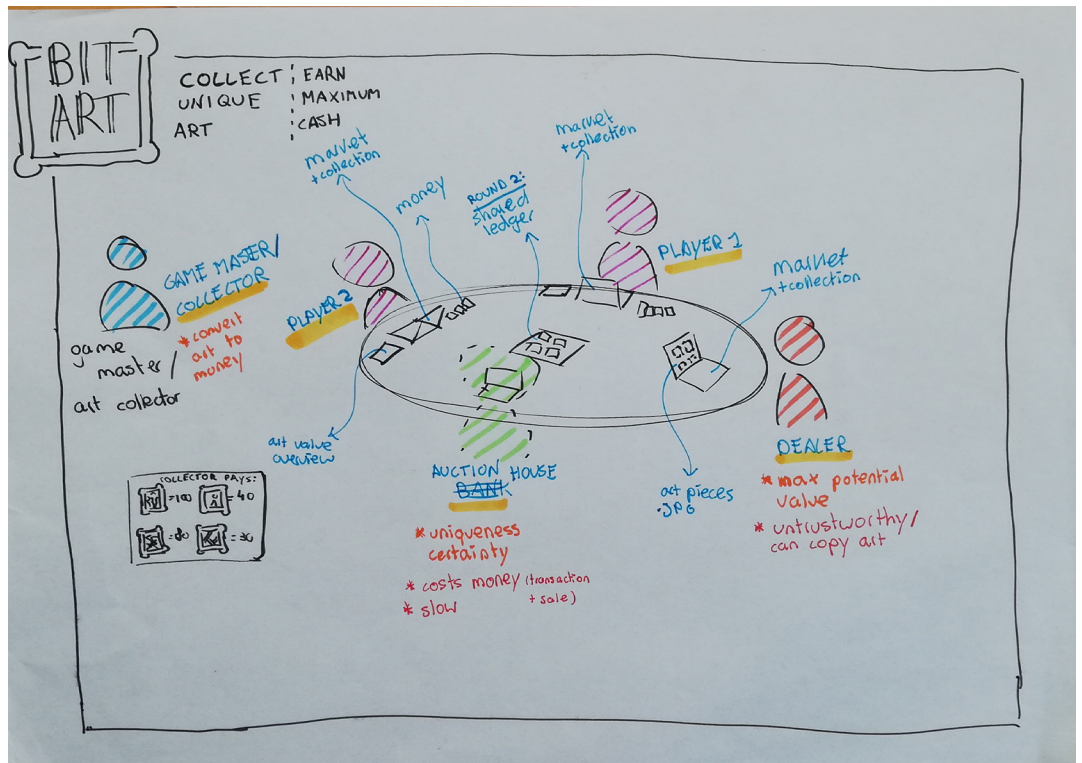Figure 8: Tunnel Vision game: Everyone starts with goggles on or sits with their back towards the table and has to trust the others. If you start to collaborate, you get to turn around and work together on shared facts. Complications make the exchange harder. Blockchain removes these complications. Key message: all maintaing facts separately does not work eventually, working together in a transparent way works better.

PERSONAL IDEATION

Besides the creative sessions that were held with other people, personal ideation took place as well.

This ideation focused mainly on extending a concept from the group session or working out components for the game.

Rely on the veracity of the data.

Shared network state to see what's happening

Make decision based on what you see, hope that it's <u>correct</u>

"you will never really feel like you're using the blockchain"

PARADIGM SHIFT
From 3rd parties to decentralized network

RULES
come up with → distribute

○ ○ ○
△ △ △

setup the rules of the game

electronic boardgame

noone can break the rules, you don't have to monitor the others

play the game, according to your rules

H2 show that we're all in charge?

H2 show experience that someone cannot be trusted?

Nikes
collectars item → pokemon

agenda

something valuable to you

diamonds → contact list

home ownership docs.

medical record → passport scan.

identity

credit card picture.

phone

Something of which you do not want to get a copy, only the original.

money

1. Receive the only one

2. Send only one for one person

with your...

creative - music content - painting ip

whatsapp → access for listing

APPENDIX G
Design experiments

EXPERIMENT 1 – BITART

Based on the first and second creative session a first game concept was created called 'Bitart'. This game tries to communicate how blockchain will facilitate the shift of trust from directly in the other/third party to a decentralized system.

Game:

In BitArt Collectors try to get a hold of three unique digital paintings. These paintings can eventually be sold to the Investor. The collector with the most capital (combination of paintings and cash) at the end of a round wins. Collecting a right combination of three unique paintings will result in more benefits than collecting three random paintings. But, the paintings are digital and there is a risk that a Collector accidentally buys a copy of a painting, resulting in 0 value. At the beginning of the game the Dealer holds the paintings and can offer these to the Collectors in each of their turns. The dealer tries to sell as many copies as possible, to maximize his profit and minimize the profit of the players.

Game rounds:

Round 1: Collectors negotiate directly with the Dealer.
Round 2: Collectors are now also allowed to buy through an Auctioner who can guarantee the uniqueness of a painting.
Round 3: Collectors simulate a blockchain ecosystem together which assures them that each transaction with the Dealer is correct.

During the first round participants should experience that the Dealer should not be trusted for trading digital assets due to the possibility of copies. In the second round participants experience how expensive it is to 'buy trust' from a third party. Finally, in the third round participants experience how keeping track of transactions collectively can reduce costs and enable the exchange of valuable digital assets.

Game turns:

For each collector a turn has the following steps:
1. Dealer offers collection of paintings to the Collector.
2. Collector chooses the painting that he/she wants to negotiate about.
3. Dealer and Collector negotiate price
4. Collector gives money to the Dealer.
5. Dealer sends a digital painting to the Collector
- bank
- blockchain

Experiment setup:

A first version of the game was created using simple paper illustrations (see figure x.x.) and email addresses (for receiving the digital paintings from the Dealer). Five employees from Cognizant joined in the tryout of whom not everyone was familiar with blockchain technology. I participated as the Dealer and facilitator of the game. After a brief introduction of the project the three rounds were played. After playing the game an elaborate evaluation was held focused on: the game mechanics, the message of the game and the fit with Cognizant's way of working with clients.

As this was truly a very first trial of the game, not all game mechanics seemed to work out and no measurements for increased trust in blockchain technology were done.

Figure 9: Assets of the game (roles, money, transaction cards, login cards, paintings, market prizes, email screenshot

Figure 10: People playing the game.

Insights:

Based on the evaluation of the BitArt game the following main insights and design criteria were setup:

Game mechanics
- Add different roles in the game to make it more interesting for everyone to play (e.g. shipping

company, bank, fraudulent dealer, game dealer)
- Add more interaction amongst players during the game as to not make the game boring for players that are waiting for their turn.
- Make the trading part of a bigger story. For example, players are collecting paintings to fill a museum. At the end of each round they really see how the trust/distrust relationship has affected the result (e.g. only copies, only a few paintings or all originals).
- Add a facilitator who continuously narrates the game and story to make it more engaging (like in the game Weerwolven) for the players.
- Add a specific purpose for each player so they are trying to achieve something rather than 'randomly' playing the game.

Blockchain message
- Make the effect of each round very clear and exaggerate the untrustworthiness of the dealer(s) and expensiveness of the auction house.
- Decentralize the ledger because having one central ledger feels like a central database which is the opposite of what it should be.
- Slowly ease into the blockchain ecosystem. Switching at once from the 'old' third party system to a blockchain system is forced and doesn't allow people to experience it themselves.
- Add an extra 'value' to the game when players enter into a blockchain ecosystem because blockchain makes everything fair so there is no

risk anymore in whether the transaction will be valid or not. This can make it a bit boring if the game is only about completing a transaction.

Cognizant/client fit
- It's good that the game takes a usecase that is not too specific and can cover multiple types of clients. Trading art is also something that most people can quickly understand.
- However, if the game would be about a simpler product it could potentially be replaced with any product from the client with whom the workshop activity is performed.
- Game would not only work for the beginning of a project but could also be a completely separate workshop that Cognizant offers to the business clients.
- Amount of players is not an issue, if this game would exist, consultants would make work of inviting enough clients to the game for it to work.
- If this game works, clients would love it. They will want to have this.

Quotes:
"second round makes sense!"
"stakes are high, that's the point" (talking about the idea of collecting art)
"I like it" (about laptop in game)
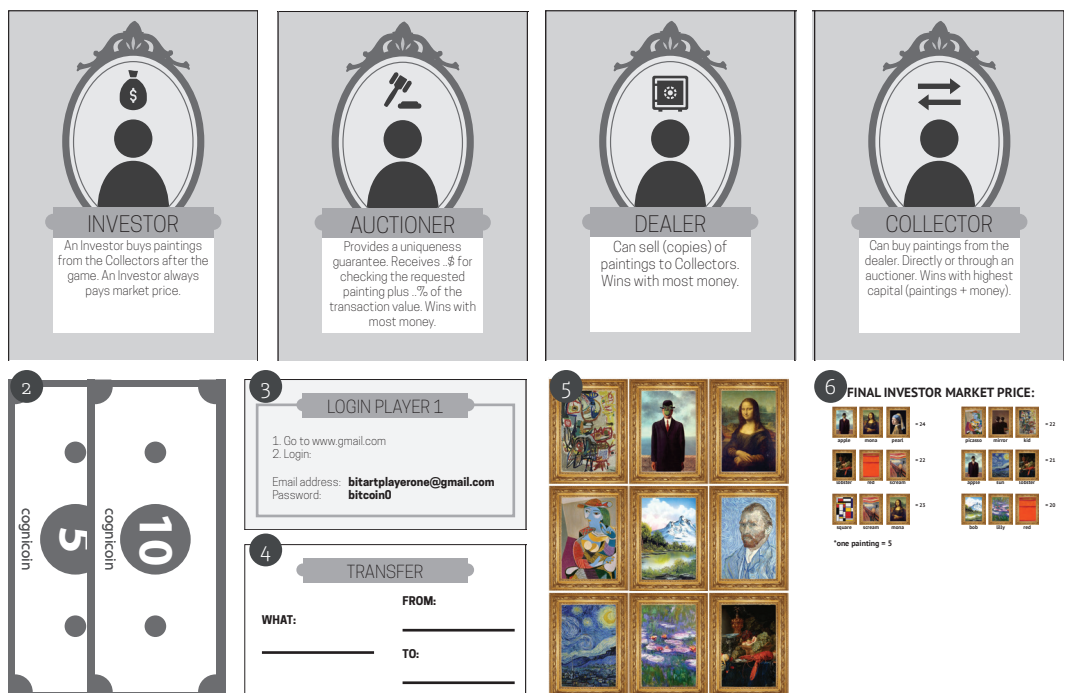"They would want to have this game." (talking about how clients would react).

Figure 9: Assets produced for the first version of BitArt. 1: Game roles. 2: Money. 3: E-mail login. 4: Blockchain transfer cards 5: Example paintings cards/digital. 6: Quest/market card.
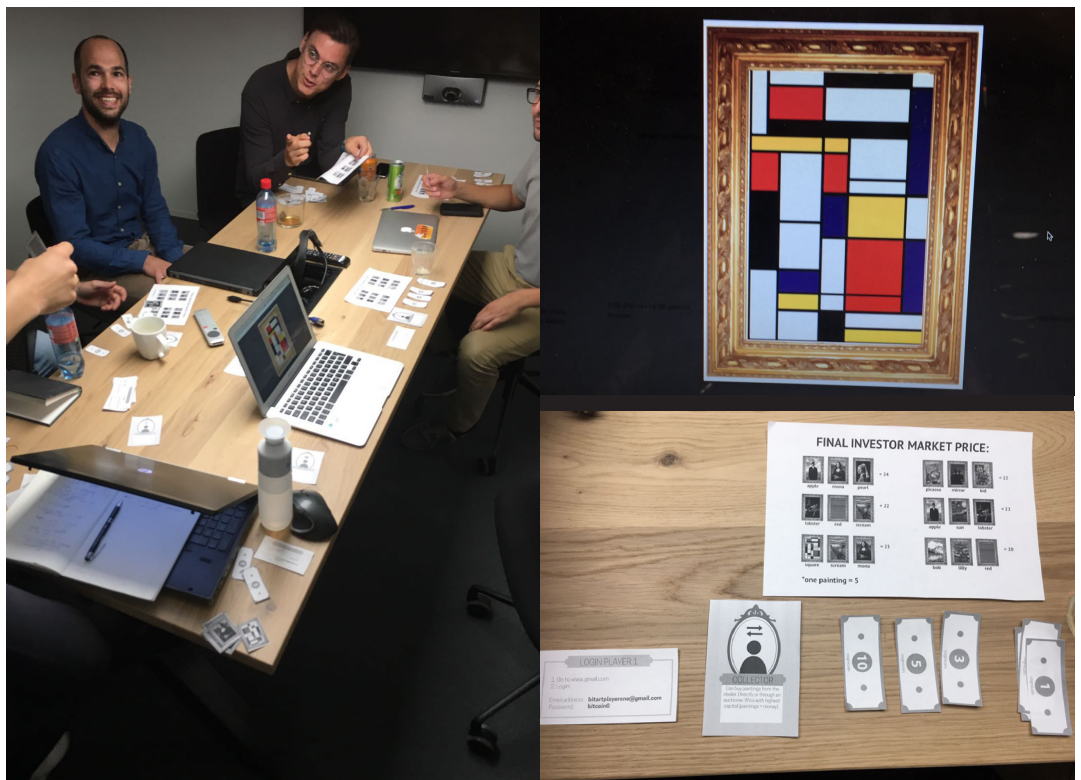
Figure 10: BitArt in action during experiment 1

EXPERIMENT II – VIRAL ART

In the first experiment it became clear that the BitArt card game did not have enough interaction but was able to evoke some of the targeted emotions. After some ideation a new extended version of the game was setup based on an already existing game called 'Thebes' (see below). The new game is called 'Viral Art' (see chapter 8).

Figure 11: Thebes board game

Experiment setup

A new paper prototype was setup (see figure 12) and a three player playing round was executed. As only three people (including the author) could join, the author joined in the game as well, whilst narrating the story. The two other participants were slightly familiar with blockchain technology. A brief introduction was given on the topic and the context of the game ("you are a museum owner who is about to open a new digital art wing"). As the game contained many mechanics flaws, a lot of discussions were held during the gameplay on ways to improve the game. These discussions focused on game mechanics, the message and the emotions of the game.

Similar to the first game, no measurements or surveys were done as the game could not be played in a 'smooth' manner yet.

Findings

Virality is not directly 'felt' as it is a multiplication that happens at the end of the game, it is hard to already foresee how it will affect your painting value at the end of the game. Make virality plus points rather than multiplication factors.

Points not in balance. Likes and Vlogs added little points to a player's score if that player already had virality multipliers. Increase value of Likes and Vlogs.

Too many collectibles limit trading/target emotions. Because there were many paintings to collect, it took a while before copies arrived in the game and people were incentivized to trade. For this reason it took too long for the target emotions to arise. Increase/derease amount of paintings for amount of players.

Combine rounds 1 (distrust) and 2 (expert) into one. Both emotions can be felt more naturally, rather than forced in round. The two emotions act like a tradeoff that players have to make: do I interact directly with the other player OR do I use an expensive expert. Having too many rounds also makes the game a bit over-complicated.

Figure 12: Playtesting 'Viral Art' during experiment II

Specific changes and ideas

Add
- You always have to move 1 step.
- It should take time to buy paintings ("you have to search for them").
    o Differ time cost from simple platforms to expensive platforms
- Landing on top of someone means you can have another full round (walking + action)
- Add a card which shows the steps of your phase (walking + action + trading)
- Add rules for if you buy adwords but don't have a painting.
- Add rule that players cannot enter spaces where other players are standing
- Add rule that if you keep two paintings, the others should be shuffled under the deck
- Add interesting transition between rounds
    o Like Pandemic, at one point in the game a random player draws the card 'new innovation' and that's when the blockchain 'era' starts.
    o Transition phase might have a free trade between all players to get their last paintings.
    o First one to arrive/cross a certain date, will initiate the transition to the new era
- Add expert rules:
    o You buy an 'expert' at Google which you can use for all your subsequent transactions. HOWEVER, for each transaction it costs X to use the expert.
    o When you buy an art piece through an expert, that art piece gets a 'guarantee' mark, other copies of that specific art piece will be worth nothing. As long as the painting was not already 'guaranteed' for another player.

- Stronger narration to get people into the game: "you can buy your painting through Google, but it will be very expensive and your museum will shrink".
- Add more copies of expensive paintings and less copies of the cheaper paintings.

Change
- Time units of 'weeks' is unrealistic for the theme of searching the internet. Maybe change it to a different unit.
- Board should have a 'start' and not a '1' at the beginning.
- Board should have 'Instagram' instead of 'Wikipedia' to fit the theme.

Keep
Game mechanics
- The mechanic of using time to move and act around the board is fun. It allows people to strategically plan the amount of actions they execute, while still being able to be 'last' to execute another action.

Extra ideas:
- Rank platforms from 'gallery' to 'museum' in terms of painting value that you can expect at them.
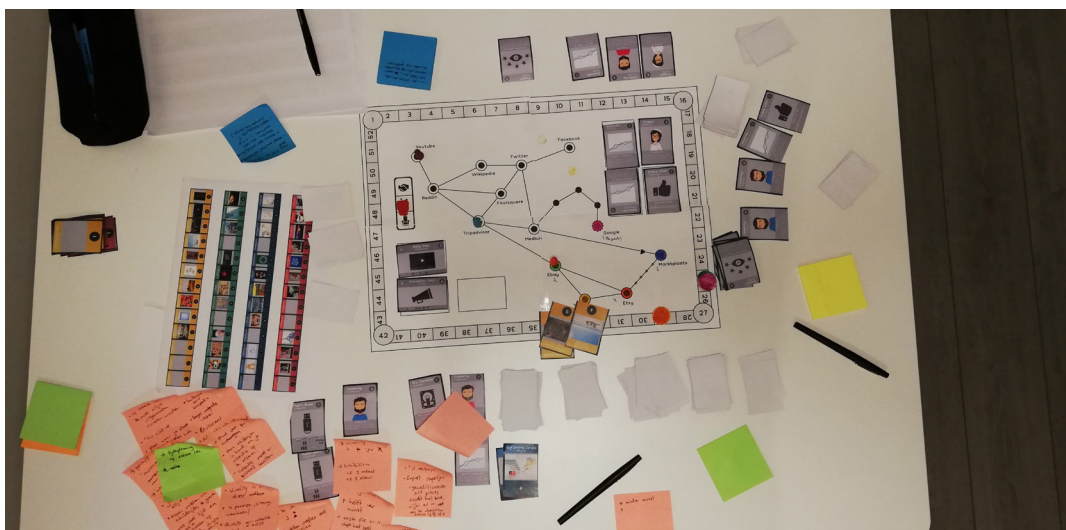- Add currency for buying paintings to improve transaction realism.

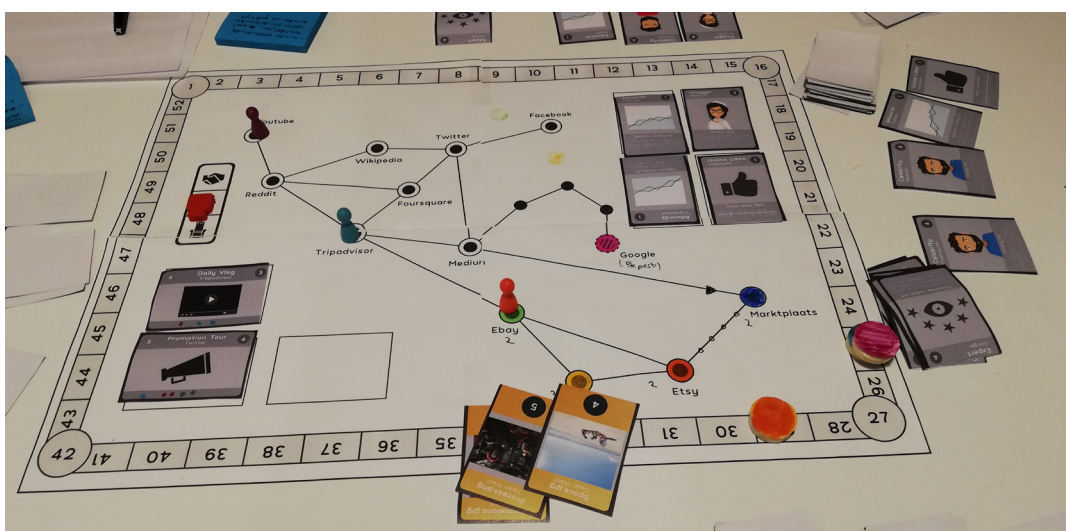*Figure 13: Overview of the paper prototype for Viral Art experiment II*

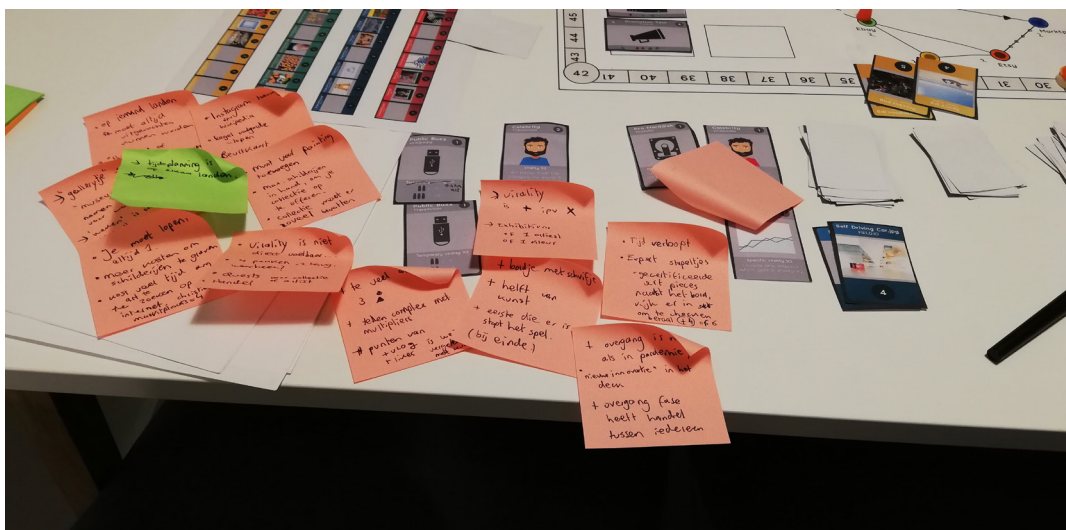*Figure 14: Board used for the experiment II*

Figure 15: During the game each player made notes of aspects that weren't working yet.

EXPERIMENT III

Experiment setup

Based on the insights of the previous experiment some alterations were made to the game: board titles, transitions between phases,

The same paper prototype was used, with some alterations drawn on the board. This game was again tested with three players, including the author. The two other participants were again slightly familiar with blockchain technology. A brief introduction was given on the topic and the context of the game ("you are a museum owner who is about to open a new digital art wing").
Similar to the first game, no measurements or surveys were done.

The focus of this experiment was on the playability of the game.

Key findings

The game worked. For the first time it could be completely played and it resulted in a winner. Besides, the points recieved by each player were in quite the similar range.

More emotion development. From an emotional point of view, it seemed that the length of the phases really impact the reaction of distrust/relying on the middle man. It takes time to build up these emotions, so the first phase should be longer.

The blockchain phase made the gameplay completely different. Playser started to trade a lot more, because they were sure what they could get. Players mentioned that they could focus more on their mission and waste less resources on activities taht didn't contribute.

Specific changes and ideas

Add
- Phase I & II (trust/expert) should be longer, until 35/40. BLockchain should be shorter. This allows for better emotion development. **I** test in next round.
- In the blockchain era, everyone was buying way more because it became more certain and cheaper.
- Blue color of cards should be more blue to distinguish between green.
- Not enough uncertainty in round 1, no one wants to buy the expert. Expert is not felt as necessary, too much good art to get.
- Quest should really be your mission, not just a side thing.

o give more points
o 1 artist OR genre/style/stream
- Vlogger should be more expensive
- Rule: you are not allowed to walk to the same spot, you need to go to another spot.
- Locations (youtube etc.) should be easier to access from the trading platforms, otherwise people stay at the platforms.
- Players miss an incentive to go back up to the internet locations (youtube etc.).
- Locations that are far away (e.g. Youtube) should offer more because they are hard to reach.
- Art guarantee is to expensive.
- Art guarantee:
       o Should be able to immediately use it for an existing painting that you have bought.
       o Or use it in a transaction.
       o Going there is expensive, walking back should be fast (dotted line)
- Art platforms should be named: christies, sotheby's, etc.
- Intro narration: if you have all copies, you own the full art piece, if you have 1 and other player also has 1, it's worth nothing because the public will know.
- Rules about bonus cards are missing
- Art pieces points should go up exponentially on the cards (more than 7 etc.)

Blockchain era
- Art guarantee should be gone in the blockchain era, not necessary anymore.
- Copies of all cards that are in the 'hands' of players should be removed at the semi opening.

Ideas
- If more people have a copy, the art is not worth nothing, but less. (e.g.: 1 = 1, 2 = 0.25, 3= 0 value)

EXPERIMENT IV

Experiment setup

Another iteration on the game was made which was tested in a two-player setting. Besides playability, the goal of this experiment was to see if the shifts in phase length and transition could enhance the emotional reaction that was necessary for the game. In figure 16 is an image of the paper prototype that was used.

Key findings

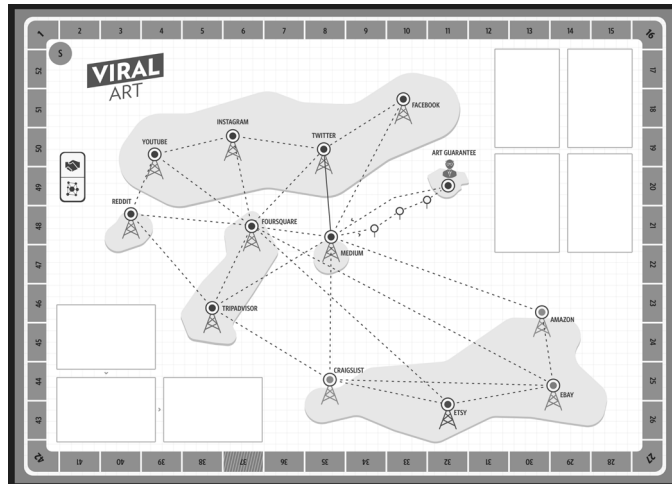Again, the game was playable and possible to finish with a clear winner.

Figure 16: Board for the fourth experiment.

The longer duration of the first phase made it possible to develop the distrust emotions at the beginning and 'need' of the players to buy an expert middle man bigger. This eventually makes the 'relief' that blockchain brings in the second phase greater.

FINAL EXPERIMENT (COGNIZANT)

The final experiment was executed at the Digital Studio of Cognizant (see figure 17). The game was played with a total four players: A business consultant, digital strategist, associate and a senior UX designer. All four were very familiar with blockchain technology and slightly with the topic of this project.

Participants were given a very brief introduction of the research topic, but without mentioning the goal of the project as to not give away the 'emotions that had to be felt'. Players were told that the goal was to first play the game and afterwards discuss about it. After this an introduction narrative was given on who the participants were playing in this game ("museum owners who want to open a digital art gallery" and some context "beware, the internet is full of indistinguishable copies"). The goal and rules of the game were explained and the game started.

During the game the narrator (author) answered questions relating to rules or gameplay. Although the goal was to play the game first, participants made many comments with regards to the concept. Sometimes short discussions were held as to why certain things were as they were. Some new ideas were written on post-it notes and saved for later.

At time marker 37 the game was stopped for a minute.

First a small evaluation was held on how players were feeling, what they felt about the expert and about trading with other players.

Then players were told that "because of high demand" an initial exposition would open. Every player had to open up their artwork and discover how many copies were in the game.

Finally a new innovation was introduced shortly: blockchain technology ("it is said to bring many efficiency boosts"). The group was asked whether they want to use this new technology for the rest of the game.

A short explanation was given on how to simulate the blockchain (see chapter 8).

The game was continued untill the end, where points were counted and a winner was announced.

After the game a discussion was held on the key message of the game (whether it came across), the fit with Cognizant, the fit with clients and some notes on the gameplay.

Observations

The game is fun

Besides the serious message which the game tries to bring across, the game seemed to be fun to play. People were laughing and trying to mislead each other by their actions. As the game was played with employees from Cognizant, there were numerous times where the participants tried to push the boundaries of the rules and

explore alternate actions that weren't necessarily explained in the beginning. This might be different for a group of clients.

Blockchain choice works well
Asking the participants whether they would want to form a blockchain ecosystem made for an interesting dynamic. It was expected that everyone would say 'yes' immediately. However, this was not the case. Players were first evaluating for themselves how they had performed, comparing points with other players (as the cards were open by now) and discussing whether they wanted to go ahead. One player, the one with the most points, asked:

"What if I say no!"

This option could potentially lead to a game where a part plays with the blockchain and a part plays without, to see the effect. Eventually the group decided to go with the blockchain and continue the game.

Expert is seen as a last resort
Players found the expert to be scarce. They expressed that they needed one but then slowly discovered that it is actually very expensive to buy one. In the discussion they did express that it works very well, the costliness are correct.

"I wanted to go, but..."

"very good middle man" (about the expert)
"justified" (about how costly the expert is)

Too many rules slow down the start
The amount of rules that players are confronted with is quite extensive. Players expressed that it was hard to digest. However, after about 4 turns players knew exactly how to play the game and started coming up with tactics and strategies. For a (half) day workshop it would be okay to have a longer introduction, however, as a quicker activity at the beginning of a project it might take up too much time. Clients, especially higher management, might not all be excited about playing a game, so having a interesting introduction is key.

"I lost you in the middle"

Blockchain simulation is too much work
Simulation is a bit of a hassle, it takes a lot of time to write on a sticker and place it on the overview for each transaction. This is a slight barrier for the game and could be overcome by making it easier

to perform (e.g. digitally or automatically).

Introducing a board game to clients might be strange
During the discussion it seemed that the Cognizant employees were not fully confident in willing to play this game with clients. Initiating a board game to a client can be a bit odd and get unexpected reactions. Maybe the game should be part of something where clients expect to 'play a game' or at least perform such an activity. Like a workshop. Or the game could be made more exciting and digital to attract clients who might not be open to a 'board game' but might be open to 'a digital experience' (see 'ideas').

Game works practically but key message needs guidance
Players did express how the two phases made them behave in a different way and how blockchain made things easier. Also, one participant noted that this game was really a way to 'experience' blockchain. Something which many clients might not have done. However, due to the lack of narration it was not fully clear what the key message was of the game. Participants wondered whether it was more about the behaviour change, the practicalities of blockchain or the value that it brings. For this reason the workshop around the game should be designed better, including the role of the narrator (see chapter 8 and 9).

Key insights

Blockchain simulation
- Decision about whether or not the players want to join the blockchain is nice.
- This way people 'choose' to trust blockchain technology for their benefit.
- Players were counting their points at the green marker to find out whether they want to join the blockchain or not. It wasn't immediately that they wanted to join (as expected).
- In the new era it is more rewarding because you get immediate results on your action (no risk/ uncertainty). Tactics also change, less random and more focus on what you want to do.

Extending to workshop
- Narrator needs to play a way bigger role. He should do actions to steer the group, constantly comment on a players' situation and tell him/ her what the options are as to stimulate action taking. In a client workshop the narrator needs to be a moderator. The moderator can act as the art guarantee expert.
- Make the black and white effect of before and

after blockchain more explicit. The narrator could be heavily involved in the first phase but, almost completely, step out in the second phase and let the players simulate the blockchain on their own.
- The transition into blockchain is not 'flashy' enough, no real impact. The narrator claims it has major impact but players then still work with paper cards and dotted stickers. Maybe give players a tablet instead of the score cards on which a blockchain system can keep track of who owns what.
- The game will not be used for a client as is, it should be part of a bigger story. What is the key message for clients and how to 'massage' them into playing a game❙ The workshop also should include a discussion that is tailored to the client. What impact will it have on their business❙
- Maybe the workshop should tell the whole story from having physical paintings in the room that are traded and slowly disintegrate this physical element towards a digital aspect. End the workshop on the scalability of blockchain/trading digital assets. E.g. bank notes become completely digital. E.g. show old macintosh as the shift from physical to digital.
- For who would this game work❙ It needs to be very clear what the objective is of the game/session. Game should be adapted for specific client groups.

Gameplay
- Game can only be played with four players. Four players is maximum otherwise waiting for your next turn takes too long.
- Art decks need more cards. At one point the art cards ran out which makes the game very predictable. Players know exactly whether their painting is unique or not.
- Game took about 1.5 hours to play. This is a good length.
- Likes are too hard to get. Since you can only do one action per turn, it is hard to collect 6 Like cards.
- A 'Turn Card' would be helpful. Display: 1. Move 2. Action 3. (Trade). Sometimes people forgot what should be done when.
- At the beginning of the game there should be more context for the 'green marker' on the board. "You are starting in the old model where everyone competes and cannot trust each other. During the game you will transition into a new blockchain phase."
- Players found it 'irritating' that they could only do one action in each turn. Sometimes two open virality cards were at the same location and players wanted to get both in one go.

Ideas
- Make the game be played on a digital table where your pawn's location is linked to the blockchain. If you buy an art piece at timestamp 24, the blockchain will register this timestamp in the new block.
- Points for the collective quality of the museums would
- Have players make more decisions about what paintings they already want to put 'in their museum' (in front of them). This gives other players some certainty and links the players more to the concept of a museum which they own.
- Art 'blank cards' to the art decks to solve the problem of running out and add some randomization/risk. These could be 'virus' cards.
- In the blockchain simulation players should place their own stickers on the art pieces and pass the overview card around (you are in charge of your own data).
- To feel more link between your actions and the end consumer, the points of the art cards should represent the amount of customers who are visiting your museum. This makes it more in line with the social aspect of the virality cards.
- To create a quicker understanding of the game, give everyone two art pieces at the beginning of the game.
- Board design 'islands' are confusing, they don't mean anything in the game. Should be more generic OR give the islands a name.
- Actions in the game should trigger smart contracts, this way transactions are actually registered rather than only on the time marker on the board.

Inquiries from participants
- Why is the 'red' platform further away from the starting space than the 'green' platform❙ It doesn't offer more money, so makes no sense❙
- Does everybody need to accept the blockchain system, or can a part run it and another part of the group not run it❙ What if one person doesn't want to join because they think they are better off without it❙
- Can we use digital art for business clients❙ Yes, if people know about blockchains trading element.

Additional rules
- You have to move somewhere else. You cannot walk a route that brings you back to the spot where you were.
- Use of the Expert has to be in a turn before crossing the green marker at timestamp 37.
- Trading action needs a clear process. Trading was

too fuzzy, players didn't know how to approach this and it took a lot of time.

Interesting game tactics
- If you move to an expert from far away, your time marker moves far down the time line. Since you block the Expert space, no one else will be able to go there in that time.

Card design
- Public buzz: get more art needs to be 'keep'
- Vlogger needs to be 'per art piece you own'.

Quotes

"I can ask someone have you experienced AR? They'll say yes. I can ask someone have you experienced AI? They'll say yes. But have they ever experienced blockchain? No of course not!"

"impossible to have original by now" (about the game deck running out)

"I feel less like its' my own ledger and more like something that is checked by everyone." (About passing the ledger around)

"Can I also say no?" (about choosing for the blockchain simulation)

"Before you could think, after you're just doing." (About the difference between before and after blockchain.

"More digital would be more logical for us." (talking about the medium of the game/workshop)

"For the right clients with beers would work very well."

"I have clients in Germany whom I have warmed up well enough for me to be comfortable introducing this game."

Figure 17: Participants playing 'Viral Art' in the final experiment