A Report by Chintan

Learning to Re-E-Cycle

What Working With E-Waste Has Taught Us
(2013)

CHINTAN
ENVIRONMENTAL RESEARCH
AND ACTION GROUP

About Chintan Environmental Research and Action Group

We are a registered non-profit organization with a vision of inclusive, sustainable, and equitable growth for all. Our mission is to reduce ecological footprints and increase environmental justice through systemic change brought about through partnerships, capacity building at the grassroots, advocacy and research, and sustainable, scalable models on the ground.

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Executive Summary

Electronic waste (e-waste) is an emergent category of waste worldwide. Our ever increasing dependence on and continuous evolution of new electronic products in the market has led to the generation of increasing quantities of e-waste.

India, along with rest of the world, has also been experiencing e-waste as a serious environmental problem. Furthermore, since 95% of the e-waste recycling is done by the informal sector, the gravity of the problem is even more serious. In this context, India recently passed the E-waste (Management and Handling) Rules 2011. The rules have been framed keeping in mind India's important e-waste management sector — the informal sector.

Chintan started working in the e-waste sector in 2006 owing to the fact that a large share of its work focuses on the informal recycling sector. Recently, Chintan has been authorized by the Delhi Pollution Control Committee to act as an e-waste collection centre. The journey from 2006 till authorization has been made possible through associating with the right partners, understanding the relevant data, organizing the informal sector, advocating for inclusive legislation. The process is described in this manual. highlighted, and beyond constantly identifying new partners.

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Chapter 1
Introduction

Electronic and electrical waste, also called e-waste, has become a cause for concern globally. In India in particular, consumption of electronics has fueled e-waste generation, and with this, several dilemmas. The first is how to handle so many highly toxic elements found in e-waste? The second is how to integrate the informal sector, currently key actors in trading, dismantling and extracting elements from e-waste, into a new handling system, so they don't lose their livelihoods? The third

is who will pay for the cost of improved handling?

Chintan has been part of this debate since 2006, when we first began to explore the issue from the perspective of the informal recycling sector. At that point, much of the discussion was related to imports of e-waste. It was easy to find imported computers strewn across peri-urban and urban India, waiting to be dismantled, and copper, gold and plastics extracted.

But that debate has changed. The problem of e-waste is now clearly from within India. In the last 7 years, domestically e-waste production has grown by almost 8 times[1]. India has to face the underbelly of its own consumption. Most often, the environmental and health costs of such consumption are internalized by the informal recycling sector, who breathe in the hazardous fumes and dust from the handling process. This is not the work of an external agent sending toxic trash to India. It is what India is doing to its own recyclers and the poor.

E-waste is not a concern for India alone. Across the world, e-waste and e-waste recyclers in the informal sector are receiving increased attention. As the issue becomes mainstream, more cities, organizations, agencies will seek solutions. This manual shares Chintan's work, learnings and expereinces. It also describes failures and outcomes. Naturally, this experience is based in the Indian context but the lessons learned can be applied to diverse contexts worldwide. Moreover, given Chintan's lens of decent jobs for the informal sector, the manual focusses on working with the informal sector to enable inclusive legislation, sectoral organization and capacity, and exploring new sources of livelihoods.

Most often, in this manual, the term informal sector or informal recycling sector has specific connotations. It refers primarily to those we have worked with and most of these have become organized. There are two separate organizations we have worked with primarily — Safai Sena and 4R. Safai Sena, the more robust and active of the two, is a highly active association that has beenworking informally since 2002 and comprises approximately 12,000 men and women working in the solid waste informal sector. This includes wastepickers, doorstep collectors, itinerant buyers, and small traders. 4R is an association of e-waste traders and dismantlers. It has since morphed into two distinct e-waste trading companies.

1 http://articles.timesofindia.indiatimes.com/2012-04-04/pollution/31286986_1_total-e-waste-automatic-dispensers-electronic-tools

Chapter 2
Background

E-waste is a term used to cover almost all types of electrical and electronic equipment (EEE) that has entered the waste stream. Electronics has emerged as one of the fastest growing segment of Indian industry both in terms of production and exports. For instance, between 1993 and 2000 in India, the growth of personal computers was 604%, compared to the world average of 181%. Many of these computers are now ready to be discarded as electronic waste and will become available for recycling. According to the latest annual report of the Union Ministry of Environment and Forest (MOEF), by the end of 2012, India would have generated (0.8 million tonnes[1]) of e-waste which is eight times higher than the past seven years. In addition to these, India also imports e-waste, both with licenses and without. In short, there is a significant amount of e-waste in need of handling in India. This amount is constantly growing.

Most electronic waste (95%) in India is picked and sold to the informal sector, where precious elements, such as copper and gold are extracted under highly hazardous circumstances, using acids, crude "tandoors" and bare hands. In fact, poor e-waste recycling emits large amounts of deadly dioxins, lead and acid fumes into the environment. Due to exposure of heavy metals and toxic chemicals, workers in the electronics industry have been suffered from severe illnesses. Recent reports tell of explosions and exposure to n-hexane at the workplaces of raw material suppliers of electronic goods manufacturer[2]. In addition to this, continuous reports of occurrence of diseases such as malignant cancer[3] among the electronics workers are being reported across the world. In some instances, these diseases have been fatal. Electronics, therefore, pose hazards to workers from the beginning to the end of the product life cycle.

1 Times of India,"India's e-waste output jumps 8 times in 7 years" http://articles.timesofindia.indiatimes.com/2012-04-04/pollution/31286986_1_total-e-waste-automatic-dispensers-electronic-tools, April 4, 2012

2 Ted Smith, "Think different, Apple, and use some excess cash to help factory workers", http://www.mercurynews.com/opinion/ci_20293787/ted-smith-think-different-apple-and-use-some, March 30, 2012

3 SHARPS, "The 55th Death from Samsung Electronics", July 20, 2012

Although e-waste is a serious environmental problem, it is also a source of livelihood for many in the informal sector in India. Most e-waste is collected, stored, dismantled and even reclaimed for metals and plastics by the informal sector. In Delhi alone, there are over 25,000 persons[4] earning their living from e-waste handling, collection, dismantling and metal extraction.

On the other hand, laws to handle e-waste are also in place now. Previously, the Central Pollution and Control Board (CPCB) had issued guidelines for e-waste management. These guidelines had limited impact because they were voluntary in nature. In May 2011, the Ministry of Environment and Forest (MOEF) issued the E-waste (Management and Handling) Rules 2011[5]. These rules came into force in May 2012. They provide a window for the informal sector through which they can now become a part of the e-waste management system legally. The informal sector can act as collection centres as well as dismantling units, (low cost work that they are already involved in) after formalizing and taking requisite consents from the concerned authorities.

The Informal Sector and E-Waste

The informal sector is involved in most aspects of e-waste collection, dismantling and metals extraction (see Figure 1).

4 Bharati Chaturvedi, Dismantling India's E-waste: Potential for Green Jobs http://www.huffingtonpost.com/bharati-chaturvedi/dismantling-indias-e-wast_b_369218.html, November 24, 2009

5 E-waste (Management and Handling) Rules 2011

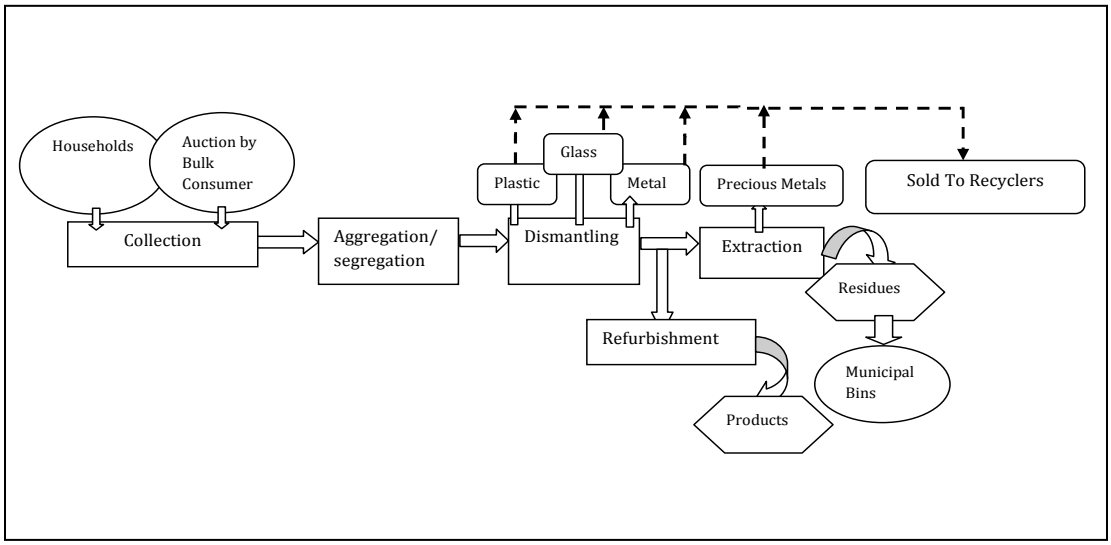


Figure 1: *Flow chart showing processing of e-waste by informal sector*

While itinerant buyers purchase e-waste from households and small-scale e-waste generators, specialized e-waste collectors forage industrial areas, office complexes and even ports for bulk e-waste. Dismantlers are primarily dependent on these sources.

A key concern around the informal sector handling of e-waste is based on the hazardous nature of the process. In particular, copper is extracted using acids and by burning mother boards. Gold is extracted using cyanide, but only approximately 30% of it is recovered when compared to the more sophisticated, formal processes[6]. Several other metals are not extracted at all. These processes release acid fumes, dioxins and furans, among other chemicals. The formal sector and producers often portray these processes in a negative light, without also considering the desperate poverty and limited livelihood options of the informal sector or the complexity of regulating these. These factors, inadvertently or otherwise, have led to the development of a sense of antipathy towards the informal e-waste sector and a general understanding of it as undesirable. Moreover, sometimes producers of e-waste also blame the informal sector for 'handling e-waste badly' and for channeling e-waste away from their own formal systems.

Recently, advocacy by a range of actors has helped shift this attitude towards the informal sector and there is consensus that the informal sector must be included in e-waste collection and dismantling processes. While formal recyclers are working to create some linkages with the informal sector to ensure e-waste supply, very few producers are demonstrating willingness to invest in partnerships with the informal sector.

6 Miriam Keller, "Assessment of gold recovery processes In Bangalore, India and Evaluation of an alternative recycling path for printer wiring boards",http://www.empa.ch/plugin/template/empa/*/59244/---/l=2, October 2006

Chapter 3
Chintan's Approach

Chintan's approach has been to organize e-waste collectors, wastepickers, itinerant buyers, e-waste dealers and dismantlers so they can shift from hazardous to green livelihoods without giving up income from the e-waste fraction for the waste. Key aspects of this work will be collection, segregation and dismantling e-waste. This will result in reduced pollution and upgraded livelihoods for informal sector actors. We also realize that the livelihoods of workers extracting gold using cyanide or copper using acids cannot be retained as e-waste management modernizes and rules begin to be enforced. But we continue to teach ourselves about technological and other options that can benefit them in the future.

Apart from decent livelihoods, other reasons for including the informal sector in e-waste recycling exist.

Informal sector players are the only means of last mile collection service provision. For example, an old cell phone charger from a household is likely to be sold or given to either an itinerant buyer or a doorstep waste collector. Without involving the informal sector, retrieving e-waste from such sources is difficult.

Unlike many developed countries, Indian waste generators do not travel to a notified point to discard their waste, much less their e-waste. It is common to see waste discarded at empty plots, or tossed away directly from kitchen windows. Many electronic and electric good producers claim they are planning to put up 'depots' where consumers can discard their e-waste, as they have done in other countries. But given how widespread the practice of irresponsible disposal is, and how long it will take to train waste generators to discard responsibility, doorstep collection services and e-waste drives locally are key to enabling safe e-waste recycling. This too, can be best done by the informal sector, particularly people who know the area.

For these reasons, Chintan believes the informal recycling sector is key to successful e-waste handling.

Chapter 4
Implementing Our Approach

Chintan's implementation process has evolved and improved with time. Initially, we focussed on organizing dismantlers, who were most likely to lose their jobs due to the passing of new e-waste rules in the country. We later began to widen our scope of work by involving and organizing e-waste collectors upstream and working with small e-waste generators directly. These included residents, small offices and restaurants. In most cases, larger e-waste disposers were already committed to selling their e-waste to authorized recyclers even before we approached them.

In order to share our experiences till date, we have divided this section into 6 process-based sub-sections. These form are the broad framework within which Chintan has worked.

The sub-sections are:

1. *Finding the right partners*
2. *Getting the right data*
3. *Organizing the informal sector*
4. *Advocating for inclusive legislation*
5. *Seeking new partners*
6. *Re-thinking Extended Producer Responsibility*

Each sub-section is detailed below.

1. Finding the Right Partners

Chintan works in partnership with marginalized communities, particularly wastepickers, itinerant buyers and small scrap dealers, for sustainable consumption, and environmental and social justice. Keeping in mind the issues and dynamics of the e-waste sector in India, Chintan first started working with the informal sector, particularly with dismantlers. Our aim was to create green jobs for wastepickers and other informal sector workers in e-waste. The idea was to seize upon an opportunity of a potential win-win situation i.e. creation of jobs for wastepickers and reducing environmental damage. The challenge was to use our experience from the solid waste sector and apply it to e-waste.

In the context of Delhi, the challenge was to demonstrate an alternative to the usual government strategy of shutting down informal units as they were deemed polluting and in violation of the government rules and the Master Plan. A second challenge was not to follow the route of mindless corporatization and privatization of municipal waste, where large corporate actors were contracted to collect, own and handle waste, thus displacing the informal sector from their livelihoods.

Some of our key first steps are outlined below.

- Working with our existing partners, Chintan took its first steps in Shastri Park, Seelampuri and Turkman Gate, well-known e-waste hubs, to speak with various e-waste dealers. Our earliest formal sector partners were the Silicon Valley Toxics Coalition (SVTC),a diverse non-profit organization based in United States engaged in research, advocacy and grassroots organizing to promote human health and environmental justice in response to the rapid growth of the high-tech industry. SVTC was able to bring to the table an understanding of what was happening globally, and enabled Chintan to think more broadly. Our partnership with SVTC helped us sharpen our focus on the informal sector and increase our areas of overlap, working towards mutual capacity building. Chintan learned about trends in e-waste handling in the United States and analyzed their relevance to India through discussions with SVTC. This also helped us to contribute better to the discussions in India. Chintan and SVTC worked with IMAK, an independent production company based in Delhi, to direct and produce a documentary that discussed Extended Producer Responsibility in the context of the informal sector. Since then, SVTC and Chintan have produced a number of blogs to disseminate and share information with other advocates interested in the issue and increase support for the informal sector as key actors in e-waste in India
- A partnership in 2008 with Deutsche Gesellschaftfür Internationale Zusammenarbeit (GIZ) GmbH enabled Chintan to focus our work and participate in wider debates on waste issues in India. GIZ also provided Chintan financial resources to organize dismantlers for one year. As a result of our work with GIZ, we were able to develop an advocacy-based understanding on the proposed e-waste rules, strategizing jointly about formalizing the informal sector and implementing these strategies. The partnership continues well after financial support ended in 2008
- Needless to add, our informal recycling sector partners were key for helping us navigate this complex and shifting terrain

Learning 1: Partners are important. They enable knowledge-sharing, and help develop a better understanding of the issues and strategies to address them. They also bring in new ideas and help build a community of practice. Experienced partners can help accelerate this process. Given that a lot of work has now been done on e-waste, it is important for new players to map the existing actors, their work and their resources to leapfrog some of the processes instead of re-inventing the wheel.

2. Gathering the Right Data

Chintan undertook a baseline study in the year 2008[1] to identify existing technologies, indigenous knowledge related to the conditions of work, and mapping the key

1 GTZ-ASEM-Chintan e-Waste Initiative for Delhi, Mid Term Report, 2008

actors in the sector. This study was crucial for planning, organizing, and formalizing informal sector recyclers. As shown in Map 1, the study was conducted in Seelampur, Shastri Park, Old Seelampur, and Turkman Gate areas considered as the hubs of e-waste handling in Delhi. The study's key benefit was that it enabled Chintan to meet various e-waste actors and understand the dynamics of the process in greater detail.

Our methodology included observation of the dismantling units, one-on-one interactions with dismantlers and collective meetings with the various actors. This approach was necessary to develop a sense of trust with the actors because these activities are now considered illegal.

This study highlighted the following:

- Contrary to popular opinion, the informal sector (e-waste recyclers / dismantlers /extractors / traders) is highly skilled because of its vast experience in and understanding of e-waste management and handling
- They use some very basic dismantling equipment, such as screwdrivers, wire strippers and hammers for dismantling.
- Most of them do not want their families and children to join this trade
- Even though they recognize the importance of associations and networks as a means of survival, many of them are not part of any association
- Workers suggest that income from this work makes it a worthwhile profession
- Workers encounter various health issues such as blisters on their hands and breathing problems. A snapshot of a study detailing the health impacts of e-waste recycling on informal sector workers is presented in Box 1
- There were three workers in a dismantling unit on average, including the owner who

Map 1: *Mapping of e-waste processing informal hubs in Delhi*

Source: Google maps

Box 1: A Snapshot Study on Health Impacts of E-waste Recycling Workers[1]

In Delhi, the most comprehensive study which has investigated the health issues faced by the informal e-waste management sector was undertaken by the Centre for Education Communication (CEC) in 2010.

This study was conducted at Loni, a suburban cluster of e-waste recyclers on the Uttar Pradesh-Delhi border. The study used a structured questionnaire to collect data from 64 individuals and conducted lab testing Blood Lead Level (BLL), Kidney Function Test (KFT) and Complete Blood Count (CBC))of 20 individuals. In all, 64 respondents, between the ages of 15 to 60 years were administered the questionnaire. Of these, 42% were in the 19 to 30 years age group, and 43% in the 31 to 40 years age group. Further, 34 (53%) were male and 26 (43%) were female. The study found that e-waste recycling impacts the workers' haemopoietic system (which affects the blood stream), nervous system, renal system, respiratory system, dermal (the external layer or skin), metabolic system, gastro intestinal system, apart from being possibly carcinogenic.

Backache was found to be a common problem among workers, attributed to their sitting in awkward positions for their work. According to the CEC, the levels of BLL were higher among children affecting their cognitive functions. Because of the high BLL, blood formation is lower. The study found out a lack of hospitals in the vicinity of their workplaces and homes. There was a general lack of awareness about health and workers did not have access to prescribed medication. Many questions from researchers were met with scepticism, and the subjects' body language suggested that researchers were not welcome. Subjects suspected the motives behind even simple questions.

The health of residents near e-waste processing units were impacted by the burning of materials in open spaces including terraces. In addition, ash remained in the open contaminating the soil and water.

1 Centre for Education Communication, "Health Impacts of E-waste Recycling Workers", 23 March 2010

also worked on the shop floor. These are very small units that cannot compete with large companies without financial and technical assistance

- Several workers and owners have been trained in mechanical repairs and even basic engineering principles, processes and practices

The working condition of informal sector is depicted in the pictures as follows:

E-waste Storage

E-waste Dismantling

LPG Cylinder used in the process

Learning 2: **Always seek out local data and information meticulously. The data helped us better understand the local context, the key players, as well as local politics.** It is important to have high quality data collected through rigorous research methodology. This draws in more support for the informal sector which otherwise appears to be 'out there.' In other words, good data highlights the importance and value of the contribution of the informal sector, thus making it harder for the public, and policy makers and implementers to ignore.

3. Organizing the Informal Sector

The baseline study provided Chintan a detailed picture of the informal sector including their working conditions, strengths, challenges, fears, etc. Based on this information, we decided to organize e-waste recyclers, particularly dismantlers, so they could work together as an organized body rather than as illegal individuals. Chintan decided to organize dismantlers because we saw them the most vulnerable group in the

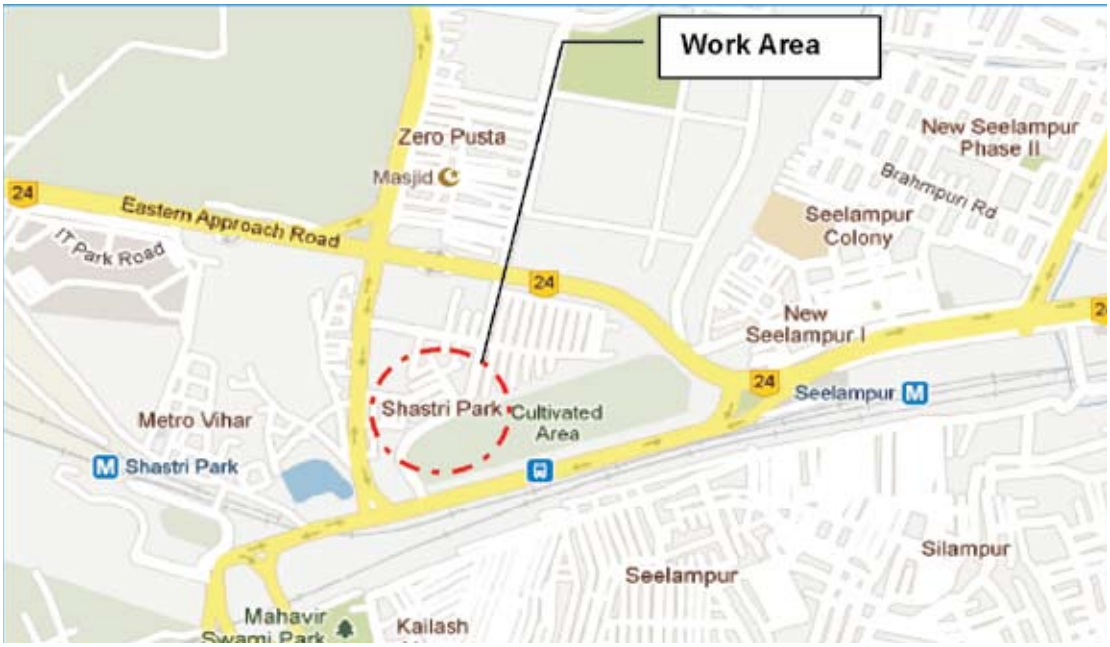
informal e-waste sector, when new policies got implemented. Their livelihoods were directly dependent on access to e-waste, particularly from bulk producers who would be the earliest compliers with laws. Additionally, we had not yet started working on e-waste collection because we were in the process of learning about the business of e-waste. To organize dismantlers, we chose Shastri Park in East Delhi, one of the most important e-waste handling hubs in Delhi (See Map 2).

space for recycling work, ideas of rights, and health etc.

- Organized workshops comparing recycling practices in India versus other countries
- Identified community leaders
- Trained the community leaders on how to gather more e-waste workers, how to explain the issue and how to organize a meeting

In January 2009, this work resulted in

Map 2: *Location of work area, Shastri Park, Delhi.*



Source: Google Map

Chintan's approach was to build networks, conduct one-on-one discussions and facilitate debates and discussions among dismantlers. This resulted in the emergence of grassroots leaders within the community.

Specifically, we:

- Organised workshops on various topics such as the Delhi Master Plan, need for

formation of 4R, an association of e-waste dismantlers and aggregators. In addition, by April 2009, Chintan had helped Safai Sena, an association of wastepickers, doorstep waste collectors, itinerant and other small buyers, small junk dealers, and other types of recyclers, based in various cities in northern India, to register itself. Many Safai Sena members worked with e-waste too, although

not exclusively. Both associations had different roots and evolved differently.

A. 4R (Association of Electronic Waste Recyclers)

During our study at Shastri Park, East Delhi, we identified some individuals who were involved in collecting and dismantling e-wastes. Our group discussions and one-on-one meetings revealed that many of them were interested in upgrading their work. Key to upgrading was a desire to become legal, either through working with or as a formal entity, or being recognized in other ways. One reason for this interest was to prevent livelihood loss and deflect competition from other informal sector actors. There was much less interest in upgrading the process per se. We therefore began organizing dismantlers to work as a group instead of individuals. We initially assumed that they would want to work with the wastepickers and itinerant buyers we had already organized, but this was not the case. Infact, they saw themselves as socio-economically superior to wastepickers. In Delhi, wastepickers, who are often migrants from other states, living in slums and handling the lower quality of dry waste, are stigmatized. The future 4R members did not wish to associate themselves with this marginalized and stigmatized social group. It was clear that they would have to form an entirely new organization. We reviewed various legal forms in India that this group could adopt and chose to develop an association registered under Societies Act 1860. The form of an association was seen as most suitable because it is relatively easy to manage even with medium levels of literacy. It is also suitable for advocacy and for initiating a small social enterprise. The dealers were not expected to make profits for the first few years, but just meeting their own basic needs, hence there was no legal challenge. Further, they could receive grants, should any companies manufacturing electronics wish to confer these. The advantages and disadvantages of various legal forms including society are presented in Table 1[2].

2 GIZ, "Baseline study on the legal status of the profit making registered entity of the group of informal sector workers", http://www.weeerecycle.in/publications/reports/FINAL-LEGAL-GTZ_REPORT.pdf, November 2010

Table 1: A comparison between various legal forms in India

	Advantages	Disadvantages
Association Society registered under Societies Act, 1860	i. Simple process of registration ii. Simple record keeping and even simpler regulations; Even semi-literate persons can track the legal requirements and ensure accountability iii. Eligible for grants	i. As a charitable institutional form, inappropriate for for-profit organizations
Not-for-Profit Companies registered under Section 25 of Companies Act, 1956	i. Exempt from taxes ii. Eligible for grants iii. Can be an additional unit of an existing company	i. Profit making activities not permitted

Company (Pvt.) Ltd. or Public	i. Ideal for persons who were most likely to make profits and run a business	i. Not exempt from taxes ii. Not eligible for grants
Cooperative Society	i. Ease of formation ii. Open membership iii. Democratic control iv. Limited liability v. State assistance vi. Many co-operatives to learn from across India and infrastructure to support these	i. Limited capital ii. Problems in management if members fail to get along iv. Lack of agreement by all members can become a big stumping block v. Dependence on and control of government
Limited Liability Partnership Act 2008	i. Separate legal entity ii. Easy to establish iii. Flexible without imposing detailed legal and procedural requirements iv. Perpetual existence irrespective of changes in partners v. Internationally renowned form of business vi. No requirement of minimum capital contribution vii. No restrictions as to maximum number of partners viii. LLP & its partners are distinct from each other ix. Partners are not liable for acts of other partners x. Personal assets of the partners are not exposed except in case of fraud xi. Easy to dissolve or wind-up xii. Professionals like CS / CA / CWA / Lawyers can form a multi-disciplinary professional LLP xiii. No requirement to maintain statutory records except Books of Accounts xiv. Lower cost of formation as compared to a company	i. LLP cannot raise funds from the public ii. Under some cases, liability may extend to personal assets of partners. iii. No separation of management from owners iv. Hard to run by semi-literate or illiterate persons

Figure 2 shows the broad steps Chintan tool to formalize 4R as a legal entity.

Figure 2: Formalization of Informal Sector[3]

Formalization of Informal Sector

The group was registered as an association under Societies Act 1860 with the name 4R (Association of E-waste Recyclers).

The e-waste handlers, with support from Chintan, created a list of objectives for 4R. The key objectives of 4R were:

- To establish a dismantling unit
- To establish 4R as a legitimate player in the e-waste sector
- To establish a code of conduct for 4R members in the future in order to enable them to benefit from 4R membership without jeopardizing the credibility of the sector. For example, members would not be permitted to sell e-waste for gold extraction, and peer monitoring would help regulate this

In addition, Chintan had also provided training on issues such as procedures for creating an association and how associations work to key members of the community. However, members of 4R indicated that they wanted Chintan not to act merely as an external facilitator, but be an integral part of the association. In other words, their understanding of Chintan's stake in e-waste was different from that of Chintan's. Two representatives from Chintan, therefore, have been a part of 4R, operationally and financially, i.e., by paying the required amount that each member was expected to pay.

3 Rachna Arora, "Establishing E-waste Channels to enhance environment friendly recycling (WEEE-Recycle)" http://www.switch-asia.eu/fileadmin/content/Dehli_Event_Sep_12/WEEE-Recycle_September_12.pdf, September 2012

Learning 3: It is important to debate but more important to listen and accept the decision of the target community in the end. While some wastepickers and collectors might set up their own organizations and seek external help occasionally, this may not always be the case. The dismantlers sought Chintan's participation in the organization's structure as part of its commitment and accountability to their livelihoods. Moreover, they also saw the organization as an entity where everyone was expected to volunteer their resources and time, instead of a dichotomous actor-facilitator relationship.

To accomplish these objectives, 4R decided to establish a dismantling unit. They were able to work with a consulting firm, Sycom Projects Consultants Private Limited, to produce a business plan. Sycom received a payment from GIZ to help 4R. The business plan showed that it was viable to run such a business even after the costs of formalization were taken into account. However, it assumed that most of the e-waste would be received at no cost. This changed once e-waste rules began to take shape. Many private companies entered the business and out-competed the informal sector in paying for e-waste by offering schemes etc. The plan was never used but it was an important tool for 4R, Chintan and GIZ to understand the scale, investment and complexity of formalization. Business plans also need to account for costs such as an initial gap fund as evidenced in Box 3.

Moreover, the assumption that dismantling would be allowed as an activity was not correct.

Box 2: Collecting and Dismantling: Can Delhi Play NIMBY?

Dismantling is seen as a hazardous activity. Based on Chintan's conversations with various Secretaries (Environment), Government of NCT, Delhi, from 2008 to 2011, this implies that formalized informal players will not be allowed to dismantle e-waste, even if they have the required skills and are able to do it without polluting. The reason for this unwritten policy is that the city of Delhi no longer wants to allow or encourage any polluting industry or potentially polluting industry within its jurisdiction. But who will bear the brunt of Delhi's electronic and electrical goods consumption? Can the capital city of India indulge in NIMBYism?

Learning 4: No matter how much awareness and goodwill there is, if the waste generator is being paid for waste, it is unlikely that this trend will reverse. No plan should forget such business realities. There is no place for goodwill in a business plan.

Box 3:
Information Asymmetry as Barrier

In September 2008, 4R decided to set up a dismantling unit, after a business plan had been created. A site, Mandoli, was selected and DPCC verbally asked Chintan and 4R if it were in a designated industrial area. 4R was under the impression that the site was being upgraded to improve its infrastructure and that it was an industrial site. After a unit had been established, the DPCC

informed Chintan and 4R that it was not yet an industrial site and provided a list of approved industrial areas from which 4R picked Bawana. After renting a plot, the DPCC informed Chintan and 4R that Bawana was a relocation site for industry owners and only original owners who had been relocated could establish their operations here. This information was not provided on the DPCC website. Finally, 4R explored options in NOIDA and Greater NOIDA. In all, Chintan and 4R made 45 trips (23 to Mandoli, 12 to Bawana and 10 for site selection) equivalent to 60 days of work, travelling nearly 1770 kilometres, the cost of which was 128.8 USD in fuel alone. It also imply lost work days, amounting to nearly 2.5 months of lost income, counting Fridays and Sundays as holidays. Given these numbers, it is clear that formalization is an expensive undertaking for the informal sector. It is therefore very important to be able to be able to procure a gap fund of at least the cost of travel, time, capital costs and rentals for the first 6 months.

Subsequently, in 2011, 4R decided to register as a company named Green E-waste Recyclers Pvt. Ltd. under Companies Act 1956 as it was considered a better business model. Whether or not an association could pay for a dismantling business was a question that could not be adequately answered by the authorizing agencies or understood and this gray area was a barrier in moving ahead. The technical assistance for the registration process was provided by several organizations. The new company has applied for authorization to the DPCC.

A SWOT matrix analyzes the strengths, weakness, threats and opportunities faced by 4R:

Strengths	**Weakness**
1. Experience in handling e-waste 2. Clear entrepreneur-ship	1. Lack of knowledge about legal and managerial aspects of association 2. Low to medium literacy
Opportunities	**Threats**
1. As a pioneer association could promote itself 2. Can fill in the collection gap	1. Competition from other informal groups who may not have to pay the cost of formalization 2. Competition from other legal groups entering in e-waste sector

However, not all the 4R members decided to become a part of this new company. Some had learned from previous experience and decided to formalize with only one partner to safeguard their livelihoods as it was easier to manage, handle and share profits. These were persons working with specialized e-waste such as photocopying machines and printers. Nevertheless, several 4R members began to seek formalization opportunities, aware of the vulnerability of staying informal.

Learning 5: Formalization in the e-waste landscape by e-waste collectors, traders and dismantlers, is different from formalization among wastepickers. In the e-waste space, informal sector organizations can morph several times, based on how informal relations work out within a formal structure and where new demands are placed on each actor. Trust between actors in a formal scenario is also critical. This is not necessarily a problem, but a part of the

process of formalization for doing business. The same shifts do not take place when the informal sector organizes primarily for advocacy. It is important to therefore distinguish between various reasons for formalization.

B. Safai Sena

Chintan has been supporting Safai Sena, an association of wastepickers, doorstep waste collectors, itinerant buyers, small junk dealers and other types of waste recyclers, since its establishment in 2001 and registration in 2009. One of its aims is to work towards the recognition of the work of waste recyclers and to provide safer and more secure work conditions. The association is comprised of approximately 12,000 recyclers, mostly wastepickers, small waste traders and itinerant buyers.

E-waste is collected both from bulk waste generators such as call centres and from households. Much of this e-waste is collected by itinerant buyers and sold to dealers. This is where an opportunity for Safai Sena to expand its work presented itself.

Working in partnership with Chintan, Safai Sena had been a well-organized entity, with plenty of experience handling solid waste. Hence, the key tasks at hand were planning and training Safai Sena members for e-waste handling. The need for such training is illustrated using a case study in Box 4. An initial training was provided by Chintan. Additionally, GIZ provided a 3-day training for trainers within Chintan and the informal sector. Based on feedback from the attendees, a basic half day training was created. Approximately 100 persons were trained in a first session, and the training course was further improved based on feedback from the attendees.

Box 4: A case study of copper stripper in Seelampur showing the degree of skill but need for training for handling e-waste[4]

Zebunnisa, 42 years old, is a resident of Loni. She has six children, two daughters and four sons. She has been extracting copper extraction for the last five years. Prior to this, she did zari (a kind of embroidery) and left it because it was difficult making ends meet. Five years ago, she spent a month learning the work of copper stripping and since then, there's no looking back for Zebunissa. Her commute from Behatagaon to Seelampur and back everyday takes her more than four hours. Her two daughters work with their mother at the same place.

They do not burn the wire for extracting copper, but peel it off with a knife (vastra in their parlance), which is a clean job, and they are adept at it, and do it with dexterity. Despite this being a safer means of handling plastic coated copper wires, the Zebunissa's hands were full of blisters due to the heat and friction from the plastic wires. She shared a good rapport with the owner, who did not interfere in the interview but did not let the interviewer take photos of them working or of the metals being stripped.

4 4R Association of Electronics Waste Recyclers, "To identify the existing low cost, indigenous knowledge to be used for protecting worker health and reducing environmental damage in a formal dismantling unit", 2009

In order to become e-waste collectors, Safai Sena had to get authorization from DPCC. However, DPCC had two reservations. First, Safai Sena's bank account did not reflect a significant balance. Second, this would have been the first authorization for the informal sector as a formal player. The DPCC believed that at least initially, Chintan would be a useful partner for the informal sector as they had worked with us previously as well.

After some afforts, Chintan obtained authorisation from Delhi Pollution Control Committee for acting as a collection centre. It is the first NGO to have been authorised to collect e-waste in Delhi. The following SWOT matrix analyzes the strengths, weakness, threats and opportunities faced by Safai Sena.

Strengths	**Weakness**
1. Experience of waste management sector 2. Knowledge about management and legal aspects of association 3. Collaboration with NGOs	1. Lack of experience in the field of e-waste but can be compensated by training
Opportunities	**Threats**
1. Growth prospects in the light of new e-waste rules	1. Competition from already existing or new, slicker groups working in e-waste sector since many years. May be difficult to collaborate

4. Advocating for Inclusive E-waste Legislation

There was a strong push from various environmental organizations to make a special rule for handling of e-waste, instead of merely clumping it with other wastes under the Hazardous Waste (Management and Handling) Rules, 1989, revised 2000. This advocacy resulted in the formation of the E-Waste (Management and Handling) Rules, 2011, which came into effect on May 1st, 2012. Initially, Chintan had not participated in the development of these rules. However, since 2009, Chintan began to advocate for rules that not only did not disenfranchise the informal sector, but included it and encouraged it to formalize.

The new legal system has a provision for the local kabaris to handle e-waste. The rules clearly define a collection centre as a "centre established, individually or jointly or a registered society or a designated agency or a company or an association to collect e-waste". This means any local kabari either individually or collectively can establish an e-waste collection centre after formalizing it through an association or company, and taking consent from the concerned authorities. This may seen trivial but it is an important step in policy because associations, a popular form of informal sector organization, were likely not to have received consent to establish and operate their enterprises. Typically, only companies are able to clear these hurdles. Such rules were therefore able to increase the level of inclusion of the informal sector and indicate its importance. Inclusion can take different forms. Box 5 demonstrates one such form.

Lesson 6: Even though an inclusive e-waste management policy did not immediately impact Chintan's work, it

is important to ensure the development and implementation of an inclusive policy because it can enable informal sector actors not working with Chintan to formalize and find new green livelihood opportunities. Policy opportunities are therefore key to scaling up. Also, inclusive policy, i.e. policy inclusive of the informal sector, compels both state pollution boards and manufacturers to see the sector with new eyes as allies, not hindrances. Therefore, policy advocacy is a crucial aspect of the work.

5. Seeking New Partners

While Chintan's initial work hinged on one set of partnerships, the growing range of work demanded a second set of partnerships. These included authorized companies to sell e-waste to, e-waste producers and the general public. In order to develop these partnerships, both Safai Sena and Chintan felt the need for upgrading their capacities. By this time, the new company floated by 4R members was able to work directly with GIZ to address compliance needs and was able to strategize its work without direct inputs from Chintan.

The objectives Safai Sena and Chintan identified included:

- Ensuring that more persons in each organization learned about e-waste
- Making a strategic plan to avoid the pitfalls previously experienced in the solid waste sector. These included privatization of collection and the actual recyclable waste in the case of municipal solid waste. Chintan hoped to prevent such an outcome in the context of e-waste
- Offering professional e-waste collection services
- Learning from existing models and systems to upgrade thinking and planning for providing e-waste management services

Learning 7: See other players who one might not usually work with through new eyes. E-waste is an eco-system and it is useful to find synergistic partners. This also saves money, which the informal sector is typically lacking and can also bring in additional investment capital.

Chintan has partnered with Nokia for one year to run a pilot project for e-waste collection (specifically mobiles) at specific areas in Delhi. Under this initiative, Chintan has been creating awareness among residents and itinerant waste buyers about safe collection of the e-waste. The aim of the project is to channelize the e-waste from the households to formal recyclers with the help of itinerant waste buyers and doorstep collectors. The key feature is to secure itinerant waste buyers as authorized agents without compromising environmental safety. In this case, Nokia's existing and well recognized slogans and awareness materials were used, which gave a boost to the formalized itinerant buyers' image as legitimate buyers of e-waste.

In addition to this, Chintan has been trying to connect door-to-door solid waste collection with e-waste collection. Chintan has already started this in its existent solid waste management network.

Learning 8: The informal sector is not at a disadvantage as far as awareness is concerned. It must tell its story and offer a unique service. Some tips for doing this are as follows:

- **Work with organizations that are good at this, or who are well recognized, as long as they support the informal sector's work and respect it**

- **Capitalize on social media, blogs etc.**
- **Participate in workshops organized by government and industry for understanding the key discussions and for recognition**

6. Re-thinking Extended Producer Responsibility

As mentioned in the previous section, one of Chintan's partners has been Nokia, a leading cell-phone brand. Chintan and Nokia have entered into a partnership where Chintan works with itinerant buyers and other informal sector actors, to collect unusable cell phones and chargers, and channelize them for recycling to an authorized recycling agency. This was part of the EPR plan rolled out by Nokia.

Nokia paid for the trainers in Chintan who reached out to already mobilized informal sector actors, particularly itinerant buyers and doorstep waste collectors. Nokia also provided Chintan with awareness materials and linkages with an authorized recycling agency. The goal was to enable the informal sector to sell e-waste to a safe recycler instead of an unsafe one, thereby protecting livelihoods and the environment.

Although the collection was robust, there was a glitch. The price differences between what the authorized reycler and the informal market offered was substantial. The informal sector traders paid more than the authorized recycler. Several residents were already accustomed to selling their cell phones, desktops and other e-waste at rates higher than what this initiative could offer. Table 2 below shows the average difference in prices in Indian Rupees in January 2013.

Table 2: Price differences for e-waste in the informal and formal sector

Items	Price offered in Informal Market (INR)	Price offered by Formal Recycler (INR)
Hard disk	Rs 45 Per Pc.	Rs. 20 Per Pc.
CPU	Rs 300-400 Per Unit	Rs. 100 Per Unit.
Mobile phone – Fully Intact (Without Battery)	Rs 1000 Per Kg	Rs. 600 Per Kg
Mobile Phone Boards (Plates)	Rs 1900 Per Kg	Rs. 800 Per Kg
Chargers	Rs 100-250 Per Kg	Rs. 20/- Kg
Refrigerator	1000 Rs	Rs. 0. They offered no money due to cost of disposal
Television	Depends on screen size	Free of cost – leaded glass costs for disposal

What does this situation tell us?

First, that the informal sector traders are likely to pay higher rates, because the informal sector recyclers are able to buy at higher rates, in the absence of expensive equipment and pollution control mechanisms.

Second, that influencing people to sell at a lower rate is not a solution. Not everyone is influenced by arguments to protect the environment and health of workers. Although some people give e-waste for free, a shift in expected prices is an uphill battle. For the

itinerant buyer to earn the same margins when the recyclers is paying less, forces her/him to pay less to the seller. Otherwise, she/he earns less, an unacceptable situation.

Third, that EPR could be a device to bridge the rates gap. This means the producer company puts the funds to equalize the rates, and offer the itinerant buyer, doorstep collector or wastepicker, a genuine and fair chance to feed e-waste into a safe facility. This cost may have to be built into the price of the product. Producer should be encouraged to let consumers know if the product will be safely managed.

BOX 5: Creating space for waste: a precedent from Delhi

In Delhi, there is precedence for this. When a fire burned down the plastic trading stores of large traders, many informal, in Jwalapuri, West Delhi in 1995, the Delhi government planned and allocated new spaces with rudimantary infrastructure for safer work for such traders. The new space was in Tigri Kalan, also in West Delhi, close to the city's border. Why can a similar idea, with more sophisticated facilities, based on consultations with the sector, be created for e-waste trading and dismantling? The Tigri Kalan market also teaches other lessons. It was never used because the space per trader was too small. The condiitons were also perceived as harmful for the business, further disincentivizing traders to move. To prevent this experience again, organized informal sector actors, who already exist, should be part of the project from the beginning.

Financial support is not the only form that meaningful EPR can take. Formally allocated, appropriate infrastructure and space is critical to the work of the informal recycling sector at large, and one of many reasons for their marginalization. What if the municipality, or another government agency enabled an industrial park for trading and dismantling? Such a park would be like an e-waste mall, where an eco-system for a range of informal sector actors would be nurtured. Trading, specialized trading, and dismantling — all these activities under one roof could result in safer work due to shared infrastructure, cross-pollination around best practices and innovation. While the land would be allocated by state agenices, EPR strategies from various producer companies could pay for infrastructure, costs of transportation of the waste to such a facility, technological innovation costs where needed, and training.

Chapter 5
Conclusions

What would Chintan do if, with this experience, it had the opportunity to work in e-waste with the informal sector all over again? Here are our top 6 thoughts:

1. **Do it all quicker.** Three and a half years is way too long. For example, instead of first working with dismantlers and then with Safai Sena separately, we could

have done both simultaneously. A better time frame might have been two to two and a half years.

2. **Tell more stories.** We have not shared the challenges faced by the informal sector with the public or policy makers enough. If we had, perhaps there would have been more support and ideas about overcoming these challenges.

3. **Develop more partnerships right at the start** instead of at a later phase, so we can garner more support for the informal sector.

4. **Advocate** for adding co-operatives, trade unions and producer companies to the list in the Rules. Of course, this is ongoing.

5. **Reduce and ideally, eliminate child labor in the e-waste sector** using the rich experience of our No Child in Trash programme.

6. **Engage in partnerships with bulk producers** to provide us their e-waste. Make working with the informal sector a win-win situation, as we have done in our solid waste management work. In the e-waste sector, most bulk producers have already tied up with large companies, and the formalized informal sector has lost access to such waste for the duration of the contract.

Chintan sees itself working with the formalized informal sector to enable them to participate in this emerging opportunity in e-waste collection and create new, green, decent livelihoods.

Collection is the greatest bottleneck in all waste technology and processing plans, so the informal sector can play a key role in safe e-waste recycling and also securitize their work and work conditions.

Chintan's own role is expected to shift from actively running the collection system to monitoring and perhaps, be entirely removed from it eventually. However, this will be a long process. Before that happens, Chintan will have to first build many types of capacity internally and with its partners, both in the informal sector and the formal sector, as well as learn the business of e-waste collection in all its nuances and challenges by working in the field. The lessons we outlined here are likely to be widely applicable and are worth considering. They might seem simple but they are absolutely vital.

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Electronic and Electric Waste, or e-waste, is a global crisis. Although e-waste is increasing everywhere, it is hard to recycle on account of its toxicity. In several developing countries, e-waste is collected, dismantled and the metals recovered by actors in the informal recycling sector. Some aspects of their work pose severe health problems for them. The challenge is to ensuring safe recycling and protect the environment on one hand, while upgrading the work of the informal sector on the other. Chintan has worked with both informal sector actors specializing in e-waste and those working in solid waste but handling occasional e-waste streams to create and advocate for inclusive e-waste recycling.

This manual distills learnings from 2006, when Chintan first began exploring the issue. It details the challenges, errors and strategies Chintan undertook. It is aimed at anyone interested in this issue and hopes that newer players glean from Chintan's experience to innovate even more and enable the informal recycling sector to enjoy decent, green livelihoods.

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