

Participatory Planning & Design

*with the E-waste dismantling community for
implementation of an E[co]work Space.*

E[co]work

Co-working spaces for inclusive
e-waste management

November 2020, Delhi, India

About

E[co]work Association International (EAI)

The E[co]work Association aims to transform the lives and livelihoods of the informal recycling sector by helping them transition into a safe and healthy sector that is recognized for its valuable work in sustainable resource management and closing material loops that makes a circular economy possible. To reach this vision, the E[co]work Association implements and supports socially inclusive and locally adapted solutions in the waste management sector. The focus lies on the design, implementation and support of E[co]work Spaces, our concept of co-working spaces for micro-entrepreneurs in the waste sector.

www.ecowork.international

Curry Stone Design Collaborative (CSDC)

We live in a world where social, economic and political inequalities manifest themselves into inequalities of built spaces. CSDC believes that thoughtfully designed, safe and functional spaces are vital for robust communities and individual flourishing. CSDC is an architecture and design collaborative and works alongside diverse communities in identifying and addressing their collective needs for an improved built environment through participatory planning, community-driven design and architecture, advocacy and consultation.

www.currystonefoundation.org/csdc/

Resource Futures (RF)

Resource Futures is a UK-based consulting firm specialising in waste and resources with a vision to create a sustainable world. RF works internationally and is B-Corp accredited, working with clients along the entire waste value chain to enable the positive management of material resources.

www.resourcefutures.co.uk



Summary

The E[co]work Association International (EAI) partnered with Curry Stone Design Collaborative (CSDC) and Resource Futures (from Summer 2020) to conceptualise and design an E[co]work Space through a participatory and inclusive process. The process, initiated in late 2019, builds on engaging with micro-entrepreneurs in the e-waste recycling business in the early stages of the project implementation. This is to ensure a robust assessment of the demand for such a space in the market, adapt the concept to local needs and develop a network of potential clients for the E[co]work Space.

It is important to respect the micro-entrepreneurs and their community as equal stakeholders in order to bring favourable changes and introduce new tools in a sector that has been running informally for decades. A participatory approach allowed us to understand the complexity of the e-waste sector and particularly the hurdles faced by these micro-entrepreneurs. It also helped recognise the strong intangible bonds, connections, aspirations and motivations that eventually are able to inform a more inclusive design for a sustainable solution.

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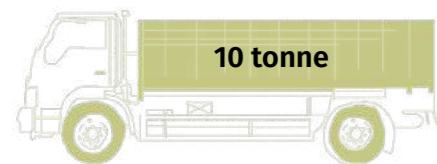




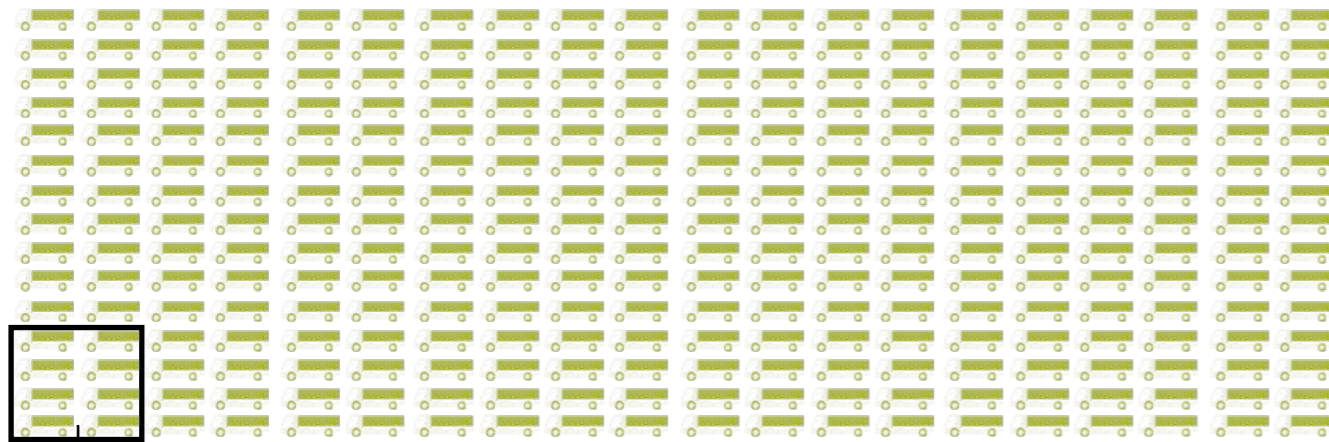
Introduction

Regional context

India is the **3rd highest producer of electronic waste (e-waste) in the world** with 3.2 million tonnes produced annually [1].



Which equals to producing **880 of these trucks everyday.**



Only a small fraction of less than 10% gets treated formally [2,3].



In and around metropolitan cities in India there are over 3000 units engaged in the informal sector for e-waste recycling [4]. **Large portions of these are concentrated in the North Eastern parts of Delhi in the neighbourhoods of Mustafabad, Seelampur, Dilshad Garden, Mandoli and Shastri Park, each with specific core activities.** These include dismantling, smelting, refurbishing and trading that are operated informally by micro-entrepreneurs living in these areas. Entire neighbourhoods are directly or indirectly involved in the e-waste business and rely on it for their daily income. Processing e-waste often follows dangerous and polluting practices causing harm to both health and environment.

Current challenges

While the e-waste micro-businesses support the local economy, provide jobs and livelihoods, directly and indirectly for skilled, semi-skilled and unskilled workers as service providers, **their work is often not valued and negatively perceived due to their illegal and polluting work practices.** To achieve a transformation into a healthier, safer and positively recognized sector, several challenges need to be addressed:

1. Unsound recycling practices

The health impacts of e-waste dismantling and recycling affect the dismantler both physically and biologically due to the presence of hazardous chemicals. Dismantling procedures using inadequate tools, machinery and no personal protection equipment add to a high risk of accidents on the job. **A long-lasting disability or chronic injury drastically decreases the future income opportunities for the dismantlers.**

The chemical risks are a combination of several factors [5]: E-waste contains a mix of hazardous substances (various heavy metals and organic substances such as additives) that can be released during the dismantling and recycling process (e.g. strong acids or mercury for precious metal recovery, dioxins from the burning of cables).



An open drain next to the residential units with ground-floors used as e-waste dismantling workshops in Seelampur. Credit: Ishtiaq Wani

These chemicals that are released have a much more pervasive impact on the community and cities as a whole [6]. **While a worker will get directly exposed to these substances, his family and especially children will be indirectly exposed** (e.g. insufficient workplace hygiene such as no specific work clothes and hand-washing, improper separation of work and residential areas). The reported effects include issues during pregnancy, birth defects, hormonal imbalances, brain diseases and impairments, leading to changes and damages in the DNA [7].

In addition, chemicals associated with e-waste dismantling and recycling can contaminate water and air. **This contributes to environmental pollution issues that Indian cities, especially Delhi are already grappling with [8], and as a result impacting the larger community and many city residents.**



A local dismantler in Mustafabad sitting outside his workshop on a block due to lack of light and ventilation. Below him is an open sewerage.

2. Marginalisation of sector

Unsanitary working conditions and hazardous recycling practices often lead to **conflicts with local government agencies, such as the pollution control board**. Although this well-established informal sector network combined with their work skills strongly support the local economy, the sector is often marginalized. Worldwide, there is consensus that the aim should be to integrate the informal sector into the official waste management system. However, **in reality, there is a lack of appropriate mechanisms to establish and nurture co-existence**.



3. High barriers to formalization

The E-Waste Management Rules issued in 2016 set recycling targets for producers that **increased demand for legally sourced e-waste**. However, micro-entrepreneurs have little opportunity to benefit from these new requirements. Even if they are willing to become formal businesses, their ability to transition is often hampered by the **complex and tedious formalization procedures** that are even more onerous for those not familiar with government procedures and with limited experience in navigating formal business procedures. This keeps their businesses illegal in nature and they continue to face multiple pressures and a real risk of closure, with few available alternatives or avenues of support.



Display of refurbished electrical goods spilling it's way to the lanes of Mustafabad. Residential houses above with bakery on the side.

4. Economic and material losses

Inefficient recycling techniques result in a loss of secondary resources and reduced financial returns. Low tech processes used in the informal sector focus on the extraction of only a few specific metals and often leave out materials that require sophisticated recycling in high-tech industrial facilities.

Cherry picking, i.e. processing of only high-valuable products, further adds to the loss of materials. This recycling method has low efficiency and recovery is carried out only for valuable metals like gold, silver, aluminum, copper, etc. Other materials such as tantalum, cadmium, zinc, palladium etc., could not be recovered [4]. Research by MeITY shows that material recovery efficiency from printed circuit boards in the informal sector is only at 20-30%, as compared to industrial processes that have an efficiency of above 80% [9].

A photograph of a recycling facility. Three workers are visible, sorting through large piles of waste in a brick building. The waste includes cardboard boxes, plastic containers, and other debris. The workers are wearing casual clothing. The scene is dimly lit, with light coming from a window on the left. A semi-transparent circular overlay is on the right side of the image, containing the text 'E[co]work Space'.

E[co]work Space

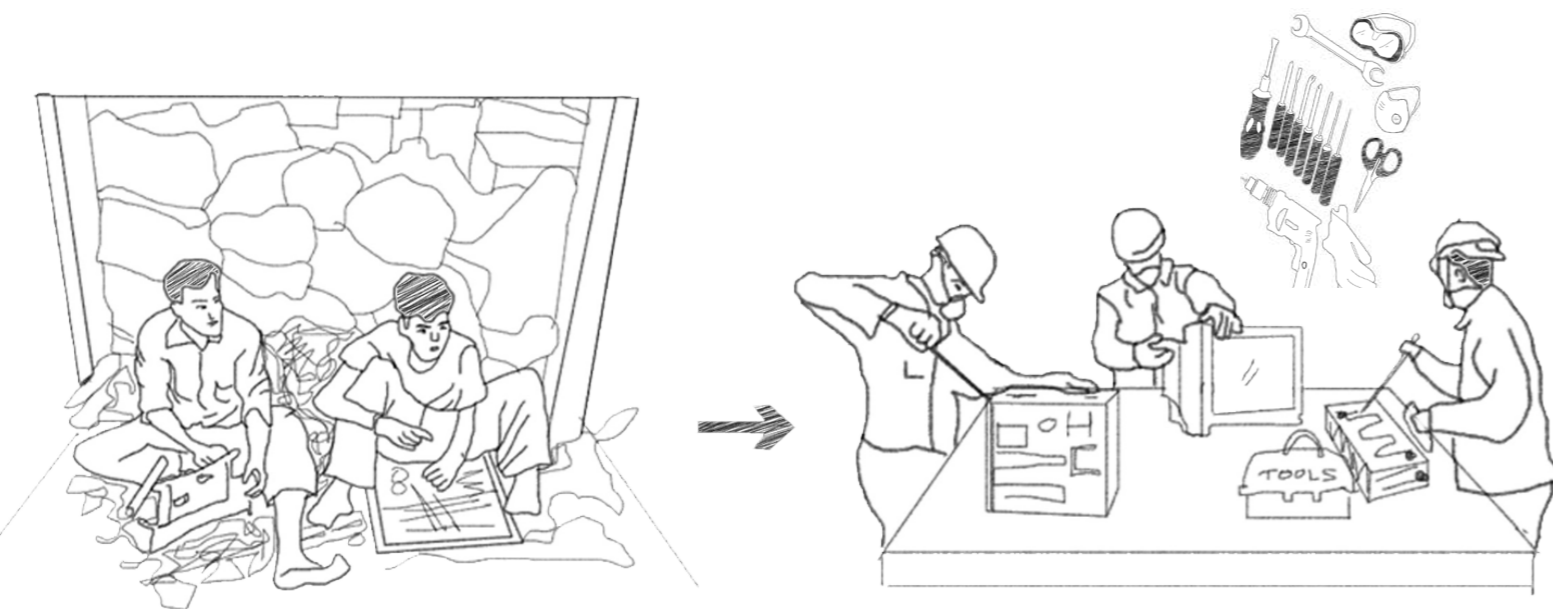
The concept

The concept of an E[co]work Space is based on the idea of co-working spaces, i.e. the **use of shared infrastructure between multiple independent businesses**. The E[co]work Space offers an actual physical “co-working space” in an industrial area for micro-entrepreneurs in the e-waste sector that is **safe and in line with legal requirements**. This includes, but is not limited to, adequate tools, protection, ventilation, lighting, machines as well as services such as training, healthcare, banking and digital access.

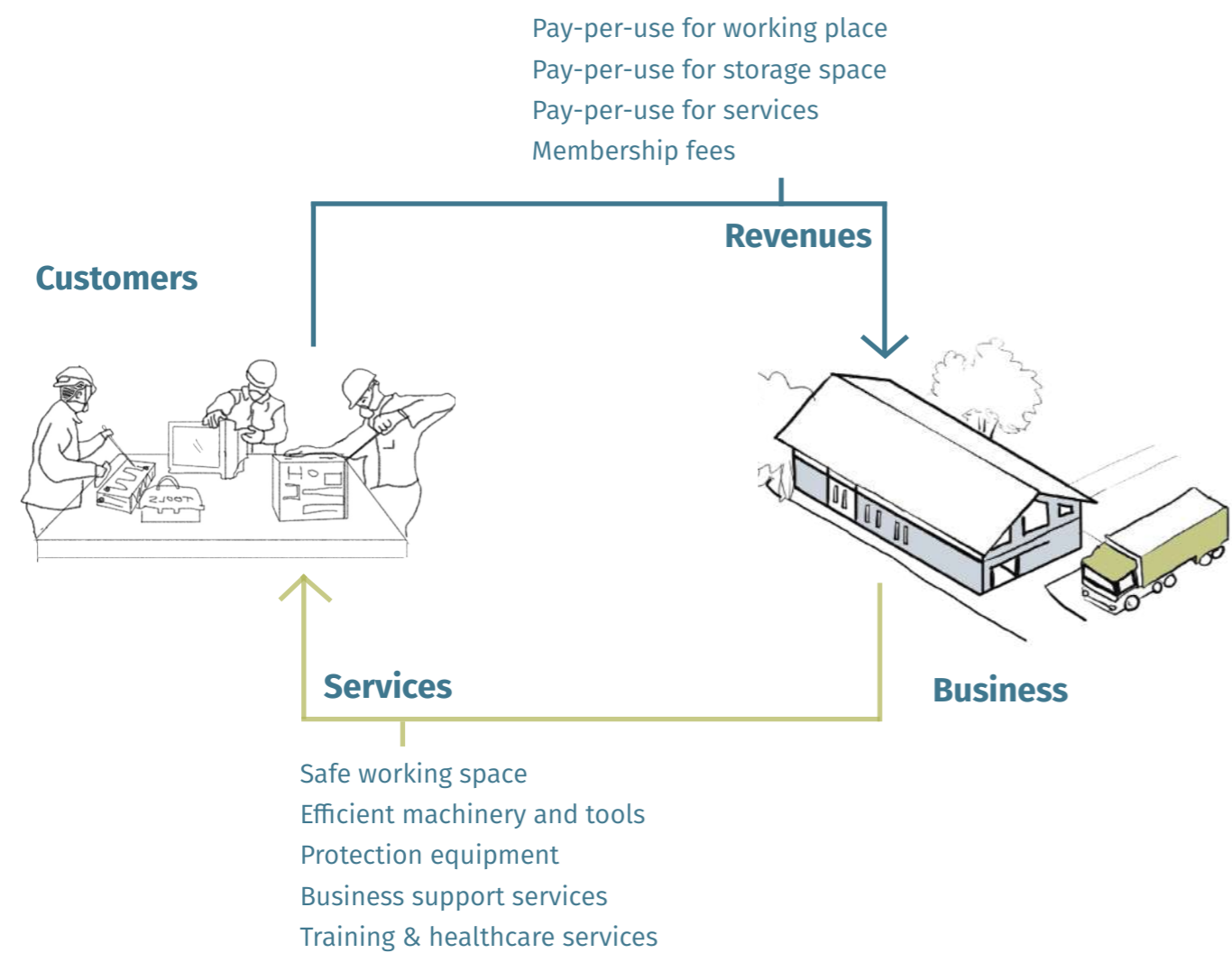
Micro-entrepreneurs can rent part of the space and equipment for specific times suited to their needs. This allows them to familiarize with the legalities and requirements, grow within the space and gradually formalize if they see the benefits. **The pooling of costs makes the use of efficient technologies, safe infrastructure and services accessible and financially affordable for the informal micro-entrepreneurs.**



A local dismantling unit in Seelampur. The e-waste material is kept inside the shop and dismantlers are sitting outside the shop on the road.



A self-sustaining business model



Business

An E[co]work Space is a physical building that is designed to provide co-working spaces for e-waste dismantling. Central to the idea of E[co]work is to create a space that provides dignity, prosperity, safety and a secure future to this community.

Customers

Potential customers of the E[co]work Space are E-waste micro-entrepreneurs. Currently they are informal e-waste dismantlers who operate from small shops, typically in residential areas and operate on very low margins, with little ability to save or invest.

Services

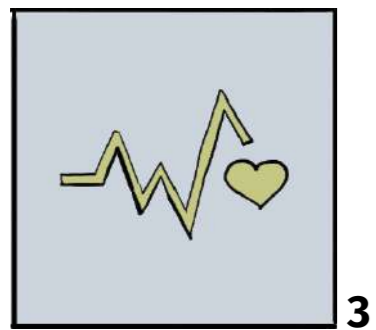
The main service is the legal rental of a workplace for dismantling e-waste and adequate storage spaces. Another benefit at E[co]work are rental options for machinery and tools. Furthermore, it will aid in enabling access to services, such as banking, medical check-ups, insurance, and registration. As a provider of infrastructure and a business incubator, the E[co]work Space does not interfere with the business of a micro-entrepreneur, rather supports the business to grow and scale.

Revenues

The main sources of revenue for the E[co]work Space are rental fees for work and storage spaces as well as for on-demand services. Rental fees are pay-per-use to allow for high flexibility and low fixed costs for the micro-entrepreneurs. Supplementary revenue options (external funding through Corporate Social Responsibility (CSR) funds), may temporarily generate an income, but in the long-term E[co]work is designed to function as an independent social enterprise.

Impact

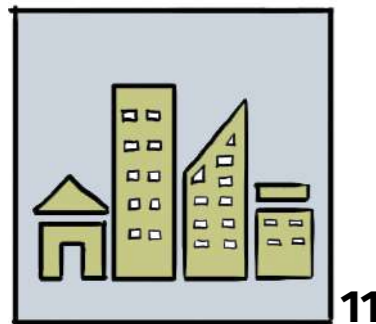
An E[co]work Space has strong potential for improving livelihoods, reducing the environmental burdens, contributing to a circular economy as well as addressing various Sustainable Development Goals (SDGs), e.g. **Good Health and Well-being (3)**, **Decent Work and Economic Growth (8)**, **Sustainable Cities and Communities (11)** and **Responsible Consumption and Production (12)**.



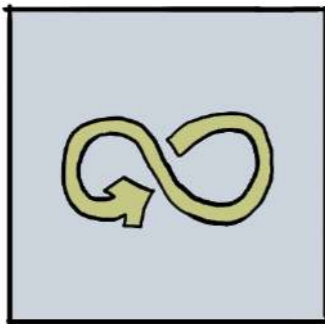
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8



11



12

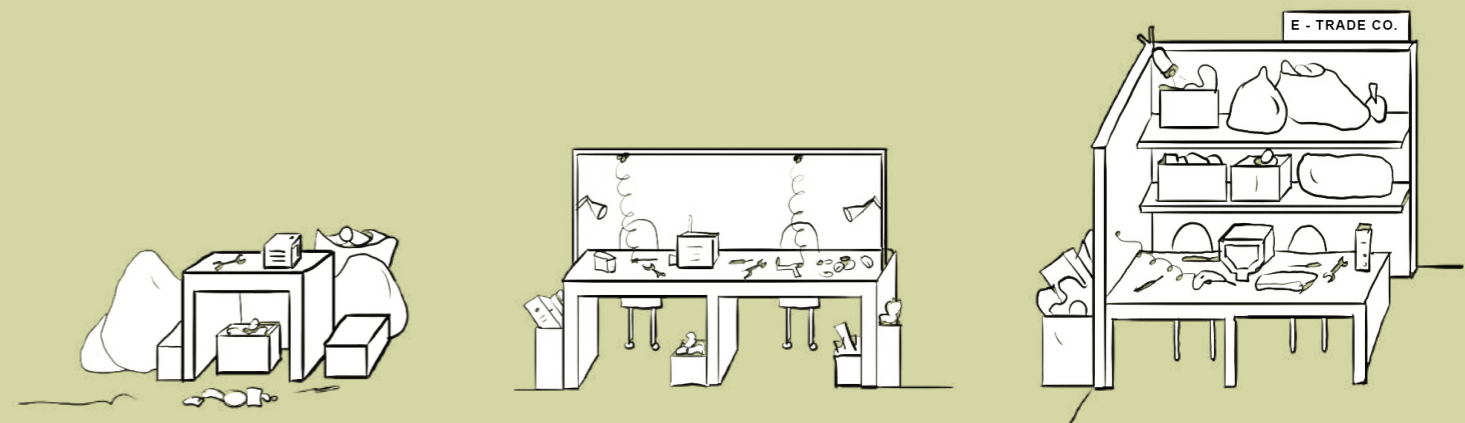
Specifically, positive **social impact** is achieved as it opens up avenues for the e-waste community to secure jobs and livelihoods in a legal workspace, while also creating dignity, respect and recognition for their work. Furthermore, increased awareness of health and safety through the provision of tools and protection equipment will further reduce risks of accidents and illness.

Environmental benefits are created through the reduction of hazardous emissions by providing downstream solutions for hazardous fractions and the increase in material recovery contributes to a more circular economy.

Economic impact includes the increase in efficiency of the dismantling process leading to increase in their daily income, through the support of selected mechanization, pooling of bargaining power, reduction of health risks and workplace accidents and business development.

Potential for replication

The business model has a high replication potential in India and other countries with a similar context. Once established for e-waste, it could potentially also be replicated for other waste streams, for example plastics and other recyclables that can be handled safely by small and medium enterprises. The project aims to document the entire process through this proof of concept pilot/pilot in order to eventually have a template and manual for replication. The template should capture the essential elements of implementing an E[co]work Space, covering technical, social and business aspects.



Participatory Design Process

Building trust with the community

The e-waste dismantling industry in Delhi is a **male dominated profession and with a majority belonging to the Muslim community**. With their families, they have migrated from different rural areas from around the National Capital Region (NCR) to the North East part of Delhi. Many of these dismantlers were born in these areas and have seen their neighbourhoods grow and change.

Our first step in building trust and a relationship with the community was identifying local people who were interested in working with us as representatives of their community. A mix of young dismantlers and experienced businessmen formed this core group. These included men who were studying, dismantling, trading and were also ready to spare some time to help us understand the community better. Our continuous engagement, both on-site through meetings and discussions and off-site through WhatsApp conversations, helped us to gain a better perspective into their lives.

Eventually, soft drinks and platters of biryani and salad were served in many Community Representative's homes and workshops which became our usual settings for meetings and discussions. The Community Representatives would bring their own confidants from the community to join us for these gatherings making a group of 5 turn to a group of 20 within minutes of invitation.



Interiors of one of the dismantler's unit dismantling parts of CPU.



When we asked them “What part of your work do you enjoy?” or “What’s the first thing you think of when you wake up in the morning?” they would look at us and at each other with surprise. They seemed to have never given any thought to the things that made them feel successful.

Glimpse from one of our first meeting in Seelampur in a dismantler's unit.

“When I see my daughters go to school, I feel like I have achieved something.”



“Maybe I will feel more successful if I don’t have to sleep with the fear of not knowing what tomorrow is going to be like.”

“As long as I get my tea from that old man from across the street and have my friends to chit-chat with, I feel like I am in a good place. You know sometimes I order for 25 cups at once but he will never send a bill along with it. We have an understanding.”



A rented dismantling unit in Mustafabad. The room at the back is a resting space for the labourers.

The intent of our questions was for the community members to think about their current situation critically, and voice their concerns and comforts. From these questions emerged stories and exchanges that gave us **insights into their goals, fears and aspirations not just as businessmen and workers, but also as fellow human beings.**

And when we asked the question of what matters the most to them about this work, they said, “We are ready to move if we have to but if we move, we all have to move to a new place together, a few of us leaving won’t be kind. We care about our relationships over profits.” In retrospect, physically being present and spending time with the community, with the intent to understand their social and cultural background as deeply as possible, played a huge role in strengthening our bond with the community.

Understanding networks



How does my e-waste from Bangalore reach Delhi?

While it was important to understand the community socially and culturally, in order to bring value to the existing system, it was important to study and understand the routes and flows of e-waste not only in and around Delhi, but from across India.

In an intensive workshop (held between the E[co]work Team and CSDC Team), maps of India and the NCR were prepared, onto which material flows and existing networks were traced out. Further, we continued to add technical data and insights to these maps through information we gathered while directly engaging with the community over many months.

What happens to the phone you discard in Bangalore?

Bangalore



1

You discard your phone



2

Your scrap-dealer (last mile collector) either buys it from you or from a local repair shop



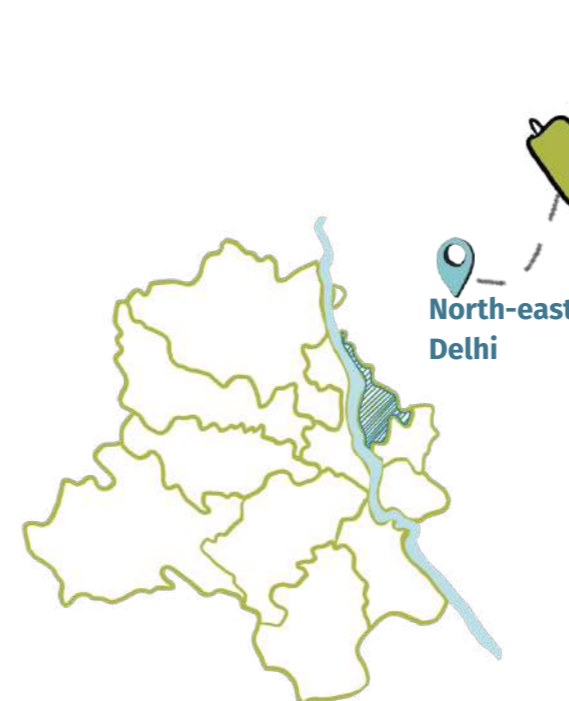
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He sells it to the local collector who buys it for recycling or refurbishing



4

The broken phone is bought by an aggregator and transported to Delhi along with other e-waste collected in that city. Aggregators in cities across India are appointed by e-waste business owners in Delhi. They are usually linked through familial bonds.





By far the largest e-waste recycling hub in the country is in the neighbourhoods of North East Delhi. **The transported e-waste from various cities of India gets aggregated in the areas of Mustafabad and Seelampur.**

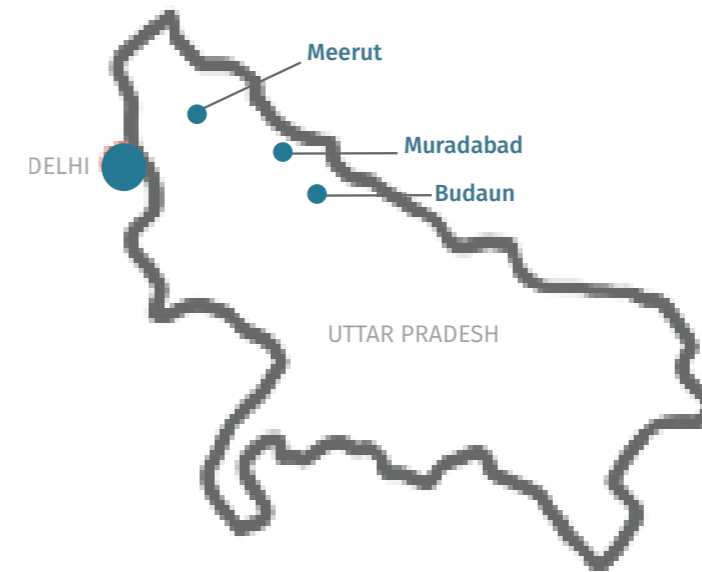
With a population of over 22 lacs (2.2M) spread over 62 sq.km., North East Delhi is a mix of semi-urbanised areas and urban villages. It borders the Yamuna River on the West and Ghaziabad District (Uttar Pradesh) to the North.

Maaliks (business owners) in these neighbourhoods are incharge of aggregation and dismantling, while also selling it to other local dismantlers. Some e-waste goes to other neighbourhoods for dismantling, burning, smelting or refurbishing.

Neighbourhood map in North East Delhi where e-waste is treated informally



Migration Map of e-waste dismantlers



There are over 50,000 people employed directly or indirectly in the informal e-waste activities in North East Delhi [10]. Many of them have migrated from districts and cities from the neighbouring state of Uttar Pradesh such as Meerut, Muradabad and Budaun and belong primarily to the Muslim community.

Activity Map



Navigating social and political externalities

Our engagement with the e-waste dismantling community in Delhi began in November 2019, at the time of rising political unrest in India largely due to protests against the amendment of the Citizenship Act. **One of the areas most affected by these protests and ensuing riots was North East Delhi, resulting in shuttering of shops and establishments for many days at a stretch due to security concerns.** The e-waste recycling community was socially, politically and economically affected by the uncertainty and instability in the law and order situation. During this challenging phase for the community, the conversations and **engagements evolved beyond discussions around their livelihood to also include conversations on their safety and wellbeing.**



Post riot images from Shiv Vihar,
a neighboring locality to Mustafabad
Credit: Hemant Banswal via Wikicommons



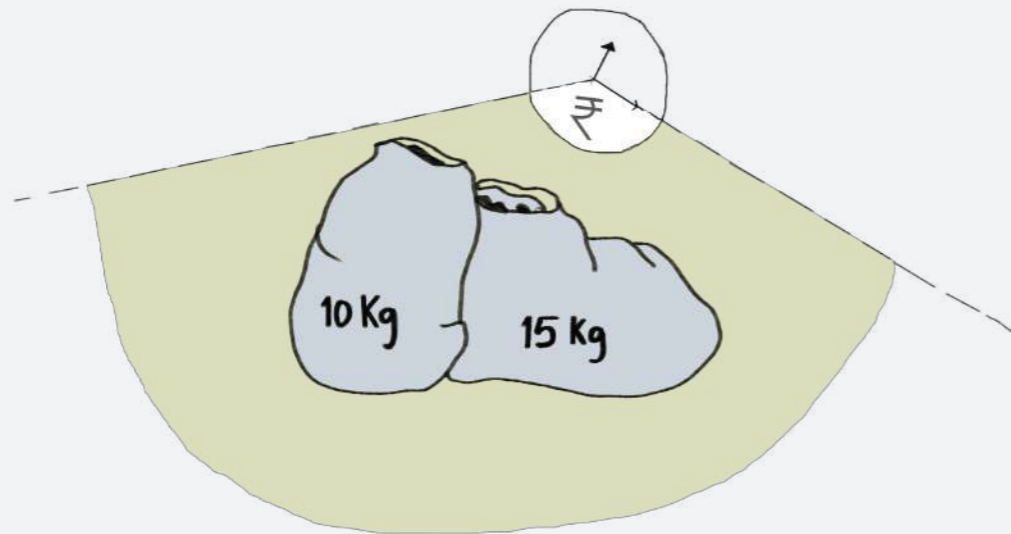
Shops and warehouses shut in major
parts of North east Delhi.
Credit: Suraj Bisht

They shared stories and details of their circumstances over phone calls, voice notes and through WhatsApp pictures. **While we were not able to stick to planned face to face meetings and immersive discussions with the community, we were able to strengthen our relationship with the community by being there for them through these times.** In this process, they were able to trust us more and open up about their needs and challenges.

As normalcy returned, we were able to kick start the process focusing towards their livelihoods and local networks to gain an in-depth understanding of how they function.

Understanding the economics and existing business models

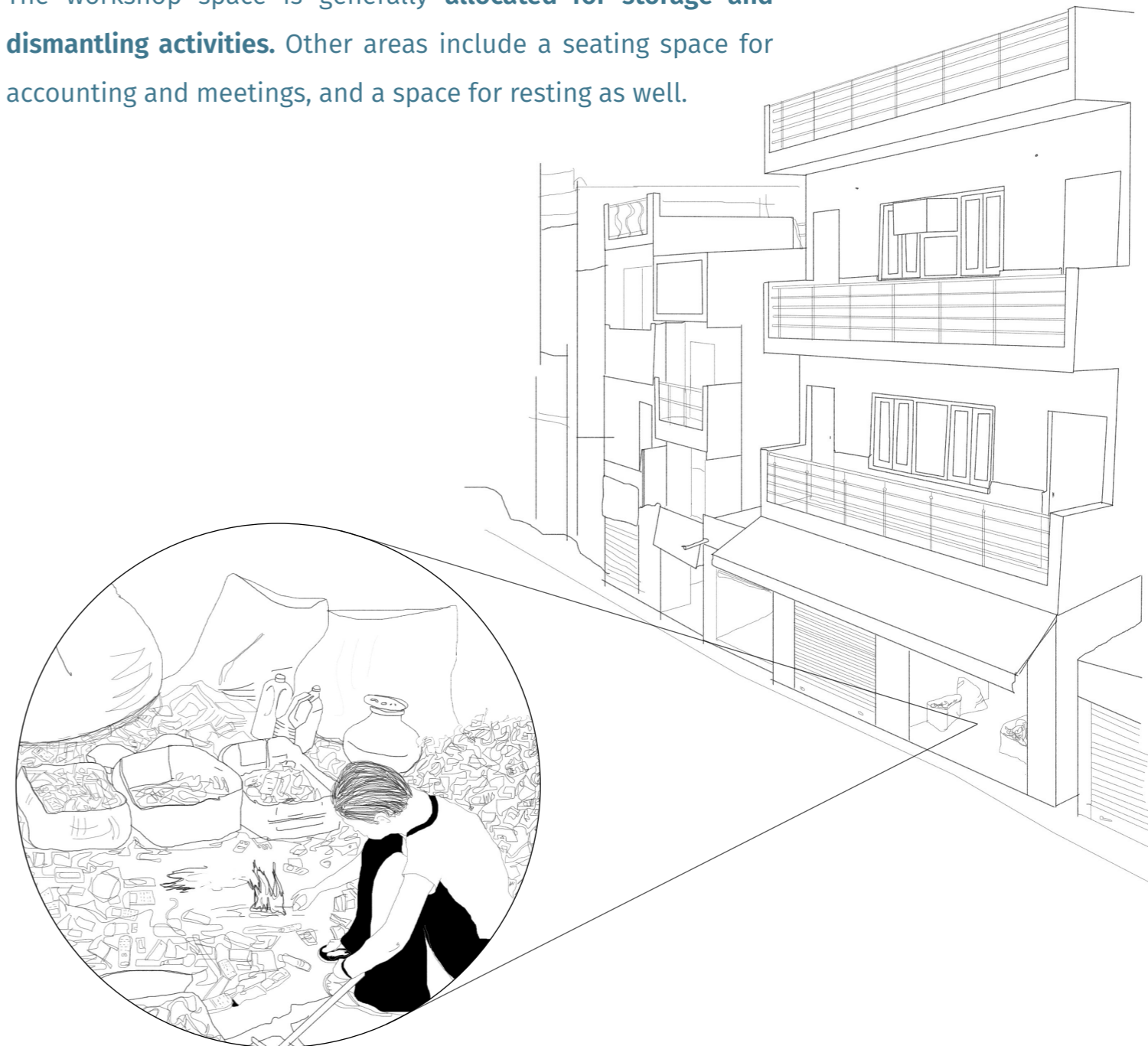
The current dismantling model amongst the micro-entrepreneurs includes a **Maalik, a dismantler himself, who then employs a number of labourers** (2-5 skilled or unskilled labour) for his business. This means **one business requires about 2-6 people at a time**. The skilled labourers are **paid by the kilogram (kg) of material dismantled, ranging from Rs 4 - 10 per kg, or are paid a salary, ranging from Rs. 8,000 - 10,000 per month**.



The space in which they work is either rented or owned. **A micro-entrepreneur rents spaces ranging from Rs. 10,000 - 15,000 per month for approximately 400 sq.ft. area**. Larger e-waste business owners have bought their own space that is often used as a dismantling workshop on the lower floors and residential area on the upper floors.

In general, the **preference for ownership of their space is very strong**, therefore there is an inclination towards buying spaces instead of renting as it is seen as a long-term investment. Additionally, **security and safety of goods is key to their business**.

The workshop space is generally **allocated for storage and dismantling activities**. Other areas include a seating space for accounting and meetings, and a space for resting as well.



The dismantling business model is heavily dependent on point to point transactions within the region, with the price of goods increasing as they get processed along the way.

For example,



Iqbal from Mustafabad buys 1 tonne of keyboards from the Maalik at Rs 50/kg to dismantle.



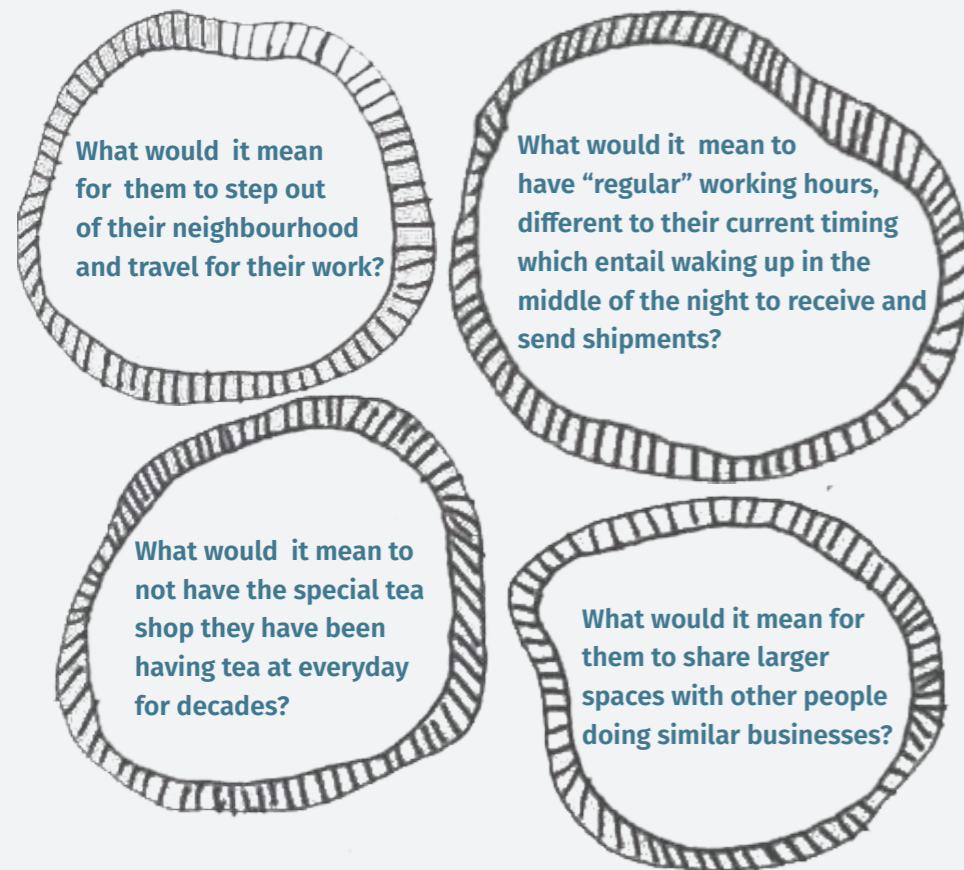
He will then invest in the labour for dismantling the keyboard to its individual parts, namely plastic, PCB (Printed Circuit Board), and copper from the wires.



He would then sell (say) the PCBs to Ahmed from Seelampur for Rs 65 per kg. Ahmed will then collect more PCBs from other dismantlers as well, and sell these to Vijay, the smelter from Mandoli, for Rs 75/kg.

Note: Rate of materials mentioned above are purely for illustrative purposes.

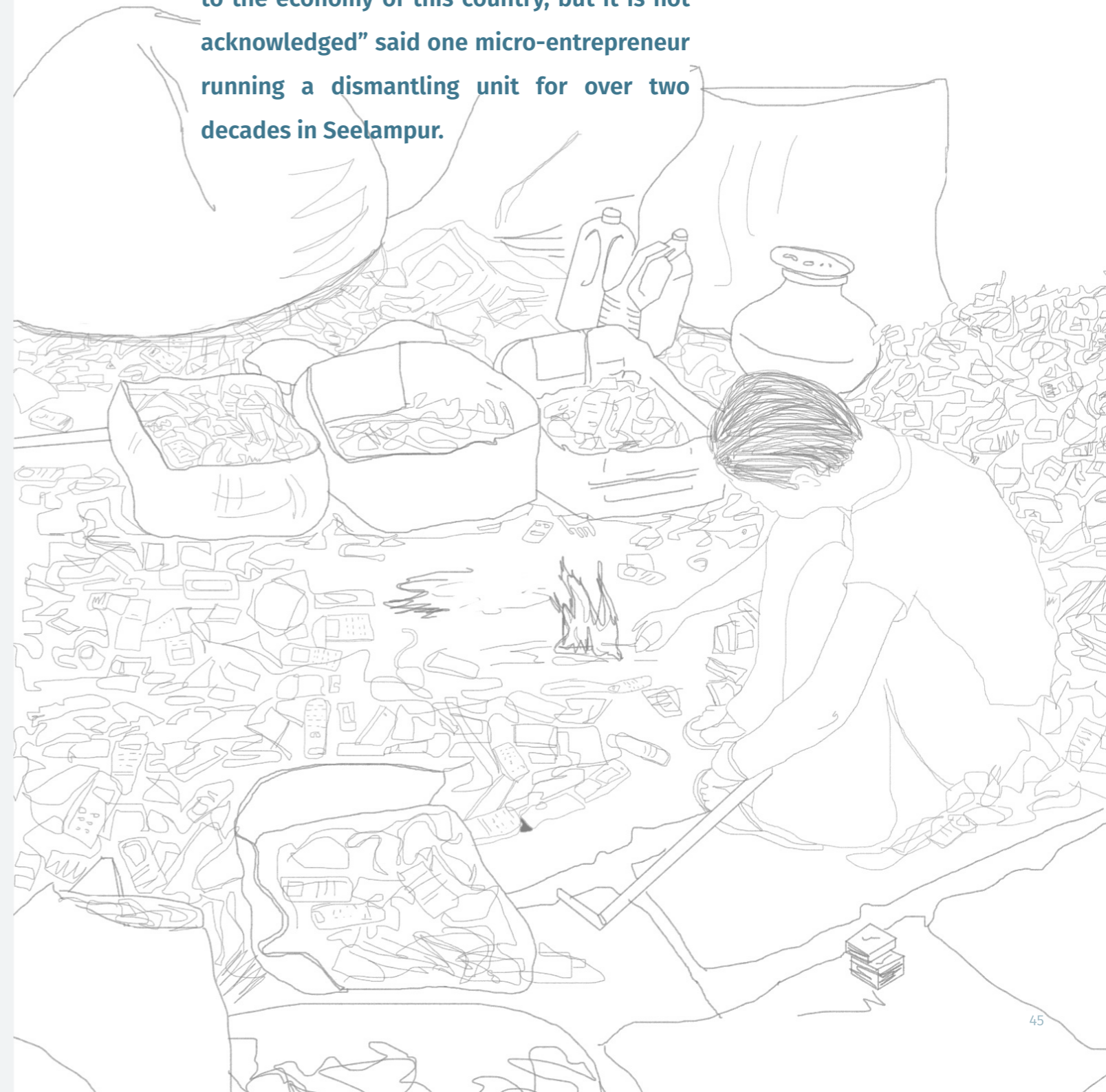
Humanising the informal sector



The informal sector is commonly (mis)understood as a problem. It is often described and defined in terms of data such as the size or the volume of material it handles, or the unsound environmental practices it uses. It is important to recognize that these are people who engage in e-waste dismantling. They have grown organically through scrap trades well before any legislation for e-waste processing was put in place. They developed mechanisms, skills and established a network to collect and dismantle e-waste to extract value from it, in exchange for a livelihood.

The businessmen and workers here **understand that change is inevitable**, more so in the post-pandemic world as also detailed further in the following section. We believe it is necessary and important to understand the changes as the community would like to see, from their own perspective, on the **idea of dignity, prosperity, safety and a secure future**.

“I just want to sleep soundly at night and not have to wake up at odd hours to send or receive trucks with e-waste. This process is considered illegal as it is done in residential areas, so we have to hide our activities, but do you know, some of us have a license and pay taxes? We feel we contribute so much to the economy of this country, but it is not acknowledged” said one micro-entrepreneur running a dismantling unit for over two decades in Seelampur.





The neighbourhood at a glance

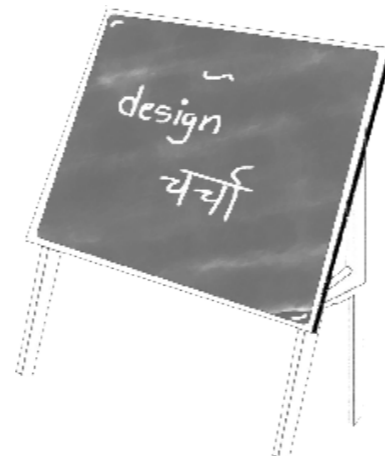


Co-creating solutions

Access to the community and building trust takes time and is not easy, more so with communities that are close-knit and wary of 'outsiders'. Although we have a strong link and a point of access through a team member who comes from and lives within this community, for the dismantler their time is valued by every kg of e-waste dismantled/traded, and hence **time equals their daily wages**.

Meetings with the micro-entrepreneurs required flexibility, adaptability and being accommodating to dynamic situations. It meant extended meeting durations while waiting for the people, and stretching timelines and deadlines. However, **as our engagement progressed, the responsiveness and interest of the community increased and delays reduced because we engaged with them as partners and not 'beneficiaries' or 'people who we were going to help.'** We were able to communicate that we wanted to work with them and for them. After several discussions and meetings, we hosted our first design workshop '**Design Charcha**' [charcha meaning discussion in Hindi].

For this workshop, we brought together 15 micro-entrepreneurs from different neighbourhoods, with the intent to share different avenues that they **as a community can pursue in order to run their businesses, while the sector begins to shift from being informal to formal**. We also used this opportunity to acknowledge and help them recognise that they are contributing to society and the economy of this country. We also shared systems that other countries have adopted to combat the problems that this sector faces.



At the Design Charcha workshop in Delhi with some e-waste dismantlers from Seelampur and Mustafabad.

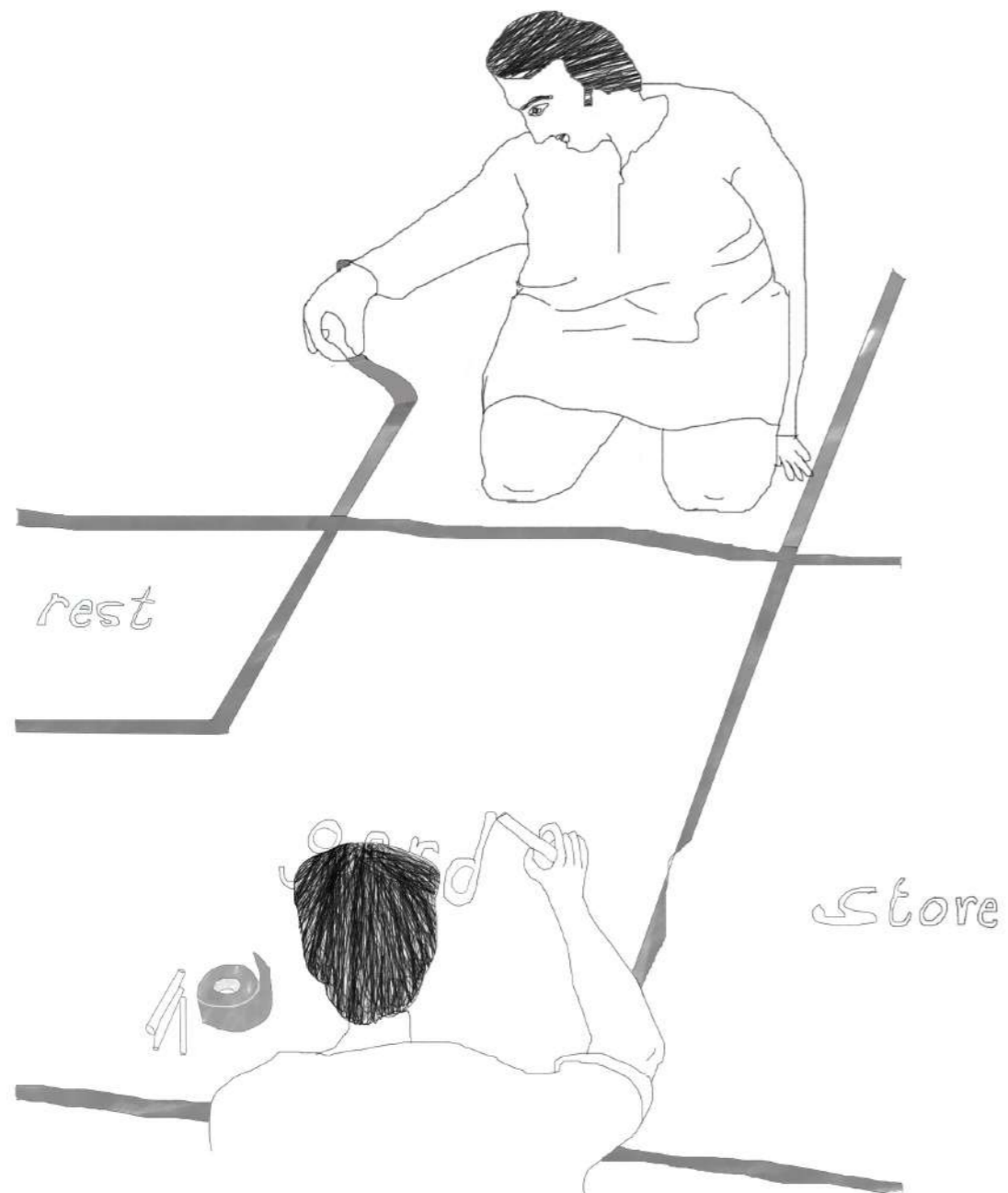


At an e-waste workshop when the projector stopped working, we resorted to a laptop to discuss how e-waste is handled in other parts of the world.



“In other parts of the world, work like this is supported and encouraged by the government, but here there are too many loopholes that get hidden behind bribes. People need to be looked at as people, not as means and source of money” said one of the dismantlers.

To conclude the workshop, we conducted an activity that allowed them to **reimagine their space of work**. The venue of the workshop added to this experience because it was one of the potential spaces where the concept of E[co]work could be envisioned. With tapes and chalk as tools, the dismantlers present at the workshop divided themselves in groups of 3 and 4 persons and started visualising it.





In the midst of reimagining their space using chalk and tap exercise. Who doesn't enjoy a bit of play!



These spaces were divided into how their existing spaces function, such as storage area, weigh bridge area, dismantling area and more. **However, the sizes of these areas were increased to make it less cramped and CCTV cameras were recommended as a security element around the space.** Along with it, they added rest areas for the dismantlers, a personal washroom (that is a luxury in these compact communities) and an **open garden space with natural lighting.** They also added an area for **emergency exit** just in case there is a fire or unforeseen accidents. The outcomes offered insights into what they truly value in their place of work and also **brought attention to things they care about.**





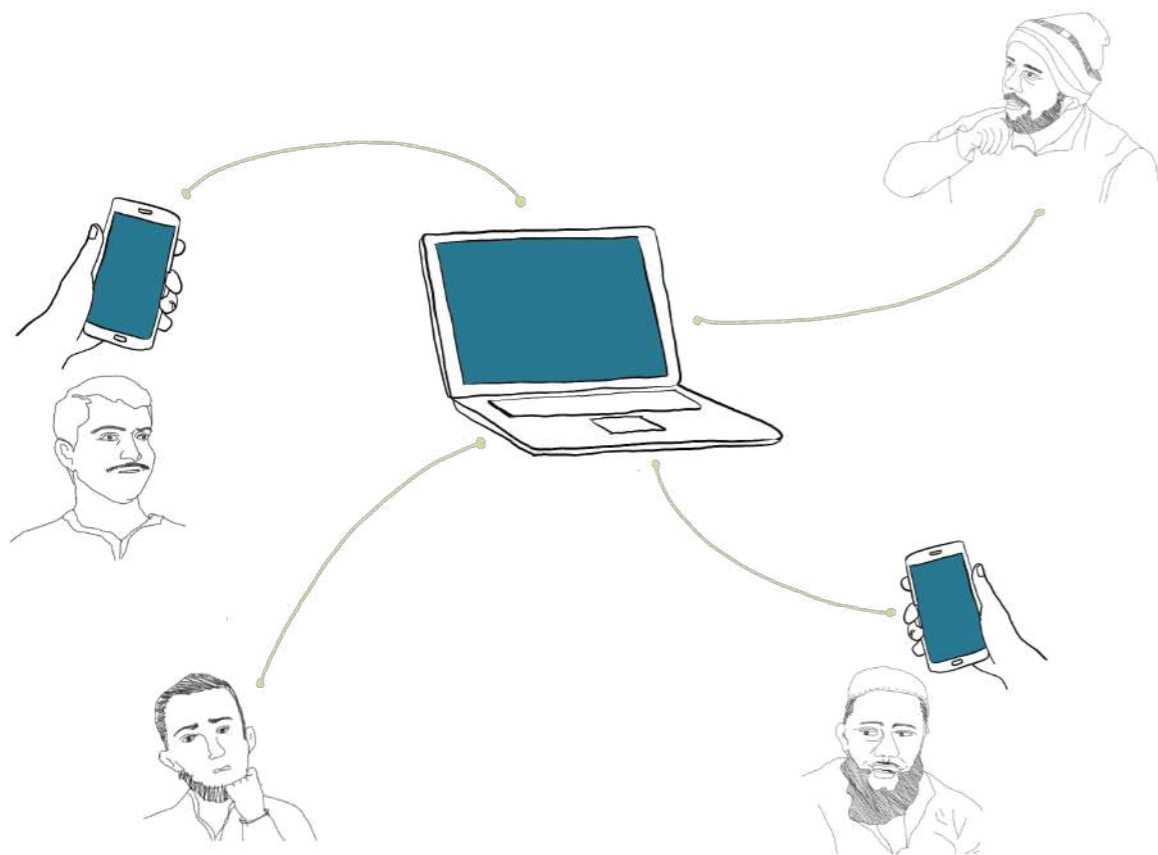
A mandatory group photograph after we finished the workshop and before the Biryani arrived.

Covid-19 impact

Alternatives to in-person meetings

Most of our gatherings, conversations and interactions with the community had been in-person and often located in the dismantling units within the neighbourhoods of Mustafabad and Seelampur over tea and snacks. However, in late March these in-person interactions took a pause as Covid-19 resulted in a nationwide lockdown that extended for many weeks. Our strategy had to pivot and many things that were planned were put on hold. **With no physical interaction with people and the neighbourhood, we were unable to continue our participatory workshops on the E[co]work spatial design with the community.**

Eventually our interaction turned to bi-weekly video conference calls with our Community Representatives to understand how they are coping with this situation.



What does uncertainty of such a scale look like for people who have been at the frontline of social inequities?

What does it mean to be living and working in small and compact spaces while maintaining physical distancing?

What does it mean to transport and trade material during nationwide shutdowns?

What does it mean to run their dismantling micro-businesses when labourers are returning to their villages?



The online calls helped us continue our engagement and keep up the established networks and bonds with the people. **Covid-19 made the impacts of poor healthcare and sanitation very visible.** Intermittent nation-wide lockdowns and lack of clarity on how the next few months will unfold, left many of them uncertain about their future.

While our bi-weekly zoom conversations did not get us answers to these questions - as the businesses had completely stopped running in response to Covid-19, **it still helped us to engage over their basic challenges such as availability of food, shelter, quarantine regulations and other safety norms.**

Even though many people were surviving on their savings, they still continued to support and help people in worse situations. **Some Maaliks who had the capacity, put their focus towards relief work by preparing ration kits for people in need, and some supported their larger families in whatever ways they could.** While some were happy spending so much time with their families, some were bored due to the inactivity of sitting at home all day. **They missed their friends, their evening tea, and the work that earned them their daily wages.** As the lockdown associated with the crisis had excluded industrial areas, **the micro-entrepreneurs have now also started to see direct business continuity benefits if they established themselves in industrial zones.**

Lack of collective representation

When we asked the Community Representatives what do you think could really help the people at this point? ***They said, “a collective voice to address our issues locally and to the government.”***



While there was a constant feeling of being unrecognised for the work they do, **they also felt that they had no system in place to represent themselves.** This is where the idea for forming an e-waste dismantling association came to be. An association, under the Society Registration Act, 1860, is a collective body of seven or more people who have come together for any common and legal pursuits, including literary, scientific, charitable or social pursuits, to subscribe their names to a memorandum of association and file the same with the Registrar and form themselves into a society. Once this body is established it helps in organisation of the activities, legally allows to form rules and regulations within the community, and also helps in representing their interests and voice their concerns to the government.

Challenges of remote access

We assumed that this idea seemed achievable as people from the community would be free to spare time for it. But it turned out to be difficult for people to converse or mobilise digitally. Some Community Representatives tried to collectivize the community with multiple follow-ups through WhatsApp messages and calls, but were unable to get sufficient responses. **They felt the community is so dependent on physical interactions that phone calls and messages are not taken that seriously.** They also felt that there was lack of enthusiasm and their worries at this point were different. For this reason, we decided to restart the process of helping form the association when we meet in person.



Key Learnings

Insights

Following are some of the insights received from the participatory design meetings and workshops that reflect on their values, challenges and needs as a community.

Needs and Aspirations

Familial bonds and tight-knit social fabric: A business that grows within the family and directly provides for the family, the micro-entrepreneurs' businesses largely depend on trust and commitment. They placed strong importance on friendships and their local networks for their well-being and economic success. They felt that it might be challenging to leave behind their community in search for bigger profits.

Sense of ownership: They strongly valued independence and desired ownership of the space they were in, however small their business was.



Challenges of Informality

The micro-entrepreneurs were quick to point out some personal challenges that they experience regularly in regard to the informal status:

Logistical challenges: Owing to the illegal status of their work and time restrictions on goods vehicles, their transport networks are mostly active at night. Due to this, they often have to resort to working at night leading to irregular sleep cycles. On the positive side, the cluster has access to very cost-efficient local transporters that have over time, become adept at transporting and handling e-waste.


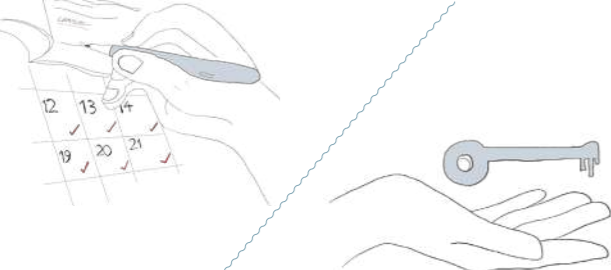
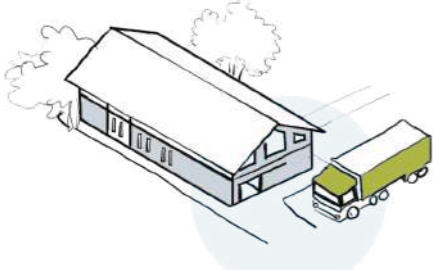
Uncertainty of their businesses: The participants often mentioned the uncertainty of their situation, as they often did not know whether they could continue working even the next day due to legal issues.

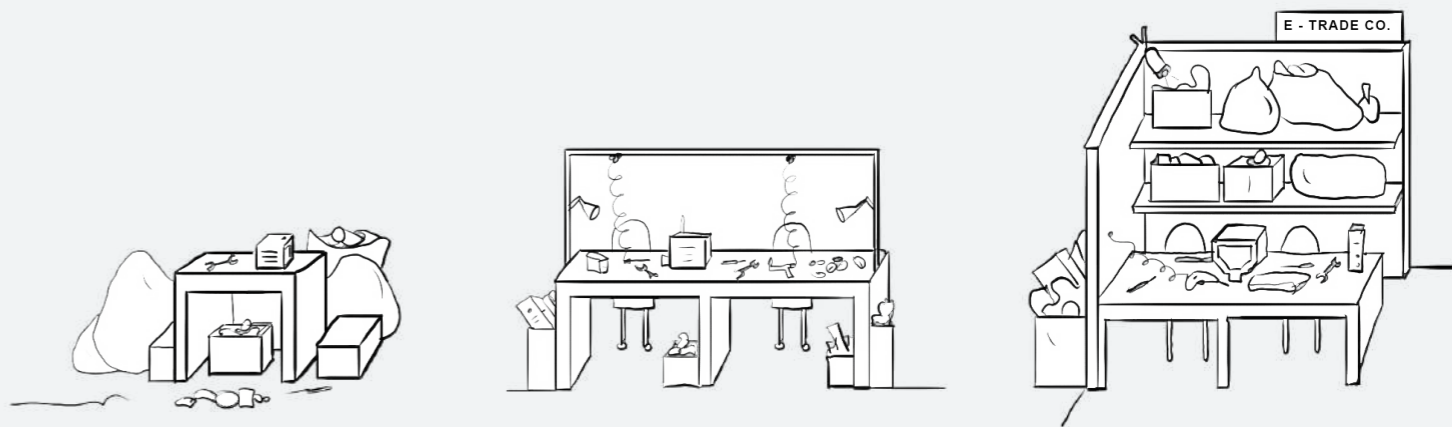
Lack of institutional support: Intrigued by how other countries have organized e-waste recycling, the participants voiced concern in the lack of support they received from institutions in order to improve their situation.

Dependence on informal supply chain networks: Younger micro-entrepreneurs depend on more established players to supply e-waste and handle the sale of fractions.

Acceptance of the E[co]work model: Solutions to overcome challenges

The participatory design process has identified not only challenges but also solutions for the acceptance of E[co]work by informal micro-entrepreneurs. We describe them below and provide some specific adaptations that will need to be considered in iterating the concept and implementing the E[co]work Space.

| | |
|---|--|
| <div> <div> Familial bonds and tight-knit social fabric  </div> </div> | <div> <div> Challenge </div> <div> <p>Work closely with family and friends and value local networks. Moving away from the existing set-up will disrupt these.</p> </div> </div> |
| <div> <div> Rental model vs. ownership  </div> </div> | <div> <div> Challenge </div> <div> <p>Ownership of a property was strongly valued. The core-concept of E[co]work is based on a rental model and hence makes it difficult to create the same sense of ownership.</p> </div> </div> |
| <div> <div> Logistical challenges  </div> </div> | <div> <div> Challenge </div> <div> <p>Easy availability of support services such as logistics providers that have industry-specific expertise in existing areas.</p> </div> </div> |



| |
|--|
| <div> <div> Solution </div> <div> <p>The E[co]work Space is intended to create a thriving community where existing relationships can continue and strengthen as well as new ones can be established.</p> </div> </div> |
| <div> <div> Solution </div> <div> <p>Acceptance of E[co]work is greater if seen as a stepping-stone to achieve the long-term vision of owning a facility. Also, offering long term rental options can provide stability, continuity, familiarity and a community spirit that can overcome the attachment to ownership. By offering an outstanding work environment and trial periods to test a co-working space that will enable them to experience first-hand the economic and social benefits of shared infrastructure.</p> </div> </div> |
| <div> <div> Solution </div> <div> <p>By ensuring easy connectivity to main highways and transport networks, logistical challenges of working in inner city areas will be alleviated. Industrial areas are commonly serviced by various logistics providers and an ecosystem of specialised providers should be rapidly developed.</p> </div> </div> |

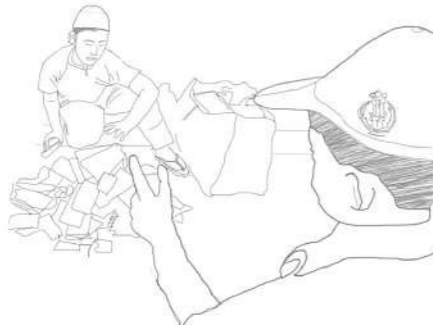
Uncertainty of their businesses



Challenge

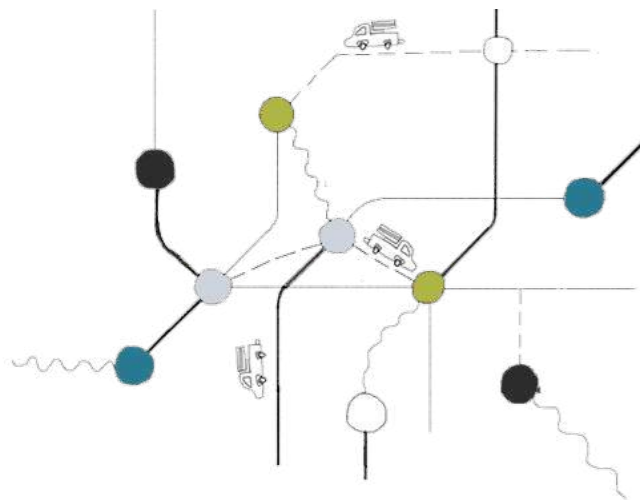
Micro-entrepreneurs face an uncertain business environment and can be hesitant to move to E[co]work.

Lack of institutional support



No experience of positive engagement with external agencies and government institutions for support - only negative experience of enforcement.

Disruption of networks and clusters



Moving away from the cluster disrupts personal networks and may thus limit the access to materials for dismantling.

Solution

By providing a licenced space, there is a greater assurance of business continuity and lower risk of business closures.
E[co]work can also be a platform to bring together upstream and downstream value chain partners for the micro-entrepreneurs.

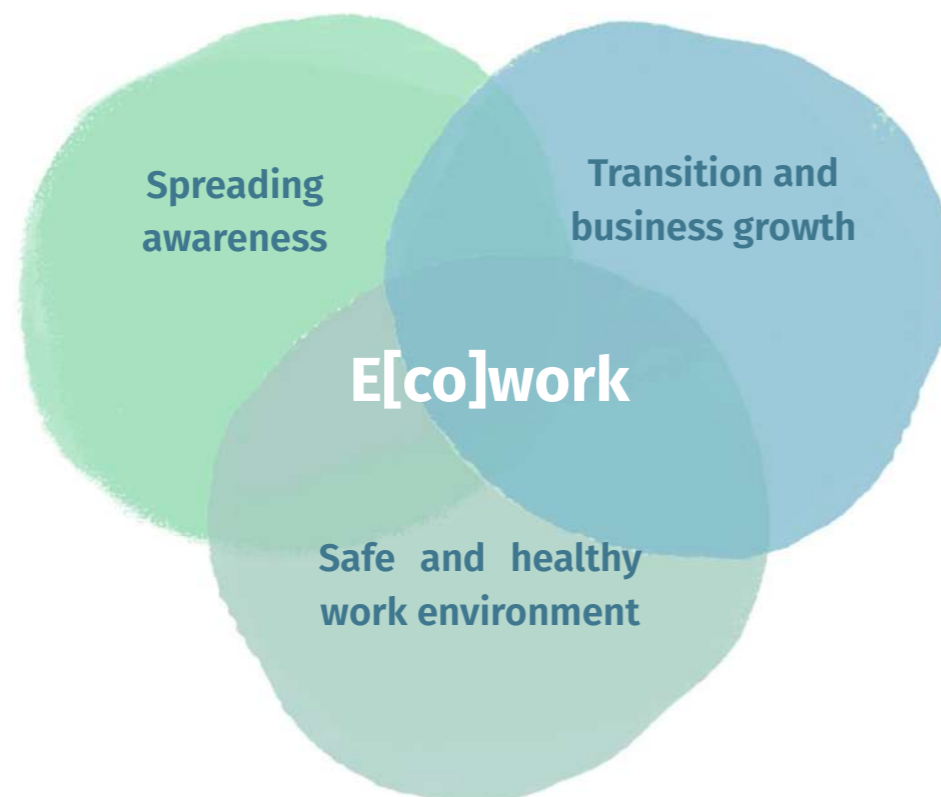
By providing a platform for the microentrepreneurs to be collectively heard. Also, by providing support to access government schemes and services that may be available, but not known about by the informal sector.

By attracting a mixed customer base that includes bigger and more established entrepreneurs so that material flows can be assured.

Way forward

Overall, we consider the results of the participatory design process promising enough to warrant an implementation of the concept and set up a pilot E[co]work Space.

The E[co]work Space is seen as a transition space that informal e-waste dismantlers can use to enable their growth in a secure environment as well as adopt best practices in recycling as well as business operations. In order to make a visible impact in the e-waste dismantling sector we need to target specific micro-businesses from the current informal sector. This becomes an opportunity to grow their business, while also setting a working model which is legally compliant and follows safe dismantling practices.



Next milestones

For future work, we aim to deepen some of the key questions regarding the acceptance of the solution and validate some of the services that the E[co]work Space will provide. Activities planned include:

- Restarting physical meetings and engagement with the community as soon as possible, and provided the Covid-19 situation allows for it, to further strengthen trust, expand the network and slowly build up our customer base.
- Planning for small scale demo spaces within the community to introduce and test elements, such as worktables, tools and machines to improve the services and business plan of the E[co]work Space.
- Support the community to establish their own officially registered association for the formal presentation of micro-entrepreneurs.
- Spreading awareness about the E[co]work model and inform them about our intent.

Apart from the next steps regarding the social aspects of implementing an E[co]work Space, the team will also focus among other issues on the securing of co-funding for renovation/ reconstruction of the facility, dismantling machines, work and safety equipment. Further, we will continue developing the business model to ensure high flexibility, short and long term renting options for the e-waste micro-entrepreneurs and ensure a smooth transition from informal to formal under the safe and secure premise of an E[co]work Space.

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E[co]work

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