Design Dilemmas Digital Platforms for Resource Communities

Resource communities
From energy communities to local car sharing schemes; from co-housing developments, to urban farming collectives: the last decade has seen a surge in *resource communities*. These are groups of people that live, work, build, produce and consume together in new ways. Usually, their aim is to produce collective benefits, and promote the social and ecological well-being of the community.

Digital platforms
Digital platforms can play a central role in the management of these resource communities. They inform community members, match supply and demand, keep records of production and consumption, and coordinate interactions. These platforms make use of sensors, algorithms and databases; they may include digital currencies, reputation systems, and decentralized database technologies such as blockchain and smart contracts.

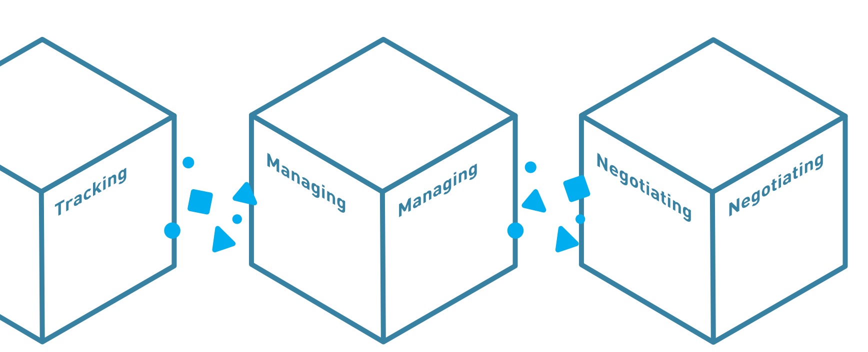
Platforms: market places and governance systems
The design of these digital platforms is complex. Their algorithms and interfaces set the conditions and limitations by which the community collaborates. They set rewards, determine who gets priority when resources are scarce, or decide which parts of an identity are revealed. They are not just an administrative or management system; in fact, these platforms govern the community.

Value tensions
In the design of these platforms, decisions have to be made that affect the organization of resource communities. This can lead to tensions between the set-up of the technology and the values of the community. The six design dilemmas described here point to possible tensions between the application of promising new technologies and the values of resource communities, like social and ecological well-being.

Design dilemmas
These dilemmas are gradient scales, rather than binary opposites. Also: one end of the scale is not by definition better than the other. The challenge for designers is to locate a position that aligns the various values and goals of resource communities with the design of the platform.

Mechanisms in Digital Platforms

Digital platforms for Resource Communities are designed around three mechanisms that require alignment with the values of resource communities and the practicalities of everyday life.



Tracking
Through various sensors and interfaces, data is captured that tracks and registers the production, consumption or transaction of shared resources. These could include time, duration, geographical location, mode of usage, reputation and evaluation data, user profiles etc.

- Which variables (resources, identities and roles, behavior, rights) need to be tracked and registered in a database?
- Which units of measurement will be used?
- Who will have access to this data, and under which conditions?
- What is better left unmeasured?

Managing
Management contains the organizational principles of a resource community. It includes the interfaces, algorithms and smart contracts that allow users to manage their interaction with the community and its resources.

- Which processes in a resource community should be formalized, encoded and automated through digital platforms? Which can best be left offline?
- What are the basic rules of interaction with regards to rights, rewards, priorities?
- Does a community want to incentivize particular behaviors?

Negotiating
Negotiating is the process by which the rules in a system can be reassessed, challenged or changed.

- How, and during which moments can a community make decisions about the rules on the platform, as well as their interpretations?
- Can exceptions be negotiated?
- How can the rules be realigned to accommodate shifts in values or insights?

Privacy vs Transparency

Which data is visible to whom, under what circumstances?

Digital platforms thrive on data. Sensors can automatically administer the amount of energy produced, or the kilometers or minutes traveled in a shared car. People can enter data through interfaces, logging their contributions, or evaluating the behavior of other users, the state of affairs in a system.

Data transparency makes the system accountable. Each user can see if he or she has been treated fairly, whether so-called free riding is taking place, and on an aggregate level, how the system as a whole is performing. Yet, making these data available can hamper the privacy of individual users. What could be the consequences if their individual use, contributions, and status becomes visible for all members of the community?

Privacy ⟷ **Transparency**

Privacy: Users have full control over their data, and no data is made available in any way to other users or third parties without their active permission.

Transparency: Users have full insight into all aspects of the system. Anyone can access all data about contributions, or activities of other users on individual and aggregate levels.

- Which data needs to be recorded, and how long is it archived?
- In what unit(s) is it recorded?
- How can users manage and control their data, and its visibility?
- To what extent should this data be made visible (individual level, aggregate level)?
- To whom should this data be made available?
- Where should this data be made available (a personal device, a public website, in public space)?

Economic vs Social Value

Which values are ascribed to the use or contribution of resources?

Resource communities are often founded by people who want to strengthen local communities. Yet, they cannot isolate themselves from the broader economy. Many of the resources produced, or consumed, like energy or housing, have a direct market value, and the availability of members for volunteering is not limitless.

This means resource communities need to establish consensus about the values assigned to the consumption and production of their resources. Will these values be coupled directly to market prices outside the community? Or will contributions and usage be administered via locally set rules and values? If so, what rules for rewarding contributions and for a fair distribution of resources will be put in place?

Economic Value ⟷ **Social Value**

Economic Value: A strong preference for exchanging resources on the basis of a (dynamically priced) market logic, in order to optimize economic profit for the community and its members.

Social Value: A strong preference to prioritize social values and responsibilities. Interactions are designed to strengthen social relations. Fairness and/or solidarity, rather than profit, are the main goals.

- What does the community envision as fair? Will economic logic determine the internal division of resources? E.g. introducing dynamic pricing for a car sharing system, or energy usage during peak times? Which alternative logics can be conceived? (First come, first serve? Prioritizing need?)
- Is a surplus of a resource, for instance of energy, sold on the external market to the highest bidder, or distributed in other ways (e.g. given away, bartered with other communities, etc.)?
- How are community duties administered? Will time invested in community chores be rewarded? If so, how? E.g. through time banking or direct economic reward?
- Can 'priority rights' be earned or calculated into some form of reputation system?
- How are internal exchange rates for various tasks assigned?

Quantified vs Qualified Values

Which (trans)actions, relations, aspects of identities and reputations should be captured and formalized?

Digital platforms and their databases make it easier than ever to measure and record (trans)actions in and around resource communities. This has many advantages: it can make the workings of the system transparent and various kinds of contributions or uses can be rewarded and exchanged.

Yet this quantification can come at a cost. Contributions and relations that used to be organized informally, based on mutual trust, reciprocity, friendship or human kindness and solidarity are now becoming formal relations attached to pre-scripted rewards and procedures. Such a formalization could even undermine the qualities of relationships built on trust, intrinsic motivations, or a sense of human duty or solidarity.

Quantified ⟷ **Qualified**

Quantified: Most or all (trans)actions and relations in the community are quantified and formalized in algorithms and smart contracts.

Qualified: Most (trans)actions and relations are organized on the basis of trust and mutual understanding and negotiating. They are navigated through case-specific and informal processes.

- Which resources and relations can be quantified and formalized? Which of these are essential to the workings of the system?
- What aspects of the identities, behavior and reputation can be quantified and formalized?
- What could formalization of relations and (trans)actions mean for informal aspects of community membership, like friendship, solidarity, intrinsic motivation, trust, duty, community pride, etc.
- Which of the aspects above is better left unmeasured or to informal negotiation between community members?
- To what extent does quantification and formalization strengthen, or undermine the project goals and stakeholder values?

Private vs Collective Interest

How are private and collective interests balanced and weighted against each other?

Resource communities need to find consensus on the collective values they aim to underwrite. For instance, a shared mobility system can guide its users along the fastest route, without taking costs or environmental impact into account. Alternatively, it could propose a trip that takes longer and is less convenient, but also has less impact on the environment.

What are the collective and private interests at stake in a resource community? When do collective values prevail, and when is there room for optimization that benefits individual members rather than the community at large?

Private ⟷ **Collective**

Private: The system prioritizes the needs and profits of individual users.

Collective: The system prioritized the interest of the community at large or optimizes for collectively set goals.

- Which conflicts between private and collective interests may emerge?
- Which interests should be prioritized, and under which circumstances?
- To what extent, and under what circumstances, can individual users prioritize their private interests, and at what (extra) costs?
- Should individual users be rewarded if they choose to prioritize collective interests above personal interests?

Incentivisation vs Manipulation

How should community members be encouraged to contribute to collective goals?

Digital platforms can be programmed to encourage community members to contribute to shared goals. For instance by handing out rewards in the form of economic profits, social recognition or by granting particular privileges or rights.

Yet, at what point does this encouragement become coercion or manipulation? What agency do individual community members have to resist such incentives? And, even if the incentives are formally optional, at what point may community members feel a strong social pressure to comply? E.g. the use of reputation systems can make people behave carefully in their interactions out of fear for low evaluations and their consequences.

Incentivisation ⟷ **Manipulation**

Incentivisation: Incentives motivate people to contribute to a particular goal, often by matching their intrinsic motivations. Users feel encouraged, while also experiencing a certain freedom to comply or not.

Manipulation: The system coerces community members into a particular behavior. Users have little or no agency to decide for themselves. They experience high levels of social pressure to comply.

- Which community goals and values will be hard coded into the mechanisms of digital platforms?
- Which community goals and values are community members merely encouraged to participate in?
- What agency do community members have to neglect system nudges?
- How are community members rewarded or fined for their (non)-compliance? Are these rewards economic, social or are they perhaps granted particular privileges?
- What negative effects could these rewards have (for instance strong experiences of social pressure or unwanted internalization of instrumental behavior)?

Human vs Algorithmic Governance

Which arrangements can be encoded in algorithms? Which decisions should be left to human decision making?

Digital platforms can automate all kinds of interactions and transactions. This saves members of resource communities the hassle of meeting up regularly to make decisions, or from being continuously prompted by the system for their input to vote or evaluate the state of the system.

However once particular rules are encoded digitally, it is very hard to change them, and to interpret them in relation to new or unforeseen situations, or to stop them. It is difficult to negotiate exceptions or to undo them, even if all parties involved agree. Some decisions are probably better made offline, whereas regular reviews of digitally encoded rules are very likely to be necessary as well.

Human Governance ⟷ **Algorithmic Governance**

Human Governance: Processes and decisions will be mainly organized through human action, such as board meetings, evaluation sessions and voting processes.

Algorithmic Governance: Processes and decisions are primarily automated, based on encoded rules in algorithms and smart contracts.

- Which rules and decisions can easily be encoded
- Which decisions are better made offline?
- At what moments do humans need to provide input for the system, to vote for or evaluate the state of affairs?
- Can the outcome of encoded rules be contested, can exceptions be made, and under what conditions can algorithms be overruled by humans?
- Can algorithms and smart contracts be halted by an 'emergency button' in case they go awry?
- Should a regular review be planned to check if system rules and community values still align?

Colophon

The Design Dilemmas and Canvas Digital Platforms for Resource Communities are results of the research project Circulate: Designing with Values in Local Platforms for the Circular Economy (2018-2021).

www.circulateproject.nl

This project is an initiative of the Play & Civic Media Research Group and the Institute of Network Cultures at the Amsterdam University of Applied Sciences, with contributions from the Situated Art and Design Research Group at Avans University of Applied Sciences.

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The Canvas and Design Dilemmas are based on the following publications:

Cila, Nazli, Gabriele Ferri, Martijn De Waal, Inte Gloerich, and Tara Karpinski. 2020. "The Blockchain and the Commons: Dilemmas in the Design of Local Platforms." CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, 1–14. https://doi.org/https://dl.acm.org/doi/abs/10.1145/3313831.3376660.

Gloerich, Inte, Martijn de Waal, Gabriele Ferri, Nazli Cila and Tara Karpinski. 2020. "The City as a Licence. Implications of Blockchain and distributed ledgers for urban governance" Frontiers Sustainable Cities. https://www.frontiersin.org/articles/10.3389/frsc.2020.534942/full

The Canvas is inspired by the Values in Design approach as described in Battaya Friedman and David Hendry. 2019. Value Sensitive Design. Shaping Technology with Moral Imagination. Cambridge, Ma: The MIT Press. This book also offers many examples of methods for value discovery, and is recommended for those interested in working with this approach.

We see our overview of dilemmas and the canvas as a dynamic overview that can be further developed and adapted to the needs of particular situated design processes. We don't pretend to be exhaustive, and invite everybody to iterate on our findings, adding or deleting dilemmas and relevant questions as they see fit for their projects. An editable version of this canvas can be downloaded at www.circulateproject.nl.

Design Canvas Digital Platforms for Resource Communities

The challenge of designing with new technologies
Designing digital platforms and infrastructures for resource communities can be a challenge. Designers and technologists find themselves working with new technologies, like blockchain, AI, Internet of Things and digital platforms. There are no well-trodden paths or extensive template libraries that can be easily implemented. And, these technologies are not simply neutral tools. They come with their own affordances and limitations that set the stage for eventual interaction between community members.

The need for value discovery
In addition, designers must explore how the systems they are building can be best designed to address the values of the resource community. Rather than optimizing for the most efficient service at the individual level or the most economical use of resources, these communities often aim to strengthen their social relations and contribute to environmental sustainability. Yet, not all of these values may be clear from the get go, and tensions may arise between the different values at play and the various interests of stakeholders, as well as the affordances of the technologies involved.

Value Sensitive Design Canvas
To address these issues, a Value Sensitive Design (VSD) framework can help explore the values at stake, the affordances of technologies, and the motivations and interests of stakeholders. The canvas laid out on the following pages can aid designers in the complex process of value discovery. It relates to technological innovation, and the design of actual services and features of digital platforms for resource communities. As such, it can help structure the design process from the start. Alternatively, the canvas can be used during the design process to explore how various values found in a particular community relate to the features of a particular digital service. The six design dilemmas are meant to further explicate some of the tensions that may arise when encoding these values into a digital infrastructure.

1. Project Goals

Describe the project initiator(s) and their goals.

For example: An architectural firm developing a co-housing project for 20 families wants to include a mobility platform that allows future residents to share a number of cars. This should save parking spaces, creating more room for public space. Contributing to ecological sustainability is also a goal.

2. Stakeholders

Map the various direct, and indirect stakeholders involved in, or affected by the resource community. Where relevant, explore their empirical situations. In what settings do the stakeholders operate, or experience a product or service? How does this interfere with or compliment their normal behaviors and routines?

Direct & Indirect stakeholders	Settings, behaviours, and other relevant aspects
For example: Inhabitants of an apartment block	Individualistic & private. Main motivation for sharing: economic benefits and pragmatism.

Direct stakeholders are the various parties that are directly affected by, or involved in a service or product. They are the community members themselves as well as (possibly) their suppliers or clients, local governments, technology providers etc.

Indirect stakeholders are those that are indirectly affected by a service or product. These can include neighbors of the resource community, passers-by, the city at large, etc.

3. Values

Explore the values, interests and motivations of various stakeholders. This can be done through methods like interviews, co-creation or other (design) workshops for value discovery. Once identified, explore these same values from a contextual perspective. What could they mean in relation to a particular project?

Values at an abstract and conceptual level	Meaning in the context of the project
Privacy	In a car sharing project, privacy could mean users don't want others to see what trips they are taking or when they are planning a trip.

Values can take many forms and be organized in categories, like:
Human dignity and rights; Economic profit; Instrumental (a service helps to accomplish a goal, e.g. travel to a destination); *Ideological* (a service is in line with a particular ideology, vision or religion); *Sustainability; Social* (it cements trust, social relations, friendship, or solidarity); Altruism (a service lets people help other people); *Identity; Pioneering & Innovation* (a service innovates or pioneers a new field).

4. Service Proposal

Describe a particular product, or service, that speaks to the project goals, as well the stakeholders' values, empirical context.

For example: A car sharing platform that respects the privacy of the users is easy to use, rewards drivers who take care of the cars (cleaning, maintenance and fueling up). Fair distribution is based on first come, first served, with an option to make cars available last minute for urgent situations.

5. Features

Break down the Service Proposal into specific features. For instance: What does the interface look like? How is it accessed and experienced? Which options do users have? Which data is collected? Which data is made visible at which moments? What is the cost structure? Which behaviors are rewarded? How does the system incentivize? How does it set priorities?

For example: the availability of cars is visible in the interface, but no information is revealed about user identity. In case of full capacity, there is an option for sending an urgent, last-minute request to all users who booked a car.

6. Map to Dilemmas

Place a design feature on the gradient scale per the six design dilemmas (See the flipside for a more extensive explanation of these dilemmas). Explore how that position relates to the project's values, as well as those of direct and indirect stakeholders.

Privacy — Transparency

Economic Value — Social Value

Qualified — Quantified

Private — Collective

Incentivisation — Manipulation

Human Governance — Algorithmic Governance

7. Implications

Describe the (possible) implications of the design choices, in regard to the six dilemmas. What could be some of the consequences of these choices? Use these implications to re-evaluate the design at a specific feature regarding the various goals and values implied.

Privacy vs. Transparency

For example, first revealing the identity of reservation holders makes usage more anonymous and context more impersonal and transactional. This also makes it more difficult for the community to identify free-riding from people who returned the car with an empty gas tank, or full of dirt.

Economic Value vs. Social Value

Qualified vs. Quantified Value

Private vs. Collective Interest

Incentivisation vs. Manipulation

Human vs. Algorithmic Governance

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