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Libraries of Things as a new form of sharing. Pushing the Sharing Economy

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Abstract: Although the willingness to share is huge, sharing is rarely applied in everyday life, because many current Sharing Economy offers are not practicable. This paper asks what contributions an innovative Sharing Service – a library not simply lending books but a wider range of items – can make to close the gap between willingness to share and practice. Most of these innovative libraries were founded in the last few years, but many still fail to overcome the identified gap. As global environmental problems demand a change of consumer behaviour to enable human actions within planetary boundaries, bridging the gap could have a huge impact. Libraries of Things could reduce the average resource and energy consumption of users, maintaining quality of life. This paper analyses existing Libraries of Things and Tool Libraries. The outcome is assessed against empirically proven user expectations to detect the discrepancies between supply and demand of current offers commonly available.

Keywords: Sharing Economy, Library of Things, Tool Library, Digital Transformation

1. Introduction

Sharing is an answer to challenges resulting from three global processes: global ecological problems, urbanisation and digitisation.

The sharing economy is becoming more interesting, since in the course of digitisation more and more working areas are becoming automated. That is the reason why more and more jobs for the middle class will be lost in industrialised countries as well as in emerging countries (Stengel, 2017; Chang et al., 2016; Berger & Frey, 2016; World Economic Forum, 2016; Ford, 2015; Cowen, 2013; Frey & Osborne, 2013). A larger number of people will likely have less disposable income in the future. Within the existing economic system, gaining access to goods will become harder or even impossible for many people, since they have to buy things in order to use them. Sharing, on the other hand, enables people to use products without having to buy them.

Furthermore, there will be more people with a smaller or a shrinking income in ever-growing cities with rising rents due to the growth of the world population combined with urbanisation (German

Advisory Council on Global Change [WBGU], 2016). These two developments pose the social challenge of guaranteeing equal access to basic goods for every citizen. In addition, the stress on the environment should be reduced in order to secure a natural basis of existence.

Four out of the nine planetary boundaries have already been crossed, whilst some of the remaining ones are in imminent danger of being crossed (Steffen et al. 2015, WWF et al. 2016, Venter et al. 2016). The ecological challenge of the 21st century is to guarantee that humankind is living within the planetary boundaries and maintains or restores the resilience of the ecosystems. In addition, the quality of life of the economically marginalised (urban) population shrinks even more due to the degradation of the global and local environment.

One way to reduce the ecological impact on societies is through sharing. Sharing has the ability to reduce energy and resource consumption (Federal Environmental Agency, 2015). For example, if ten people share one car, then the energy and resource consumption needed for producing one instead of ten cars is decreased by 90%. Furthermore, sharing facilitates access to many things, even for people with a reduced income. Sharing therefore is an important strategy to further develop the social dimension of sustainable development.

Several surveys, global ones as well as regional ones within individual countries, show that the willingness to share is high. Many people are willing to share things with others, they just don't do it in their everyday life – with the exception of cars, bikes and flats. Sharing works best in these product categories (Consumer Association 2015). The sharing of everyday goods, however, is lagging behind its potential (Sundararjan 2016).

Consequently, there is a gap between the willingness to share and the practice of sharing internationally. This gap is further perpetuated by existing sharing offers that are inconvenient for users. The effort required by the user to engage in the lending process is too high since it does not fit seamlessly into everyday life. Furthermore, most sharing offers are organized online and demand an additional level of trust to participate.

In this study a new sharing service is presented – a Library of Things, which is a product service system [PSS] (UNEP 2002; Ceschin 2014). This offer should have the potential to close the gap described above, because it avoids many disadvantages of existing sharing offers, and it therefore represents a solution for a systemic problem (Manzini et al., 2001; Manzini &Vezzoli, 2003).
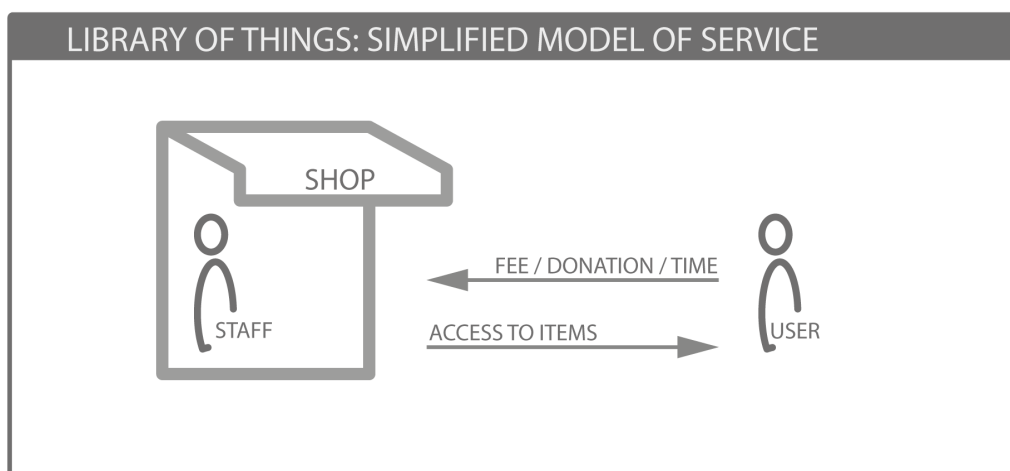

Figure 1: Library of Things: Simplified Mode of Servicel (own picture)

In addition to the Libraries of Things, Tool Libraries, a tool based offer, are examined here. These are already in more common use across North America and starting in other countries. For the purpose of this paper, Library of Things referes to both types of lending libraries.

2. State of the Art

2.1 Willingness to Share

Several surveys have been carried out with respect to the sharing economy and the willingness to accept its offers. These are indicative of the fact that the willingness to share things instead of owning them is high across many nations.

According to a survey conducted by Nielsen (30.000 participants in 60 countries worldwide), 68% of the respondents "are willing to share or rent their personal assets for financial gain. Nearly two thirds of global respondents (66%) are likely to utilise the products and services from others in a 'share community'. Electronics, lessons/services and power tools are favoured items for sharing." (Nielsen, 2014, p.2)

German users also show a great willingness to share as is shown by another survey (1009 respondents, age 18 and older): approximately two thirds could imagine to make use of sharing offers (Consumer Association, 2015). This number is in line with the outcome of the survey made by Nielsen. One third and up to half of the respondents, depending on their age, could even imagine to using sharing offers in order to reduce their own property (representative study of the Federal Ministry of Education and Research Germany [BMBF], 2016).

2.2 Practice of Sharing

At the same time other surveys reveal that there is a positive image of sharing as well as the willingness to share instead of owning, but that it's rarely put into practice: a third survey ordered by ING-DiBa (2015) in 13 different European countries (12.800 respondents, approximately 1000 in each country) showed that on average 35% of the respondents could imagine borrowing things. Within the last 12 months only 4% actually did it. In Germany, 63% of the respondents said that sharing offers are not attractive for the majority of the population (BMBF 2016).

If the willingness to share is high, but only comparatively few items are actually shared, we can deduce that the existing online sharing offers, under consideration here, are demanding too high an effort from potential users, e.g. they are too time-consuming or require too much organisational effort, and thus are not suitable for everyday life. In Germany only 14% of the respondents are interested in sharing and exchange platforms, and only 9% use them (Consumer Research Association [GfK], 2015). It is hard for the platforms to canvass for users, although a huge number of people are willing to share and lend or borrow things. A large portion of the sharing offers currently are online platforms. This strategy has a number of significant drawbacks that limit the leverage to share to join into sharing practice. That leads to the question of why these sharing offers are hardly ever accepted. Many platforms work in the following way: users list things that other users could borrow from them. For the actual exchange the users have to arrange a time and place, which isn't always easy. The travel distances for the participants might become too long. According to Pelz (2012), a critical mass of items is essential to guarantee a functioning system of mutual exchange of things. But there are even more reasons: the German sharing app "Why-own-it" which allowed you to connect with your friends via e.g. Facebook in order to share things from each other failed because people wanted to borrow things from others, but nobody wanted to lend their own things

to others. Since the offer also depended on the numbers of friends participating, some users didn't have any range of products to choose from. A gap between supply and demand was revealed (Glöckler, 2015). Studies confirmed this experience and showed that in Germany only 30% of respondents could imagine lending their own things to others (BMBF, 2016). One reason for the discrepancy is the missing trust between strangers using a sharing offer. Another barrier is the missing answer to the question of who's in charge in case of damage or loss of the borrowed items. A study of the European Commission (2016) about the disadvantages of the sharing economy showed, that the missing liability in case of problems is a main barrier for 46% of respondents. In Germany 62% of respondents prefer a company or organization instead of a private person for sharing processes (Consumer Association, 2015).

2.3 Library of Things as a Possible Solution

A Library of Things could solve these shortcomings, since the concept of the library has been working since antiquity and is culturally proven and settled. The sharing economy could expand with the support of the concept of a library and could help decrease the culture of owning things. In order to do that Libraries of Things have to meet several goals: they have to have user friendly opening hours, and they must provide a large range of things for a huge number of users. The ideal Library of Things offers needed items 24/7 to reduce the user's effort as much as possible. The Library of Things functions as person in charge and guarantor as well as facilitator for the sharing process of the possibly privately donated items and it has to be located in a central place, in order to reduce the transaction efforts for all parties involved as much as possible.

When designing an optimal Library of Things the focus lies on the design of the access to the items, in order to create a user experience that is as easy and convenient as possible. Service Design can be a massive help in this process. Essentially, Service Design deals with the question of designing a positive user experience between company and user, being the two actors involved in the sharing process.

Looking at offers within the Sharing Economy, Service Design processes do have to consider more actors involved in the process of service delivery. It is no longer the company itself that is responsible for the process of service delivery. Especially in peer-to-peer offerings there are many different actors involved. An organization involved in this process has the role of a facilitator rather than a service provider. Service Design agencies claim that the service is provided by networks (Radka, de Jon & Margolis, 2012). Regarding the Library of Things this means that the Library of Things helps in the dialogue of sharing. The products may be donated by users or bought by the Library of Things, volunteers care for the maintenance of the products and lend them out to users. During this process safety checks of the items can be done and questions can be answered with the relevant people on site. Thus, different actors in different functions are part of the process, guided as smoothly as possible by the institution "Library of Things". In this way a good service delivery can be guaranteed.

The focus of Service Design is no longer is on designing a Service Journey in form of a positive user experience, but rests instead on the design of a positive network experience, and of the interaction of all actors involved in the network who deliver the service (Radka et al., 2012).

Up until now, it is not known whether the tools and methodology of Service Design and PSS Design have been applied in optimising Libraries of Things.

3. Research Questions

A gap between the willingness to share and the practice of sharing was detected and empirically proven with the help of surveys. The question that arises is whether the gap can be overcome, and if so, how? The subsequent research question asks, what the contribution of Service Design in this process might be.

The leading question of this paper is whether and how the Library of Things can contribute to close the gap detected. To answer this main question, the following secondary questions will be assessed:

- What do users expect of a Library of Things and under which circumstances are they willing to use it?
- Which areas of improvement do existing Libraries of Things identify looking at their service offer?
- What should a Library of Things be like, to be as user-friendly and trustworthy as possible?

4. Methodology, Limitation and Scope

To answer the research questions, (a) a full survey of all relevant Libraries of Things was conducted and (b) potential users were polled.

(a) First of all, desk research (websites, studies, reports) helped to locate all currently existing Libraries of Things. Most of the 58 initiatives considered in this study were listed on www.localtools.org.

As a second step, a questionnaire was sent to these initiatives. Those initiatives, which answered but were not able to fill out the questionnaire (because they were moving, currently closed or still too new) are excluded. So far 38% filled out the questionnaire. More data will be added as the research project continues. In order to gain more individual insight, semi structured in-depth interviews are conducted but not evaluated yet. As the research continues, visits in selected initiatives are planned to get in touch with the users themselves. A survey is planned as well as interviews and/or workshops on site.

(b) At the same time citizens in Germany were asked in an online survey if and under what conditions they would use the service of a Library of Things. Many of the results mirror the results of the studies presented above or cited earlier.

The results of this survey helped to identify deficits in the service of Sharing Economy offers in general and of Libraries of Things in particular. In the ongoing process, a user survey is planned as mentioned above.

5. Research Outcomes

5.1 Provider

Using desk research all information available online was gathered and the Libraries of Things were made more easily comparable. All actors involved and their respective role in the delivery of the service were identified. Differences between the offers were detected concerning size, structure and formalities. Most initiatives were founded after the change of the millennium. Many started as a

bottom-up movement with little or no budget and are based on volunteer commitment. Only a few have been developed in the form in which they exist now. Most of them are the result of constant development. Professional planning or even a business plan was not necessarily part of the process.

In order to close the gap between user willingness to share and their actual participation, the offer of a Library of Things has to be adoptable as easily as possible into existing patterns of action. Furthermore, the supply has to meet demand.

The focus lies on the design of access to the items and the items themselves. A Library of Things is a PSS that consists of the following components: (1) the products, (2) the service, to make the products accessible and to manage them during and after the usage phase, (3) the network of actors that is responsible for delivering the service to the user and (4) the infrastructure, within which the service has to operate. At this point of research, the products are not part of the design challenge, since they already exist and are supposed to be used more efficiently (mostly donated by people).
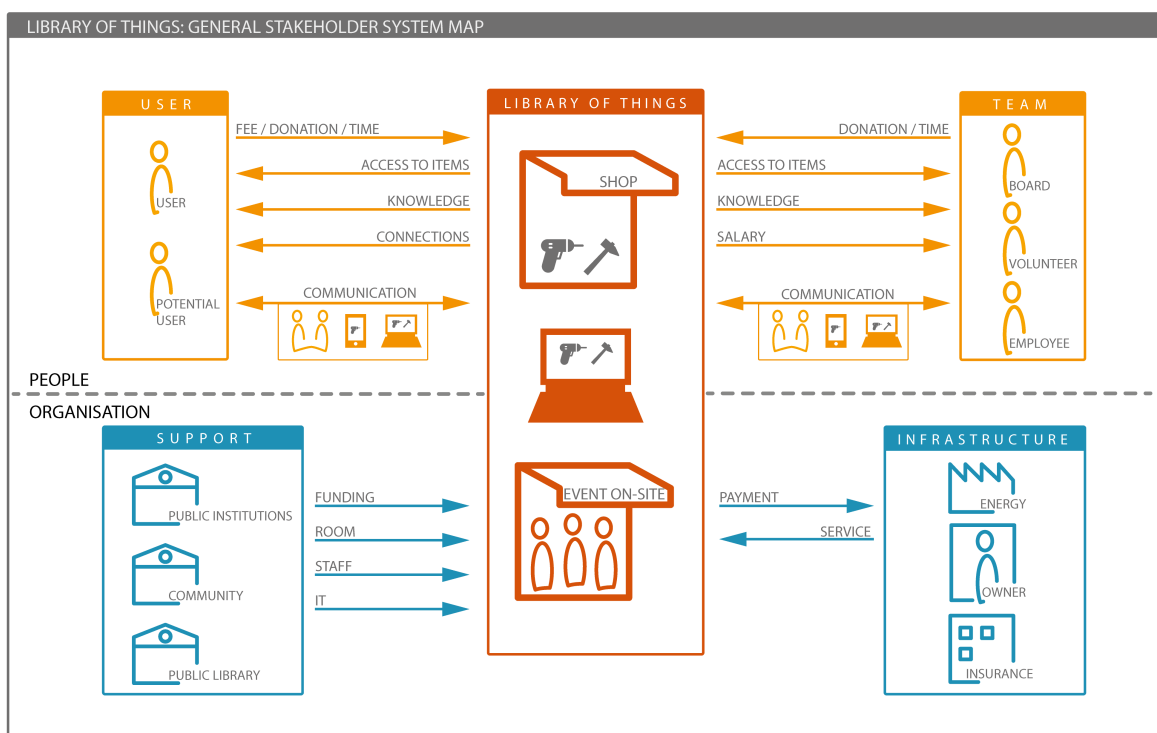

Figure 1.   Library of Things: General Stakeholder System Map (own picture)

Research showed the following: ease of implementation and the attractiveness of the offer depend on several factors: a)spatial accessibility, b) opening hours, c) costs for the user. The choice of a) location was rarely on purpose, thus many initiatives are not easily accessible. In North America some Libraries of Things are connected to public libraries or other already established public institutions. The b) opening hours depend on personal availability of the volunteers and is limited in time mainly to 2-3 days a week for a few hours. The need of new volunteers to guarantee these opening hours is communicated on many websites. The costs for the user c) depends on additional support for the Libraries of Things. Many have set up a crowdfunding campaign some time during their founding process, have applied for support programs or have tried to raise money elsewhere to be able to pay the bills and to be more independent of user fees. As a form of organisation most initiatives have chosen to be a non-profit (dependent on the different countries' rules) or an association.

The questionnaire delivered an estimation of user expectations and attitudes. The following questions were asked:

1. "What do users like most about your Library of Things?"
2. "Do users ask for improvements of your offer? If so, what are these?"
3. "What's your opinion: Which measures are likely to attract more users?"
4. "Would you have done something differently in the past, if you had had today's experiences? If so, what would that be and why?"

The open questions triggered individual and case specific answers and, as intended, some unexpected insights were gathered.

The main reasons for users to take part seems to be a) the offer of a cost saving alternative to buying and storing items, b) the big range of products gathered together in one location combined with c) counselling and advice as well as workshops. Additionally the d) social aspects of sharing were mentioned. Ecological aspects seem to be rather unimportant for the user, which is why the initiatives do not communicate it strongly on their websites.

When asked for improvements demanded by the users, the providers mainly listed a) better supply of products (wider range, longer opening hours and longer time limits for lending) and b) (more) workshops for training in the usage of the products as well as the opportunity to use the products on site to work on projects. The workshops are mainly demanded by users who borrow tools, but as Libraries of Things also have tools listed in their inventory, workshops are demanded here as well.

To increase the number of participants, most providers claimed they would try to improve their public relations, which mainly does not work due to the lack of money and/or time. In order to make existing users as pleased as possible with high quality items and optimal service delivery is another strategy. Thus, the users themselves acquire new users for free through word of mouth.

When asked for the biggest mistakes so far, the replies revealed a) the importance of the choice of the location and it's affordability for the overall success. The problem b) was not to get items but to get items of at least a certain standard of quality. Otherwise the Libraries would end up with a huge pool of items unsuitable for intensive use, which stay on the shelves. Reliance on volunteers c) leads to a high dependency on the individual willingness of commitment – which is not guaranteed indefinitely. This critical self-reflection showed how important the ease of use for the user is in order to guarantee the success of the initiative.

5.2 Potential Users

An online survey with 390 respondents about the concept of Libraries of Things showed that 93.4% of the respondents would be willing to use it, after the concept was quickly introduced to them. Among the reasons of those who would not use it were hygienic concerns, security concerns, low quality of items, high effort and the unwanted dependency on other people.

Respondents stressed the importance of special accessibility, its opening hours and the importance of online access to check out the availability of items. Unnecessary journeys should be avoided. An app to manage the borrowing process was not seen as a driver to use such an offer. In order to participate in a Library of Things, 77.5% of respondents want to have the opportunity to quit at any time, a probation period was not deemed to be important. Investing more time because of the logistic effort was fine for more than half of the respondents and only 10% found it disturbing. In order to have the chance to have the item donated back into one's own possession again was

important for 70% of respondents. Most of the respondents are willing to pay 20-30€/year for this service. Fewer than 10% of respondents are either willing to pay more or are asking for free access.

6. Conclusion

The goal is, to boost user-friendliness to increase the overall number of users to deal with the challenges mentioned in the introduction.

6.1 Sharing's Impact on Resource- and Energy Consumption

When more people are using the same things, things are used more efficiently and less people need to buy new items. Both developments lead to a reduction of the ecological impact, since products consume energy and resources over their lifespan (divided into the following phases: resource extraction/production, distribution, use and disposal). This impact mainly happens during the use or the resource extraction/production phase. Especially products with a high energy demand during the resource extraction/production phase have a huge potential for resource and energy savings.

Regarding the common example of a power drill it can be seen that 90% of all the energy used during its entire lifespan is used in the first phase. Due to the shortage of usage, only 2% are used during its use phase (WRAP, 2010). Were it used more often, the overall energy consumption would not change much, whereas buying a new one would have a great impact.

In Europe, approximately 10.000 items are located in each household (Trentmann, 2016). If 100 rarely used items are eliminated per household, the effect on the household's energy consumption can be profound. Looking at a higher level, the neighbourhood's energy consumption can be decreased tremendously. Assuming that these 100 items per households weigh 1 kg on average, then, in Germany, with 40 million households 40 million kg of resources and the energy for their extraction, processing and transport can be saved.

The empirical knowledge nevertheless points out, that these theoretical savings cannot be realised in practice, due to multiple rebound effects (the expected reductions stemming from new technologies that increase the efficiency of resource use, because of e.g. behavioural changes). These effects diminish the savings by up to 50%. But even if this number of potential rebound effects is applied for Libraries of Things, the increase of resource consumption compared to the status quo is still profound.

6.2 Findings

The empirical insights help to answer research questions 1 and 2. The user expectations and the circumstances for using a Library of Things contrast with the identified areas of improvement make the discrepancy between supply and demand visible:

- Users do not want to lend their personal belongings to strangers and they also do not want to completely let go of them. They do let go of things of low quality and hold on to things of high quality. At the same time they have high demands regarding the items for borrowing. Providers criticise the low quality of the items donated and even refuse donations due to low quality.
- Users ask for more access to items, with workshops to attend and social interaction. Providers cannot deliver more access and service due to a lack of money, time and volunteers.

- Users prefer short distances and spatial accessibility and at the same time a cheap offer. Provider cannot afford high rents if they want to keep the fees low for the users, in order to serve social aspects.
- Users want to have workshops and guidance for the use of the items and a place for social interaction with other people. Providers cannot realise that due to lacking time and facilities.

To answer question 3, dealing with user-friendliness and trustworthiness of a Library of Things, the following criteria have to be met in order to improve the entire service:

- Better access (central location, frequent opening hours)
- Wider range and higher quality of items in the pool
- Possibility to retrieve your donated item to trigger high quality donations
- An organization, as person in charge for questions regarding security and organization.

All these insights serve as the starting point to derive an answer on whether or not a Library of Things can contribute to overcome the gap between the willingness to share and the practice of sharing and if so, how this can be done.

The gap can be closed, if the uncovered barriers are overcome successfully, since an international willingness to share does exist. The Library of Things can resolve the following discrepancies between the demand of the users and the service delivered:

- People want to borrow things rather than lend their own assets to others. Within a Library of Things the process of sharing is no longer dependent on the willingness of users to donate their personal items. If the willingness to donate is low, the items can be acquired differently.
- With the help of the Library of Things, donated items can be managed in a way that allows receiving the donation back. This can result in the donation of high quality items.
- Supply and demand can be harmonised much more easily by an institution such as a Library of Things than by already existing online platforms. As a consequence the critical mass can be provided to guarantee a satisfying sharing experience for the users.

Further research needs are stated below:

- Implementation in different locations
- Development of solutions for criteria mentioned above
- Optimisation of logistics and transaction of items

On a meta-level, indicators need to be defined for the measurement of the Libraries of Things' impact on sustainable development.

These questions should be observed in the ongoing research process. And since the very nature of design problems is that they are "wicked problems" (Buchanan, 1992) and designers principally are concerned with bringing people, structures, and resources into alignment around an outspoken purpose (Junginger, 2007) the designers' contribution to the further development of an optimised PSS can be significant.

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