Appendices

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I. Explanation Blocklab

BlockLab

Blocklab was founded by the Port of Rotterdam as a research and practice fieldlab for blockchain development. The lab is cofounded and run by Aljosja Beije, a blockchain expert in logistics, and JanJoost Jullens, an innovative thinker in the energy business. By teaming these two disciplines, the port could maintain their current scope of energy and logistics.

As Blocklab is a fieldlab, which means it is a practice based environment in which companies and knowledge institutes collaboratively create Smart Industry solutions, and test and implement them in a surrounding where people learn to apply these solutions, they needed to create a plan of action within the fieldlab format. Their scope: creating new revenue models and a new international lead in port (logistics) through the application of blockchain. To realize this goal, 7 sub goals were proposed:

1) **Direct impact and prove:** realizing blockchain use cases for safer and more efficient chains in logistics.
2) **Knowledge based economy:** educating, guiding and maintaining blockchain talent in the metropole region for now and the future.
3) **Accessibility:** Creating a low threshold for SMEs to enthuse them to use blockchain.
4) **Economic transition:** Realizing new revenue models and streams through blockchain in logistics.
5) **Growth:** developing scalable blockchain applications, implementation trajectories and accompanying revenue streams.
6) **Open innovation ecosystem:** Creating an effective (triple helix) knowledge-application infrastructure for blockchain technology, open knowledge, matching supply and demand, in forming consortia and cross-overs with other fieldlabs and innovation programs.
7) **Evaluate, certify & integrate:** Developing the industry should not be a goal on its own.

With these goals in mind, Blocklab was launched in September of 2017 and is now working to realize its first applications, after a range of successful proof of concepts and minimal viable products within the sectors of energy and logistics.

Port logistics   Energy

II. Explanation IT-cases

deliveroo — 💎 $2 billion

Deliveroo is a food delivery service that gives restaurants the opportunity to start a home delivery service through independent bikers. When you order food from a high-quality restaurant, a biker pick it up and delivers it straight to your front door. The only thing the company owns is branded bags and jackets and their app.

Mission:
Transform the way you order food.

Priorities:
By constantly innovating and expanding, we offer the best choice and convenience.

Priorities:
- Becoming more affordable
- Reaching those outside of urban areas
- Protecting the rights (and wishes) of riders
- Investing in international expansion

airbnb — 💎 $38 billion

Airbnb is the largest holiday stay provider that doesn't own a single property. Its service is based on letting people rent out spare rooms or entire apartments when they don't need to them, bringing in some extra money. This way, tourists can taste the local life and pay a price that is generally lower than a hotel fee.

Mission:
Help create a world where you can belong anywhere and where people can live in a place, instead of just traveling to it.

Vision:
Belong anywhere

Values:
- Champion the Mission
- Be a Host
- Simplify
- Every Frame Matters
- Be a Cereal Entrepreneur
- Embrace the adventure

Uber — 💎 $120 billion

Uber is the world's biggest taxi company that solely relies on regular drivers with an app, turning any car into a cab. Its service connects car owners who want to make some extra cash to people who want a taxi, without paying the full service-fee of city transportation. Currently they are expanding into self-driving cars and food delivery.

Mission:
Ignite opportunity by setting the world in motion.

Norms:
- We build globally, we live locally
- We are customer obsessed
- We celebrate differences
- We do the right thing
- We act like owners
- We persevere
- We value ideas over hierarchy
- We make big bold bets.

coinbase — 💎 $8 billion

Coinbase is a service provider offering online wallets to trade and store cryptocurrencies like Bitcoin. Where regular crypto-trading means you have to program your own wallet, store your own keys and become a node yourself, Coinbase offers to do this for you in exchange for a small transaction fee.

Mission:
To create an open financial system for the world.

Priorities:
- Be the most trusted
- Be the easiest to use

Values:
- Clear communication
- Positive energy
- Continuous learning
- Efficient execution

III. Detailed explanation DLT-technology

To explain the mechanism behind distributed ledger technology, the example of Bitcoin (Nakamoto, 2008) will be used. In his whitepaper, Nakamoto suggest a structure in which individual blocks, three of which can be seen in figure 5, incorporate the data of a number of transactions. Next the transaction data, which can be seen as a list, is encrypted through hashing, to make sure it cannot be changed later. Hashing is a technique in which a message is run through a secure hash algorithm (SHA), in this case SHA-256. This means the algorithm uses 256 bits, a string of 256 ones and zeros, to encrypt the message into a code with 2^{256} possibilities. The amount of possibilities means it is near uncrackable. Using the algorithm, the list is formed into a hash, as seen in figure 5.

Problems with distributed networks

Because Nakamoto wanted to create an open environment in which there was no longer the need for a third party to verify a transaction, he had to solve two problems. These problems are defined as the Byzantine General's problem and the Double spending problem. The former, as depicted in figure 6, uses the analogy of an ancient general in the Byzantine empire.

Figure 2: Byzantine General's problem

The general wants to attack a city but will only win if his fellow generals attack as well. He knows there might be traitors amongst the generals and messengers. Failure to reach consensus means an attack without full force will end in a massive loss. How does he reach a reliable consensus? This problem, which also occurs in distributed networks, makes distributed networks incredibly vulnerable to fraud and corruption.

The second problem, the Double Spending problem, is depicted in figure 7. This problem shows that a distributed network is prone to fraudulent transactions, as any digital form of currency can simply be copied and pasted before the entire network is updated. Being aware of this time delay, you can spend your money at

Figure 1: The blockchain behind Bitcoin, as proposed by Nakamoto (2008)

least twice, allowing a corrupt peer to create double transactions.

Figure 3: Double spending problem

Nakamoto's solution

Both of these problems remained unsolved in the distributed network domain, until in 2008 Nakamoto published his famous whitepaper. He suggested a timestamping structure to solve the double spending, together with a reliable consensus mechanism to solve the general's problem, making sure everyone does the same thing. Following his paper, in practice this means each block includes a link to the previous block, a timestamp, as seen in figure 5. To make sure that all nodes agree on the next block, a consensus mechanism is used, in this case proof of work. A proof of work is a numeric addition to the message, now including the timestamp (previous hash) and the transaction, in order to create a hash that starts with a predetermined number of zeros (red in figure 5). As finding a unique number that produces a hash starting with an X number of zeros takes a lot of time and effort, it's called a proof of work. These proofs of works are found by miners: individual nodes who run calculations until a unique number is found. Within the Bitcoin network every

node is a miner, and they all compete in finding the next solution first. This process generally takes about 10 minutes per block; a predetermined value.

Lastly, figure 5 shows a simplified transaction list, but in reality, every block can contain up to thousands of transactions. The process to fit that much information into a single message is done using the same kind of hash as earlier, this time through a Merkle tree. This tree, as shown in figure 8, encrypts smaller messages into bigger messages by multiplying their hashes.
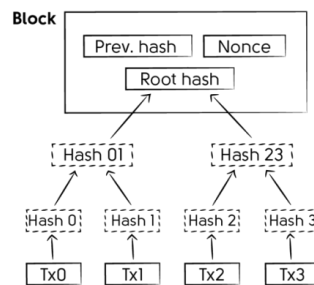

Figure 4: Merkle tree Tx=transaction (Nakamoto, 2008)

In conclusion, the technological basis of DLT is build up from blocks, which are linked cryptographically to ensure they cannot be altered. By using a time stamp through a link to the previous block and a consensus mechanism like proof of work, distributed ledger technology can be used without the oversight of a third party and all data can be shared amongst a network of peers. See figure 9 for an overview.
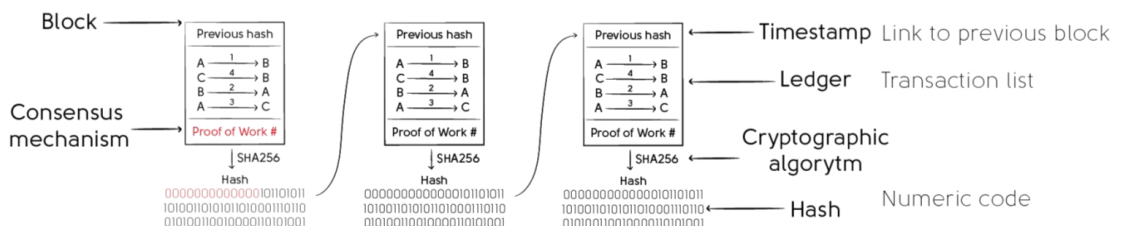

Figure 5: Concluding summary of the technological basis of DLT

IV. IT-case analysis

Successful UCD

So, what does successful user centered design look like? According to Verganti (2016), Airbnb and Uber provide a good example. In their respective sectors, they have achieved radical innovation through creating new meaning for its users. Airbnb went from a travel service to: *"find a safe and good-quality hotel room to be immersed in the authentic sociocultural life of a place" (*p. 215*)*. Uber in the taxi business went from I choose a taxi because I "*trust the taxi company* to *trust the driver"* (p. 216). Both shifted focus and created companies that individuals would make up, rather than the company assets. They innovated from a user perspective. To gain some understanding, each case is highlighted below:

Airbnb

The company Airbnb is very open about their user involvement and co-design. They have a large design team that collaborates closely with hosts and guests. They listen to feedback and observe their behavior carefully, mostly through feedback gatherings like Airbnb open (Arden, 2016). Designers at Airbnb organize workshops that focus on cross-disciplinary sharing, to create broad understanding between programmers and user experts (Schleifer, 2018).
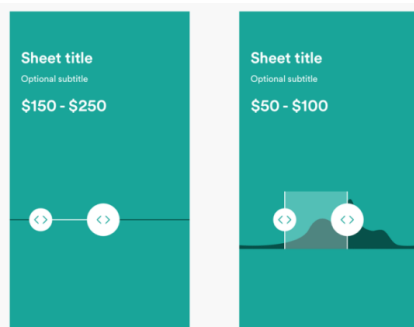

Figure 6: Test frames for Airbnb (Schleifer, 2018)

In an outlook to the future, one UX manager even suggests UCD should go as far as creating pleasurable friction. This means using design to encourage moments of confrontation and self-reflection (Selzer, 2017). This fits right into their vision of *Belong* anywhere, where they try to explore what belonging means. Lastly, Airbnb has a large focus on aesthetics. They do a lot of interface testing, mostly AB testing, in which a large group is sampled different layouts. An example is shown in figure xx.

Uber

Uber, like Airbnb has a large design department. They stimulate cross-disciplinary working and focus heavily on user centered design. Figure xx shows an example of wireframe testing at Uber, where a broad team will go through different options to prototype. On a daily basis they interview users and test prototypes with them (Hilhorst, 2016).

Figure 7: Uber wireframes and buttons

Uber also puts a lot of effort in reaching their users directly. A great example is their *accessible by design* case study ("Accessible by design," 2018). In this study their paired with the Communication Service for the Deaf (CSD), a US organization. Through them they connected to deaf partners (drivers)

and set up a design study on how to engage them better. It resulted in the website ubersignlanguage.com, which engages users in simple conversation with deaf people. The interface is shown in figure 3. Again, aesthetics and simple interface play a large role, as the article explain. A simple insight was that more features in one screen caused annoyance,

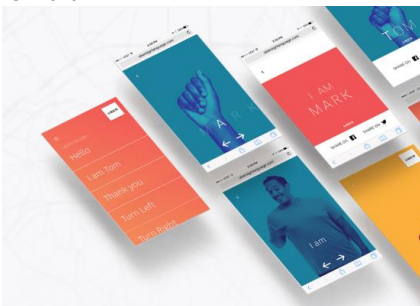which was found out through user research. Thus, the sign-language interface is very basic and straight forward.

Figure 8: Uber sign-language examples

Deliveroo

Like Airbnb and Uber, Deliveroo also greatly believes in collaboration across disciplines. The product teams at Deliveroo operate by having different departments work closely together (Lee, 2018). When it comes to the user, they have more recently started forming a large research department. Here they perform continuous user testing, both qualitative and quantitative. Most heavily they do qualitative studies, like ethnographic fieldwork and usability testing with riders (Clancy, 2018).

Lastly, Deliveroo uses design iterations internally as well, to improve reflection and justification. Their design doc template (figure xx), which needs to be filled in per iteration, helps their employees to be guided through the necessary steps of research and reflection

(Fagan, 2017). It also provides an overview to select the right methods for the job. "Meticulously laying out what the problem is and why it exists, corresponding research or analytics findings, jobs to be done, and design goals helps you wrap your head around the complexity and lays out a foundation from which to progress from". An added bonus is that "the doc allows you to keep track of all these meetings and subsequent changes. A clear source of truth that you can always point to", which helps team-members to communicate and decide more clearly.
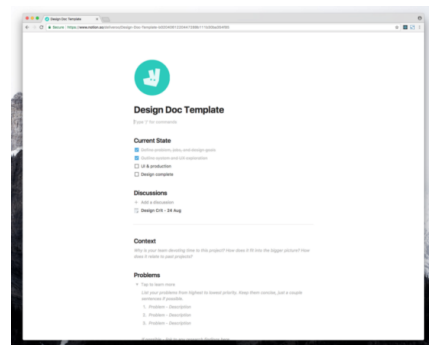

Figure 9: Deliveroo's design doc (Fagan, 2017)

Coinbase

Coinbase's success is not due to their integration of complex distributed ledger technology on the inside, but due to the lack thereof on the outside. Coinbase's design focuses on use and clear design, following their design goal *to be the easiest to use*. They engage in user conversations and design from analogies. Connie Yang (2018), design director at coinbase, compares blockchain development to the start of the internet: "we have the highways, and the cars are getting super-fast, but our signs have not caught up. These are totally new problems." Thus, Coinbase tries to bring the information back to something the user can understand. In explaining a fork, a blockchain split, they use the example of

a three, out of which a new branch is formed. It has the same root and base (block sequence) but goes on a different path from there on (Cascade SF, 2018). Accordingly, they invest heavily in having a clear message, as they try to achieve transparency, which leads to trust. In the end Coinbase found, the users don't care about the technology, they care about the features and their needs.

Critical reflection

When looking at their market value and their extensive user integrated design methodologies, the companies mentioned seem to be the ultimate example of user centred design in software design. But, as mentioned before, many others struggle to move away from a fully software focused culture. Time to integrate design principles is often not in abundance. Furthermore, small software teams might not have the resources to hire design departments. So what basics can be learned from the big guys?

Lessons from practice

When looking for the integration of user values in design, there are many methods out there. Simple tools such as the value proposition canvas by Strategyzer (2018) as seen in figure xx or the well know business model canvas can help to create some needed reflection. In an interview, Connie Yang from Coinbase mentions small things such as asking friends or family to reflect on your product in early stages, can help a lot (Cascade SF, 2018).
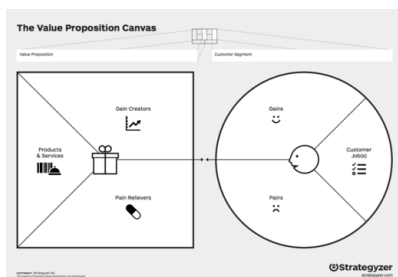

Figure 11: Value proposition canvas (Strategyzer, 2018)

Another helpful lessons can come from Eric Ries's book, the Lean Startup (Ries, 2011). He describes that instead of building minimal viable products that are focused on technology, they should include all aspects of design, from functionality to usability, reliability and emotional value. Figure xx shows what this means. When innovating the lean way, creators are pushed to get out of the office and start testing assumptions as quick as possible. Fails hard and succeed harder, Ries says. Only by testing your assumptions, you can learn about the user. It does not have to be done through fancy prototypes, wireframes can do, and later on, simple bits of code and interface.
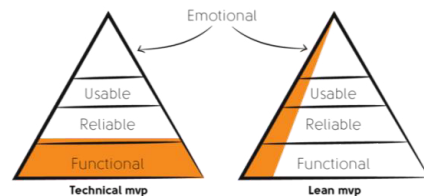

Figure 10: Technical mvp versus a lean mvp

Integration of societal values

The examples and cases mentioned above can greatly help in understanding the user better. But how do they perform when it comes to broader, societal values? As the Rathenau 2017 report *urgent upgrade* mentions, our societal values are at stake in the ever growing digital world (Kool et al., 2017). Values such as privacy, self-determination, mutual responsibility, autonomy and human contact are being threatened by digitization.

When looking at the case studied companies, a harsh reality boils up. Airbnb and Uber have triggered national lawmakers to step in, in many countries. Airbnb is accused of overcrowding cities, sponsoring illegal subletting and increased nuisance to the city environment. Furthermore, as houses are not hotels,

the safety standards are much weaker and less-regulated, leading to potential increases in hazardous situations (Breebaart, 2017).

When looking at Uber and Deliveroo, they have been sued multiple times for providing little to now help to their drivers, in case of insurance and responsibility during issues. They are also notorious for their below minimum wage earnings, as currently 85% of New York partners earns below minimum wage (Persson, 2018). Both Deliveroo and Uber have been reviewed on worker exploitation numerous times. For now, judges say lawmakers need to change the law, as currently their business practices are not illegal (Bergeijk & Weijer, 2018; Khaleeli, 2016). Additionally, a company as Uber has widely disrupted its branch, but not necessarily in a good way. In New York for example, Uber partners driving around, looking for farers, are said to overcrowd the already busy roads and spread pollution without thought. Moreover, the fact that taxi-drivers need expensive licensing and Uber drivers don't, has caused large inequalities between the established business and the disruptive newcomers (Persson, 2018).

All in all, the sharing economy and disruptive models like Deliveroo and Uber, with only partners instead of workers, has led to a lot of disturbance. Lawmaking is having a hard time keeping up and societal values that go beyond the company, seem not to be included in their design principles. The exampled cases seem, in this perspective, yet another scream for change in policy and lawmaking, as they themselves have still to prove they can deal with these larger-than-profit issues.

V. Interview protocol

Interview Blockchain

- Explain research (goal, process, relevance)
- Sign consent form (GDPR, anonymity, NDA?)
- Ask permission to **record**
- Explain process interview

Introduction   5min.

- Can you introduce yourself?
    - ❖ *Background, current occupation/function*
- How did you end up working in the blockchain business?

Project   10min.

- Can you briefly introduce the project you are working on?
    - ❖ *Type of blockchain, hardware/software, partners*
- How did this project start?
    - ❖ What do you want to achieve with this project?
    - ❖ What phase is it in currently? (mvp, PoC, release date)
- What does the development process look like?
    - ❖ *Waterfall, agile, lean, design thinking*
- Why is a blockchain the best solution?
- What do you hope this project will ultimately lead to?
    - ❖ *What is the significance of this project? (raison d'être)*
    - ❖ *Where do you see yourself in that future?*

Collaboration (Networked innovation)   20min.

Ask for examples, what happened.
Define role: company perspective (private) or consortium perspective (group).

- How did the team/collaboration come together?
    - ❖ *Were the members known associates from previous collaborations?*
- How is the collaboration arranged?
    - ❖ Standard representatives or mixed team consistency?
- How are the tasks divided?
    - ❖ *Role, responsibility*
    - ❖ *Experience with division? (what worked, what didn't?)*
- How are important decisions made?
    - ❖ *Who makes the decisions?*
    - ❖ *Experience with decisions (what worked, what didn't?)*
- What challenges do/did you experience in this project?
    - ❖ *How do you deal with that?*
- What are the differences between the team members?
    - ❖ *Knowledge, organisational cultures, working methods, interests, goals*
    - ❖ *How is knowledge/information shared?*
    - ❖ *How do you deal with that?*

User perspective   **20min.**

- How do you define a blockchain?
    - ❖ *Protocol, application, product*
- How do you see the user in a blockchain?
    - ❖ *Who: end user, consortium members, read/write/consensus*
    - ❖ *Role*
- At what level (abstraction) should the user be involved in the development process?
    - ❖ *Societal impact, resistance to the unknown*
- Who is the user in this project?
    - ❖ *What role do they have?*

Introduce and explain value proposition canvas.
Fill in with participant.

- How is/can the user perspective (be) incorporated in the development process?
    - ❖ *What tools/methods are used to involve user?*
    - ❖ *What stages?*
    - ❖ *(Little/big) upfront design?*

Tool propositions   **15min.**

Open conversation regarding design thinking tools (see handout)

- What would you need to know about the user?
    - ❖ Adaptation, needs, wishes
- Which tools would fit your process?
    - ❖ What could its added value be?
- How can they be used in the development process?
    - ❖ *Where could they be used?*
- How would you use them?

End   **5min.**

- Do you have any additional questions/remarks?

Thank you for your participation.
Explain the further stage of the project/what's next.

- Do you want to stay involved?

VI. Codebook

Nodes

Name	Description	Files	References
Adding user value		5	6
Personal insights through app		1	1
Blockchain constructs		0	0
AI link		1	2
Aspects		0	0
Encryption		3	5
Immutability		4	5
Predetermined conditions		2	4
Transparency		2	6
Wallets		2	4
Tokens		1	1
Collaborative properties		4	6
Description		0	0
Background protocol		5	5
Decentralised technology		2	2
Digital communication protocol		1	1
Digital solution to hardware problem		1	4
Distributed ledger		3	7

Name	Description	Files	References
Gateway technology		2	4
Modular platform to suit multiple needs		4	7
Oversight ecosystem		2	2
Peer to peer internet technology		1	1
Single source of truth		3	4
Status database		2	6
Disruptive properties		3	7
IoT link		3	3
Issues		11	165
Business level negotiation		4	6
Business-case thinking		1	2
Heavy computing		1	1
Hype		4	6
Maturity		6	12
Need for business model		3	3
No added value		7	11
Incentive design		2	2
Ownership		5	12
Consortium		1	1
Effort based share division		2	3
Founder led network		2	2
Third party ownership		4	4
Reliability		3	3
Risk management		6	15

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Name	Description	Files	References
Safety - security		6	9
Scaling up		7	16
Should not discriminate		2	3
Stakeholder autonomy		2	2
Supervisor		3	5
Technology push		3	4
Time constraints		6	13
Transaction speed		2	2
Trust		7	33
Identity		5	15
User friendliness		3	7
Linking ecosystems		1	3
Network thinking		2	7
Reflective properties		2	3
Shift of power		1	2
Smart contracting		2	3
Types		0	0
Democratised blockchain		3	3
Hybrid blockchain		1	1
Permissioned blockchain		1	1
B2B solution		3	4
Private blockchain		7	12
Public blockchain		5	10
Business opportunities		0	0

Name	Description	Files	References
Allocation of resources		1	1
Autonomous network		4	6
Batteries become cheaper		2	3
Decentralised local energy market		5	8
End-to-end visibility		1	1
Energy is free		1	1
Global connectivity		1	1
Inter-operability		3	3
No value wasted to make energy		1	1
Open communication		1	2
Operational excellence		2	2
Peer to peer insurance		1	1
Peer to peer trading		2	2
Power network congestion		4	8
Real time data		3	4
Reconciliation		1	1
Revision salderingsregeling		1	2
Self sustaining ecosystem		3	3
Smart charging		3	3
Solar panel more value for less money		1	1
Supply chain finance		1	1
Umbrella blockchain structure		1	1
Undeniable track record		4	9
Collaborative constructs		11	124

Name	Description	Files	References
Advancement through collaboration		4	7
Co-creation		1	2
Convincing by showing		8	14
Inspiring		3	4
Critical reflection (atmosphere)		3	4
Cultural differences		5	7
Democratic decision making		2	2
Email newsletter		1	1
Helps people flourish		1	1
Innovation champion		1	1
Spreading and guarding vision		4	5
Innovative atmosphere		3	4
Middle managers		5	7
Need for a driving force		4	5
Negotiations		5	7
Network effect		6	6
Open minded people		6	10
Personal connections helps consensus		3	3
Personalities influence dynamics		2	2
Physical meetings		7	9
Proper tooling		6	12
Protective of partnership		1	2
Stakeholder autonomy		3	3
Taking out of comfort zone		1	1

Name	Description	Files	References
Task division based on expertise		5	6
Top level support		5	8
Communication		10	58
Discussion helps advancement		7	20
Create support (change management)		10	39
Incremental change		1	1
Taking government along		4	4
User involvement		5	14
Early adopters		3	6
Impact based involvement		2	2
Judgement on usability		3	4
User should not notice		5	10
General information meeting with users		3	4
Meetings split by topic		1	1
Story telling		10	29
Familiar or common language		4	7
Matching content to audience		8	14
Visualising data		3	4
Development process		11	176
Building vision		1	1
Using outside views to fine-tune vision		1	1
Create business opportunities		2	3

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| Name	Description	Files	References
Creative techniques		2	2
Brainstorming		4	4
Design thinking		2	6
Sponsored users		4	5
Digital prototype		6	10
Moonshots		1	1
Observing user		1	2
Predicting future policy		1	1
Propose radical hypothesis		2	4
User stories		2	7
Value proposition canvas		1	1
Defining ecosystem		9	26
IT domain		1	1
Map stakeholder demands - wishes		4	5
Physical domain		1	1
Socioeconomic domain		1	1
Defining interactions		3	3
Defining trends		2	3
Drawing future landscape		5	7
Establishing common ground		5	9
Finding alternatives		1	1
Finding barriers		3	3
Front end development		7	10
Inviting business representatives		2	2

Name	Description	Files	References
Linking ideas to form bigger picture		1	1
Localised testing		4	4
Minimal viable product		3	4
Lean mvp		3	4
Minimal viable ecosystem		1	1
Tipping point		1	1
Technical mvp		4	4
Open source infrastructure (mentality)		7	24
Open platform accelerates distribution		4	7
Open platform accelerates ease of use		2	2
Open platform aides collaboration		2	2
Proof of Concept		3	4
Research		0	0
General feedback		1	1
Surveys as user input		2	2
Usability test		1	1
Set boundaries		2	3
Tipping point		2	2
Validating technology		11	34
Iterations		6	13
Validation through simulation		3	6
Working agile		7	14

Name	Description	Files	References
Architecture		1	1
Governance		2	4
Software development		3	4
Workshop		7	16
Expert knowledge		7	13
Facilitator		2	3
Interaction designer		1	1
Product owner		4	6
Programmer		3	3
Software developer		2	2
Lego workshop properties		0	0
Lego workshop makes blockchain tangible		1	1
Lego workshop to aide creative process		1	1
Lego workshop to enthuse		1	1
Lego workshop to gain understanding		1	2
Lego workshop to generate income		1	1
Motives blockchain use		0	0
Anticipate future need		8	9
Long term investment		1	2
Decentralised nature of blockchain		2	3
Decentralised is cheaper		3	5
Exploring		11	61

Name	Description	Files	References
Exploring to gain knowledge		10	18
Learning by doing		9	16
Let's try it mentality		8	15
Generating new opportunities - ideas		4	10
Having impact		2	6
Higher efficiency		6	10
Rapid decentralisation		1	1
Self-preservation		5	6
Simplify process		1	1
Social experiment		1	2
Societal interest		5	8
Reactions to blockchain		11	43
Let's try it mentality		8	15
Maintaining status quo		7	18
Negative reaction established order		4	4
Pragmatic enthusiasm		5	5
Recognition through award		1	1
Rules and regulation		1	2
Policy restraint		4	12
Not allowed to be own energy supplier		2	2
Postponing plans due to current policy		2	2
Rules and regulation supporting		3	4

18

Name	Description	Files	References
localised energy markets			
Salderingsregeling		1	1

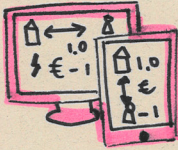# VII. Company analysis sketches
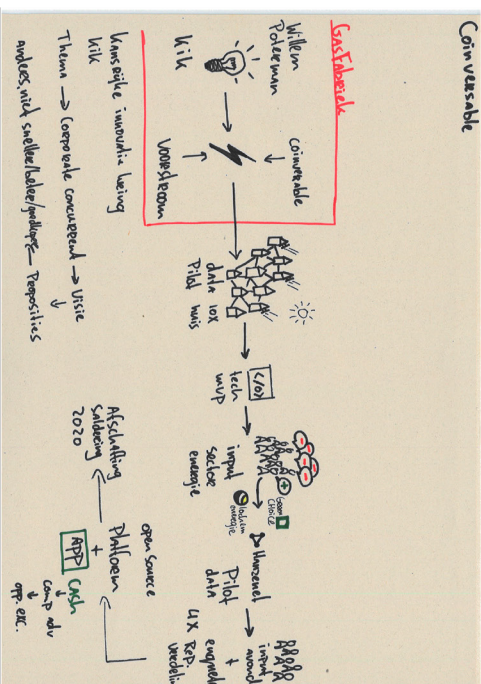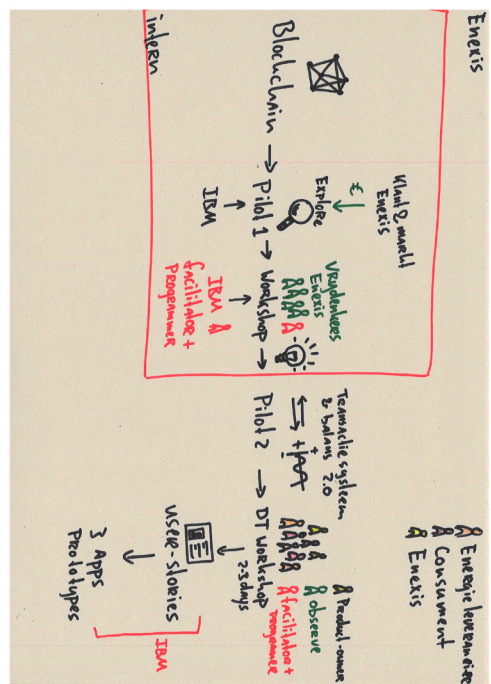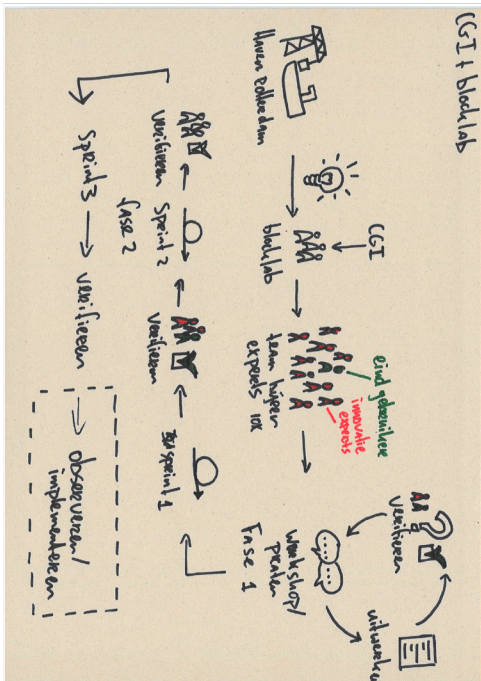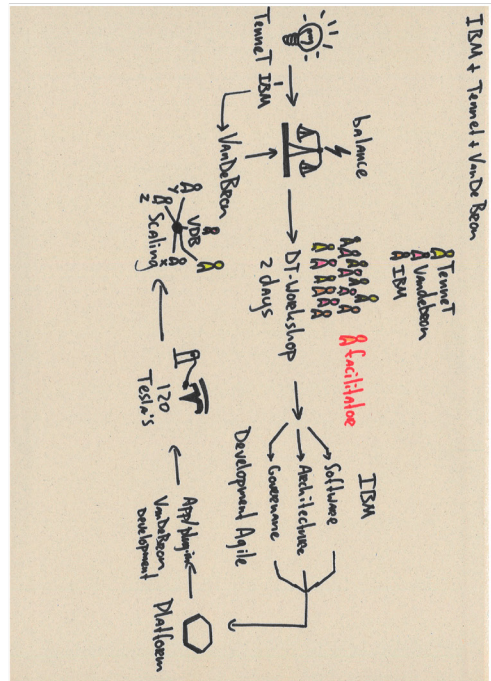
Hoog Dalem 2.0

ABB → hardware

EWF- blockchain
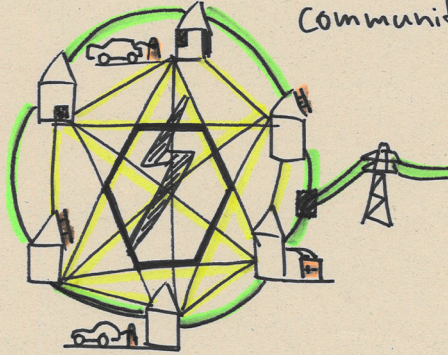
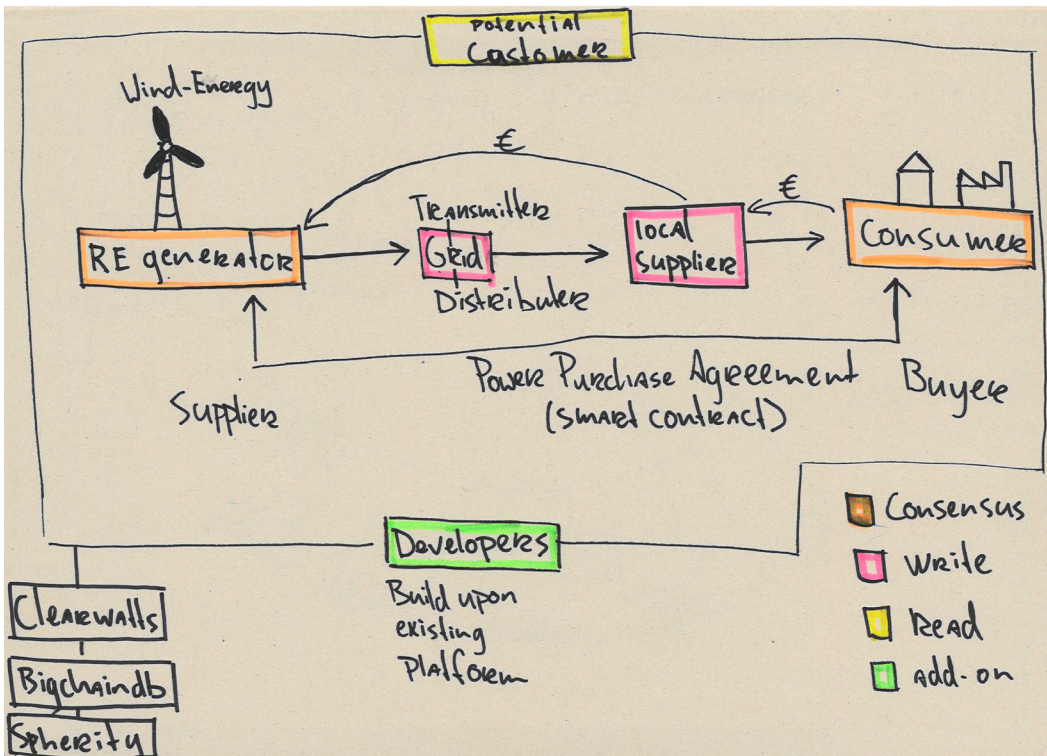Enervalis → slim besturingssysteem

Stedin → Energie netwerk

community energy trading

testing mvp's
↓
incremental build up

confined peer to peer trading
only local, geo-bound

14x

Potential Customer

Wind-Energy

RE generator → Grid → local supplier → Consumer
Transmitter / Distributer

€ ... €

Supplier

Power Purchase Agreement
(smart contract)

Buyer

Developers
Build upon
existing
Platform

Clearwalls

Bigchaindb

Spherity

🟧 Consensus
🟥 Write
🟨 Read
🟩 add-on

21

VIII. Design challenge development

Design challenge

In order to kick off the design process, a design challenge is formulated. This design challenge will serve as the starting point of the design, incorporating the needs and goals of the design. To create a design challenge, IDEO's approach is used ("Design Kit: Frame your …," n.d.). IDEO states the process of creating a design challenge consists of several steps. First, the problem at hand needs to be defined, which is done above. Next, IDEO states the need for a design question:

How can an open mindset be created that lets people experiment to the fullest extent with network thinking through the use of vision building with DLT?

From this, the wanted impact of the design is considered. In this case, we want to achieve disruptive thinking by using DLT in such a way that new networked ecosystems arise, generating new ideas of future change. When it comes to measurable impact, this is most likely to result in a type of vision or roadmap for the future. This vision or roadmap should be communicable to both programmers as well as partners, internal and external to the companies creating it. Next, we define possible solutions to the problem. The following solutions were gathered through literature research and reflection on the problem: lack of open mindset.

1. Create a methodology based on change management to learn how to take people along in changing environments.
2. A canvas based on frame innovation, to adjust the way people see and approach a problem through framing.
3. A tool based strategic niche management, that helps

companies break through the regime of business as usual.
4. A canvas that helps define new business models through disruptive thinking methods
5. A network centered design method to define the needs of all players and to create accompanying business models.

After this, a brainstorm was performed that focused mainly on the following questions: *How can you change a mindset?*, *How can you influence attitude?* and *How can you improve collaboration?*. The latter was chosen to find solutions focusing on groups rather than individuals. The main results of this brainstorm were:
- Change of behavior can be achieved through passive and active means
- Participants believed most in inclusive means like cocreation and involvement, rather than punishing or showing insight in wrongful behavior.
- A mindset is dependent on the values and ideals one holds within.
- When changing a mindset, the frame of reference should be changed.
- Having a shared focus can help to change together.
- Positive encouragement from a team helps, social pressure engages.
- Clarity is needed in a collaboration.

To find how these ideas could facilitate the achievement of the goals, the choice was made to go back to literature. As the matter of DLT-innovation is so complex, is was decided to look for existing methods, for the changing of perspective or a mindset. This was done in order to have some solid ground that allows a focus on the goals and problems, rather than having to spend time creating an entire method from scratch. In this search, the theory Frame Innovation was found. This

theory, which is explained in detail below, was created by Kees Dorst (2015) and focuses on using a method of reframing problems in order to find new solutions. This seemed particularly suited, as the problem of DLT-innovation seems to deal with people not being able to see beyond their own limited frame.

Frame innovation

Frame innovation is a method by Kees Dorst (2015) which uses an "innovation-centered approach to problem-solving in organizations". This method fits well to the proposed problem as it looks to designers to deal with "the emergence of a radically new species of problem: problems that are so open, complex, dynamic, and networked that they seem impervious to solution" (p.1). What makes it particularly suitable, is that is uses framing, which is "universal human ability" (p.2), making it easier for non-designers to understand and to practice. Framing Furthermore, the frame creation model by Dorst as described below, has large similarities to the current processes found, as displayed in figure 4.

The frame creation model by Dorst follows the next 9 steps:

1. *Define archeology*: gather all relevant insights surrounding the problem.
2. *Paradox*: what makes the problem hard to solve? Best described as a series of 'because questions'.
3. *Context:* define the context surrounding the problem, including all stakeholders and their relations.
4. *Field*: map all interactions (currency) of the playing field, finding the deeper, universal values that bind all parties. Think

of cultural, economic, social, and symbolic aspects.
5. *Themes*: find the motivations and experiences that link the players.
6. *Frames*: reframe the problem. 'If the problem is approached as if it is …, then …'.
7. *Futures*: Generate realistic and viable solution within the frame.
8. *Transformation*: Find the most workable frames, weed out the bad and create a business plan to reach the newly proposed future.
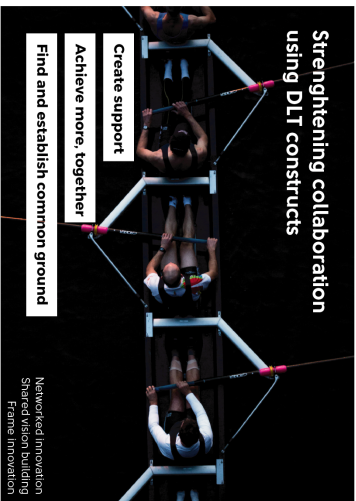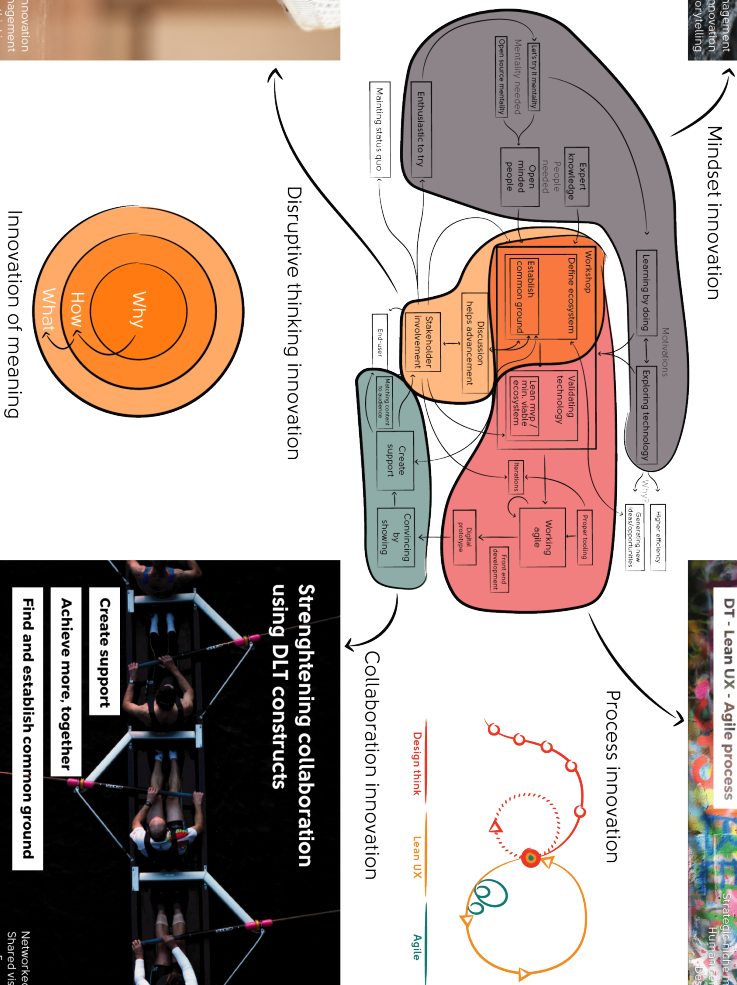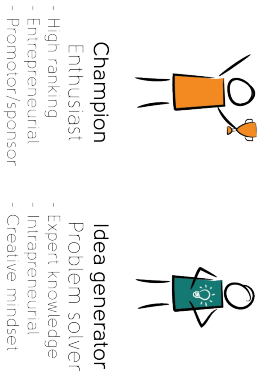9. *Integration*: Bring the new frames into your organization.

When this method is compared to the process model from the research, the following links can be found. Both try to define a broad networked context, step 1 & 3. Next, the sociocultural context is mapped in step 4, followed by defining a common ground of deeper underlying values, step 5. As this part of the approach is similar to the current process, people are hopefully more acceptable to the proposed tool.

Design challenge

The last step, as mentioned, is creating a design challenge that looks to solve the problem at hand. After some careful iteration, the following challenge was created:

Use frame innovation to create a design that uses the constructs of DLT to create a more open mindset, which enables companies to create disruptive yet desirable future visions that are both workable (IT) and communicable (internal/external)

Using DLT to challenge the status quo

Discussion helps

Changing meaning and roles

Establishing new common ground

Radical and provocative statements

Design driven innovation
Change management
Design thinking

Champion
Enthusiast
- High ranking
- Entrepreneurial
- Promotor/sponsor

Idea generator
Problem solver
- Expert knowledge
- Intrapreneurial
- Creative mindset

Getting stakeholders into an open mindset

The right message

Open minded mentality

Motivated to learn and do

Change management
Frame innovation
Storytelling

Mindset innovation

Innovation of meaning

Why
How
What

Disruptive thinking innovation

Strenghtening collaboration using DLT constructs

Create support

Achieve more, together

Find and establish common ground

Networked innovation
Shared vision building
Frame innovation

Collaboration innovation

Process innovation

Putting human values into the process

Socioeconomic values

DT - Lean UX - Agile process

Human value led design

Design think
Lean UX
Agile

Using DLT to challenge the status quo

Discussion helps

Changing meaning and roles

Establishing new common ground

Radical and provocative statements

Design driven innovation
Change management
Design thinking

Strenghtening collaboration using DLT aspects

Create support

Achieve more, together

Find and establish common ground

Networked innovation
Shared vision building
Frame innovation

Putting human values into the process

Socioeconomic values

DT - Lean UX - Agile process

Strategic niche management
Human centred design
Design thinking

Getting stakeholders into the right mindset

The right message

Open minded mentality

Motivated to learn and do

Change management
Frame innovation
Storytelling

X. Literature review DLT-aspects

Research on DLT-aspects

Transparency:
TITLE-ABS-KEY (transparency AND blockchain OR "distributed ledger") AND (LIMIT-TO (SUBJAREA , "SOCI"))   19 results
- Eradicate fraud and corruption
- Access to audible data
- Real time data
- All changes made visible
- Openness of process
- Know who owns what at all times and who does not (piracy)
- Knowing all (re)sources and substances present in a product
- Verifying and tracking content distribution
- All the data on blockchain is public, it cannot be arbitrarily tempered with and easily auditable
- Quality of data improves through openness
- Full data accessibility
- Public and openly accessible

Immutability:
TITLE-ABS-KEY (immutability AND blockchain OR "distributed ledger") AND (LIMIT-TO (SUBJAREA , "SOCI"))   16 results
- Cannot be altered or deleted
- Integrity of records is ensured by intrinsic properties of the underlying code rather than from the identities of system operators
- Immanent rules and automatisms
- An unchangeable history of transactions

Integrity of data:
TITLE-ABS-KEY ("integrity" AND blockchain OR "distributed ledger") AND (LIMIT-TO (SUBJAREA , "SOCI"))   9 results
- Integrity of stakeholders
- Peer to peer without trust
- Trust through integrity of data
- Guarantee over time
- Integrity of evidence
- Non-repudiable
- Guaranteed authenticity
- Communication without alteration
- Systemwide security
- An exchanged message must not be altered or modified during the network transit.
- Involves maintaining the consistency and trustworthiness of data over its entire life cycle

Privacy:

TITLE-ABS-KEY (privacy AND blockchain OR "distributed ledger") AND (LIMIT-TO (SUBJAREA , "SOCI"))   30 results
- Privacy law and the right to deletion or right to be forgotten
- Anonymity
- Pseudonymous
- Not able to be linked
- Accountability
- The right to privacy is our right to keep a domain around us, which includes all those things that are part of us, such as our body, home, property, thoughts, feelings, secrets and identity. The right to privacy gives us the ability to choose which parts in this domain can be accessed by others, and to control the extent, manner and timing of the use of those parts we choose to disclose.
- Protection against leakage of personal details
- Ownership right
- Rights in rem can be designated as a right to be left alone or the right to exclude others from one's property. The right in rem is defined by reference to the existence and location of the thing itself and cannot survive the extinction of the thing.
- Privacy preservation protocols

Reliability:
TITLE-ABS-KEY ("reliability" AND blockchain OR "distributed ledger") AND (LIMIT-TO (SUBJAREA , "SOCI"))   5 results
TITLE-ABS-KEY ("reliability" AND blockchain OR "distributed ledger") AND (LIMIT-TO (EXACTKEYWORD , "Reliability"))   21 results
- Legal reliability
- Trustworthiness of a record as a statement of fact, based on the competence of its author, its completeness and the controls on its creation.
- Who creates the record and how they go about creating it.
- A full and accurate representation of the transactions, activities or facts to which they attest and can be depended upon in the course of subsequent transactions or activities
- Authenticity
- Honesty or truthfulness/trustworthiness
- Constant and continuous stability

Versatility:
TITLE-ABS-KEY (versatil* AND blockchain OR "distributed ledger")   10 results
- Roles are often used in a trans-organizational manner.
- Flexibility
- Enable complex services securely, sustainably, efficiently.
- Extensible
- Protocol instances optimized for latency, throughput, bandwidth, or scalability
- Versatile system capable of facilitating, automating and enforcing an agreement
- Ability to adapt or be adapted to many different functions or activities.

- What if no-one could be held accountable as an individual or a firm?
    - What would you do with it and how would it change your current role and interactions?
- What if privacy is the highest available good?
    - What would you do to protect it and how would this effect your interactions?

Reliability
- What if all machines in the system could communicate to each other?
    - What would you do with it and how would it change your current role and interactions?
- What if the system is in control and the computer says no?
    - What would you do with it and how would it change your current role and interactions?
- What if everything you do is automatically checked for legality?
    - What would you do with it and how would it change your current position?
- What if all processes and procedures are automated?
    - What would you do with it and how would it change your current position?
- What if machines could do all the (hard) work?
    - What would you do with it and how would it change your current position?
- What if the highest goal is constant stability in your system?
    - What would you do with it and how would it change your current role and interactions?
- What if the system would always give you the best advise possible?
    - What would you do with it and how would it change your current position?

Versatility
- What if you could connect (your systems to) every network on the planet?
    - What would you do with it and how would it change your current role and interactions?
- What if everyone shares ownership over everyone?
    - What would you do with it and how would it change your current role and interactions?
- What if everyone has access to the same resources?
    - What would you do with it and how would it change your current position?
- What if you can put contract logic into a (automated) transaction? (if / then)
    - What would you do with it and how would it change your current role and interactions?
- What if the system was infinitely flexible?
    - What would you do with it and how would it change your current position?

Transparency
- What if all your knowledge, data and information was accessible to everyone?
  - What would you do with it and how would it change your current role and interactions? (Wikipedia)
- What if you had access to all information from everyone relevant to your needs?
  - What would you do with it and how would it change your current position? (EPD)
- What if you could real time follow all processes and statuses around you?
  - What would you do with it and how would it change your current position? (Track and trace/Deliveroo)
- What if you had complete openness of process in your sector and can see what changed when and why?
  - What would you do with it and how would it change your current role and interactions?

Immutability
- What if everything is undeniably on the record and no one could lie?
  - What would you do with it and how would it change your current position?
- What if you could unearth every process from beginning to end with a single click?
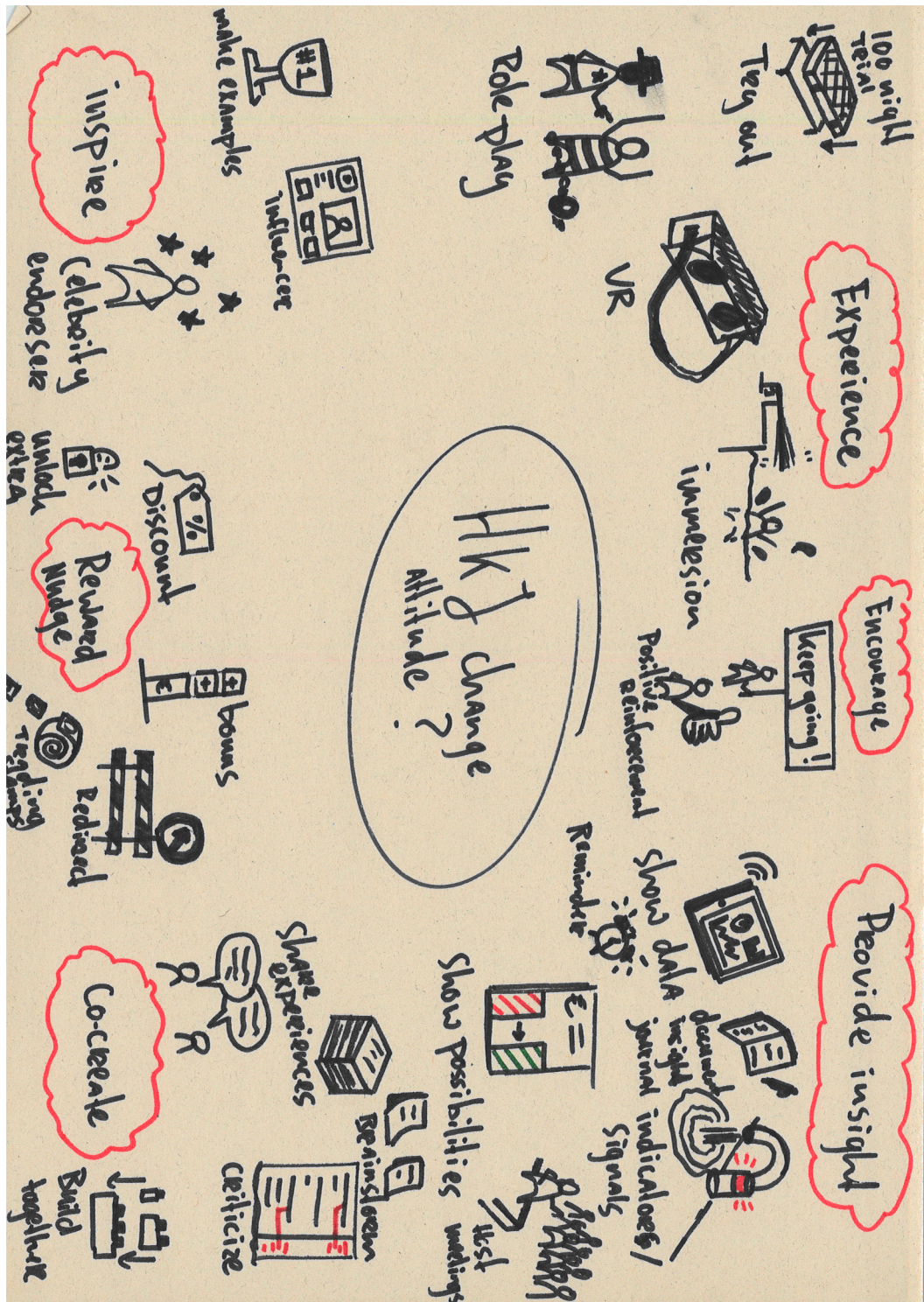 - What would you do with it and how would it change your current role and interactions?
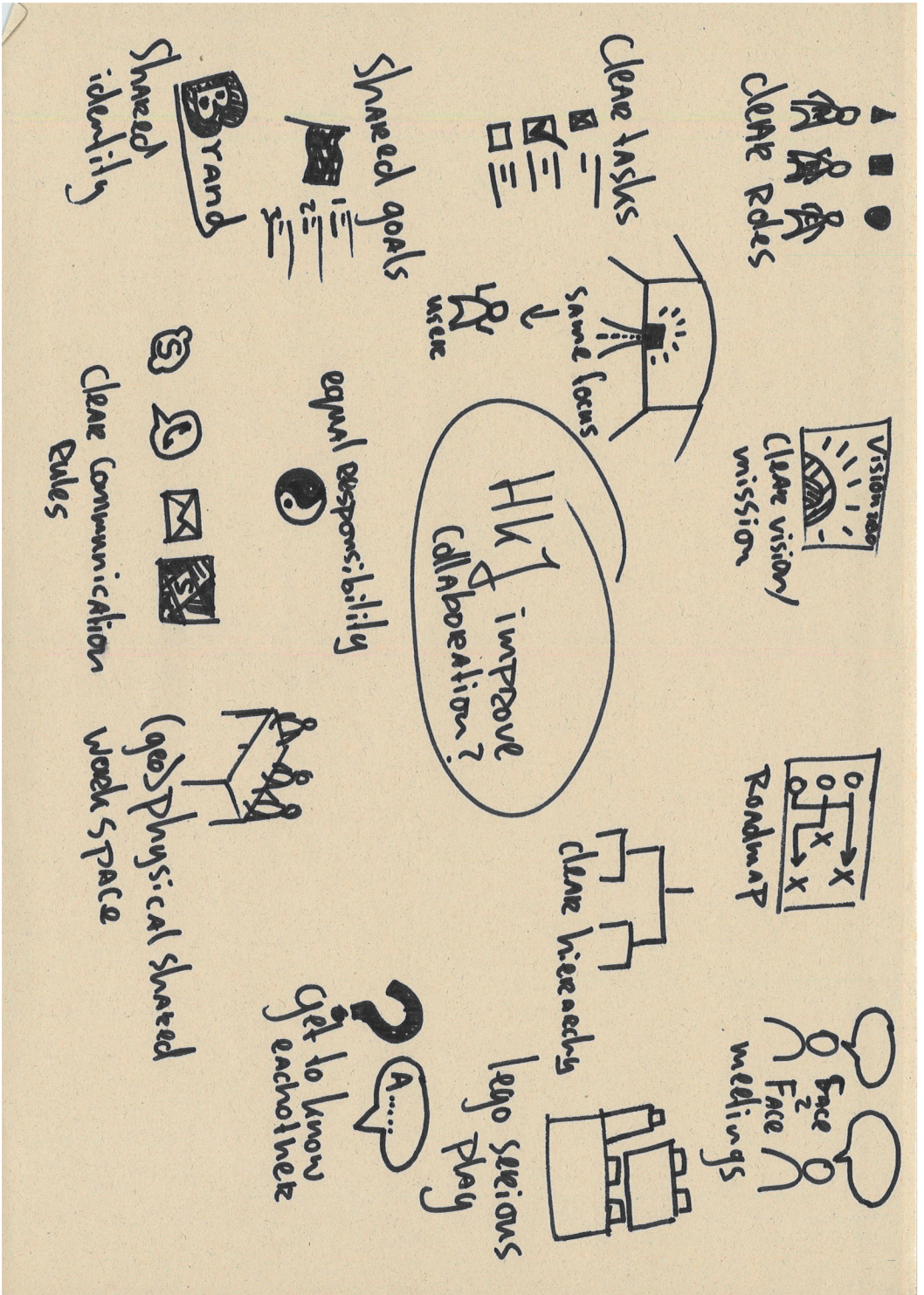
Integrity
- What if everyone is guaranteed integer and you do not need to know everyone personally.
  - What would you do with it and how would it change your current role and interactions?
- What if the data is always right and can make the best choice for you?
  - What would you do with it and how would it change your current position?
- What if you could interact and trade with everyone on a direct peer to peer basis?
  - What would you do with it and how would it change your current role and interactions?
- What if there is no need for third parties?
  - Which roles and interactions would become obsolete and how would you deal with that?

Privacy
- What if everything you do is guaranteed private and secure?
  - What would you do with it and how would it change your current position?
- What if everyone could operate in complete anonymity?
  - What would you do with it and how would it change your current role and interactions?

XI. Part of the brainstorm outcomes

HK of change
Attitude ?

Try out
100 night
trial

Role play

VR

Experience
immersion

Encourage
keep going!

Positive
Reinforcement

inspire

make examples

#1

Influencer

Celebrity
endorsee

Discount

unlock
extra

Reward
Nudge

bonus

trading
reward

Reduced

Show data

Reminder

Provide insight

document
height
journal indicators/
Signals

Test

Co-create

Share
experiences

Show possibilities

Brainstorm

criticize

Build
together

Clear Roles

Clear tasks

Shared goals

Shared identity

Brand

same focus

users

(Clear vision) mission

Vision 2030

HW improve collaboration?

equal responsibility

Clear Communication Rules

Roadmap

clear hierarchy

Lego serious play

Face 2 Face meetings

get to know eachother

? A......

(geo)Physical shared workspace

XII. First test case instructions

Info sheet, test 1 Chemie-Pack

Taken overheid en toezicht/handhaving:
-   Communicatie burger en bedrijven (ook in geval van crisis)
-   Preventie (campagnes)
-   Wetgeving
-   Controle en toezicht

Taken Chemie-Pack
-   Mengen en verpakken chemicaliën
-   Winst maken/kosten besparen
-   Corporate social responsibility
-   Competative advantage creëren: goedkoper dan concurrent
-   Naleven reglementen veiligheid

Brandweertaken

Preparatie en nazorg

Onze brandweermensen moeten goed voorbereid hun werk kunnen doen. Daarom hebben we uitgebreide oefen- en trainingsprogramma's, maken we plannen en procedures die ons helpen bij het bestrijden van incidenten, en zorgen we ervoor dat onze voertuigen en ons materiaal in orde zijn. Deze voorbereidingswerkzaamheden noemen we preparatie. Met nazorg bedoelen we wat we doen na afloop van een incident. We evalueren, zodat we een volgende keer nog beter ons werk kunnen doen. Tijdens een inzet zien brandweermensen soms afschuwelijke dingen. Daarom kunnen ze rekenen op psychologische hulp om deze ervaringen te verwerken. We doen dat onder andere door eigen teams van medewerkers, die op verzoek een luisterend oor bieden aan andere collega's.

Repressie

Het meest zichtbare deel van ons werk is 'repressie', het bestrijden van brand en het verlenen van hulp aan mens en dier. We doen onder andere de volgende taken:

- redden van mens en dier bij brand	- hulp bij storm- en waterschade
- hulp verlenen bij een verkeersongeluk	- bevrijden van dieren in nood
- redden van mens of dier te water	- takelen en helpen van mensen op hoogte of grote diepte

Om al deze verschillende situaties het hoofd te kunnen bieden, zijn er speciale teams voor de 'specialismen' duiken, hoogteredding, technische hulpverlening, natuurbrandbestrijding en gevaarlijke stoffen.

Proactie en preventie

We proberen ook risicovolle situaties te voorkomen. Dat doen we door te adviseren in de prilste planningsfases van grote projecten, zoals een nieuwe woonwijk of de aanleg van een weg. Wat is bijvoorbeeld een veilige locatie voor het bouwen van opslag met gevaarlijke stoffen? En hoe zorgen we ervoor dat de hulpdiensten overal snel ter plaatse kunnen zijn? We noemen dit proactie.

Bij preventie gaat het om concrete maatregelen om de kans op brand zo klein mogelijk te houden. Er zijn in Nederland allerlei bouwvoorschriften, waarop de brandweer controleert. Ook adviseren we aan gemeenten of bepaalde vergunningen voor gebouwen of evenementen kunnen worden afgegeven. Denk aan regels over het gebruik van brandveilig materiaal, rookmelders, blusmiddelen en nooduitgangen. Een andere belangrijke taak is het geven van voorlichting over brandveiligheid aan inwoners van onze regio. Een gemiddelde huiskamer staat binnen 3 minuten volledig in brand. Het is daarom van groot belang dat mensen in staat zijn zichzelf en hun omgeving in veiligheid te brengen in die cruciale minuten tot de brandweer aankomt.
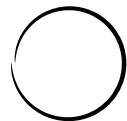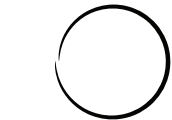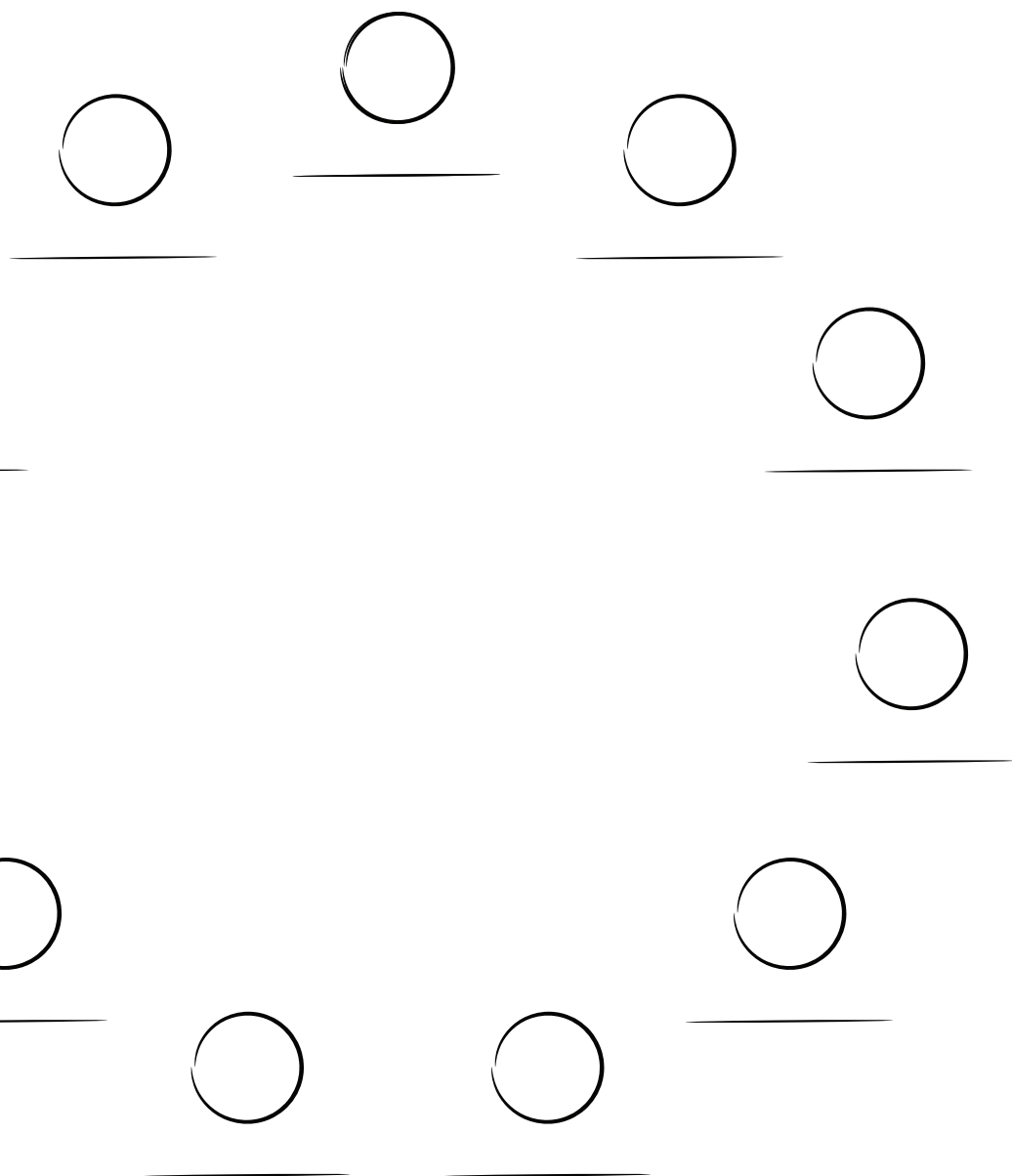
XIII. Prototype 1.0 canvasses

Define the context you are in by going through the following steps.

1. Define all relevant players and map them on the spaces in the circle. Try to create a wholesome circle: if there are less players, place them opposite one another.

2. Draw lines between them with different colors to show their interactions. Write down in the legend what currency of exchange is; these are values, goods or services. Think in cultural, social, economic and symbolic aspects.

3. Define the underlying values that house behind the interactions. If you need help, look at the basic human values list. Write them down next to the players. The devil's advocate will help to go into depth.

4. Think of metaphors to describe the found interactions, based on the values. Put them on post-its.

For example: For the interaction of knowledge between a library and students, one could think of a tribe in which the library is the wise elder and the students are the workers.

Legend: currency interactions

Challenge the current metaphor based on the 6 elements of distributed ledger technology. There are different *What-ifs* for each category to help you think of new interactions and metaphors.
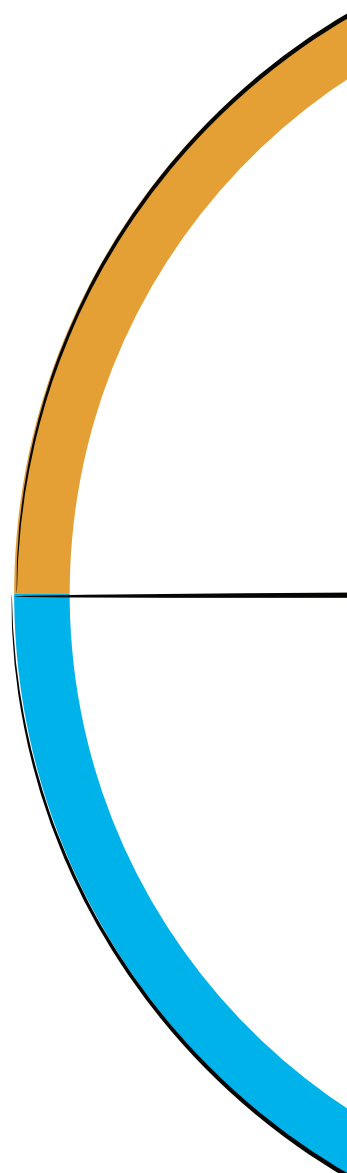
1. Redefine the interactions and create ideas by challenging the current metaphor (keep in mind the current context):
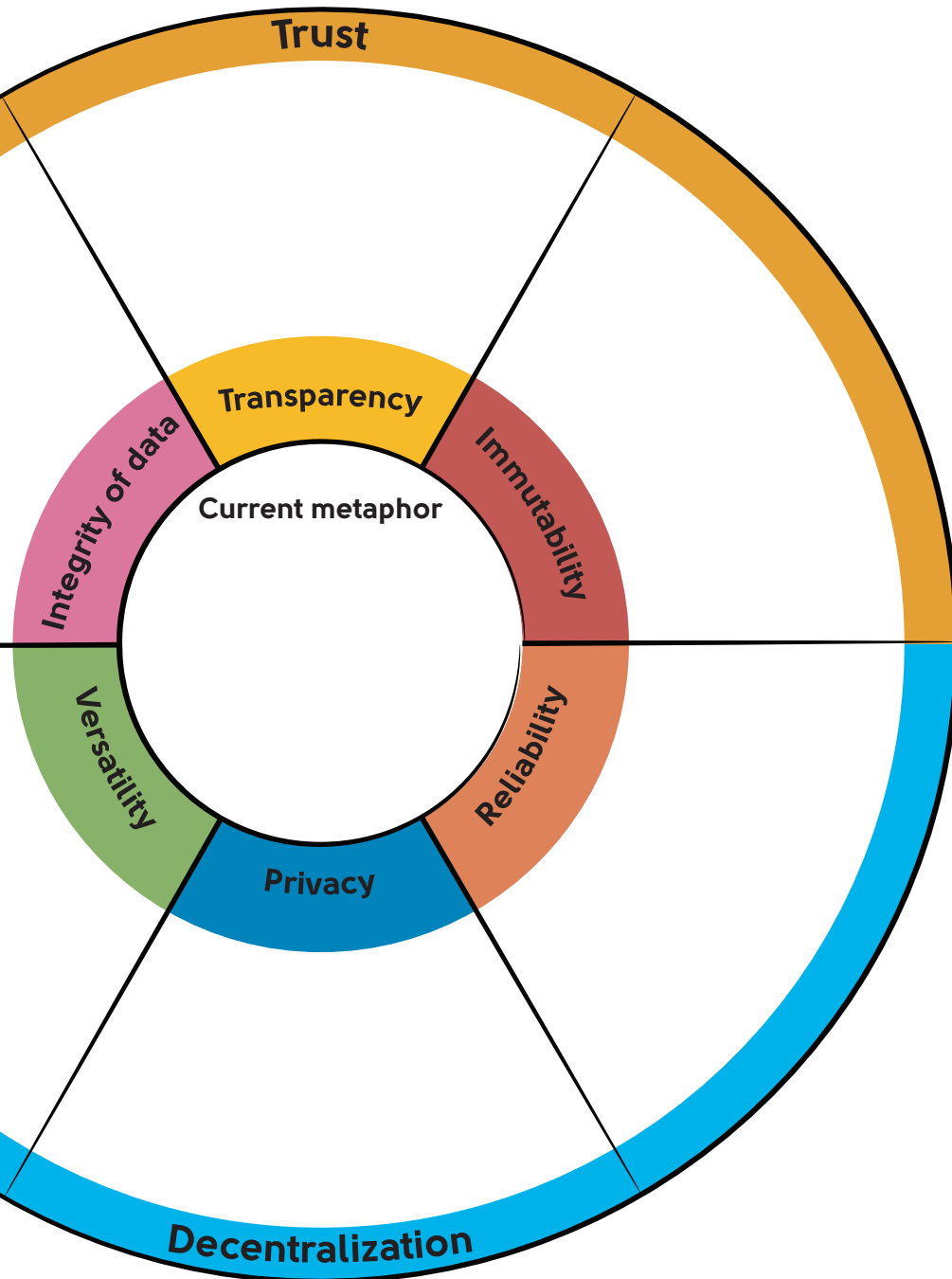
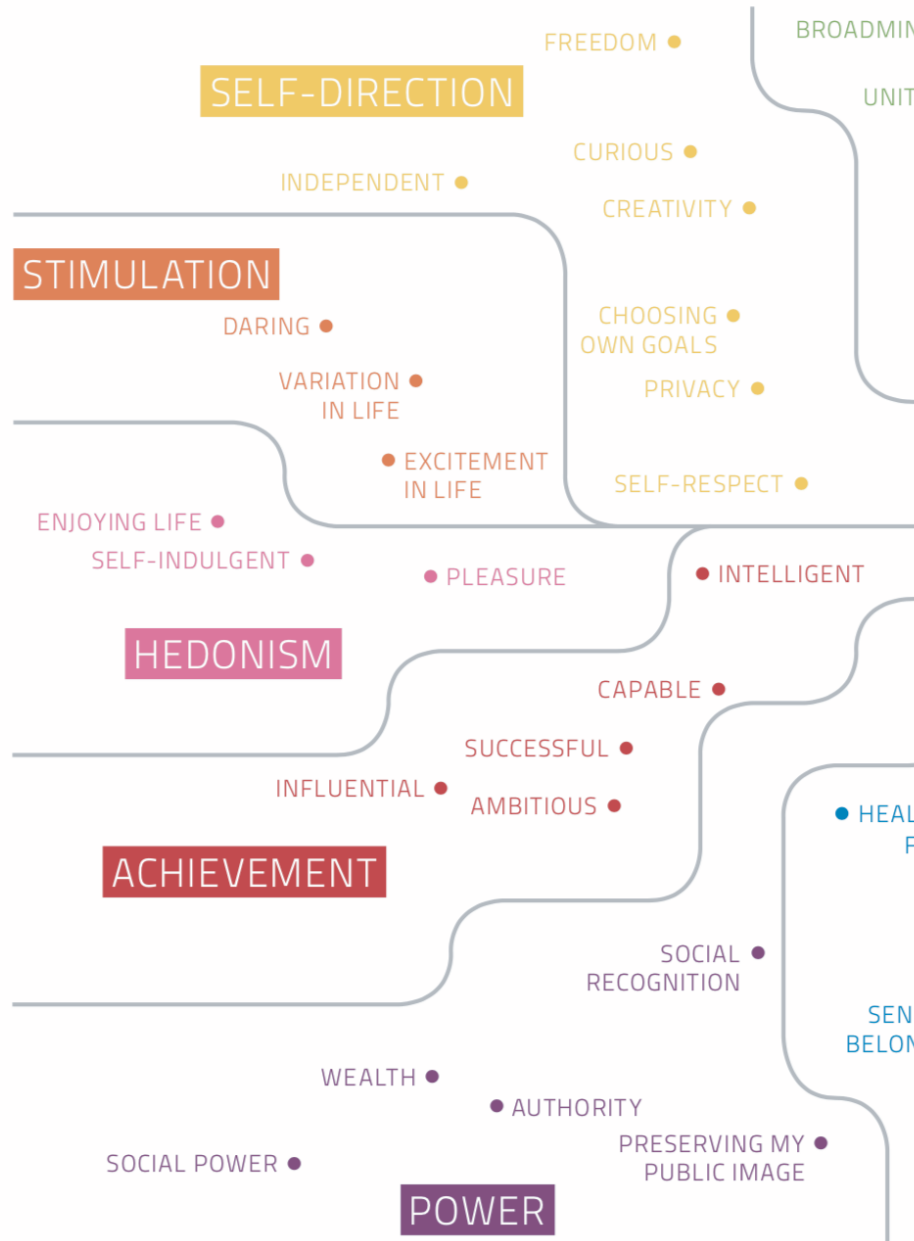What if the interaction was not build on *current metaphor* but on *Transparency*?

For example: What would the role of the tribe elder (library) be if all workers (students) had open access to all knowledge?
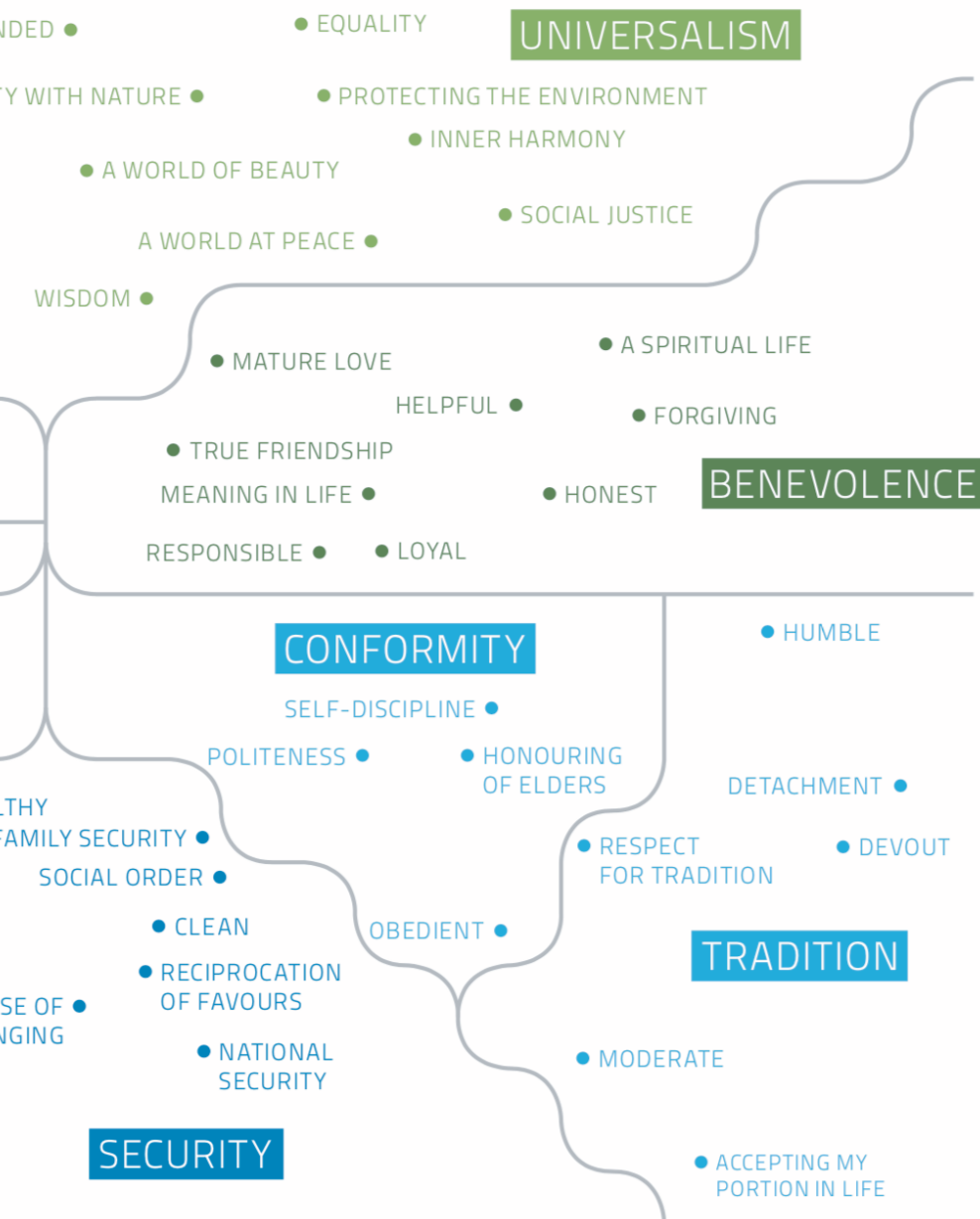
2. Create new metaphors based on the newly found interactions.

For example: Instead of being the knowledge distributor, the elder could be a guiding light through all information when the workers have a specific quest.

Trust

Transparency

Integrity of data

Immutability

Current metaphor

Versatility

Reliability

Privacy

Decentralization

FREEDOM ●

BROADMIN[DED]

UNIT[Y]

SELF-DIRECTION

CURIOUS ●

INDEPENDENT ●

CREATIVITY ●

STIMULATION

DARING ●

CHOOSING ●
OWN GOALS

VARIATION ●
IN LIFE

PRIVACY ●

● EXCITEMENT
IN LIFE

SELF-RESPECT ●

ENJOYING LIFE ●

SELF-INDULGENT ●

● PLEASURE

● INTELLIGENT

HEDONISM

CAPABLE ●

SUCCESSFUL ●

INFLUENTIAL ●

AMBITIOUS ●

● HEAL[TH]

ACHIEVEMENT

SOCIAL ●
RECOGNITION

SEN[SE]
BELON[GING]

WEALTH ●

● AUTHORITY

PRESERVING MY ●
PUBLIC IMAGE

SOCIAL POWER ●

POWER

NDED ●

● EQUALITY

UNIVERSALISM

TY WITH NATURE ●   ● PROTECTING THE ENVIRONMENT

● INNER HARMONY

● A WORLD OF BEAUTY

● SOCIAL JUSTICE

A WORLD AT PEACE ●

WISDOM ●

● A SPIRITUAL LIFE

● MATURE LOVE

HELPFUL ●   ● FORGIVING

● TRUE FRIENDSHIP

BENEVOLENCE

MEANING IN LIFE ●   ● HONEST

RESPONSIBLE ●   ● LOYAL

CONFORMITY

● HUMBLE

SELF-DISCIPLINE ●

POLITENESS ●   ● HONOURING
OF ELDERS

DETACHMENT ●

LTHY
FAMILY SECURITY ●

● RESPECT
FOR TRADITION   ● DEVOUT

SOCIAL ORDER ●

● CLEAN

OBEDIENT ●

● RECIPROCATION
OF FAVOURS

TRADITION

SE OF ●
NGING

● NATIONAL
SECURITY

● MODERATE

SECURITY

● ACCEPTING MY
PORTION IN LIFE

XIV. Prototype 1.0 "What-if" cards

Transparency

What if all your knowledge, data and information was accessible to everyone?

What would you do with it and how would it change your current role and interactions?

Transparency

What if you had access to all information from everyone relevant to your needs?

What would you do with it and how would it change your current position?

Transparency

What if you could real time follow all processes and statuses around you?

What would you do with it and how would it change your current position?

Transparency

What if you had complete openness of process in your sector and can see what changed when and why?

What would you do with it and how would it change your current role and interactions?

Immutability

What if everything is undeniably on the record and no one could lie?

What would you do with it and how would it change your current position?

Immutability

What if you could unearth every process from beginning to end with a single click?

What would you do with it and how would it change your current role and interactions?

Integrity of data

What if everyone is guaranteed integer and you do not need to know everyone personally?

What would you do with it and how would it change your current role and interactions?

Integrity of data

What if the data is always right and can make the best choice for you?

What would you do with it and how would it change your current position?

Integrity of data

What if you could interact and trade with everyone on a direct peer to peer basis?

What would you do with it and how would it change your current role and interactions?

Integrity of data

What if there is no need for third parties or authorities?

Which roles and interactions would become obsolete and how would you deal with that?

Privacy

What if everything you do is guaranteed private and secure?

What would you do with it and how would it change your current position?

Privacy

What if everyone could operate in complete anonymity?

What would you do with it and how would it change your current role and interactions?

Privacy

What if no-one could be held accountable as an individual or a firm?

What would you do with it and how would it change your current role and interactions?

Privacy

What if privacy is the highest attainable good?

What would you do to protect it and how would this effect your interactions?

Reliability

What if all machines in the system could communicate to each other?

What would you do with it and how would it change your current role and interactions?

Reliability

What if you have no control over the system (think: computer says no)?

What would you do with it and how would it change your current role and interactions?

Reliability

What if everything you do is automatically checked for legality?

What would you do with it and how would it change your current position?

Reliability

What if all processes and procedures are automated?

What would you do with it and how would it change your current position?

Reliability

What if machines could do all the (hard) work?

What would you do with it and how would it change your current position?

Reliability

What if the highest goal is constant stability in your system?

What would you do with it and how would it change your current role and interactions?

Reliability

What if the system would always give you the best advise possible?

What would you do with it and how would it change your current position?

Versatility

What if you could connect (your systems to) every network on the planet?

What would you do with it and how would it change your current role and interactions?

Versatility

What if everyone shares ownership over everyone?

What would you do with it and how would it change your current role and interactions?

Versatility

What if everyone has access to the same resources?

What would you do with it and how would it change your current position?

Versatility

**What if you can put contract logic into a (automated) transaction?
(if / then)**

What would you do with it and how would it change your current role and interactions?

XV. Prototype 1.0 Results

Define the context you are in by going through the following steps.

1. Define all relevant players and map them on the spaces in the circle. Try to create a wholesome circle: if there are less players, place them opposite one another.

2. Draw lines between them with different colors to show their interactions. Write down in the legend what currency of exchange is; these are values, goods or services. Think in cultural, social, economic and symbolic aspects.

3. Define the underlying values that house behind the interactions. If you need help, look at the basic human values list. Write them down next to the players. The devil's advocate will help to go into depth.

4. Think of metaphors to describe the found interactions, based on the values. Put them on post-its.

For example: For the interaction of knowledge between a library and students, one could think of a tribe in which the library is the wise elder and the students are the workers.

Legend: currency interactions

— Brandwer – Bedrijf ⟹ values
[service → hulpverlenend]
- authority
- responsible

— Media – Samenleving ⟹ values
[dienst → informeren]
- Honest

— Overheid – Samenleving ⟹ values
[value → veiligheid waarborg.]
- authority
- Health / family security
- preserving my public image

— toezichthouders – Overheid ⟹ values
[dienst]
- Responsible
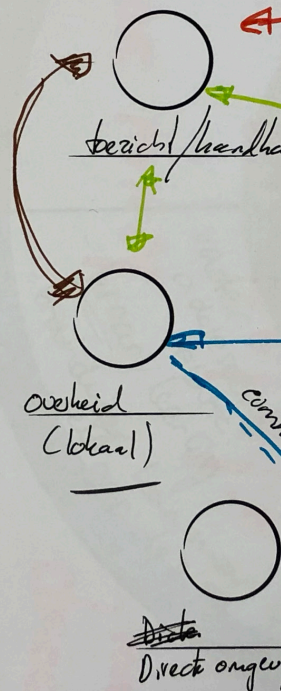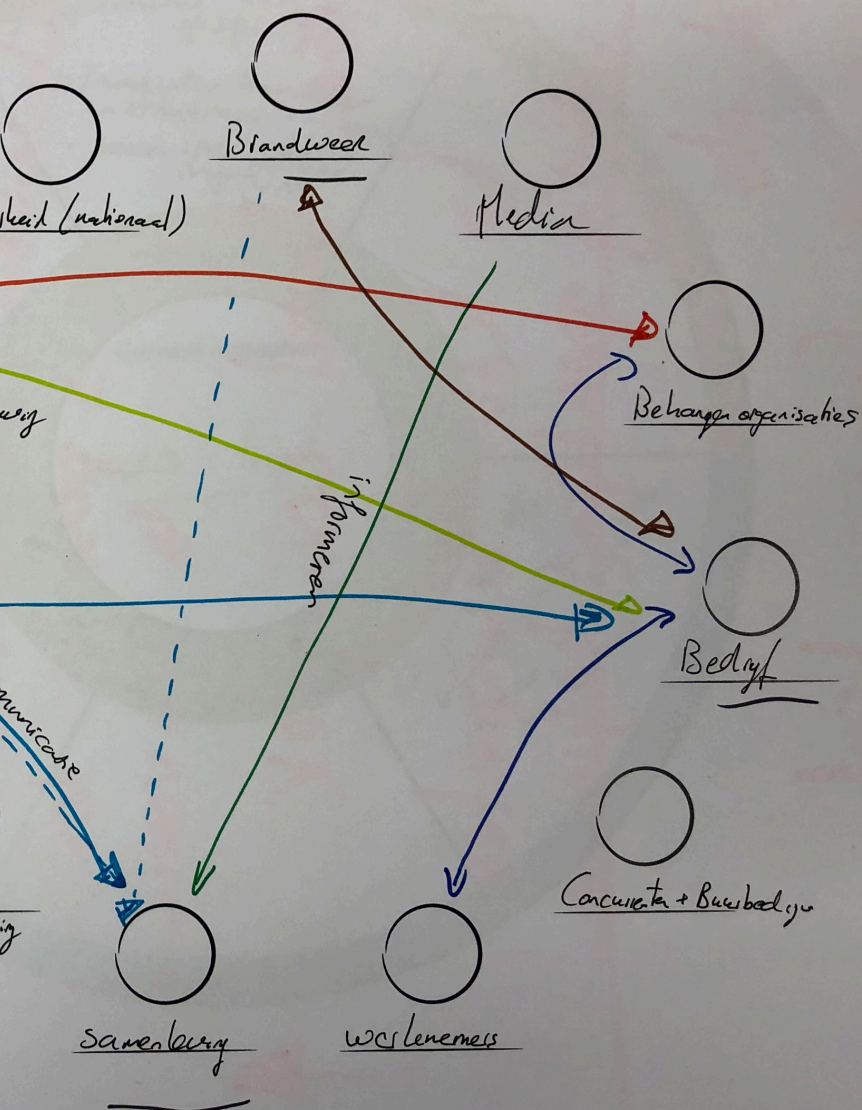
Ove

bericht / handha

Overheid
(lokaal)

com

Direct omgev

When shit hits the fan

Brandweer

Media

...heid (nationaal)

Behangen organisaties

...wij

informeren

Bedryf

...municatie

Concurrenten + Buurbedryu

...ij

Samenwerking

werknemers

Challenge the current metaphor based on the 6 elements of distributed ledger technology. There are different *What-ifs* for each category to help you think of new interactions and metaphors.
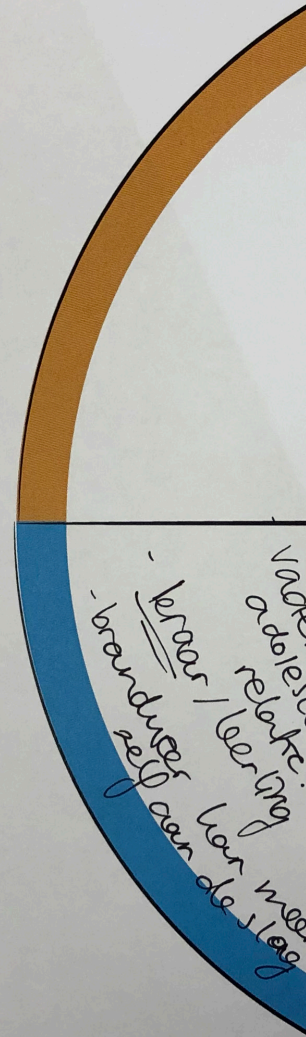
1. Redefine the interactions and create ideas by challenging the current metaphor (keep in mind the current context):

What if the interaction was not built on *current metaphor* but on *Transparency*?

For example: What would the role of the tribe elder (library) be if all workers (students) had open access to all knowledge?

2. Create new metaphors based on the newly found interactions.

For example: Instead of being the knowledge distributor, the elder could be a guiding light through all information when the workers have a specific quest.

Trust

- brandweer han zich opsplitsen
- brandweer han meer instrueren → self-discipline
- kan specifieker ingrijpen

Transparency

Integrity of data

Immutability

Current metaphor

Vader - kind

Versatility

Reliability

Privacy

- co-piloten vh
- vliegtuig
- samen het systeem besturen

Decentralization

XVI. Prototype 2.0 canvasses

Define the context you are in by going through the following steps.

1. Define all relevant players and map them by putting post-its with their name on the circle.

2. Draw lines between them to show their current interactions and discuss what the currency of exchange is; these are values, goods or services. Think in cultural, social, economic and symbolic aspects.

3. Pick a maximum of three interactions you want to explore further. Highlight these interactions by coloring over their lines. Next Define the underlying values that house behind the interactions. If you need help, look at the basic human values list. Use the legend to explain the lines and values.

4. Think of metaphors to describe the found interactions, based on the values. Write them down in the boxes.

Example metaphor:
Consider a city and its fight against crime currently as the metaphor:

Crime is a beast that should be locked up.

Legend: interactions

Color	Parties	Values

Metaphor

Metaphor

Metaphor

To create a future vision, new dimensions need to be explored. This is done by challenging the current metaphor by using the principles of distributed ledger technology.

1. Place the current system metaphor in the middle of the circle. Next, look through the 6 dimensions around it and use the explanatory cards to pick at least 3 to challenge the metaphor.

2. Per dimension, look through the different aspects to think of possible changes to the current system. Do so by looking at the different cards describing 'what if' scenarios for each aspect.

3. Create a new metaphor for each explored dimension and name the underlying values that play a role in this metaphor. Using the value map can help.

Example:
What if a city and its fight against crime would share its data openly with other organizations and the public?

- Citizens can recognize symptoms.
- Data from different organizations can be used to find patterns.

Example metaphor:
Crime is an infectious disease that can be treated with education and prevention.

Peer 2 peer

No 3rd party

A - - - B

Integrity of data

Integer people

Highest good

Anonymity

Privacy

No accountability

Full privacy

2 machine

Trust

Immutability

Data is right   Undeniable record Process overview   X-ray vision

Open process

Transparency

Real-time

Open access

Contract logic

Current metaphor

Equality

Versatility

Connectedness

Ownership

Authenticity

Reliability

Decentralization

Machine

Full legality

System in control   Automation

ON

55

Now new metaphors have been created, a future vision will be created.

1. Stick the new metaphor in the box and start thinking of ideas based on the metaphor. What solutions or scenarios can you think of that would fit within the new metaphor. Put them on small post-its.

2. Re-do the process for each newly found metaphor.

3. Discuss per post-it the 3 factors of design. How viable, desirable and feasible would it be? Depending on the outcomes, rank them on the circles of possible, plausible or probable.

4. Take a look at the current post-its ranking and pick your favorites from the possible and plausible rings to fill the preferable circle. Ideas have to stay in their respective rings

5. Develop a future vision based on the preferable circle.

Example:
Is data sharing of criminals and their behavior:

1. desirable from a human value perspective?
2. feasible from a data perspective?
3. viable from a business perspective?

— Desirable
✛ Feasible
— Viable

— 1. When looking at privacy, it is not desirable.
✛ 2. Data sharing to the public is feasible.
— 3. It might cost a lot to maintain structure and order when sharing all kinds of data to the public, making it less viable.

New metaphor

Socioeconomic

Viability
(Business)

Desirability
(Human)

IT

Feasability
(Technology)

Physical

Possible
Might happen

Plausible
Could happen

Probable
Business as usual

Preferable
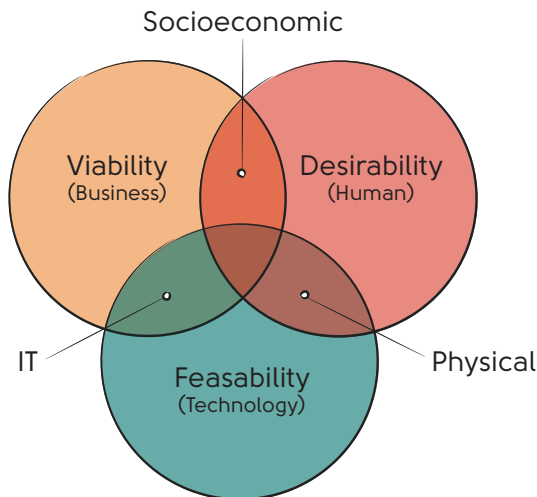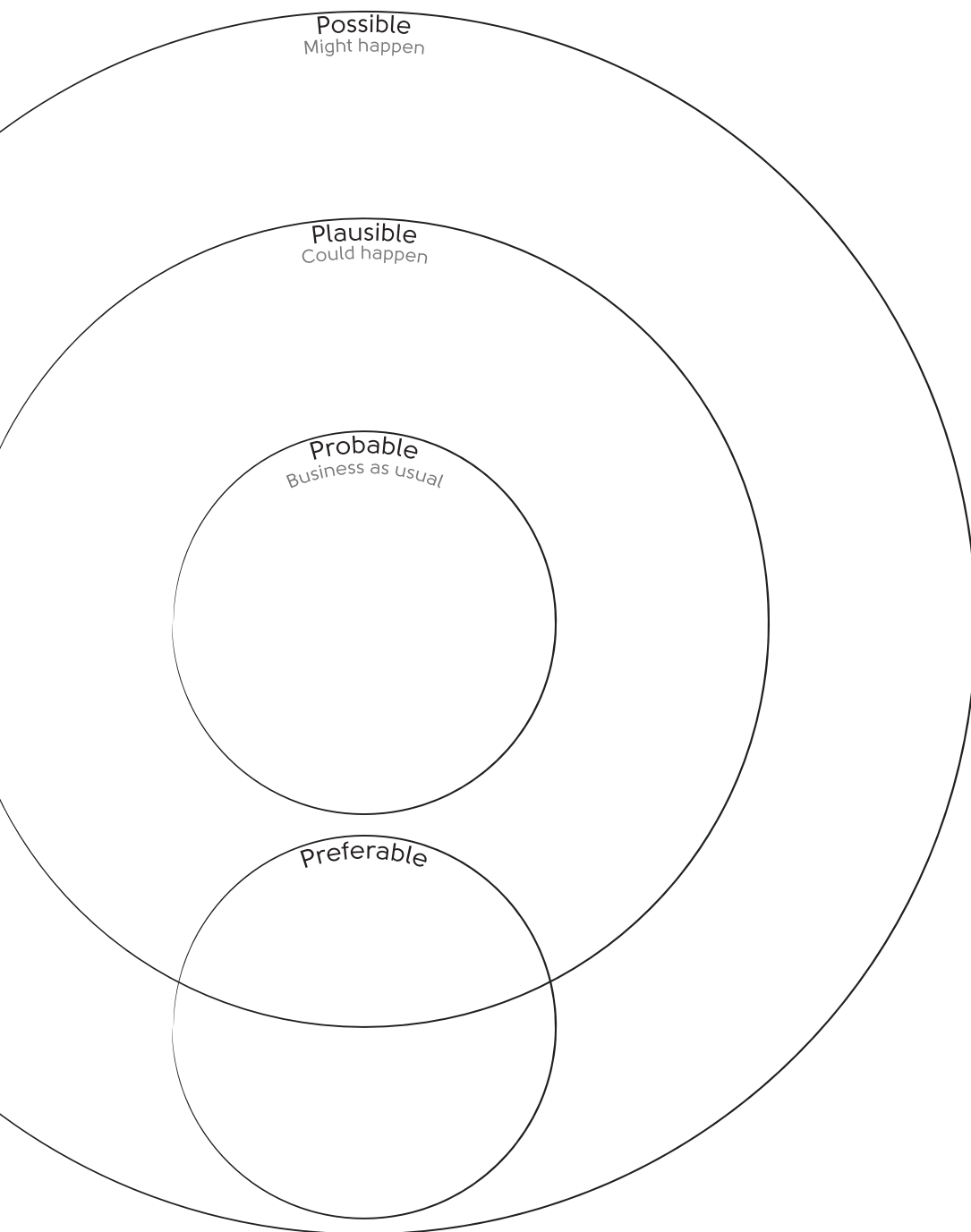
XVII. Prototype 2.0 "What-if" cards

Reliability

Reliability within the system means that it can operate based on predefined logic, creating a fully automated environment that needs no human interactions. This means machines can communicate to each other and regulate their own system.

What ifs:
- Full legality
- Automation
- Authenticity
- Machine 2 machine
- System in control

Example:

Think of a car that goes to the garage itself automatically when it needs repairs or to a car-wash when it needs to get washed. In this reliable system the whole process will be automated without human interaction.

Full legality

What if everything you do is automatically checked for legality?

When legal code can be build into transaction logic, the system will always make sure all action are legal. Legality would not be an issue.

What consequences would full legality have on the interactions in the system?

Automation

What if all processes and procedures are automated?

In a fully automated system, the machines can do all the hard work, without needing to get a salary.

What processes would change in the system and how would this effect the roles and interaction of the different players?

Authenticity

What if the system could guarantee online authenticity?

In a system that can create online authenticity, third party record keepers are no longer required.

How could online authenticity change the dynamics of the system? What roles would change?

Machine 2 machine

What if all machines in the system could communicate to each other?

In a system where all machines can communicate directly as peers, human interaction becomes unnecessary.

What machines could connect in your system and how would that change current roles and businesses?

System in control

What if you have no control over the system (think: computer says no)?

When the control lies within the system instead of with the players, a power shift happens. The system will always give the best advice.

What would happen to the existing powers when the system is in control? How will it change relationships and trust amongst parties?

Versatility

In distributed ledger technology, versatility means it allows you to make a connection to any system or environment. This allows for broad possibilities in connectedness, full flexibility, the incorporation of business logic and the use legal rules within transactions.

What ifs:
- Ownership
- Equality
- Connectedness
- Contract logic

Example:

Think for example of an automated shopping list, that checks your fridge and orders accordingly at the store and delivers it at your home.

Ownership

What if can own thing online or share ownership with others?

With DLT, digital ownership can be assigned without physical records. This means digital property can be authenticated and shared.

Who currently owns what and how could changes in ownership structure effect the current system?

Connectedness

What if you could connect (your systems) to every network on the planet?

Through DLT technology, sharing data on a safe and secure basis becomes accessible, allowing different networks of data to connect safely.

What networks would you want to connect the system to and how would it changes interactions?

Contract logic

What if you can put contract logic into a (automated) transactions? (if / then)

When contract and business logic can be added to digital transactions, automation replace a lot of human work.

What logic would you want to add to the system and how would it influence current roles and interactions?

Equality

What if everyone has access to the same resources?

In a system where all data is shared, there is a possibility to grant everyone access to the same resources.

What resources could be shared and how would shared resources changes the power structure of the current system?

Immutability

Immutability means that once verified, everything is set in stone. This way, no one can change anything afterwards and there is a single source of truth in the form of an undeniable record.

What ifs: • Process overview
• Undeniable record

Example:

Think of the a digital crime scene with time stamped fingerprints that cannot be erased and denied. This was no one can lie about previous actions or agreements.

Process overview

A:	10/11
B:	14/12
C:	23/12
D:	18/01

What if you could unearth every process from beginning to end with a single click?

In an immutable system, every process is recorded from beginning to end, without the possibility of revision or alteration.

What would you do when you can analyze entire processes from beginning to end; would this have consequences for the interactions in the system?

Undeniable record

What if everything is undeniably on the record and no one could lie?

In a system with where everything is undeniable, there cannot exist any lies, as everything is set in stone.

How would this effect the interactions within the system; do you still need supervisors?

Integrity of data

Integrity in a distributed ledger means that all transactions and data can be considered integer. One cannot lie about the parameters within the system; meaning you can trade directly with any-one without needing to know or trust them.

What ifs:
- Data is right
- Integer people
- Peer 2 peer
- No 3rd party

Example:

Think of buying candy from a stranger, with a 100% guarantee that the candy is safe and that the stranger will not rob you.

Data is right

What if the data is always right and can make the best choice for you?

In an integer system, the data know the best choices to be made and can give helpful advice.

How would you treat other people's data and what could you do with it to benefit you, if integrity is no problem.

Integer people

What if everyone is guaranteed integer and you do not need to know everyone personally?

When the data can prove integrity, you do not need to know everyone to trade with them.

How would this change the interactions in the system and what possibilities arise?

Peer 2 peer

What if you could interact and trade with everyone on a direct peer to peer basis?

When peers can trade and interact directly, they can trade goods and services without corporate interference, still maintaining lawful integrity.

What would direct peer trading mean in the current system and how would it changes the roles of the different players in it?

No 3rd party

What if there is no need for third parties or authorities?

In a system that can guarantee integrity through software, record keeping authorities or no longer needed. Think of banks, customs or notaries.

If integrity can be provided without third parties, how would this change current interactions?

Transparency

Transparency within distributed ledger technology means full openness of process and data. Think of it as Wikipedia: everyone can edit and check, all knowledge is open to everyone and there is a record of changes over time.

What ifs: • Open access   • X-ray vision

            • Real time   • Open process

Example:

Think of the new food tracking app by Albert Heijn which lets you track your oranges from beginning to end and which shows the circumstances of growth.

Open access

What if all your knowledge, data and information was accessible to everyone?

Meaning everyone can request access to your files and systems.

How would you behave in such an open world and how would it effect your role?

Real time

What if you could real time follow all processes and statuses around you?

This means you can real time monitor all processes around you.

How would you adapt to this and how would you use the new insights to change your business?

Open process
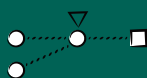
What if you had complete openness of process in your sector and can see what changed when and why?

When all data is transparent, everyone can see which moves are made when and why.

How would you behave in an open world and how would you use it to your advantage?

X-ray vision

What if you could look into everyone's process and all relevant information.

This is when you can x-ray all processes around you and obtain anything you want and need.

What would this do with the data and how could this effect the roles within the system?

Privacy

Privacy within distributed ledger technology means that you have guaranteed anonymity and full control of your identity. You get to decide who gets access to what regarding any personal data.

What ifs:
- Full privacy
- Anonymity
- No accountability
- Highest good

Example:

Think of going to the venetian carnival, you can do everything with a mask and decide when to take it off and for who to do so.

Full privacy

What if everything you do is guaranteed private and secure?

Meaning no one can link you to the data or the actions you perform within the system.

How would this effect the roles in the system and what would change about the current interactions?

Anonymity

What if everyone could operate in complete anonymity?

Meaning there is no way of knowing who is behind the nodes in the system, ergo, you have no clue who you are in business with.

What would this change about your business logic and how would it effect your business model?

No accountability

What if no-one could be held accountable as an individual or a firm?

If everything is private, the system bears the burden and no individual can be held accountable.

How would you maintain stability in such a system and how can the roles change accordingly?

Highest good

What if privacy is the highest attainable good?

What if at all cost, privacy had to be the most important constant?

How would the system maintain privacy and what would the consequences be for each party?

XVIII. Prototype 2.0 results

Define the context you are in by going through the following steps.

1. Define all relevant players and map them by putting post-its with their name on the circle.

2. Draw lines between them to show their current interactions and discuss what the currency of exchange is; these are values, goods or services. Think in cultural, social, economic and symbolic aspects.

3. Pick a maximum of three interactions you want to explore further. Highlight these interactions by coloring over their lines. Next Define the underlying values that house behind the interactions. If you need help, look at the basic human values list. Use the legend to explain the lines and values.

4. Think of metaphors to describe the found interactions, based on the values. Write them down in the boxes.

Example metaphor:
Consider a city and its fight against crime currently as the metaphor:

Crime is a beast that should be locked up.

Legend: interactions

Color	Parties	Values
roze	patient	health
	huisarts	helpfulness
	zorgverzekeraar	privacy
	apotheek	social power

Metaphor:

Auto lease

h.a.= monteur
patiënt = autorijder
verzekeraar: leasemaker
apotheek: levert onderdelen

Metaphors

Title _____

Metaphor:
_____
_____
_____

65

To create a future vision, new dimensions need to be explored. This is done by challenging the current metaphor by using the principles of distributed ledger technology.

1. Place the current system metaphor in the middle of the circle. Next, look through the 6 dimensions around it and use the explanatory cards to pick at least 3 to challenge the metaphor.
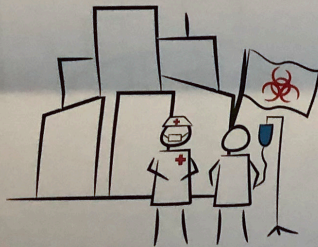
2. Per dimension, look through the different aspects to think of possible changes to the current system. Do so by looking at the different cards describing 'what if' scenarios for each aspect.

3. Create a new metaphor for each explored dimension and name the underlying values that play a role in this metaphor. Using the value map can help.

Example:
What if a city and its fight against crime would share its data openly with other organizations and the public?

- Citizens can recognize symptoms.
- Data from different organizations can be used to find patterns.

Example metaphor:
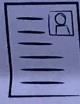*Crime is an infectious disease that can be treated with education and prevention.*

Peer 2 peer

No 3rd party

A - - - B

Integrity of data

Integer people

Highest good

Anonymity

Privacy

No accountability

Full privacy

Machine 2 machine

Trust · Immutability · Undeniable record · Process overview · X-ray vision · Transparency · Real-time · Open access · Contract logic · Equality · Connectedness · Versatility · Ownership · Authenticity · Automation · System in control · Full legality · Decentralization · Reliability

geen regels maar richtlijnen

info voor patiënt

openbare kennis

minder kost

patiënt is de baas

verantwoordelijkheid bij patiënt

de sleutel

Now new metaphors have been created, a future vision will be created.

1. Stick the new metaphor in the box and start thinking of ideas based on the metaphor. What solutions or scenarios can you think of that would fit within the new metaphor. Put them on small post-its.

2. Re-do the process for each newly found metaphor.

3. Discuss per post-it the 3 factors of design. How viable, desirable and feasible would it be? Depending on the outcomes, rank them on the circles of possible, plausible or probable.

4. Take a look at the current post-its ranking and pick your favorites from the possible and plausible rings to fill the preferable circle. Ideas have to stay in their respective rings

5. Develop a future vision based on the preferable circle.

Example:
Is data sharing of criminals and their behavior:

1. desirable from a human value perspective?
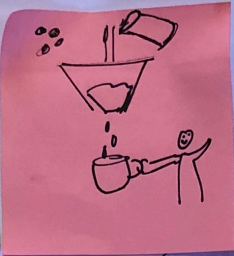2. feasible from a data perspective?
3. viable from a business perspective?

1. When looking at privacy, it is not d...
2. Data sharing to the public is feasible...
3. It might cost a lot to maintain structure and order when sharing all kinds of data to the public, making it less viable.

Handwritten notes (post-its):
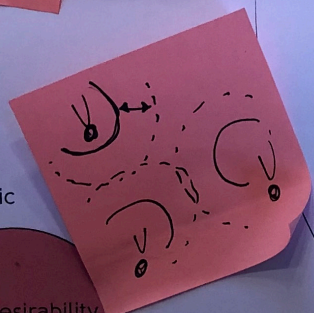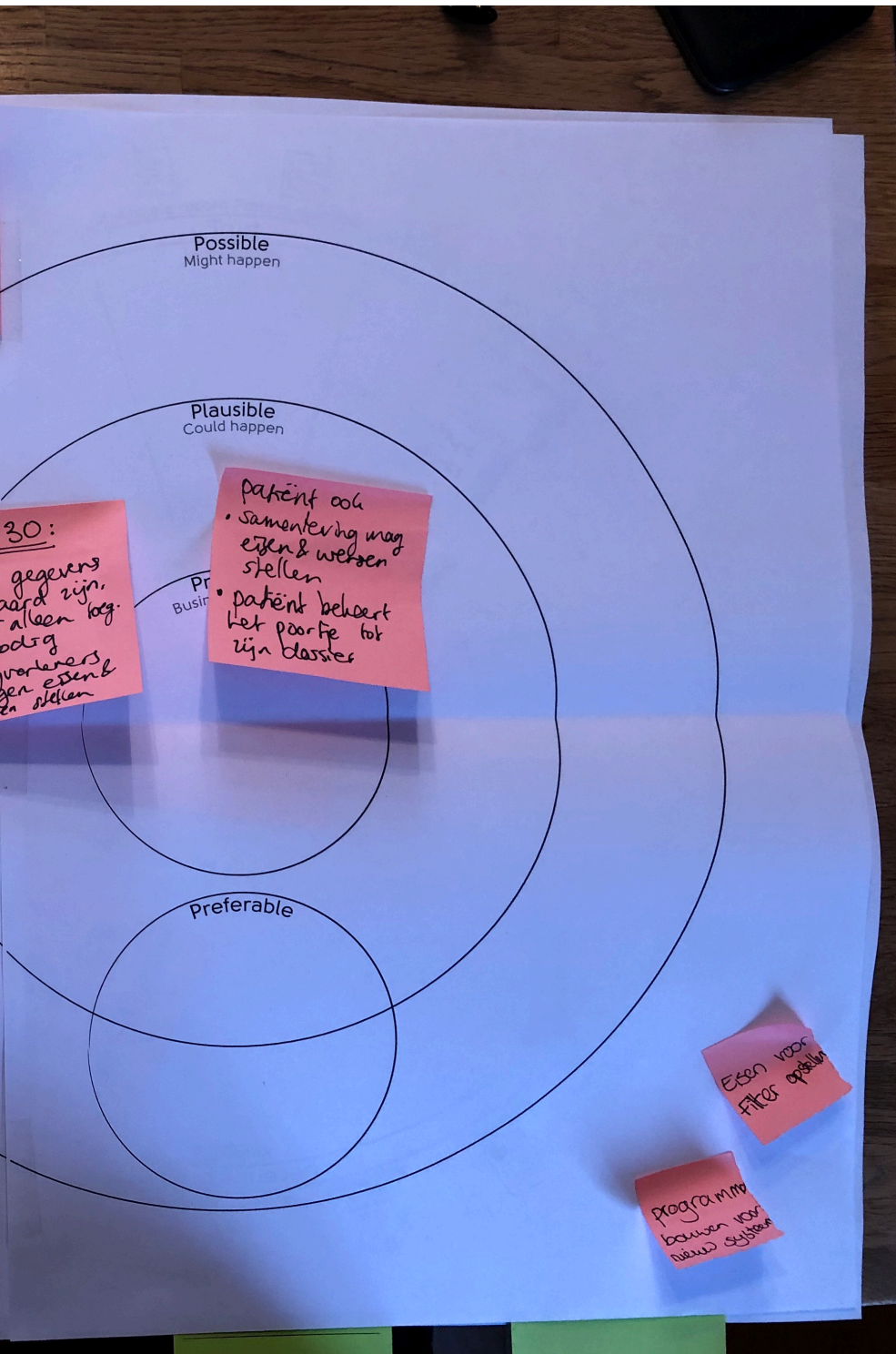
Metaphor:
DEPD ?
"systeem" koffiefilter
+ drab ... verzamelaar
patient is koffiedrinker

- autonomy
- freedom
- healthy
- responsible
- clean / pure /
- sober

autonome
vs.
goede zorg?

wat de poortje de functies?

mobiel

patiënt han parameters wijzen voor een zelfden hand poortje

2O
- alle bew...
maa...
als n...
- 20...
mo...
wer...

---

economic

Desirability
(Human)

IT

Feasability
(Technology)

Physical

Possible
Might happen

Plausible
Could happen

Pr...
Busi...

Preferable

30:
gegevens
...aard zijn,
...alleen toeg.
...dig
...verleners
...gen eisen &
...n stellen

patiënt ook
• samenleving mag
  eisen & wensen
  stellen
• patiënt beheert
  het poortje tot
  zijn dossier

Eisen voor
filter opstellen

programma
bouwen voor
nieuw systeem

XIX. Prototype 3.0 canvasses

Privacy

Privacy within distributed ledger technology means that you have guaranteed anonymity and full control of your identity. You get to decide who gets access to what regarding any personal data.

Example:
Think of going to the venetian carnival, you can do everything with a mask and decide when to take it off and for who to do so.

Transparency

Transparency within distributed ledger technology means full openness of process and data. Think of it as Wikipedia: everyone can edit and check, all knowledge is open to everyone and there is a record of changes over time.

Example:
Think of the new food tracking app by Dutch supermarket Albert Heijn, which lets you track your oranges from beginning to end and which shows the circumstances of growth.

Versatility

In distributed ledger technology, versatility means it allows you to make a connection to any system or environment. This allows for broad possibilities in connectedness, full flexibility and the incorporation of business logic within transactions.

Example:
Think for example of an automated shopping list, that checks your fridge and orders accordingly at the store and delivers it at your home.

Immutability

Immutability means that once verified, everything is set in stone. This way, no one can change anything afterwards and there is a single source of reference in the form of an undeniable record.

Example:
Think of the a digital crime scene with time stamped fingerprints that cannot be erased and denied. This was no one can lie about previous actions or agreements.

Reliability

Reliability within the system means that it can operate based on predefined logic, creating a fully automated environment that needs no human interactions. This means machines can communicate to each other and regulate their own system.

Example:
Think of a car that goes to the garage itself automatically when it needs repairs or to a car-wash when it needs to get washed. In this reliable system the whole process will be automated without human interaction.

Integrity of data

Integrity in a distributed ledger means that all transactions and data can be considered integer. One cannot lie about the parameters within the system; meaning you can trade directly with anyone without needing to know or trust them.

Example:
Think of buying candy from a stranger, with a 100% guarantee that the candy is safe and that the stranger will not rob you.

Consider the impossible

Workshop: introduction to network thinking and blockchain

Project aim (title):

My organisation:

My goals:

- _____
- _____
- _____

My values:

- _____
- _____
- _____

Discover your ecosystem

1. Define all players that are in your ecostystem by placing them with post-its on the circle.

2. Define the interactions in the ecosystem by drawing lines between the players. Next, write down what currency of exchange is; these are values, goods or services that can be economic (ex. money), sociocultural (ex. help) or symbolic (ex. comfort).

3. Define the top 3 of values that matter most in your ecosystem. Write them down below.

Example:

Step 1

Step 2

Step 3

System values:

- _____
- _____
- _____

E...
tit...

cosystem
tle: _____

You
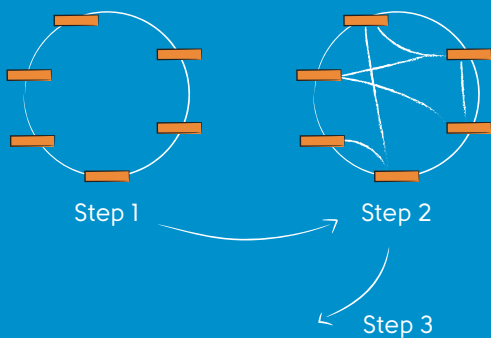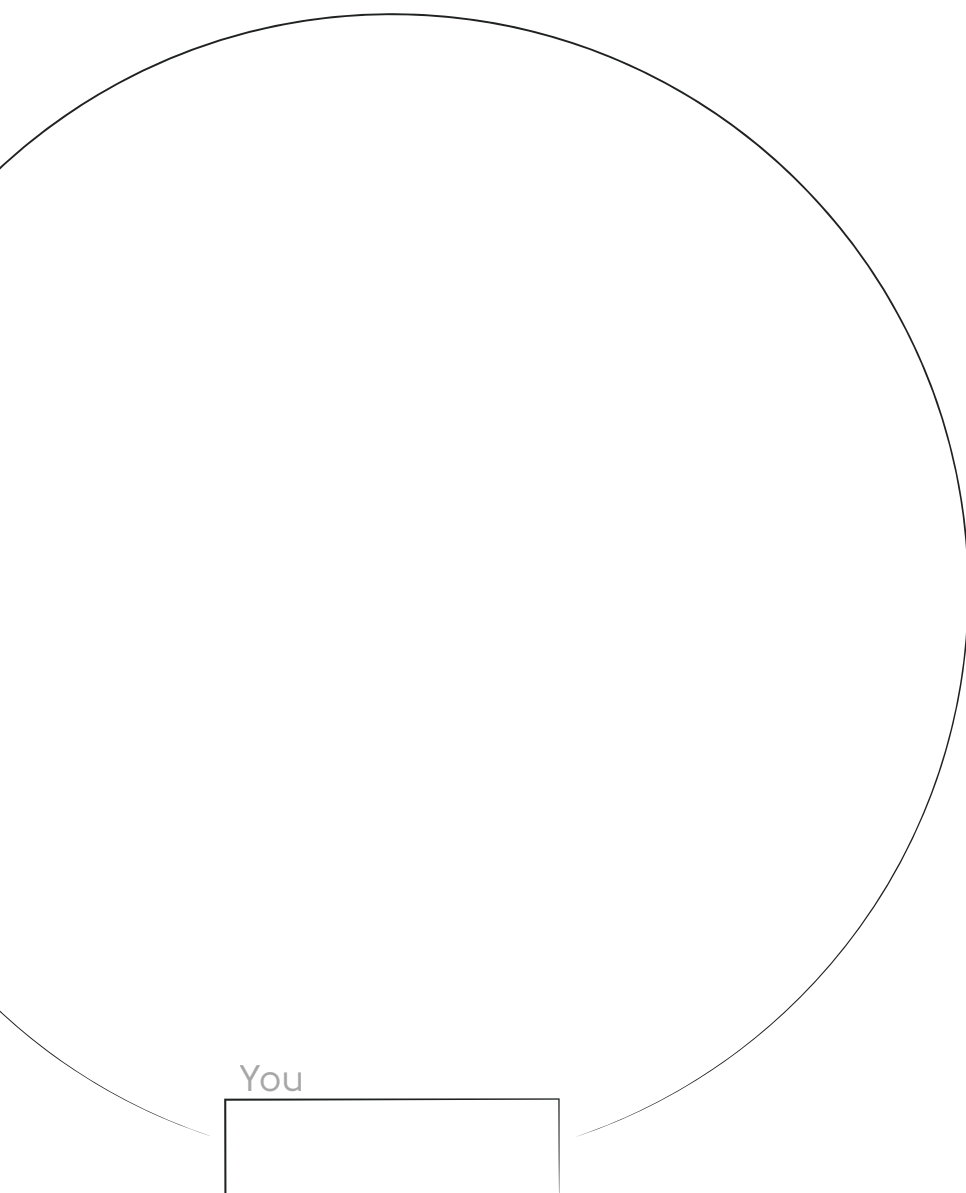
1. Define the shared ecosystem

In order to understand the impact of a blockchain, a networking technology, it is important to first start to map your network or ecosystem (= all players that have a direct or indirect influence on the system).

1. Define all relevant players and map them by putting post-its on the circle.

2. Draw lines between them to show their interactions and discuss per line what the currency of exchange is; these are values, goods or services that can be economic (ex. money), sociocultural (ex. help) or symbolic (ex. comfort).

3. Define the top 3 values in your shared ecosystem. Write them down below.

4. Find a maximum of three critical points within the system that you feel could be improved. A critical point might be an imbalanced interaction, a dilemma or a weakness in the ecosystem.
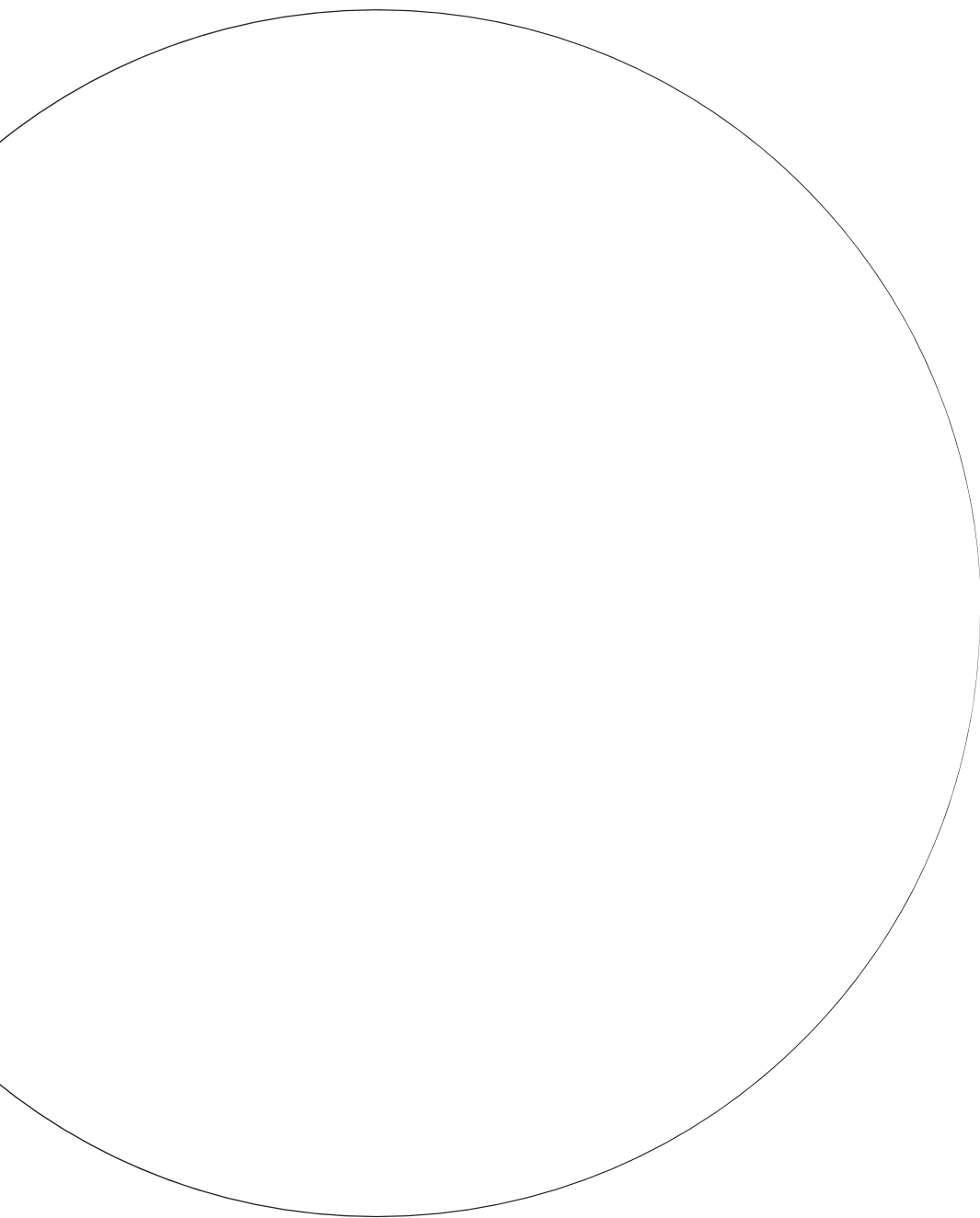
Example:

Step 1   Step 2

Step 3

System values:

- _____
- _____
- _____

Step 4
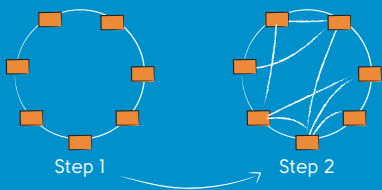
Critical points:

- _____
- _____
- _____

3. Write down the worldviews that enable these causes

Ex. Industrialism/materialism/ western individualism

4. Create a metaphor that describes the worldview

Ex. The Very Hungry Caterpillar

2. Develop a deeper understanding

Now that the shared ecosystem and its critical points have been defined, it is key to understand how these critical points have come to be. For this, the four steps of the causal layered iceberg have been created. Discuss each step briefly and write down your findings as a group.
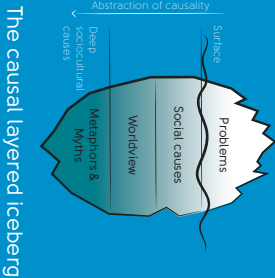
For more guidance, look at the example in the boxes.

The causal layered iceberg

1. Write down the ciritical points/interactions

Ex. Traffic congestion/pollution

2. Write down systemic/social causes behind these points

77

3. Explore the blockchain

Now you understand the critical points in your ecosystem, it is time to see what solutions a blockchain could offer. Look on the back of your booklet and read through the six mentioned aspects that define the basic abilities of this technology.

The facilitator will now take you through the different aspects. Write down your considerations in the corresponding slice.

When barriers or dilemmas pop up during the discussion, don't try to solve them immediately, but instead write them down below.

After all aspects have been discussed, write down a maximum of three most promising areas that might help you in the future.
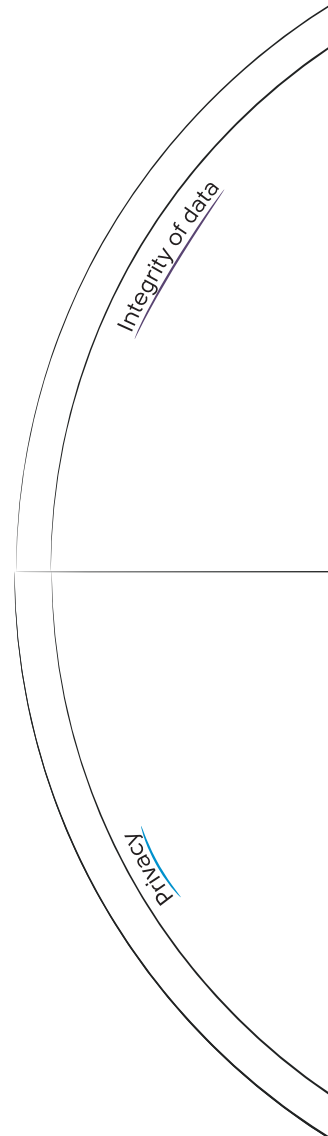
What barriers or dilemmas arise?

- _____
- _____
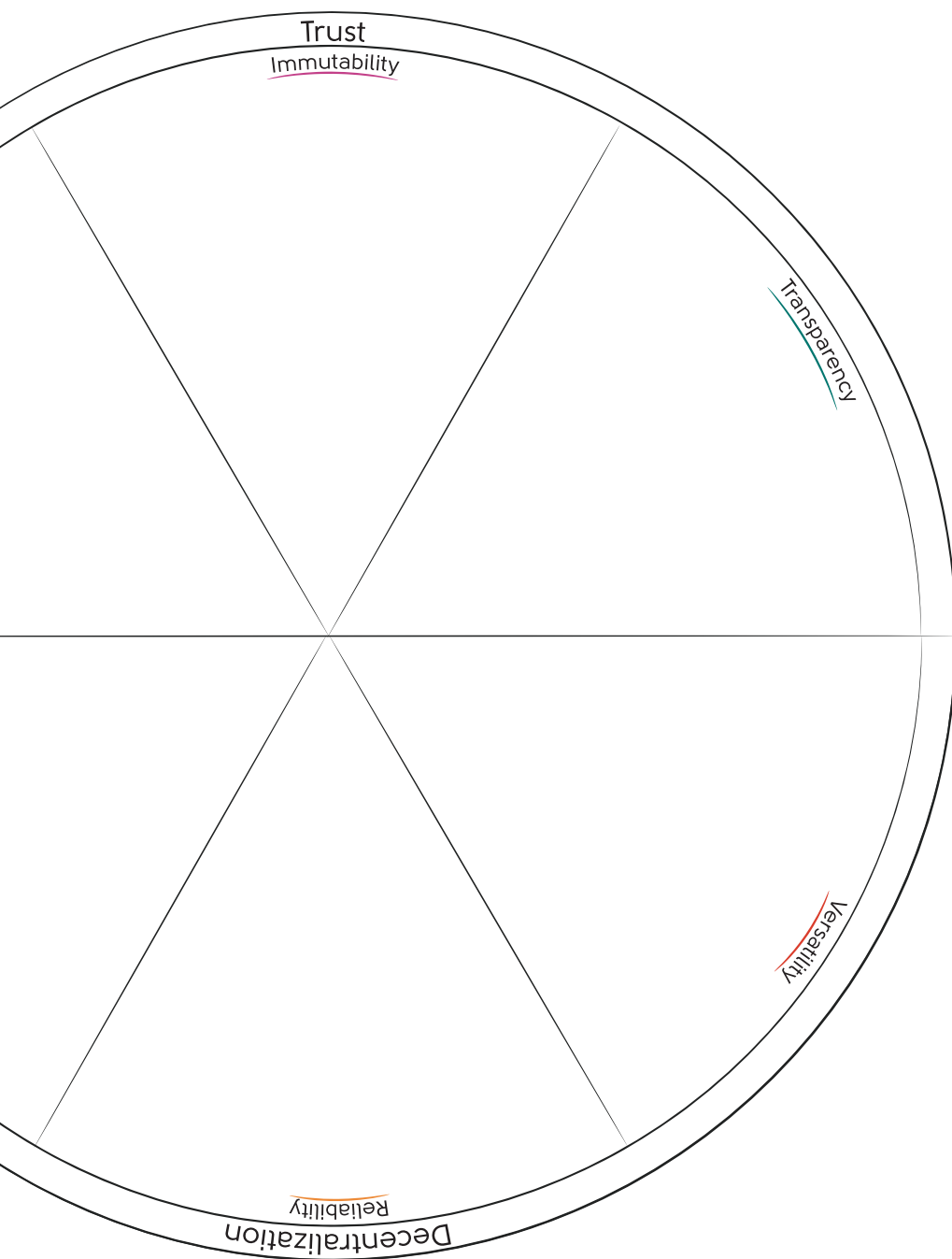 _____
- _____
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- _____

Which aspects fit best to tackle the critical points in your system?

- _____
- _____
- _____

Ecosystem title

Integrity of data

Privacy

e: _____

Trust

Immutability

Transparency

Versatility

Decentralization

Reliability

4. Deliver a future headline

Now create a headline for the future (2030) that is the solution to your problems.

Make it something of which everyone will say that is impossible.

The X

Extra edition

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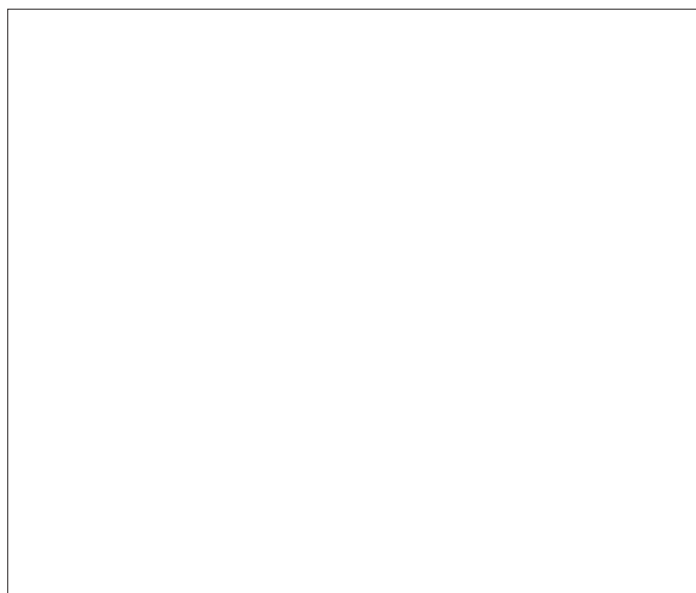
Daily Telegraph

22 june 2030   Extra edition

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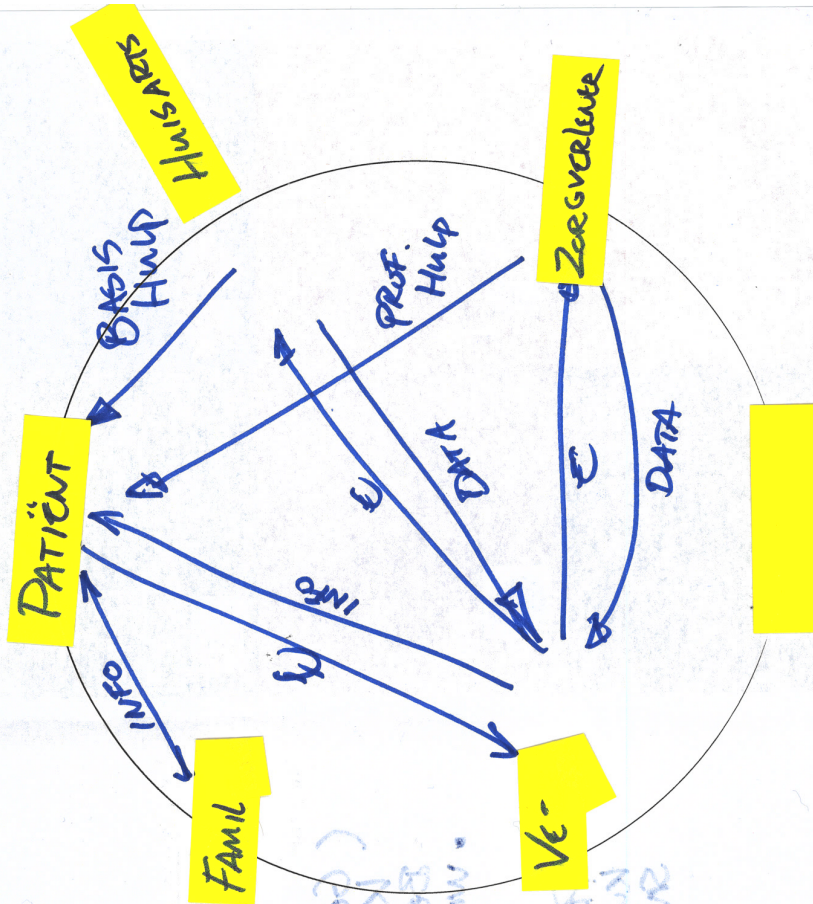
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XX. Prototype 3.0 results

Title project ___EPD___

My organisation ___PATIËNT___

My goals:
- (GESCHIEDENIS INZIEN)
- KOSTEN
- BETER WORDEN
- WAAR/HOE KAN DAT?

My values:
- PRIVACY
- KWALITEIT (GEEN KWAK-
- SNELHEID   ZALVERIJ)

MAATSCHAPPIJ
VEILIGHEID
VERTROUWEN

Transparency

Transparency within distributed ledger technology means full openness of process and data. Think of it as Wikipedia: everyone can edit and check, all knowledge is open to everyone and there is a record of changes over time.

Example:
Think of the new food tracking app by Albert Heijn which lets you track your oranges from beginning to end and which shows the circumstances of growth.

Immutability

Immutability means that once verified, everything is set in stone. This way, no one can change anything afterwards and there is a single source of truth in the form of an undeniable record.

Example:
Think of the a digital crime scene with time stamped fingerprints that cannot be erased and denied. This was no one can lie about previous actions or agreements.

13:37

Integrity of data

Integrity in a distributed ledger means that all transactions and data can be considered integer. One cannot lie about the parameters within the system; meaning you can trade directly with anyone without needing to know or trust them.

Example:
Think of buying candy from a stranger, with a 100% guarantee that the candy is safe and that the stranger will not rob you.

Privacy

Privacy within distributed ledger technology means that you have guaranteed anonymity and full control of your identity. You get to decide who gets access to what regarding any personal data.

Example:
Think of going to the venetian carnival, you can do everything with a mask and decide when to take it off and for who to do so.

Versatility

In distributed ledger technology, versatility means it allows you to make a connection to any system or environment. This allows for broad possibilities in connectedness, full flexibility, the incorporation of business logic within transactions.

Example:
Think for example of an automated shopping list, that checks your fridge and orders accordingly at the store and delivers it at your home.

Reliability

Reliability within the system means that it can operate based on predefined logic, creating a fully automated environment that needs no human interactions. This means machines can communicate to each other and regulate their own system.

Example:
Think of a car that goes to the garage itself automatically when it needs repairs or to a car-wash when it needs to get washed. In this reliable system the whole process will be automated without human interaction.

Now you will define your ecosystem

1. Define all players that are in your
ecostystem by placing them on the circle.

2. Define the interactions in the ecosystem
by drawing lines between the players. Next,
write down what currency of exchange is;
these are values, goods or services. Think in
cultural, social, economic and symbolic
aspects.

3. Define a top 3 of values that matter in
your ecosystem. Write them down below.

System values:

- TRANSPARANTIE
- SOLIDARITEIT
- KWALITEIT

Title project _elektronisch patiënt dossier_ [EPD]

My organisation _Zilveren Stee verzekering_

My goals:
- Goede zorg voor iedereen
- Betaalbaar zorg
- Om zorgen

My values:
- In leven
- Solidariteit
- Groen zален

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Players (pink notes): Huisarts · Verzorger · Familie (mantel) · Patient · Zorg aanbieder · Verzekeraar · Overheid · Publieke diensten (politiek)

System values:

- Gezondheid bevolking
- integriteit
- Betaalbaarheid

Title project __Elektronisch Patienten Dossier__

My organisation __Dokter__

My goals:

- Patienten genezen
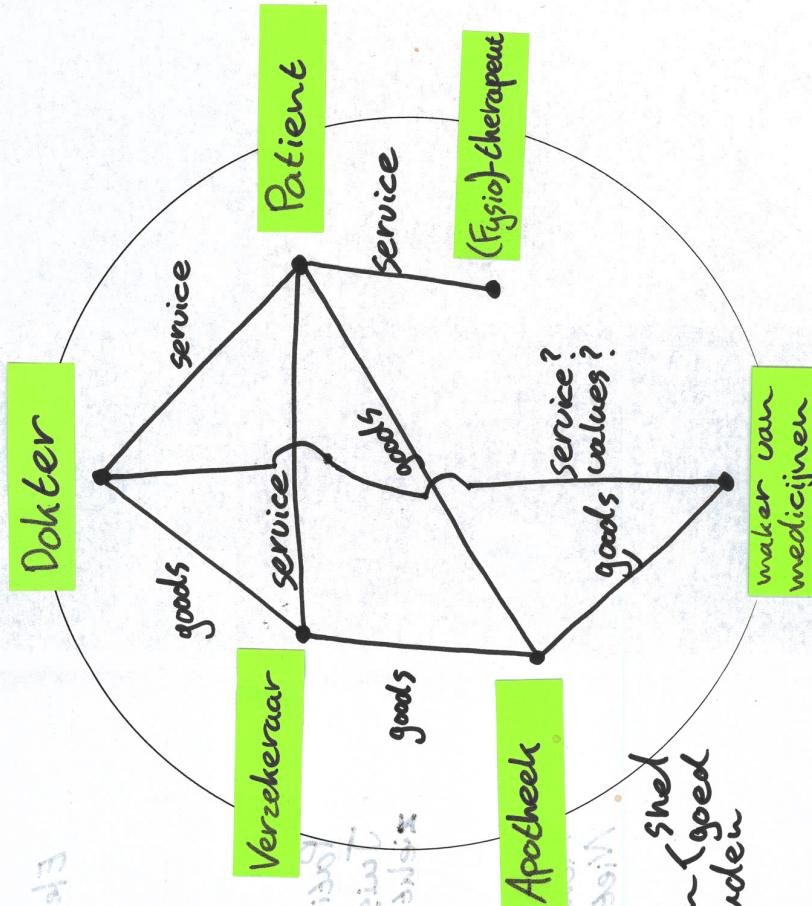- Juiste diagnoses stellen
- ziektes voorkomen

My values:

- Mensen helpen
- Niet te dure diensten aanbieden

Privacy

Privacy within distributed ledger technology means that you have guaranteed anonymity and full control of your identity. You get to decide who gets access to what regarding any personal data.

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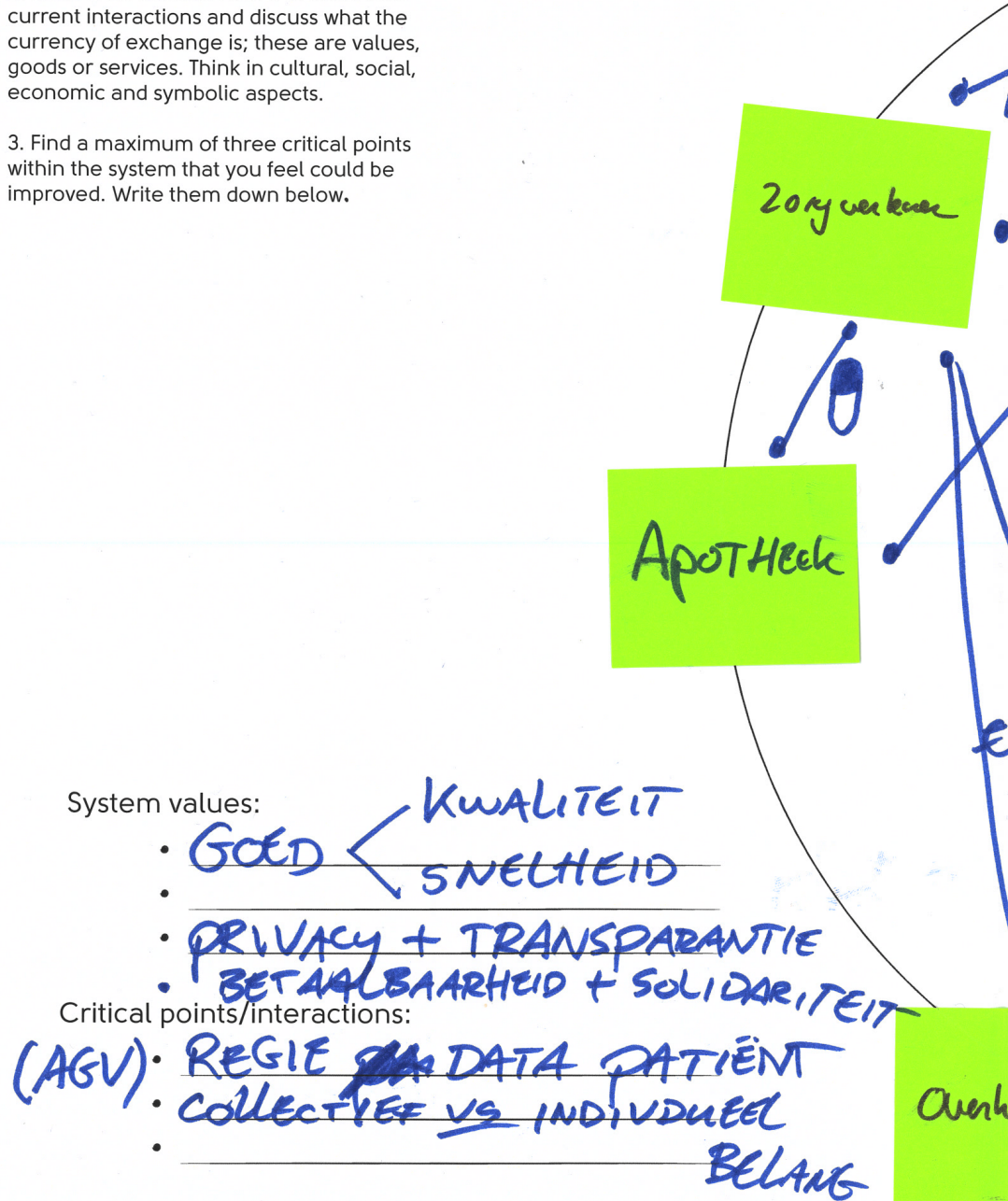

System values:

- mensen genezen (snel (goed
- kosten laag houden
- _____

Define the context you are in by going through the following steps.

1. Define all relevant players and map them by putting post-its with their name on the circle.

2. Draw lines between them to show their current interactions and discuss what the currency of exchange is; these are values, goods or services. Think in cultural, social, economic and symbolic aspects.

3. Find a maximum of three critical points within the system that you feel could be improved. Write them down below.
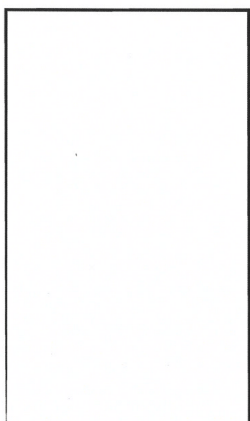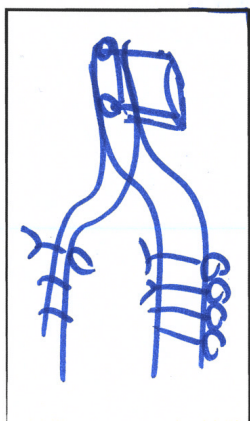
Zorgverzekeraar

Apotheek

Overh

System values:
- GOED < KWALITEIT / SNELHEID
-
- PRIVACY + TRANSPARANTIE
- BETAALBAARHEID + SOLIDARITEIT

Critical points/interactions:
(AGV) · REGIE DATA PATIËNT
· COLLECTIEF VS INDIVDUEEL BELANG
·

PATIËNT

FAMILY + FRIENDS

HUISARTS

stein / zorg / info / geld

ZORG

INFO (+ €)

1e Diagnose + "Behandeling" / doorverwijzing

INFO + SERVICE

INFO

€

MEDICIJNEN

€

€

€

POLITIEKE WAARDEN

€ INFO

€

€ + REGELS

Verzekeraar

...leid

mijbvill
Data = Geld

neinherk wer
'vije' wi?
pe Celg'lcheis

(NL)
Westers wold view

suravive of the fillest

4. Create a metaphor that describes the worldiew

Oy bally 317
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1. Write down the ciritical points/interactions
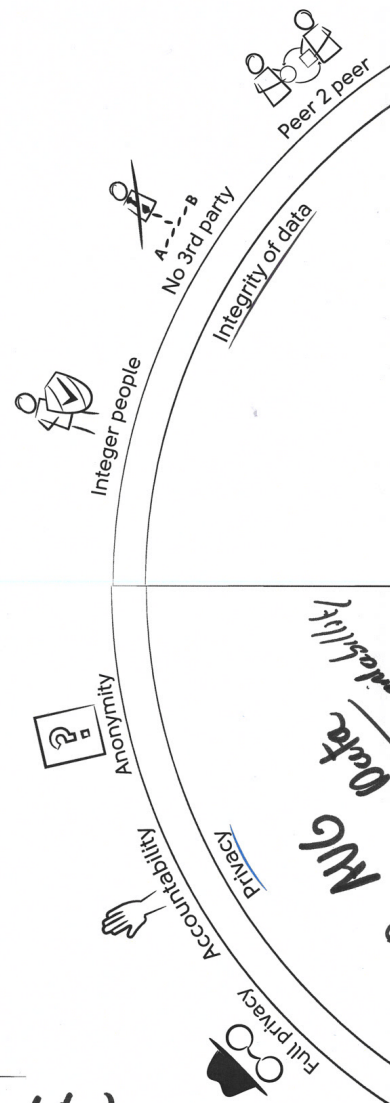
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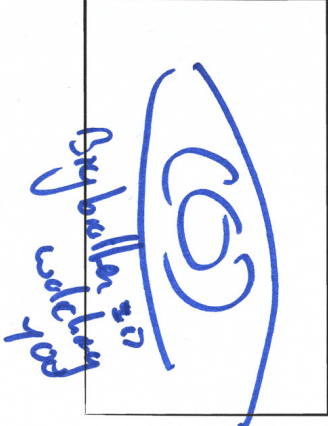
collectief vs. individu

2. Write down systemic/social causes behind these points

vertrouwen
transparantie
Gebrek aan controle

Natuurlijkheid
Solidariteit
iko

Now distributed ledger technology is introduced. Look on the back of your booklet and read quick through the six mentioned aspects.

The facilitator will take you through the different aspects now.

Peer 2 peer

No 3rd party
A - - - - B

Integrity of data

Integer people

Anonymity

Accountability

Privacy

Full privacy

Which aspects do you like best?

- integriteit van Data
- Transparantie proces (collectieve data)
- immutability niet bij met absolutewaarden (medium)
- _____
- _____
- _____

Undeniable record

Timeline

Trust

Immutability

Open process

Transparency

Real-time

Open access

Contract logic

Equality

Connectedness

Versatility

Ownership

Automation

Reliability

Decentralization

Autonomous systems

Machine 2 machine

als data Geclelete kan worden

tactisl lastig bij niet absolute waarden

process

vitleg baarheid

(tot aggreerde data) collectieve data

logic en contract netwerk bij ons

kan het afleveren

Robustness systeem

10/01

Now create a headline for the future (2030) that is the solution to your problems.

Make it something of which everyone will say that is impossible.

The I

Consoritum

XXX introducent:

EpD
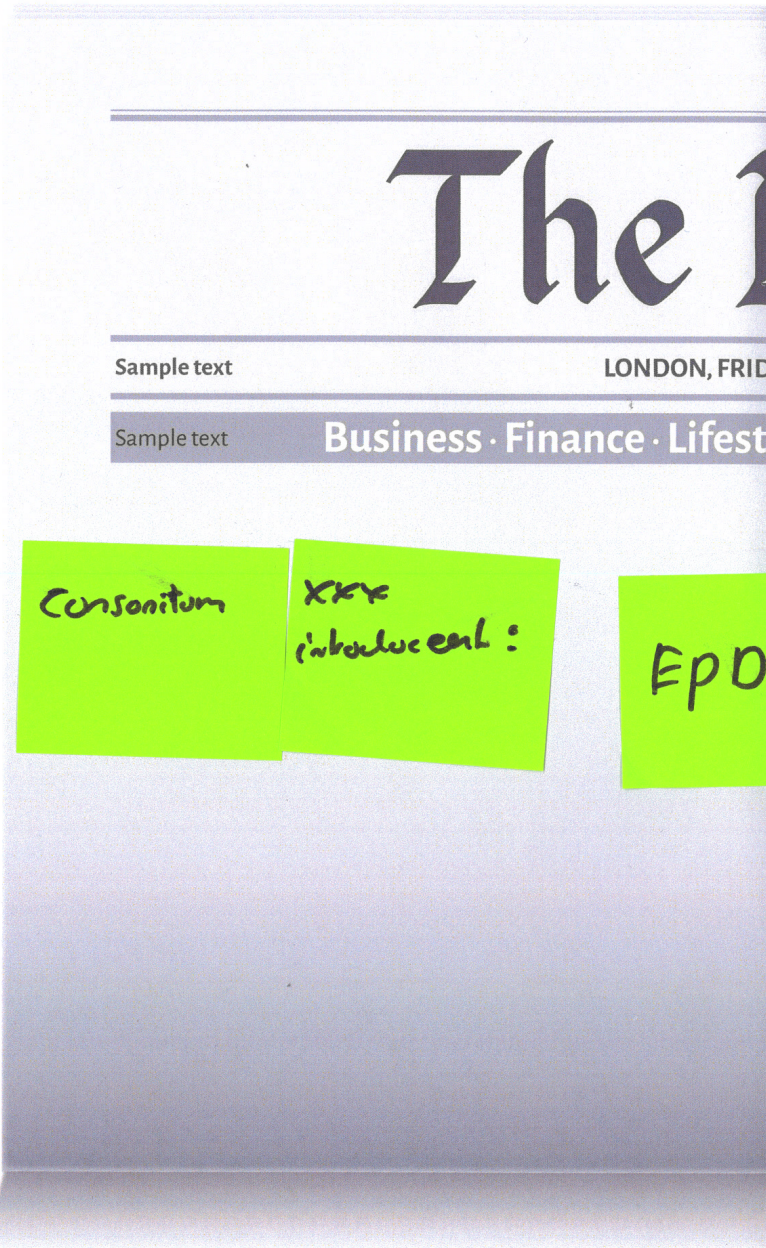
EPD$^{2.0}$ als panacea voor de zorg: verlaagd kosten, waarborgd' vertrouwen + kwaliteit

Double degree
Master thesis

Sander van Welsem

Delft University of Technology

March 2019