PLATE conference
Delft University of Technology
8-10 November 2017

PLATE
Product Lifetimes And The Environment

Room for change: Impact of building-level innovations to facilitate product reuse among residents

Ordóñez I.[(a)], Hagy S.[(b)], Bard F.[(b)], Wahlgren L.[(c)] and Ringstrand B.[(c)]
a) Department of Industrial and Materials Science, Chalmers University of Technology, Gothenburg, Sweden
b) Department of Architecture and Civil Engineering, Chalmers University of Technology, Gothenburg, Sweden
c) Industrial Ecology master program, Department of Energy and Environment, Chalmers University of Technology, Gothenburg, Sweden

Keywords: Reuse; give-away; residential infrastructure; waste prevention; user participation.

Abstract: This article explores the importance of building spaces in residential areas to encourage waste prevention through product reuse. First, a short review is made over five existing spaces that allow residents to leave and take products to be used again by others. Then, the initial experiences of establishing such a space in the HSB Living Lab in Gothenburg are presented to complement the review. In general the experiences of establishing these rooms for change are positive, with users making use of the space frequently. Aspects such as location and open hours are crucial to make the change-stations convenient for residents to use. Making the space available to a large group of people is important to ensure good product flow and renewal. Even though these spaces enable product exchange between users, it is not always possible to link this exchange to a measureable effect on reduced waste generation or consumption. It is not always true that the items exchanged would have been discarded or purchased if the space to change them was not available. There is an exception when the exchanged items are food, since the food made available for others to take would have been wasted otherwise.

Introduction

Choices people make are influenced by the environment in which they make them (Thaler, Sunstein, & Balz, 2010). Also, convenient infrastructure has been shown to support waste sorting behaviour (Ando & Gosselin, 2005; Miafodzyeva & Brandt, 2013; Porter, Leeming, & Dwyer, 1995). Therefore, it may be expected that convenient infrastructure might support waste prevention activities, such as the reuse of consumer products. Specifically, this article explores the potential benefits of infrastructure that allows leaving or taking products for them to be reused by a different user. Such infrastructures are refered to in this article as change-stations.

To be successful, waste preventing infrastructure should be made available where users would be likely to engage in such activities. Many studies on recycling behaviour support the same premise: the closer to home the better (Dahlén, Berg, Lagerkvist, & Berg, 2009; González-Torre & Adenso-Díaz, 2005). Also, the best place to prevent waste generation is at the source. If the goal is to minimize household waste, it would be necessary to have change-stations in residential areas. Some waste preventing strategies are only possible to achieve if they are implemented among groups larger than individual households or if facilitating infrastructures are made available for individual users (Bekin, Carrigan, & Szmigin, 2007).

Residential buildings with multiple dwellings congregate several households and users to one built infrastructure that can facilitate or hinder waste preventing activities. It is not uncommon to see that

people leave books, furniture or diverse artefacts for others to take. If building managers would wish to encourage this behaviour of leaving items for reuse, they could establish formal structures for item exchange. However, there is little research about how such exchange infrastructures are implemented and mantained.

In order to explore the importance of building spaces to encourage waste prevention through reuse, this article presents a short review of cases where infrastructure located in residential areas supports the reuse of products. The review describes briefly how these infrastructures were established and maintained, as well as some experiences and recommendations that have resulted from these cases. After, this article details the initial results of establishing the Swap Cube change-station in the HSB Living Lab in Gothenburg, Sweden.

The HSB Living Lab is a five storey building with 29 apartments and functions both as a student residence and a research infrastructure (for more about the HSB Living Lab please refer to Chalmers, 2015). Upon residents' requests and management's initiative, it was decided to introduce a space in the building to support waste prevention through re-use, called the Swap Cube. The initial experiences of having the Swap Cube running are used in this article to complement the cases presented in the first section. Together they provide a more detailed description of what to expect when making rooms for change.

Methodology

This article is informed by two sources:
1) Case studies: existing change-stations observed by the authors through study visits, interviews and written documentation.
2) Swap Cube: a change-station in the HSB Living Lab established by the authors and followed through direct observation, user surveys and a swap log.

The case studies are five existing change-stations located in residential areas in northern Europe (i.e. Copenhagen, Gothenburg and Berlin). Four cases accept common household items such as clothing, books, toys, kitchen ware, etc. One case, the Solidaric Refrigerator, is dedicated to food. The cases were chosen because the authors have personally been able to visit the sites and collected information from the actors managing the infrastructure. The choice of cases described is not representative in any way, it is merely the result of what cases the authors could visit.

The Swap Cube was launched officially together with the HSB Living Lab, in September 2016. This change-station is always accessible to the tenants of the building. It consists of a wooden frame located in a corner of a common space, furnished with shelves and a clothes hanger (Figure 1). The tenants are asked to document their use of the change-station on a paper log located in the cube (the form is seen in Figure 2).

Figure 1.Swap Cube in the HSB Living Lab.

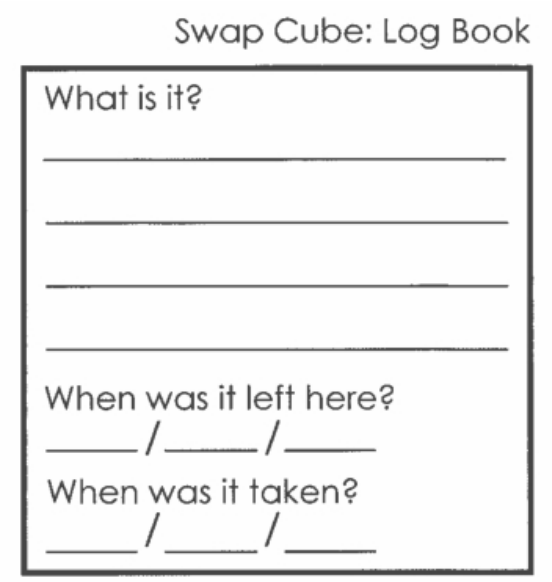

Figure 2. Example of a Swap Cupe log form.

An initial user survey was done, to evaluate tenants' predisposition and previous experiences regarding swapping, with a follow up survey and user interviews planned as part of a master thesis done during spring 2017. The initial survey consisted of 23 alternative questions with space for comments, of which 11 were about swapping. The second survey had 26 questions (with five specifically about the Swap Cube) consisting of both closed and open-ended questions, some of which were multiple choice. Both surveys, the swap log and direct observations are used to inform this article about the results of running the Swap Cube for little less than a year.

Case studies

Change-station on Soender Boulevard, Copenhagen
The authorities of Vestebro, Copenhagen asked Naboskab to help them test a change-station in a well transited intersection of their borough. Naboskab designed the change-station using only recycled material and hired a neighbour to care for the change-station a few hours per week. Initially it was planned that the change-station would operate for 6 months, so the construction was planned accordingly. However, after launched so many people used the station, that there were several requests to keep the change-station working longer

The station is still running strong, with several dozen visitors daily. Given that the station is on the street (Figure 3), it is available to users at any time. Naboskab estimates that about 80% of the users live in the vicinity, divided into four main user groups: families with kids (~30%), elderly people (~15%), socially marginalized citizens (~20%) and school children (~15%). They estimate also that on average the change-station sees a flow of 150kg of items per weekday and 200kg per day on weekends (Naboskab, 2016).

Figure 3. Change-station on Soender Boulevard.

Neighbourhood recycling station in Hørgården, Copenhagen
Hørgården is a residential area in central Copenhagen, characterized by a large social housing area. In this area, the commune recently redesigned together with the inhabitants, the neighbourhood recycling station. The renewed recycling station now includes, in addition to the recycling containers, an external grilling area, a volunteer bike repair shop and a change-station, which is seen in Figure 4. The change-station is open on Wednesdays and Fridays from 12 to 18 and Sundays from 10 to 16.

Figure 4. Change-station in the Neighbourhood recycling station at Hoergården.

The recycling station workers do not maintain the change-station, users are supposed to leave items neatly placed in the space. They do have volunteer youths that help with organizing and keeping the change-station tidy as part of their work training activities. In general, the personnel considers it works well and say it is frequently visited by varied groups of users. No record of the exchanges are kept.

Reuse-house in Hisings Backa, Gothenburg

In Hisings Backa, one of the residential areas run by the housing company Poseidon, they have established what they call a reuse-house. This change-station is administrated by a motivated tenant that keeps it organized and manages the open hours. It is located among the apartment buildings, on the path between the housing area and the nearest bus stop (Figure 5).

Figure 5. Change-station in Hisings Backa.

This change-room is open a few hours once or twice a week in the evenings, when the tenant that maintains it is present. According to the housing company staff the change-station is fairly used, but has no noticeable effect on the waste volumes generated in the area. They also think the change-station would be used significantly more if the open hours where longer.

Solidaric Refrigerators in Gothenburg

This change-station started as an open refrigerator (as seen in Figure 6) located at the “Transition workshop” (a space that houses several community projects). Now they have two more open refrigerators in other areas of Gothenburg.

Figure 6. Solidaric Refrigerator at the Change workshop. © Solikyl.se.

Basically a open refrigerator serves as a change-station for food. The refrigerators are accessible to all public at least three times a week, depending on the open hours of where they are located. The main difference with other change-stations is that most of the items left have been recovered from dumpsters or are donated by one of the collaborating partners. Initially the Solidaric Refrigerator was provisioned with food mainly from

dumpster diving[1], but over time the project managers have established collaborations with some stores, making the collection of their discarded food official. Both cases result in large quantities of food that can be shared with many users.

Food change-stations have higher requirements for hygiene, given that they exchange edible items. Therefore, every open refrigerator has a person responsible for cleaning it out at least once a week. Also, users of the Solidaric Refrigerator are asked to personally evaluate if the food is still in edible condition before taking it, by carefully inspecting and smelling it before consumption.

Kubiz free shop, Weissensee, Berlin
This change-station is located in the cultural and educational center Raoul Wallenberg (KuBiZ), that is dedicated to host projects for social, cultural and infrastructural change. It is open on weekday mornings, as well as between 3 to 7 pm from Tuesday to Thursday.

The shop is designed as a social space where people can book it for meeting or events outside the open hours (as seen in Figure 7). Users are asked not to bring large quantities at once and to bring clean items in good conditions. If there is no room in the shop, then people should take the items back with them. This change-station depends on user donations to pay their rent.

1 Dumpster diving means going through the trash bins of supermarkets and other shops to recover what has been discarded but is still in edible conditions. This is often done after the stores are closed and may involve trespassing shop-owned property.

Figure 7. The Umsonstladed (Free shop) at the Kubiz cultural center.

The Swap Cube

The Swap Cube started with some items donated some of the tenants that took the initiative of starting the change-station. The first items donated were mainly clothes, interior decorations and books.

Initial survey
When launching the Swap Cube, the 33 tenants living at the HSB Living Lab at the time received a paper survey. The surveys were distributed by placing them on each floor of the building. Seventeen filled surveys were collected three weeks later.

Most respondents had heard of change-stations or similar infrastructure (10/17 respondents), but only five had used such facilities. Most respondents claimed not to exchange things with friends often (12/17), with one respondent stating that they are very protective of their things. All respondents could imagine themselves using items previously owned by others in the building, with two respondents saying that they see potential problems with swapping with people in the building. Most respondents said that they thought they would take (12/17) and leave (15/17) things in the Swap Cube. Some comments from the respondents that expected not to use the cube were that they had all they needed, or that they rather sell their items. Most respondents said they thought the Swap Cube would make them buy less things (11/17) and even reduce the waste they generate (13/17). Some concerns the

respondents noted were that it is not sure they would find what they need, they had special interests and they prefer to have warranty on specific items.

Swap Cube log book
Since established, the Swap Cube has had 65 transactions registered in the log book until the end of May. Of the registered transactions, 27 are marked both when the item was left and taken, 20 are marked only when incoming, and 18 are marked only when taken. Of the items that have both in and out registers, seven where taken on the same day they where donated. The other items vary from spending a couple of days in the change-station to several months.

The items most commonly exchanged where clothes (32 registered items), followed by household items with 13 registered items (e.g. telephone, lamps). Other items exchanged where a few books, some electronics (e.g. mobile chargers, speakers), personal accessories (e.g. jewelery, sunglasses), a desk and a board game. Noticeably, an expensive item, such as an Xbox 360 console, spend almost five months in the Swap Cube without being collected. Some days had increased activity, with single users donating several items simultaneosly.

Follow-up survey
After 9 months of the Swap Cube being in operation, a follow up websurvey was performed, obtaining fifteen responses. Most respondents had used the Swap Cube (i.e. 12/15), with five respondents only taking things, three only leaving things and four both taking and leaving items. Most respondents said they would like the Swap Cube to continue (i.e. 10/15), with no one directly opposing this.

When asked what has worked well, they commented that it is trustworthy, its location and convenience, it is easy to swap things and they had found some cool stuff. When asked what has not worked well, they commented that they do not get much item renewal, it seems to be a bit inactive, the offer is quite limited and there is not that many people interested in it. One respondent said that it felt too isolated to the tenants of the building, and they would rather see a solution where more people got access to the change-station.

Leassons learned

Location and open hours determine how convenient a change-station is for its users. These two aspects are critical in defining who uses the space and how often. Frequency in use is important to renew the product stock, while the characteristics of the user group will define what type of items are made available. In comparison to the cases reviewed, the swap cube caters to a small group of users, resulting in a stagnated change-station, that would need interventions to renew product stock.

The log form as it is has the practical problem that the description users leave of the items may be too generic or difficult to recognize by the future user taking the item. The authors are aware that there have probably been more interactions than the ones noted, since there are some inconsistencies in the log and with what is observed on display. Therefore the log should be only considered as a reference of the activity that has taken place.

Conclusion

In general, the experiences of establishing change-stations are positive, with residents making use of the space frequently. Even though these spaces enable exchange, it is not possible allways to link this exchange to a measureable effect on reduced consumption or waste generation. It is not allways true that the items exchanged would have been discarded or purchased if the space to change them was not available. This connection is clear in the case of the Solidaric Refrigerator, however. Since the

food available there would have been wasted otherwise.

There are great possibilities for supporting product reuse among users through building-level innovations. Regardless if products are designed for reuse, the presence of change-stations in residential areas has an immediate effect on users, who promptly engage in exchanging items when convenient infrastructure is available. Therefore, the idea of designing residential spaces to accommodate for product reuse should be promoted among building managers and is a relevant topic to investigate further.

References

Ando, A. W., & Gosselin, A. Y. (2005). Recycling in multifamily dwellings: Does convenience matter? *Economic Inquiry*, *43*, 426–438. https://doi.org/10.1093/ei/cbi029

Bekin, C., Carrigan, M., & Szmigin, I. (2007). Beyond recycling : " Commons-friendly " waste reduction at new consumption communities, *286*, 271–286. https://doi.org/10.1002/cb

Chalmers. (2015). HSB Living Lab | Chalmers. Retrieved June 23, 2017, from http://www.chalmers.se/en/areas-of-advance/buildingfutures/strategic-partnerships/HSB-Living-Lab/Pages/default.aspx

Dahlén, L., Berg, H., Lagerkvist, A., & Berg, P. E. O. (2009). Inconsistent pathways of household waste. *Waste Management (New York, N.Y.)*, *29*(6), 1798–806. https://doi.org/10.1016/j.wasman.2008.12.004

González-Torre, P. L., & Adenso-Díaz, B. (2005). Influence of distance on the motivation and frequency of household recycling. *Waste Management*, *25*, 15–23. https://doi.org/10.1016/j.wasman.2004.08.007

Miafodzyeva, S., & Brandt, N. (2013). Recycling behaviour among householders: Synthesizing determinants via a meta-analysis. *Waste and Biomass Valorization*, *4*, 221–235. https://doi.org/10.1007/s12649-012-9144-4

Porter, B. E., Leeming, F. C., & Dwyer, W. O. (1995). Solid Waste Recovery: A Review of Behavioral Programs to Increase Recycling. *Environment and Behavior*, *27*, 122–152. https://doi.org/10.1177/0013916595272002

Thaler, R. H., Sunstein, C. R., & Balz, J. P. (2010). Choice architecture. *Social Science Research Network*. https://doi.org/10.2139/ssrn.1583509