E[co]work

Baseline Market Research

*On the informal e-waste sector in Delhi to facilitate
and assess the E[co]work concept*

India | November 2020

Financing partners, Phase 1

Project partners

Project title
E[co]work: Co-working spaces for inclusive e-waste management.

Project description
E[co]work is the adaptation of the co-working concept to the informal e-waste dismantling sector in India who manage the bulk of e-waste in India albeit in unsafe working conditions. By employing a participatory design of the workspace by the stakeholders, the concept aims to address the economic and systemic disparities faced by the informal sector in India due to their marginalisation and unsafe working practices despite their value-add to the e-waste management system.

Names of partner
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E[co]work Association (EAI), Implementation Lead | *ecowork.international*
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Introduction

Electronic waste i.e. e-waste is the waste arising from end-of-life Electrical and Electronic Equipment (EEE, products having circuits or electrical components with a power or battery supply.) It is the fastest growing waste stream in the world today growing annually by 2 Million Tonnes, since 2014. Rapid growth in technologies, has led to a growth in consumption of EEE. In 2019, the e-waste generation was 7.3 Kg per capita which led to a generation of approximately 53.6 Million Tonnes of e-waste globally (Global E-waste Monitor, 2020). Hence, e-waste management is a growing concern across the globe that needs to be addressed systematically by putting proper policy and practices in place.

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

10 tonne
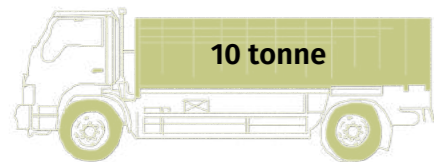
Which equals to producing 880 of these trucks everyday.
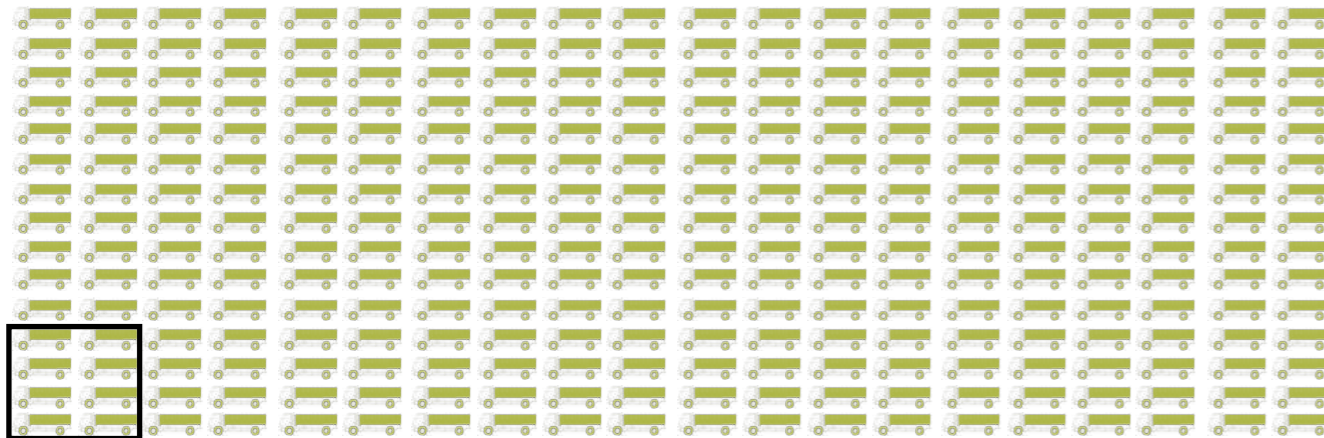
Only a small fraction of less than 10% gets treated formally [2,3].

Map of India

The rest is handled by the informal sector largely concentrated in Delhi, mainly North East Delhi. Though this informal sector provides jobs and livelihoods for many families at the base of the pyramid, the unhealthy and hazardous work practices have proven to be harmful not only to the health of the dismantlers but also to their communities.

As e-waste contains high-value materials in it, it is usually seen as the urban mining point to recover high value and rare metals. In the recent years, there has been a recognition by the Government of India (GoI) in seeing potential of formal recycling to mitigate environmental and health problems caused due to informal methods of handling and disposal of e-waste (E-waste Roadmap 2023 for India). Recently introduced regulations are driving the sector to formalize and integrate with larger corporate players. However, the restrictive rules, costly and difficult authorization procedures prevent micro-entrepreneurs from the informal sector to comply.
This is where the concept of E[co]work comes in.

E[co]work Concept

The E[co]work project aims to design a socially inclusive solution for the informal dismantling community in the e-waste sector in Delhi, India and enable their transition and integration with the formal sector.

Adapting the concept of co-working spaces to the informal e-waste sector, **E[co]work facilities aim to offer affordable, safe and healthy work spaces** with appropriate tools, protective equipment, ventilation, lighting and machines, as well as access to additional support services and training for banking, healthcare, insurance, business administration that are currently not available to these disadvantaged groups. It contributes to a circular economy as well as addresses 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).**


A local dismantler in Mustafabad, North East Delhi is sitting outside his workshop on a block due to lack of light and ventilation. Below him is an open sewerage.
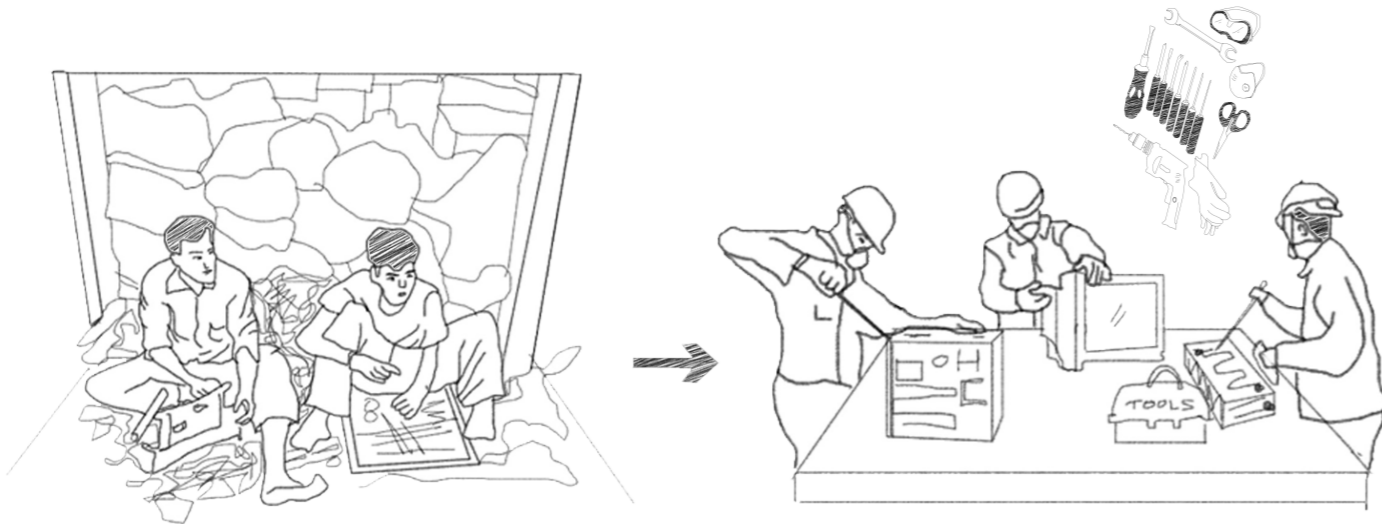
Phase 1 activities

This report is part of an ongoing research project, part-funded by UK Research and Innovation (UKRI), to further the E[co]work concept in Delhi, India. The timeline below encompasses the project's anticipated activities and outputs under Phase 1 of UKRI's Global Challenge Research Fund.
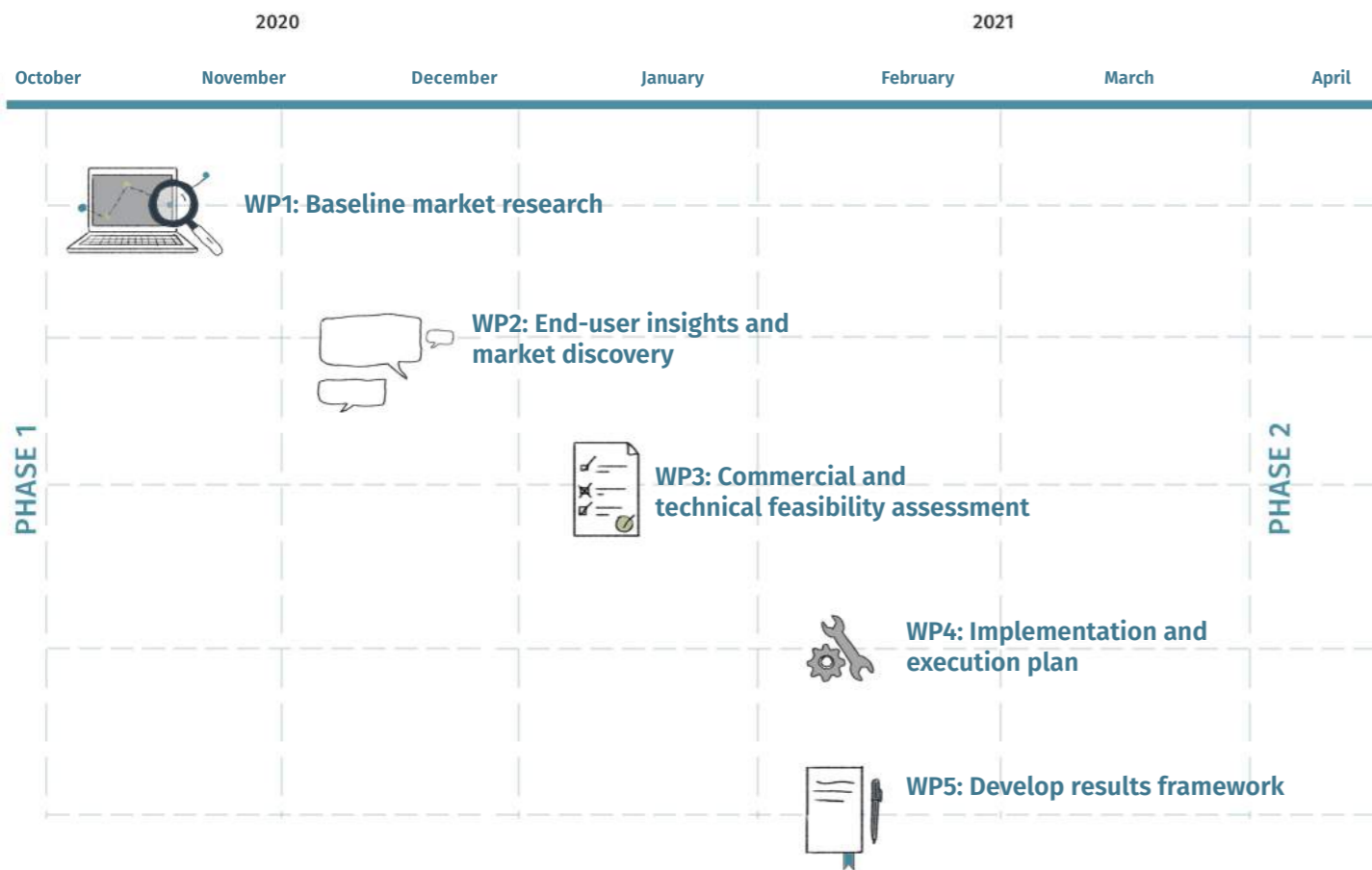
Phase 1 of this research will focus on building trust with the community, understanding their aspirations and challenges to inform the design and implementation of an E[co]work space. Through a human-centred design approach, we aim to validate the concept and generate buy-in of the end-users as well as identify the support services, business models and legal and operational structures that are needed to ensure that the E[co]work facility is financially sustainable.

The objective of this report is to develop an in-depth understanding of the current local market and best practices. Activities that informed the findings in this Baseline Market Research report are:

- Detailed mapping of the e-waste businesses in Delhi.
- Detailed understanding of the transport networks connecting the   e-waste businesses in and around Delhi.
- Visiting the neighbourhoods identified through mapping and research, and further mapping and understanding the cultural and social interconnections in the neighbourhood to get a sense of the people living there.
- Developing Tools and Mechanisms for the field team to engage with e-waste dismantling communities and sharing the initial E[co]work concept with some dismantlers to get initial feedback.
- Identifying Community Representative (CRs) to organise groups of potential clients in different neighbourhoods.
- Informal conversations to understand stakeholders, networks, material flow.
- Informal meetings and research to understand spatial, environmental, and legal issues in the sector through both online and onsite research.

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

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.

"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.
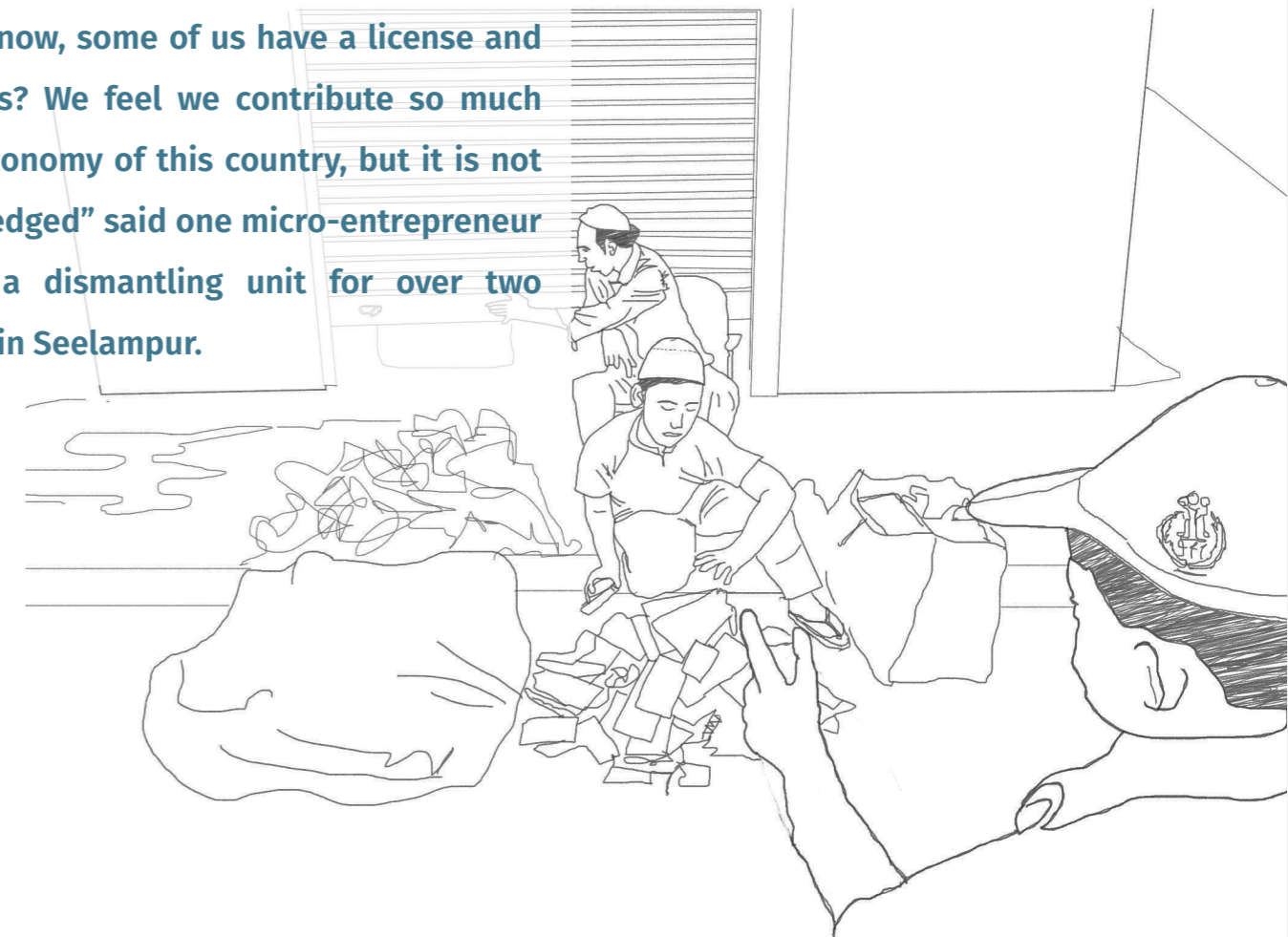
3. Little benefits and high requirements for formalization

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.

"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 during our stakeholder engagement meetings
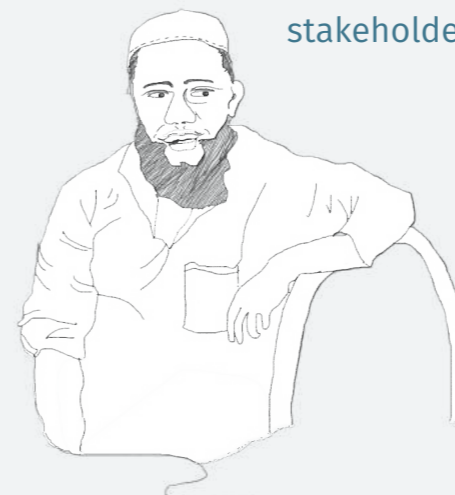

4. Economic and material losses

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].

Regional Context

North East part of Delhi is by far the largest e-waste recycling hub in India. **There are over 3000 informal dismantling units employing thousands of people in the informal e-waste sector in North East Delhi alone** [4].

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. 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.
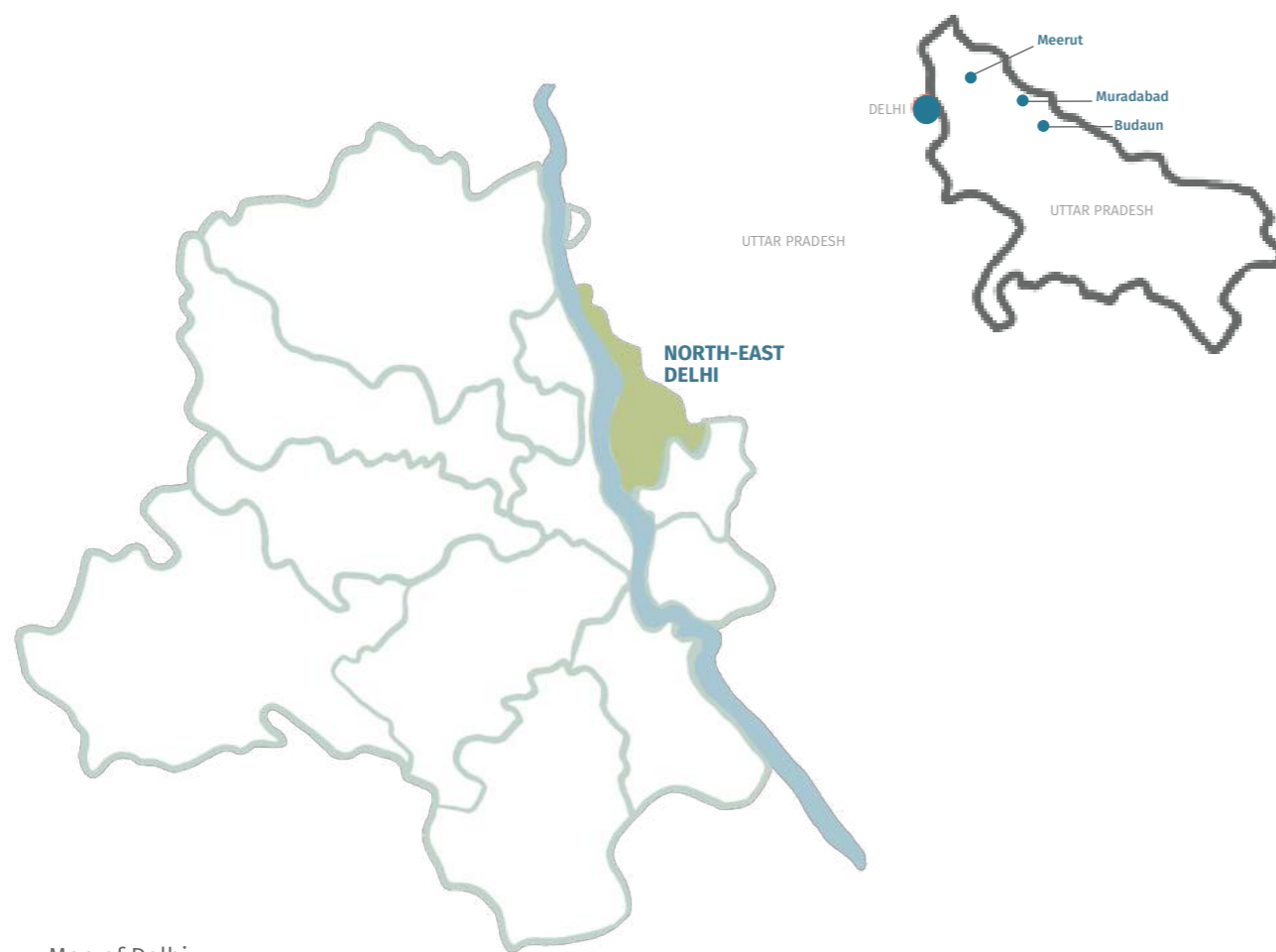
Map of Delhi

Photo Credit: Aftab Shaikh,

In the last one year, the neigbhbouhoods of North East Delhi have faced the brunt of communal violence and political unrest in India due to the Citizenship Amendment Act.* The e-waste dismantling community working and residing there have been socially, politically and economically affected by this uncertainty and instability, resulting in shuttering of shops and establishments for many days at a stretch due to security concerns.

The neighbourhood at a glance

Understanding the Community

Human-centred Design Approach

The data on E-waste shared in the earlier part of this report very well substantiates the need to address unsafe practices and a lack of healthy workplaces for the dismantlers in this sector. However, it is critical to view these challenges through the dismantler's lens. **The E[co]work Association (EAI) partnered with Curry Stone Design Collaborative (CSDC) to build a network with the e-waste community and design the E[co]work space through human-centered design approach.**

This approach from the inception of E[co]work not only helped in validating the literature research on the subject but helped provide a very nuanced understanding when looked at the issue through multiple perspectives – economics, social, cultural and geographical. Applying a participatory approach is important to aid in assessing the potential demand for a space like E[co]work in the future, as well as iterating and developing the model both businesswise and design wise while putting the needs and ideas of the end-user front and centre. **To gain critical insights into the field and to tap into the existing eco-system, a community engagement strategy was developed.** Having identified the neighbourhoods where most of the dismantling takes place, representatives from these areas were selected to operate as Community Representatives and be the conduit between the E[co]work team and the owners and labourers in the e-waste dismantling businesses. Further, cultivating a unique language to communicate with the end-users as the project evolves helps bring the empathetic design process that is critical to develop E[co]work.

Our on-ground team and Community Representatives at dismantling units of Mustafabad.

Identifying and organising Community Outreach Representatives.

Our first step in understanding the community was to identify 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, their situations and current challenges.** And eventually, soft drinks and platters of biryani and salad were served in many Community Representative's (CR) homes and workshops which became our usual settings for meetings and discussions. The CR's 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.

Their 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. 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.

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.

From a discussion with a dismantler in his unit in Mustafabad. The room at the back is a resting space for the labourers.


Snippet from a meeting on identifying their spatial challenges of working in residential neighbourhoods.

# Understanding Networks

Identifying stakeholders and value chains

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.

Mustafabad

Mandoli

Dilshad
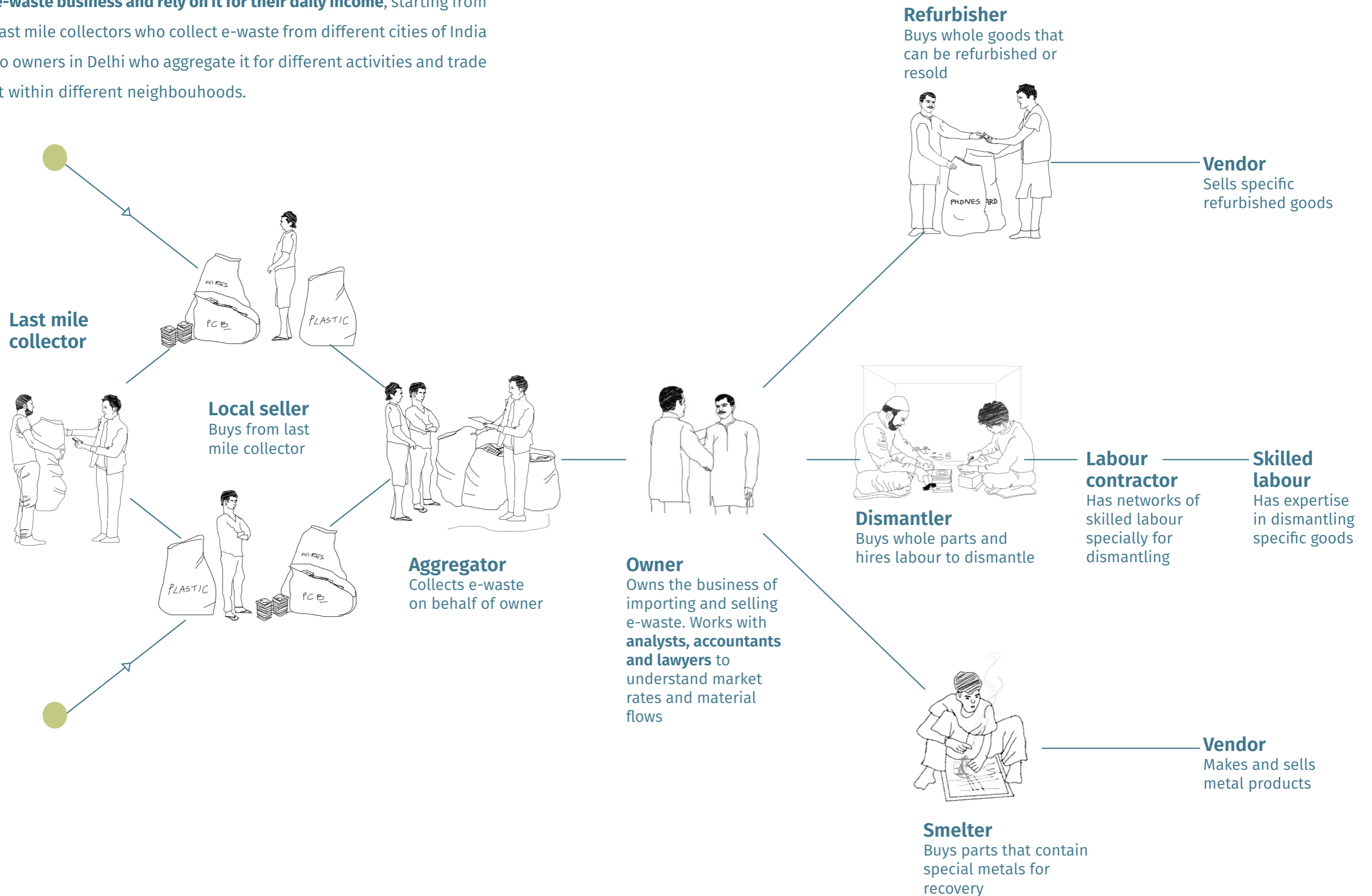Garden

Shastri
Park
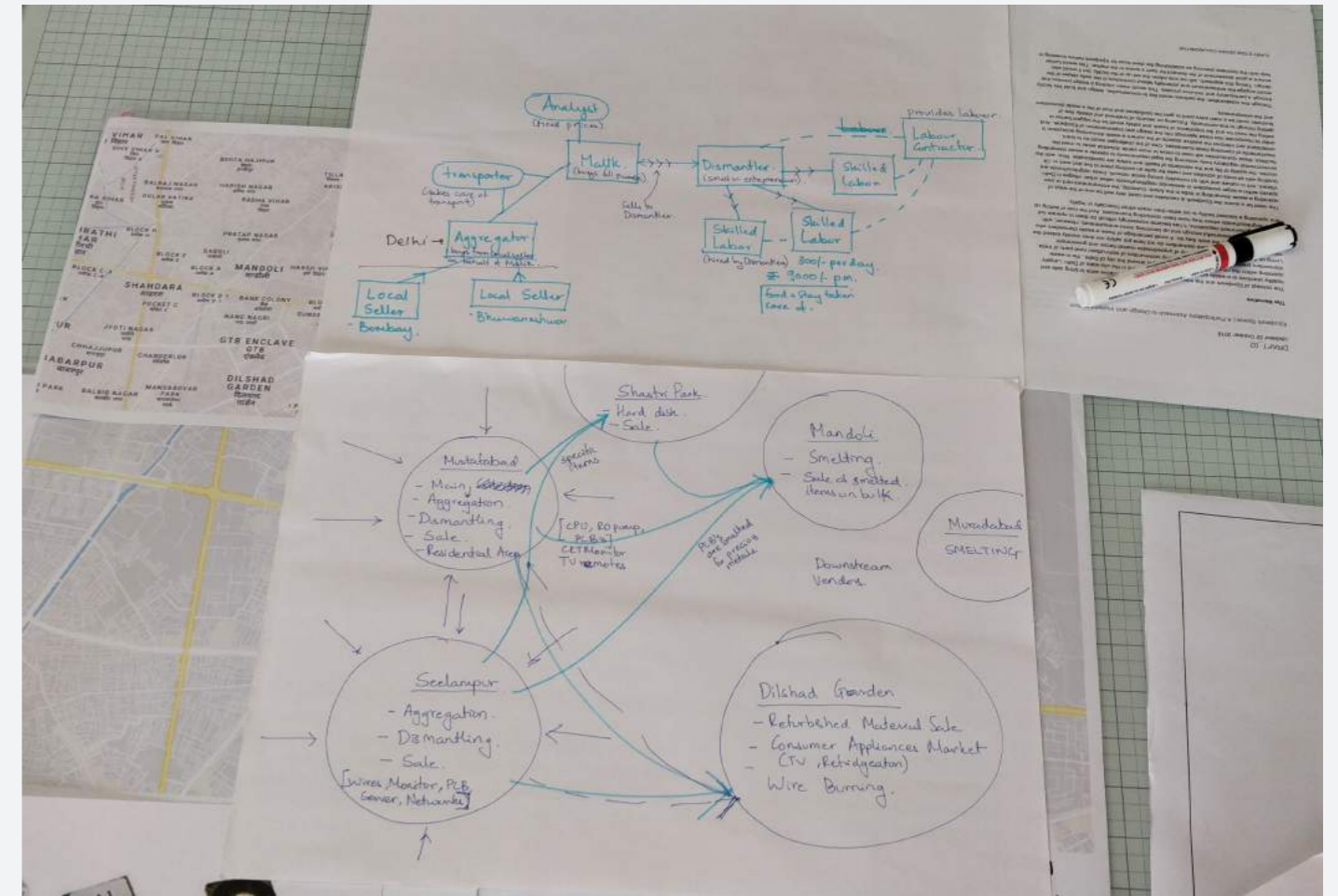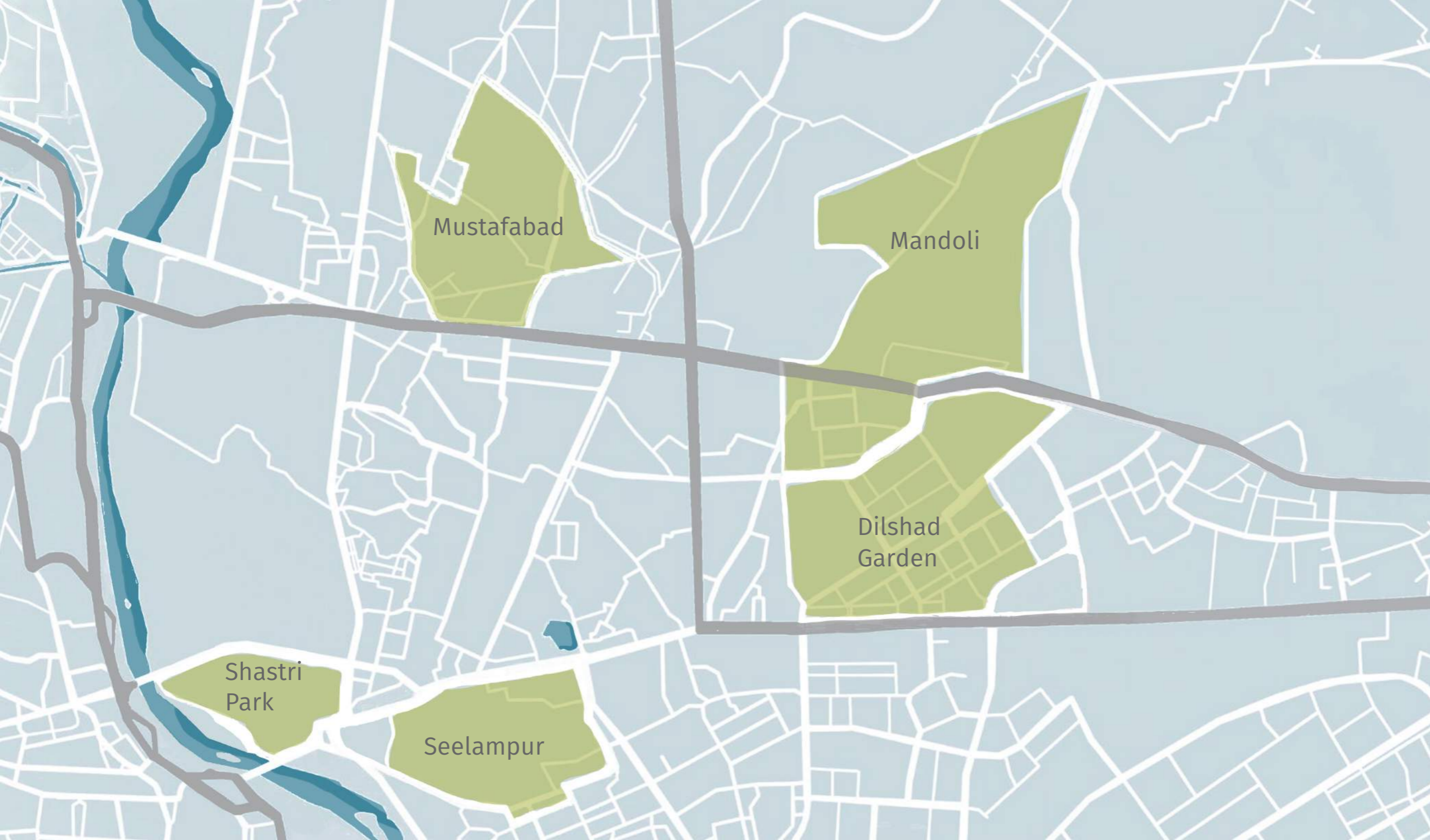
Seelampur

Map of North East Delhi

Large portions of these e-waste recycling hubs are concentrated in the North Eastern parts of Delhi in the neighbourhoods of Mustafabad, Seelampur, Dilshad Garden, Mandoli and Shastri Park.

Entire neighbourhoods are directly or indirectly involved in the e-waste business and rely on it for their daily income, starting from last mile collectors who collect e-waste from different cities of India to owners in Delhi who aggregate it for different activities and trade it within different neighbouhoods.

Refurbisher
Buys whole goods that can be refurbished or resold

Vendor
Sells specific refurbished goods

Last mile collector

Local seller
Buys from last mile collector

Aggregator
Collects e-waste on behalf of owner

Owner
Owns the business of importing and selling e-waste. Works with **analysts, accountants and lawyers** to understand market rates and material flows

Dismantler
Buys whole parts and hires labour to dismantle

Labour contractor
Has networks of skilled labour specially for dismantling

Skilled labour
Has expertise in dismantling specific goods

Vendor
Makes and sells metal products

Smelter
Buys parts that contain special metals for recovery

31

21

Here is an example of how e-waste travels to Delhi.

Scenario: **How does my e-waste from Bangalore reach Delhi?**

Delhi

Bangalore

Bangalore

1
Phone discarded

2
A scrap-dealer (last mile collector) either buys it from an individual or from a local repair shop

3
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.

North-east Delhi

Understanding the economics

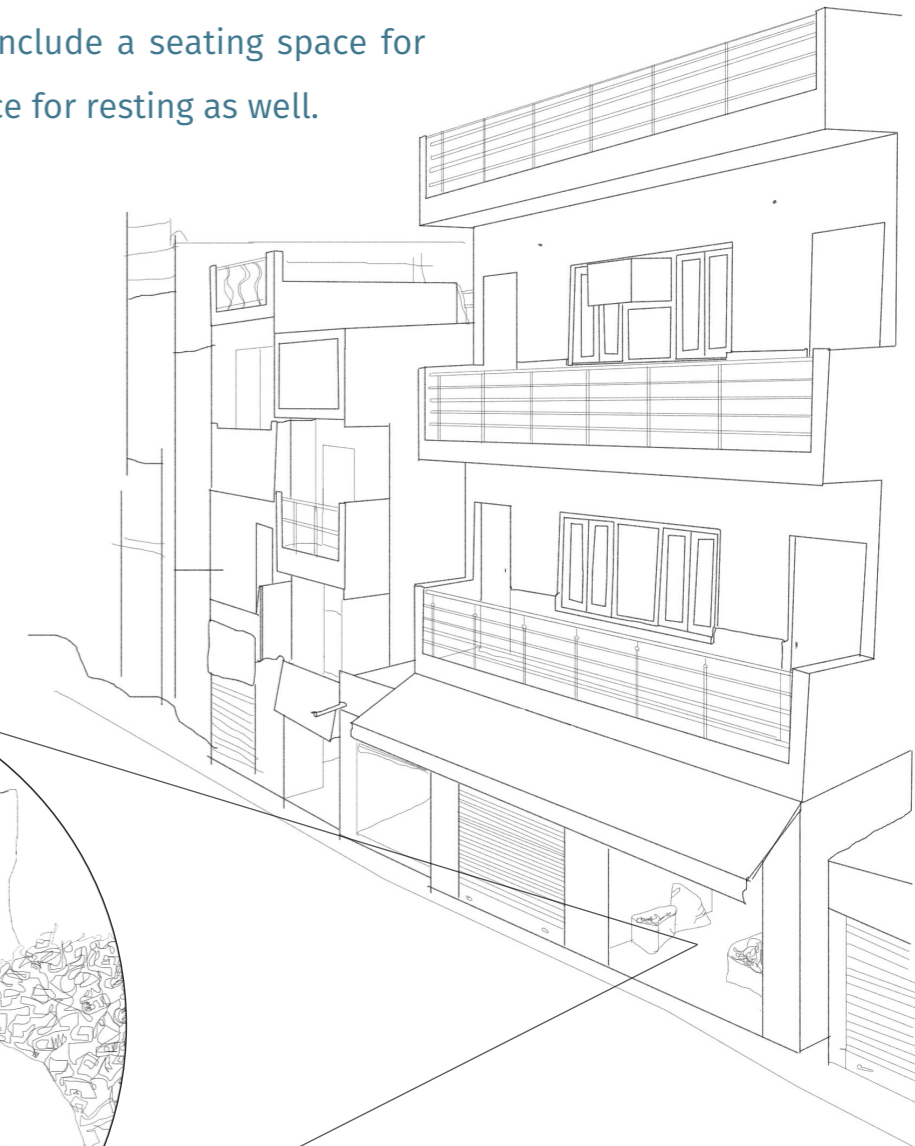**Identifying current business model and material flow**

Through multiple interactions with the community, we were able to understand their business model and modes of operations. The current dismantling model amongst the micro-entrepreneurs includes a owner, 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.
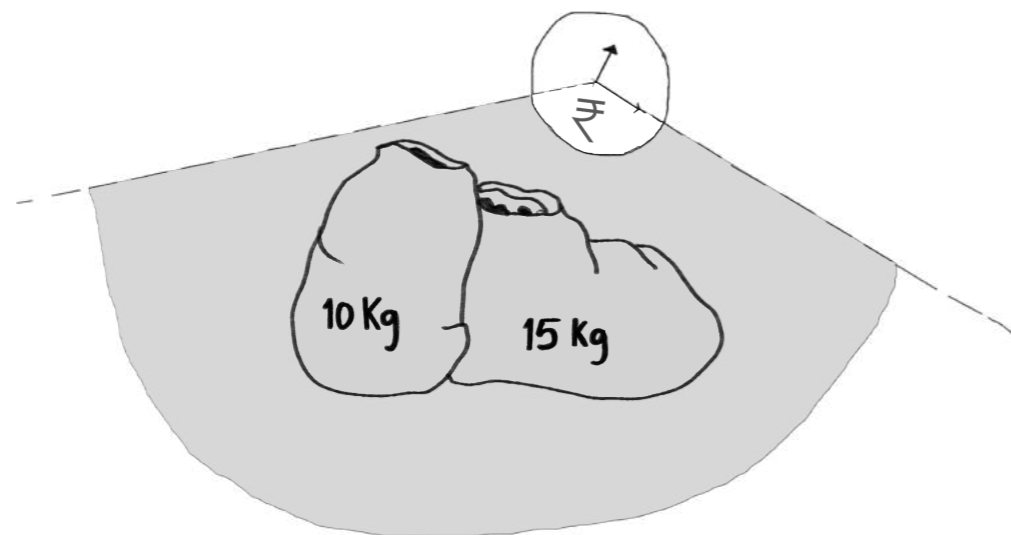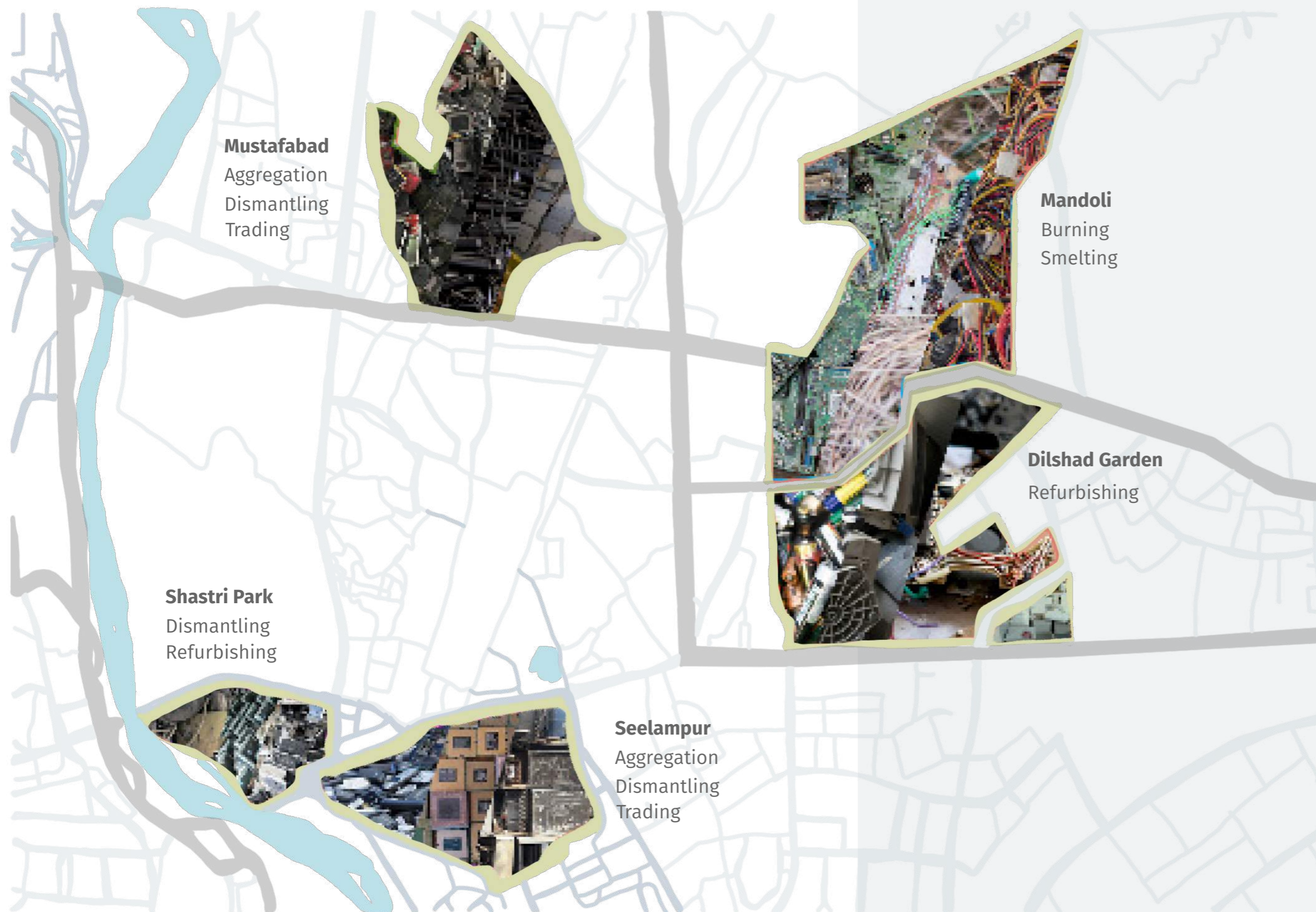

The space in which they work is either rented or owned. A micro-entrepreneur rents spaces ranging from Rs. 10,000 - 15,000 per month for approximately 400 sq.ft. area. Larger e-waste business owners have bought their own space that is often used as a dismantling workshop on the lower floors and residential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

Mustafabad
Aggregation
Dismantling
Trading

Mandoli
Burning
Smelting

Dilshad Garden
Refurbishing

Shastri Park
Dismantling
Refurbishing

Seelampur
Aggregation
Dismantling
Trading

Different neighborhoods in North East Delhi conduct different activities that include dismantling, smelting, refurbishing and trading that are operated informally by micro-entrepreneurs living in these areas.

Mustafabad:
Cathode Ray Tubes
RO Pump,
Cooler Kit
Water Pump
PCB
Wires,
Keyboards
DVD/CD ROM,
Hard DIsk,
TV Remotes,
RAM chips,
SMPS (Power supply),
Case Fan

Mandoli:
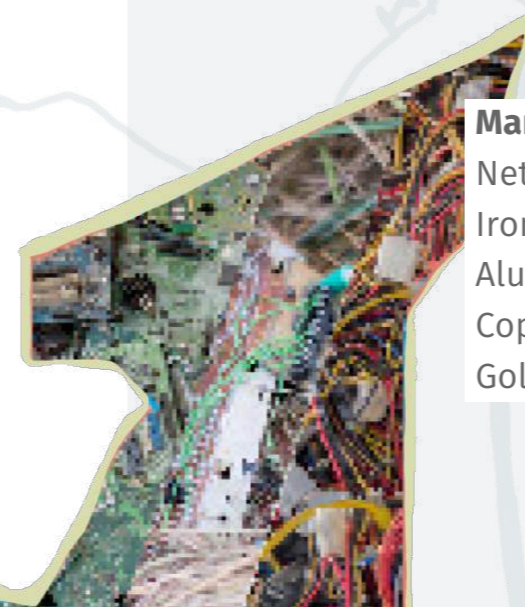Network Card
Iron
Aluminium
Copper
Gold

Seelampur:
Mobile Phones
Tower Servers,
Cathode Ray Tubes,
Phone Charges,
Transformer,
Laptops (PC)
RO Pump,
Cooler Kit
Water Pump
CPU
PCB
Wires,
Keyboards

Dilshad Garden:
DVD/ CD ROM
Batteries
Tape Recorders
Children's toys
Watches
Microwaves
Playstations

Shastri Park:
CPU
Keyboard
Hard Disk

Similarly, dfferent materials and parts are traded to different neighbouhoods in North East Delhi based on the activity done in that neighbourhood.

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.

Example of point to point interactions between different businesses with North East Delhi.
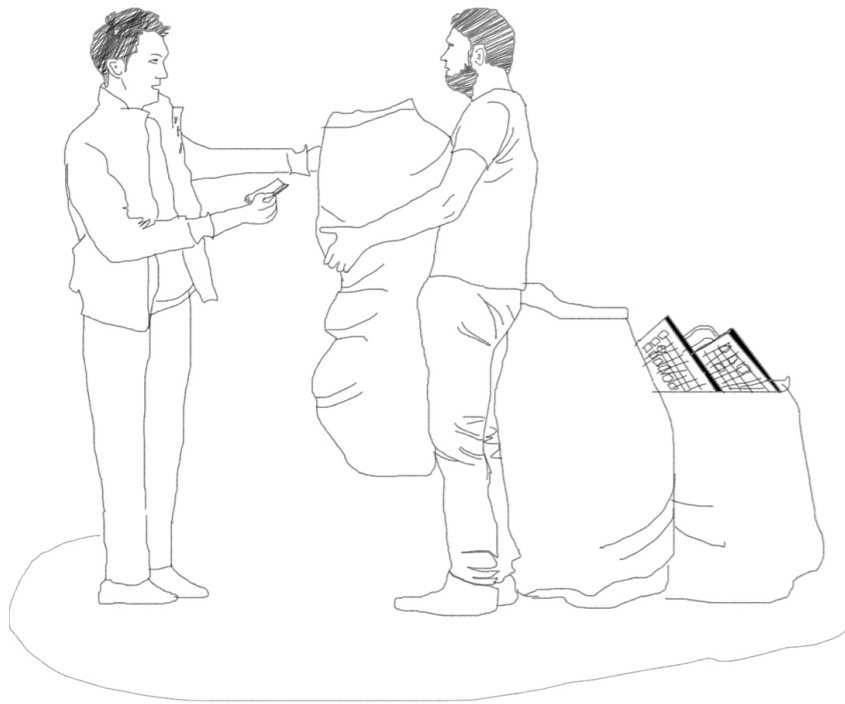
Iqbal from Mustafabad buys 1 tonne of phones from the Maalik at Rs 50/kg to dismantle.

He will then invest in the labour for dismantling the phone to its individual parts, namely plastic, screen, circuit boards, and copper from the wires.

He would then sell (say) the circuit boards to Ahmed from Seelampur for Rs 65 per kg. Ahmed will then collect more circuit boards to extract cooper 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.

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

Covid-19 impact

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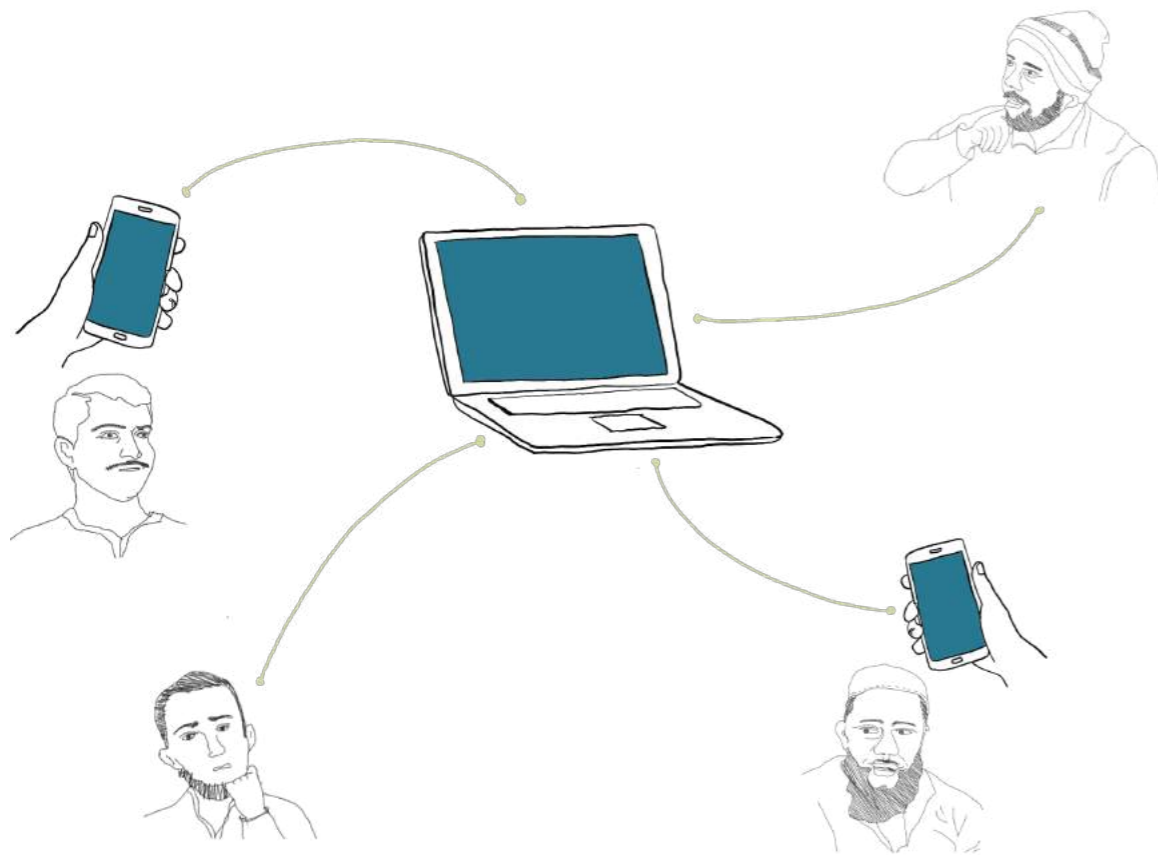
What does uncertainty of such a scale look like for people who have been at the frontline of social inequities?

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 nation-wide 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 micro-entrepreneur 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.
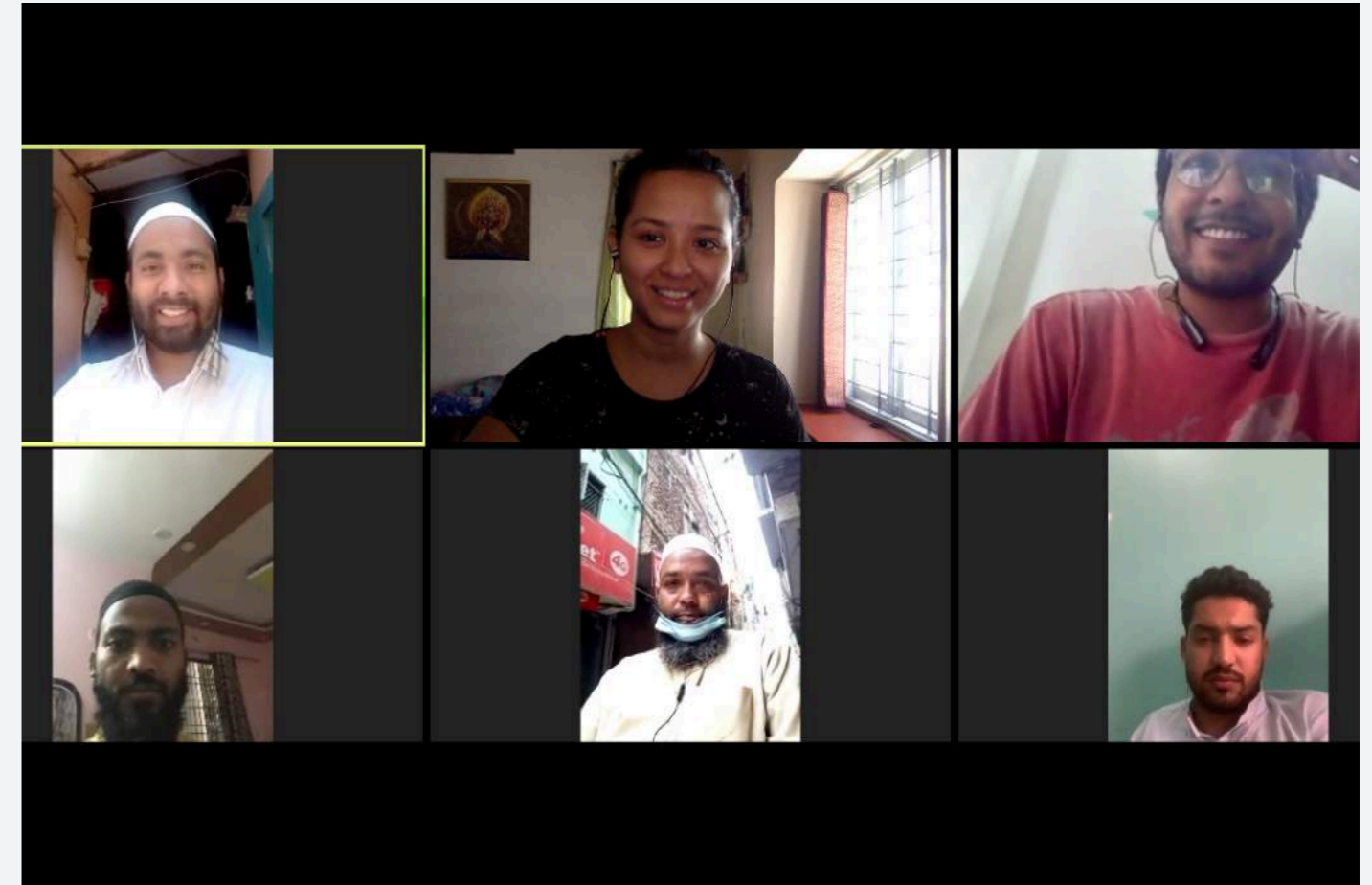
Screenshot from one of our calls with the Community Representatives from Seelampur and Mustafabad.

Insights

Following are some of the insights received from the participatory design meetings 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:
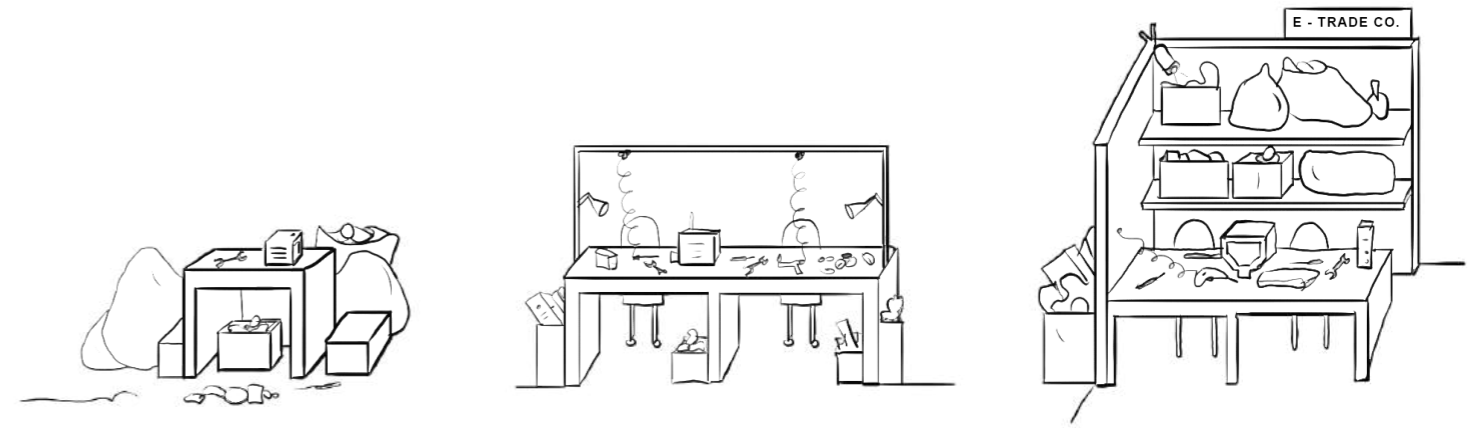
Logistical challenges: Owing to the illegal status of their work and time restrictions on goods vehicles, their transport networks are mostly active at night. Due to this, they often have to resort to working at night leading to irregular sleep cycles. On the positive side, the cluster has access to very cost-efficient local transporters that have over time, become adept at transporting and handling e-waste.
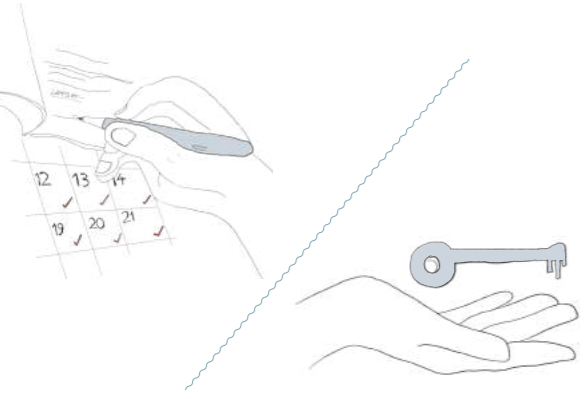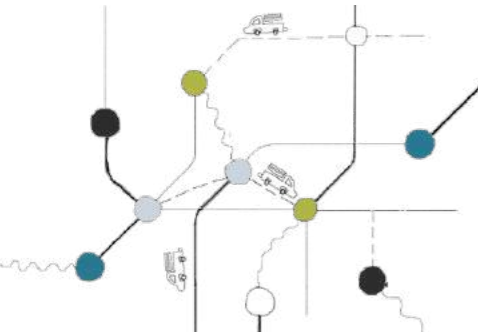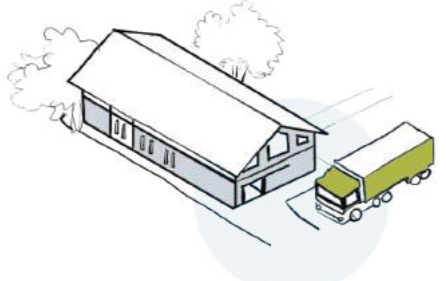
Uncertainty of their businesses: The community often mentioned the uncertainty of their situation, as they often did not know whether they could continue working even the next day due to legal issues.

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.

The participatory design process has also raised several key obstacles 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.


	Challenge	Solution
Rental model vs. ownership	As mentioned above, 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 provide for ownership.	E[co]work will account for the need of ownership by focusing on being a stepping-stone to achieve their long-term vision to owning a facility in the future. Also, we consider the inclusion of long term rental options into the business model so that the community has flexibility and a sense of ownership. Further, we aim to overcome and adequately accommodate their underlying motives for ownership through an outstanding work environment and trial periods of the co-working space that will enable them to experience the benefits of sharing of infrastructure (e.g. cost savings).
Disruption of networks and clusters	Moving away from the cluster disrupts personal networks and may thus limit the access to materials for dismantling. Particularly younger micro-entrepreneurs depend on more established players to supply materials and handle the sale of materials.	To overcome this challenge, we need to ensure integration of more established players and target for a mixture of different micro businesses (both small and bigger players), so that material flows can be quaranteed."
Logistical drawbacks	Indian informal e-waste clusters provide similar benefits to its members as regular industrial clusters. This includes the availability of support services such as logistics providers that have industry-specific expertise.	Micro-entrepreneurs interested in E[co]work need to be supported in adapting their transport networks and pass on scale-related benefits enabled through cooperation where possible.

Way forward

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.

Spreading awareness

Transition and business growth

E[co]work

Safe and healthy work environment
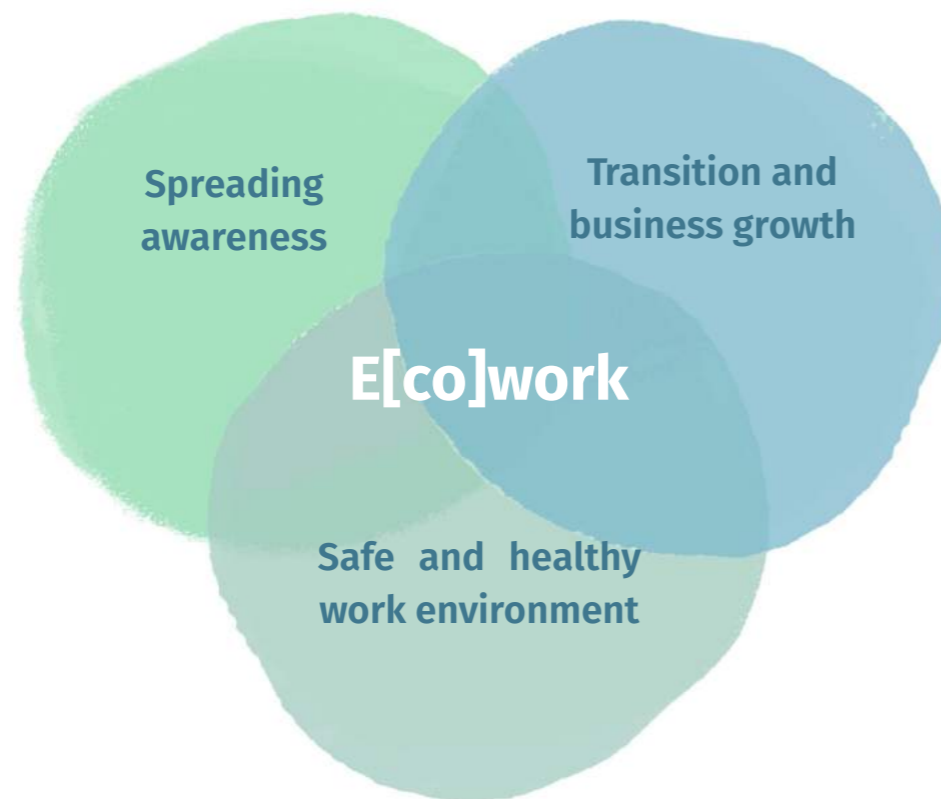
Next milestones

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:

- Starting physical meetings and engagement with the community as soon as possible, and provided the Covid-19 situation allows for it.
- Initiating workshops with focus group discussions and workshop to determine services to include in E[co]work space.
- Expanding the network and interacting with new groups of dismantlers to build up our customer base.
- Support the community to establish their own officially registered association for the formal representation of micro-entrepreneurs.
- Spreading awareness about the E[co]work model and inform them about our intent.

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