Amsterdam University of Applied Sciences

Centre for Design Informatics: Blockchain City

Exploring Possible Futures with Design Fiction, Technology Probes and Experience Prototyping

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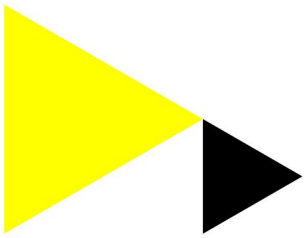

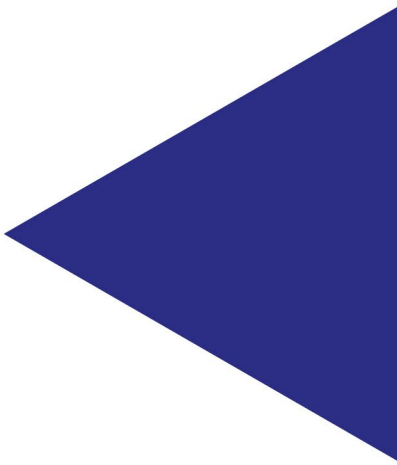

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Creating Tomorrow

A LAB OF LABS: METHODS AND APPROACHES FOR A HUMAN-CENTERED DESIGN

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A LAB OF LABS: METHODS AND APPROACHES FOR A HUMAN-CENTERED DESIGN

Gabriele Ferri & Martijn de Waal (editors)

COLOPHON

A Lab of Labs: Methods and Approaches for a Human-Centered Design

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CONTENTS

Preface **5**
Introduction **7**
Waag Society: Designing inclusive interactions **15**
Ideal Lab: Roots and identities **25**
Fields of View: Designing for dialogue and sociality in smart cities **37**
Kitchen Budapest (KiBu): Hyperlocal civic platforms **49**
Centre for Design Informatics: Blockchain City **59**
Conclusions **69**

CENTRE FOR DESIGN INFORMATICS: BLOCKCHAIN CITY

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EXPLORING POSSIBLE FUTURES WITH DESIGN FICTION, TECHNOLOGY PROBES AND EXPERIENCE PROTOTYPING

THE LAB

The Centre for Design Informatics is a research group situated across the schools of Edinburgh College of Art and Informatics at the University of Edinburgh. The Centre's central concern is the increasing flow of data in society and, in particular, its consequences for interaction between humans as well as between humans and things in relation to newly emerging complex digital economic systems. What kind of value systems underpins the organization of these flows of data, and what alternatives are thinkable?

The projects the Centre engages in typically aim to build and test working data-driven prototypes. These products and services aim to 'eff' (express, make experienceable) the ineffable: they make real the ideas that underpin the emerging algorithmic society. Through their proto-

types, probes and design fictions, the Centre wants to make tangible ideas that otherwise seem abstract and over-complicated. Similarly, researchers at the Centre build systems that give glimpses into near future social, technical and economic experiences, starting from the adage 'When people can see what might happen – and what might go wrong – they are better placed to shape what should happen.' As such the Centre aims to shape the debate about the development and impact of new technologies by creating alternative imaginaries for their future use.

For instance in their ThingTank project, carried out in collaboration with Elisa Giaccardi (TU Delft) and Neil Rubens (University of Electro-Communications, Tokyo), various probes for smart things were designed around which future use scenarios were envisaged. The point of departure for the ThingTank was the idea that 'things' may soon know more about our lives than we do and may also be able to make suggestions about what is missing. As one example, a set of cutlery was designed that was able to measure health-related data of the food consumed with it. It was to spur a debate around questions such as: Who would have access to these data? What would the uptake of such eating utensils mean, and how would it change the way we organize our meals? And what counter-strategies would consumers come up with to game the technology, to make it think they were eating healthier than we actually were? By developing technology probes and design fiction scenarios, it was the aim to identify novel patterns of use within the data that is streamed through the interaction between people and things, and between things and things.

THE CHARRETTE

If the representation of economic value is changed, does the value it represents change as a consequence? Chris Speed, Dave Murray-Rust, and Larissa Pschetz from the Centre for Design Informatics (CDI) from Edinburgh, led a charrette on the future of blockchain transaction technologies to explore possible answers to this dilemma. Drawing from the interdisciplinary background of CDI, participants in the charrette were introduced to technology probes, experience prototyping, and design fiction as methods to begin imagining alternative economic systems built around blockchain technology and using crypto-currencies such as Bitcoin.

The CDI methodology demonstrated in this charrette exemplifies a combination of speculation, deployment, and prototyping, all carried out in a playful and accessible manner. In this specific case, the challenge was to make the complex mechanics of the blockchain understandable to designers, theorists, activists, and coders alike. We point towards this methodology as an effective way to 'think through' the interplay of digital and non-digital practices – in this case, offline and online transactions. Participants were invited to think about 'the affordances of money if it were to become software', to unpack the economic systems that govern everyday digital transactions and to explore alternative ways of conceptualizing them.

BLOCKCHAIN, BITCOIN, AND SMART CONTRACTS

The blockchain is a means for the peer-to-peer exchange of value; it was formed as a reaction against the centralized power of third parties, such as banks or governments, over monetary transactions. It is a distributed database that tracks completed and ongoing transactions. This technology disrupts the asymmetry that sometimes exists in the digital age – as in the case of the data created by us being owned by a handful of powerful companies or governments – and enables everyone to take part in the decision-making system instead of being an inert recipient.

Blockchain records not only show which transactions are completed but also contain other structured information. For instance, the best-known virtual currency, Bitcoin, can be used for any type of 'smart' contract that can be initiated, verified, and enforced electronically. The charrette tackled this issue in particular, i.e. how blockchain technology can create user-generated contracts between citizens and help us imagine new economic systems. This meant addressing the values underpinning the current economic system, and exploring what other kinds of values it might be possible to exchange, as well as how blockchain technology could exert control or offer incentives to citizens.

METHODS: TECHNOLOGY PROBES, EXPERIENCE PROTOTYPING & DESIGN FICTION

CDI employed a methodology that combines three HCI design research methods (Figure 1). Technology probes collect data about the use of new kinds of technologies in a real-world setting, and inspire users and designers to reflect on the use of that technology[1]. Experience prototyping extends the scope of traditional prototyping to investigate the role of the product in users' lives and the contextual factors influencing this role[2]. Lastly, design fiction involves any kind of media prototype used to explore and critique future possibilities in design, and to open up a space for discussion[3]. These methods were carried out in the charrette through three exercises.

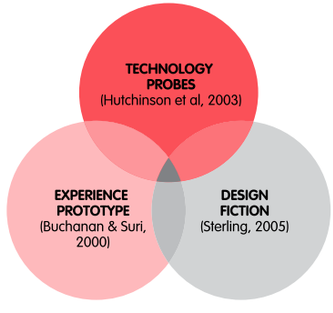

Figure 1 - The methods used in the CDI charrette.

1 Hutchinson, H., et al. (2003). 'Technology probes: inspiring design for and with families'. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '03), 17-24.

2 Buchenau, M., & Suri, J. F. (2000). 'Experience prototyping'. *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques*, 424-433.

3 Sterling B. (2005). *Shaping Things*. Cambridge, Massachusetts: MIT Press.

BLOCKCHAIN WORKSHOP WITH LEGO

To familiarize the participants with Blockchain technology, the CDI team first presented the logic behind its functioning and then asked the participants to enact Blockchain transactions by trading LEGO bricks for different resources like barley, oil, and sheep. The workshop method, entitled Block Exchange allows participants to record their transactions by sticking their initials on LEGO bricks towered up on a base plate, a material representation of the Blockchain ledger.[4] While the group was exchanging resources with each other, two of the participants were assigned to perform symbolic 'Blockchain mining' by solving mathematical calculations in a given time period; the winner earned additional LEGO bricks.

The rules of trade changed every five minutes. The main aim of the first round was to achieve a more diverse portfolio of resources where each resource cost one LEGO brick, whereas the second and third rounds involved trading resources for more bricks, such as one sheep for four bricks or one unit of oil for six. All of these changes slowly prepared the group for the last rule change, which was also the principal objective of this exercise - to experience open trading with an unregulated currency and to inspire some radical propositions. When commodities are taken away from the game, what other things become valuable enough to be tradable? The things that were offered for sale in this last round varied from material (e.g. pens) to services (e.g. singing a song with the buyer's name in it) and political statements (e.g. pension funds).

BITCOIN CAPTURE IN THE WILD

After the participants had familiarized themselves with the blockchain concept, the charrette team introduced a mobile platform they had developed called 'Geocoin'. The platform used GPS to map and circulate Bitcoins in physical hotspots, i.e. areas having a direct effect on the balance of one's Bitcoin wallet. This 'technology probe' used virtual boundaries (geofences) to separate physical spaces and associate them with economic values. Fifty GBPs worth of Bitcoins were distributed in hotspots around the venue, which were displayed as markers on an Amsterdam map.

- Green markers gave a small amount Bitcoins, but one kept on earning them as long as they was standing on the marker.
- Black markers gave a large amount of Bitcoins, but only once.
- Red markers were traps that ate up one's Bitcoins as long as the person was standing on the marker.

The functions of the markers were not revealed to the participants; they were asked to go out and discover what the rules of the transactions were for about 40 minutes. After reconvening, the participants were shown their transactions and given a more comprehensive explanation of the relationship between the locations and the number of Bitcoins. An example given to concretize a possible use of this platform was if a hospital was a red marker, it could automatically take donations from the citizens, or if there were a green marker at a shop, it could entice the citizens to visit the shop.

[4] www.blockexchange.designinformatics.org.

DESIGN FICTIONS FOR A NEW VALUE ECONOMY

After experiencing the Geocoin platform, participants formed two groups and discussed how algorithms and digital currency might be used in physical spaces. They were prompted to think about specific locations and conditions, such as transport companies charging customers only if their bus arrives on time. After this discussion, groups were asked to create an 'experience prototype'. A programmer was contacted through Skype to discuss how to prototype the proposed ideas. Additionally, participants were asked to produce a 'design fiction' video explaining their take on blockchain technology in city life. This involved presenting the meta-context for their idea, a situated story with a human dimension, and a demo of their experience prototype. They were asked to script, storyboard, shoot, and edit their video during the second day.

Two provocative design concepts were sketched in this charrette. Handfastr focused on marriage - one of the oldest forms of social and economic contract. The team appropriated the marriage concept from the state and the church and turned it into a temporary mobile agreement to be performed anywhere and at any time. By creating a mobile application based on the Geocoin platform, the team aimed to enable impromptu financial commitments between people in public space. The second concept, Civic Blocks, was about involving citizens in taking decisions about their city. The team used blockchain technology as a means to enable citizens to allocate Bitcoins to their favorite projects in the city, as a sort of a transparent participatory city budget.

INTERVIEW

Did this design charrette follow your usual process for a workshop, or did you adapt your methodology in any way?

In general, we try not to work with 'off the shelf' methods. For example, we encourage our students to be inspired by a methodology and then to reconfigure it to suit their specific research. Every project is different, and the charrette we conducted for Design & the City combined different methods we have experimented with in the past. For instance, we usually conduct shorter workshops but, in this case, we wanted to discuss complex topics like blockchain technology and transaction methods, and having two full days at our disposal allowed us to integrate different perspectives. On the first day, we began by demonstrating blockchain transactions and enabling our participants to try them out for themselves. This gave us good foundations to build on, as we presented some 'unfinished products' to elaborate. This is a key point: to develop something from scratch is not often feasible in the context of a workshop and, for this reason, we provided a basic transaction app and about £50 of actual Bitcoins to experiment with. Participants were able to experiment with some scenarios we pre-developed, and we had a programmer available to do some on-the-fly prototyping.

Did playfulness have a role in your charrette?

We should be careful here, as whenever you mention the word 'play' it evokes certain literature and connotations. For example, when we demonstrated blockchain transactions with LEGO bricks at the beginning of the charrette, we purposefully avoided using the word 'game' to make sure participants did not approach the experiment as if they were playing Monopoly.
Conversely, we recognize playfulness in the 'open-endedness' of the system we experimented with, rather than in the in the actual LEGOs that were used as a demonstration. If we think about how the unstructured, unfinished nature of the platform we set up to be 'handed over to the participants' we see that it was definitely open-ended, and play is a great term to describe what we have been doing. And, without any doubt, we had fun. All our outcomes, especially the speculative video prototypes, were at the same time quite fun and very serious.

What did your participants do to understand and represent your potential users?

In the final presentation, while we were discussing with participants and organizers from the other charrettes, we noticed an underlying tension between those who had relied on personas and similar abstractions, and those who hadn't. We were in a peculiar situation because blockchain technology is conceptually complex, and only part of the community fully understands it.

Some of our participants started with assumptions about personas, and then went out to interview real-life stakeholders to confirm that. But I guess it was less an attempt at constructing a holistic persona and more a test to check whether they were touching the 'right' ways in which transactions were conceptualized. For example, one of the speculative video prototypes that was developed in conclusion of our charrette used the concept of marriage as an example of a transaction that might be carried out through blockchain. This is clearly a provocation, but also an attempt at probing something that potential users understand, to ground and make concrete a mechanism as abstract as the blockchain.

In this sense, storytelling became a way to explore stakeholders' conceptualizations, understanding, and behaviors. Abstract notions may be intractable, 'out-of-this-world', and our participants reacted by making video prototypes that are definitely set in the real world, in real places, and addressing potentially real practices. By doing so, they made their stakeholders believable. That allowed us to show the videos to real people – in the final public presentation, for example – and to gauge real reactions to a plausible use, rather than general reactions to abstract mechanics.

I find it interesting that your charrette went from tinkering with LEGO to experimenting with algorithms, and finally to making video prototypes. Would you comment on the different degrees of materiality you explored in your charrette?

Making the blockchain physical was the main problem we had when planning our workshop. Most participants, in the beginning, had a difficult time relating to the blockchain existing mostly in the digital domain. It is difficult to picture a blockchain, and that is where we got our idea of using LEGO bricks. Some participants struggled with the lack of physical components in blockchain technology until they found their own personal way of framing it. And once they had a concept for a possible use case, and they could act it out. In this sense, the 'bodystorming' method, an embodied brainstorming, was particularly useful. People's bodies are into play whether they interact with hardware, or software, or more complex combinations of iPhones, landscapes, virtual coins, and society around us.

Also, having some real software to try out helped, even if our programmer had to work to the last second to make it work. It was a close call. It was being written on Monday night while we were having a beer after the first day of the charrette. We ourselves did not really know what we were going to get on Tuesday morning, which was a bit stressful but maybe made it more interesting as well.

Having 'real' money also helped to make the experience more physical and tangible for our participants. We decided to use real Bitcoins, with actual monetary value, when we could have just used arbitrary numbers in a database representing coins. But there was something powerful, I think, in experimenting with £50 or £60 worth of Bitcoins. That was an odd thing, regarding its tangibility: it was real money, but sometimes it did not feel that way. Looping back to how participants conceptualized the blockchain and Bitcoins they were experimenting with, it was only when they could come up with a concrete story or a use case scenario that they could grasp the abstract mechanisms in an accessible way. In the end, asking participants to produce video prototypes was a good idea to push them to act out and materialize their understanding of the blockchain.

ANALYSIS

The CDI charrette followed a clear step-by-step structure towards integrating blockchain technology into the physical places in the city to imagine new systems of value exchange. The first exercise in this regard, the re-enactment of Bitcoin exchange through the LEGO Block Exchange workshop, was a sensitization exercise for the participants, to help them get their heads around the complex computational Blockchain process. It also helped the participants to start thinking about a new digital and unregulated form of market trading, so it was a necessary first step to prepare for the activities that were to come. The next exercise, in which the participants used a technology probe to capture Bitcoins in the city, was intended as a real-life use scenario to demonstrate how the blockchain technology can be integrated into physical locations in the city. Technology probes are different from design or research prototypes in that they are built with the intention of challenging current practice and influencing future design.[5] They are not an early version of a technology that researchers are seeking to develop or test, but rather a method of reflecting on that technology. These probes are a form of 'speculative design' in

[5] Hutchinson et al.

[6] Auger, J. (2013). 'Speculative design: crafting the speculation'. *Digital Creativity*, 24(1), 11-35.

this sense, where the purpose is to enable us to critique and think about the future.[6] Using the Geocoin probe during the charrette achieved its purpose very well; it was a catalyst for the later discussions about what kind of locations were meaningful to include in the new economy, and therefore, was a useful step towards the ideation phase.

EXPERIENCE PROTOTYPING

The last exercise involved creating an experience prototype and communicating the design concept through a design fiction video. Experience prototyping as a method has to do with allowing the designers, clients or users to experience the product themselves in a way that is (partially) situated in the real use context. It is intended for designers to think of the design problem in terms of attaining an integrated experience, rather than creating an isolated artifact.[7] Creating an experience prototype involves role-playing, building environments and scenes, and rehearsing the use of the product in these scenarios. During the charrette, the experience prototypes helped the participants to immerse themselves in imaging how it would be to live with the physical, dynamic and social aspects of their product concepts. This method fits well with this charrette for two reasons: first, the participants did not have time to test their concepts with actual users and observe the impact of their ideas at the city level. While experience prototyping creates only approximate simulations of the real experiences others will have, it still brings a subjective richness to bear on design problems. Second, the charrette was mainly an exercise on the alternative uses of the blockchain. So, role-playing with the experience prototypes helped to build a vision without necessarily limiting the participants to the realities of the current socio-economic systems, and constituted the primary component of the design fiction videos.

FICTION AND NARRATIVE IN DESIGN

Using fiction and narrative is not new in the design field, but what is new is that fictional practices are now being considered as viable pathways for producing valid knowledge in design.[8] Design fiction has the ability to experiment with situations that do not currently exist.[9] It can take the form of stories, films, objects, and prototypes. During the charrette each group experimented with shooting a video, which was intended to document the experience prototype, present a meta-context for it, and open a discussion with the audience about the possibilities of integrating new technologies into the economy. Both teams used design fictions to address the implicit social and political context of these two ideas. DiSalvo (2012) argues that design fiction must present ideas and objects in ways that can be interrogated and challenged, otherwise they turn out to be simplistic provocations.[10] This was a concern for the charrette participants as well. They were explicitly cautious about the ethical implications of their bestowed power when deciding how some lines of code could affect the behavior of citizens. Overall, creating design fictions was a fruitful method to recognize and shape the impact of their design ideas on society.

The overarching component of the methods used in the charrette was playfulness. From the exchange of LEGO pieces to hunting Bitcoins in the streets of Amsterdam or role-playing new economies, a play dimension was present in all the methods chosen. In the former, the play component served the purpose of providing insights into the complex blockchain platform. Although this exercise did well in explaining the fundamental concepts and structure of the system, the participants sometimes considered its rules unclear, e.g. whether it was possible to exchange resources without paying with LEGO bricks, or according to which future state one was required to invest in a particular resource. These open rules, however, also allowed the exercise to be adaptive. The CDI team mentioned that they had carried out this exercise on five previous occasions and that it has evolved on each occasion.

While the LEGO exercise was a simulation type of game, the technology probe and experience prototyping were slightly different. In the former, finding out what the hotspots in the map were for transformed interaction with the probe into a sort of concealed-rule game. Furthermore, although the group was not explicitly motivated to do so, there was an implicit competition between participants to win the most points during this exercise. Experience prototyping was a role-playing game in which participants experienced their concepts in their actual contexts. All of these uses of play provided an engaging and enjoyable ideation environment during the charrette.

IN CONCLUSION

To conclude, in the capitalist system every aspect of human life has been transformed into a commodity to be exchanged. The system has its own established rules and economies. With the advancement of new technologies, however, these economies are open to being questioned. The Blockchain City charrette demonstrated that blockchain technology could be one way of providing a paradigm shift in imagining alternative means of exchange. Creating design fictions was the main method chosen to tackle new uses of this technology and its ethical and social implications on society. As was also noted by the charrette leader during discussions, the concepts generated by the participants went well beyond 'just gamifying the city', which would have been an obvious use of the blockchain. This was the success of the the CDI team, the charrette, and its chosen methods.

The design fiction videos of the charrette participants can be seen at the following links:
Handfastr: www.vimeo.com/163565402
Civic Blocks: www.vimeo.com/163760240

[7] Buchenau & Suri.

[8] Markussen, T., & Knutz, E. (2013). 'The poetics of design fiction'. *Proceedings of the 6th International Conference on Designing Pleasurable Products and Interfaces,* 231-240.

[9] Lindley, J., & Coulton, P. (2015). 'Back to the future: *10 years of design fiction'. Proceedings of the 2015 British HCI Conference,* 210-211.

[10] DiSalvo, C. (2012). 'FCJ-142 Spectacles and Tropes: Speculative Design and Contemporary Food Cultures'. *The Fibreculture Journal* 20 (2012): Networked Utopias and Speculative Futures.