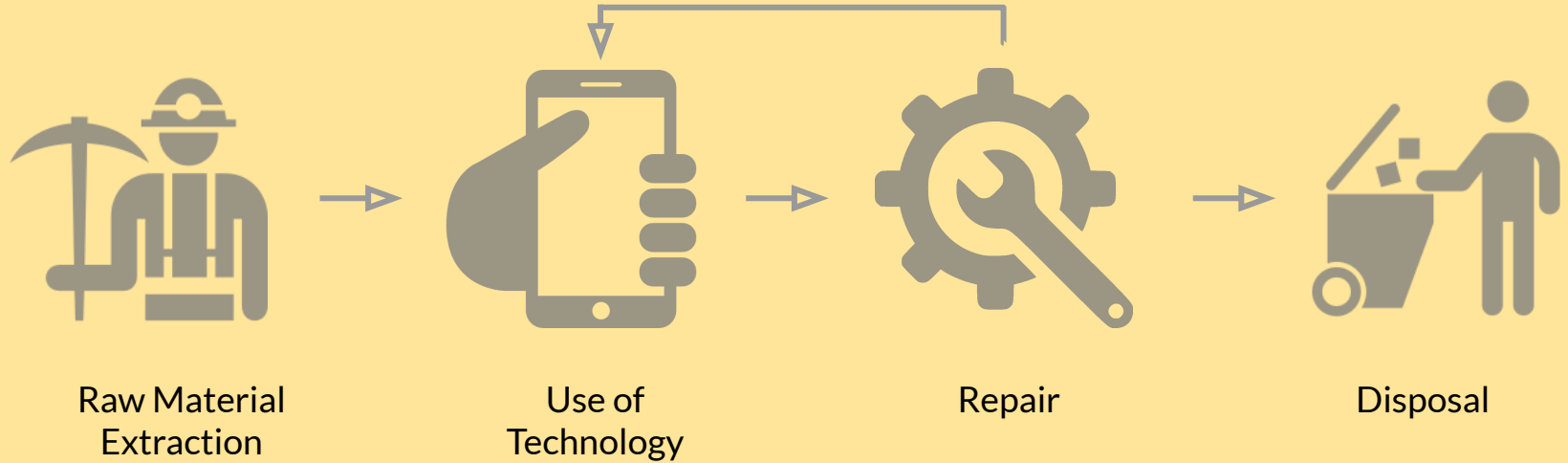




Repair and Recycle CSC300

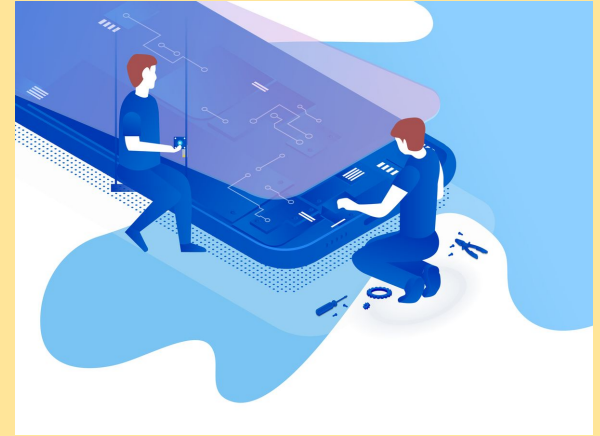
Ishtiaque Ahmed
CSC300

Technology Life Cycle



Rethinking Repair: Broken World Thinking

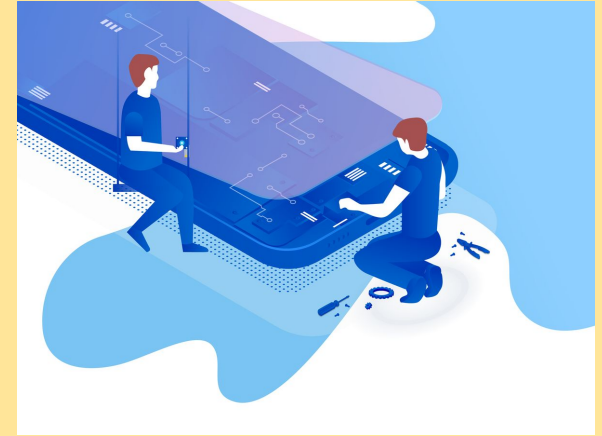
- When you approach the point of **breakdown** when discussing the nature, use, and effects of information technology and new media



Rapid Repair Service
Source: Thameem/Dribbble

Rethinking Repair: Broken World Thinking

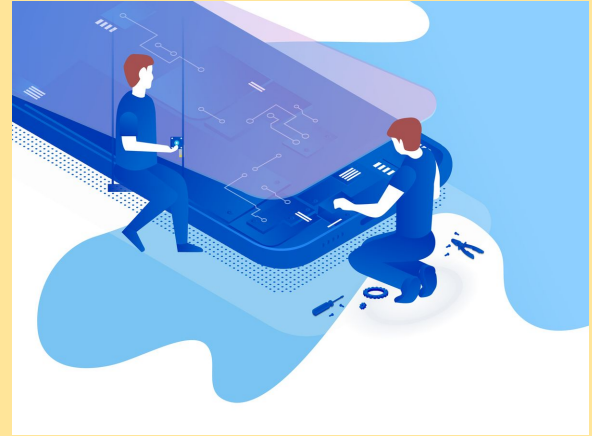
- Two parts to this:
 - Appreciation that **natural, social, technological worlds are limited and fragile** and **many stories/orders of modernity are coming apart** - breakdown, dissolution, and change are key themes and problems rather than innovation, development, and design
 - Appreciation for **ongoing activities by which stability is maintained** - repair and restoration of sociotechnical forms and infrastructures
- Rethink repair as a site of care and collaboration



Rapid Repair Service
Source: Thameem/Dribbble

Rethinking Repair: Broken World Thinking

- Repair work is often rendered **invisible** - it is articulation work that involves breakdown, maintenance, and restoration that underlie bigger stories such as exploration, empire, and globalization
- The world is always breaking - this process is **generative, productive, and consequential**



Rapid Repair Service
Source: Thameem/Dribbble

Rethinking Repair: Broken World Thinking

- **Implications for Innovation**
 - It is often highly valued in development while repair is ignored, though often innovation is dependent on breakdown
- **Implications for Knowledge + Power:**
 - Broken world thinking draws attention to the sociality of objects forward in the ongoing forms of labour, power, and interest that allow things to survive as objects in the world





Rethinking Repair: Broken World Thinking

- **Implications for Ethics:**
 - An ethics of care underpinning relations between other ethical actors shaped by ethical responsibility in mutual dependency and entanglement - care brings the worlds of action and meaning together
 - Could bring care into the world of technology - that often lacks this moral slant - through repair in the style of craft traditions

Case Study: Care in Repair: The Caring Hand

- Bangharis (e-waste recyclers) in Bangladesh use knowledge, skills, collaboration, and especially care to refurbish or repurpose e-waste
 - The hand is the device that bangharis use to sense, test, and assess the worth of a device



Source: The Breaking Hand: Skills, Care, and Sufferings of the Hands of an Electronic Waste Worker in Bangladesh

Case Study: Care in Repair: The Caring Hand

- Care is embodied in the hand in two ways:
 - Making sure important devices/components do not break further
 - Make sure they do not hurt themselves while interacting with broken objects
- While the *hand extends care* it also *endures pains* due to bangharis working in unprotected work environments with hazardous materials



Source: The Breaking Hand: Skills, Care, and Sufferings of the Hands of an Electronic Waste Worker in Bangladesh

Discussion

Apply Broken World Thinking to the case study: Care in Repair: The Caring Hand

- What implications do the activities discussed in the case study have for:
 - Innovation?
 - Knowledge and Power?
 - Ethics?
- If the hand can be considered to be a 'device' or 'technology' for repair, what other 'devices' could be implicated in this repair world?



Source: The Breaking Hand: Skills, Care, and Sufferings of the Hands of an Electronic Waste Worker in Bangladesh

Disposal: E-Waste

- When electronics break down they are disposed of and often discarded electronics from the Global North end up in the Global South
- E-waste can be viewed from three perspectives:
 - **Social and Environmental Justice**
 - **Environmental Toxicology and Occupational Health**
 - **Material Energy Flows in Electronics Production and Ways to Manage the Disposal of Post-Consumption Electronics**



Source: [Phys Org](#)

E-Waste: Social/Environmental Justice

- Understanding the lifecycle and flow of e-waste and the advocacy efforts and calls for implementing systems of social or environmental justice to mitigate risks, prevent harm, and improve social and environmental conditions



Source: Ricardo Levins Morales

E-Waste: Social/Environmental Justice

- Ex. Environmental injustice occurs in a form of “**toxic colonialism**” when hazardous waste is exported to developing countries
 - Countries like the US and Canada consider these countries pollutable and perpetuate colonial processes that prioritize certain lives



Source: Ricardo Levins Morales

E-Waste: Environmental Toxicology and Occupational Health

- In the disassembly of e-waste in disposal facilities, toxic compounds spread to the environment, affecting the health of individuals in the facility (that do not have the means to use PPE) and in the local area



Brominated flame retardants prevent electronics from fully igniting. Source: Campus Firewatch

E-Waste: Environmental Toxicology and Occupational Health

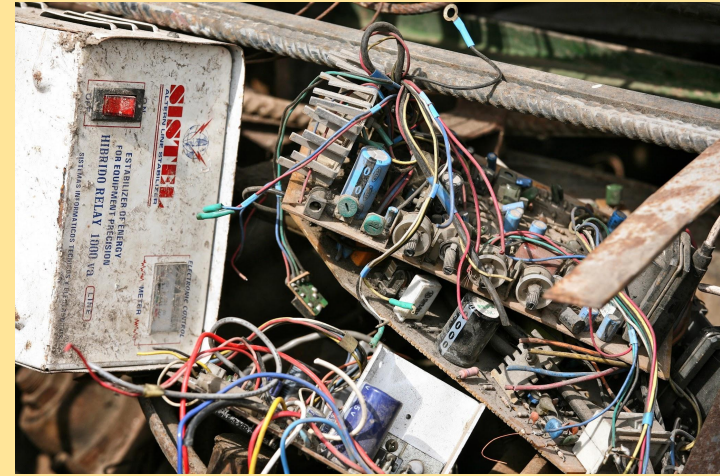
- Ex. High levels of brominated flame retardants in dust and air in the e-waste recycling and nearby urban areas in South China and Thailand - BFRs accumulation in people associated with endocrine-, reproductive- and behavioral effects.
- Ex. Silicone wristbands + fabric of t-shirts can be used to measure exposure to flame retardants - high levels found amongst e-waste disposal workers in Bangladesh



Brominated flame retardants prevent electronics from fully igniting. Source: Campus Firewatch

E-Waste: Material Energy Flows

- Can rethink waste and value in a relational way
 - Discussing e-waste as material that can undergo value creation/transformation - can go from waste to product and enter reuse market
- **Dirt, disposal, and waste are material categories** - indicative of social ordering practices rather than an essential end point in an economic chain
 - Contingencies of practices bring things into and out of rubbish value





E-Waste: Material Energy Flows

- While value is often understood as a **proportion of final price** along a value chain/production network, this **doesn't account for post-consumption value creation** (resale, refurbishment, remanufacturing, repair, dismantling, etc.)
 - More than 200,000 people are involved in the rubbish recovery economy Bangladesh, bringing rubbish value material back into production - typical value chains and processing networks do not account for this

E-Waste: Material Energy Flows

- Value is also created in post-disposal
- Importation from other countries in Asia account for the large proportion of e-waste volume in Bangladesh
 - Components and materials are returned in and for production in the South (refurbished monitors sold locally and shipped to Afghanistan, China, and Somalia)
 - E-waste materials also enter production in the South for the North
 - Flow can occur across sectors (e-waste in Bangladesh → toys/jewellery for the North)



CRT monitor remanufactured as television. Source: Making Chains that (Un)Make Things

Building on Broken World Thinking: Repair Worlds

- Focusing on the repair worlds in the Kavango region of northeastern Namibia, and making this the locus for opportunity, allowed for the discovery of implications for policy and design
 - Ex. Need for better bridges b/w formal development projects and local repair worlds - otherwise there is a double loss
 - Ex. Challenge separation of IT design and IT policy, challenge the idea of innovation only at the point of creation

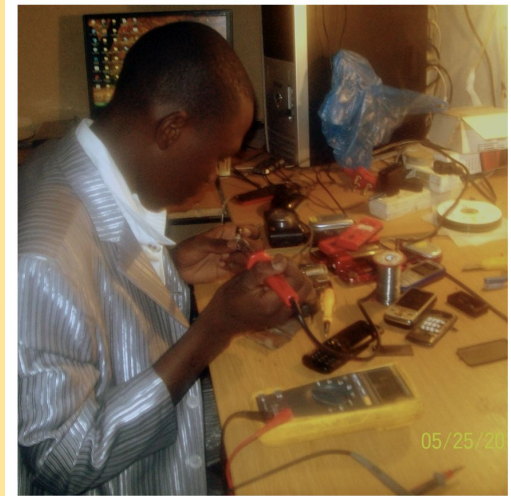


Figure 2: An apprentice at the Rundu Institute of Computing repairing a broken cell phone.

Source: Repair worlds: maintenance, repair, and ICT for development in rural Namibia.

E-Waste Life Cycle

Source: The Hidden Risks of E-Waste: Perspectives from Environmental Engineering, Epidemiology, Environmental Health, and Human-Computer Interaction



Right to Repair

- Copyright laws are now being used to copyright software/technologies
- Tech companies are increasingly using copyright law to target third party tech repair companies



Right to Repair

- People are challenging these copyrights for reasons of transparency (for reasons such as cybersecurity) and to enable the consumer to affordably/fairly repair their device
- If you legally own something you should be able to access/repair your technology



Right to Repair Statistics

- To make products last longer and save some money
- More than half (53%) have replaced broken products
- 83% says repairing is important for vehicles
- 60% says repairing is important for larger appliances

https://advocacy.consumerreports.org/press_release/consumer-reports-survey-finds-americans-overwhelmingly-support-the-right-to-repair/



Discussion

- Discuss e-waste's social impact.
- Reflect on personal behavior changes.
- Promote community-level e-waste initiatives.
- Suggest tech sale regulations.
- Propose further e-waste solutions.





Understanding Breakdown → Repair Socially

- A dominant culture of consumerism means that there is often stigma surrounding repairing what is broken (rather than buying something new) and it is often forgotten that repair is skilled work and involves creativity/innovation
- Repair work supports numerous institutions/devices/communities, often invisibly
- Modes of Resistance:
 - Individual
 - Community
 - Cultural

Individual

- Developing a “relationship”* and engaging with these tools in a meaningful way can incentivize repair rather than throwing it away for something new
 - * Not tied/dependent to objects in the ways of consumerism
 - Instead a deep appreciation for the way it assists you / might enhance your life and recognizing the effort put into/lifecycle of the object



<https://vimeo.com/89527147>

Individual

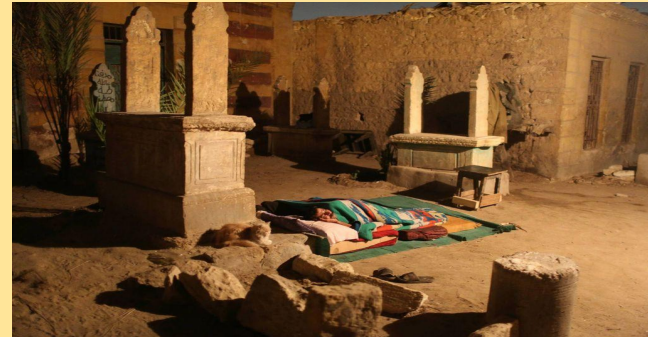
- Ex. Post-Humanism Approach: Digital Being: Scale, 2014
 - *'Scale' hacks, repairs, and reassembles a series of broken and discarded technologies to produce new interactive combinations that call out the forms of value, obduracy, and creative possibility to be found in the object worlds around us. It also invites reflection on contemporary experiences of technology use and obsolescence more generally.*



<https://vimeo.com/89527147>

Community

- City of Dead in Egypt - originally cemeteries/mausoleums and now home to a community
 - Metaphoric approach: What once was home to the dead is now home to many who are living
 - Residents here face stigma over making their home amongst cemeteries



Cultural

- Understanding objects as having greater value with having been fixed - objects are imbued with history and meaning and the process of tending to and repairing the object imparts more meaning upon them
- “Kintsugi (金継ぎ, "golden joinery"), also known as Kintsukuroi (金繕い, "golden repair"), is the Japanese art of repairing broken pottery with lacquer dusted or mixed with powdered gold, silver, or platinum”



Cultural

- “Jugaad” - a way of approaching repair and extending the life of objects through innovation
- A way to fix problems and discover solutions using seemingly incongruous objects and technologies in an out-of-the-box manner

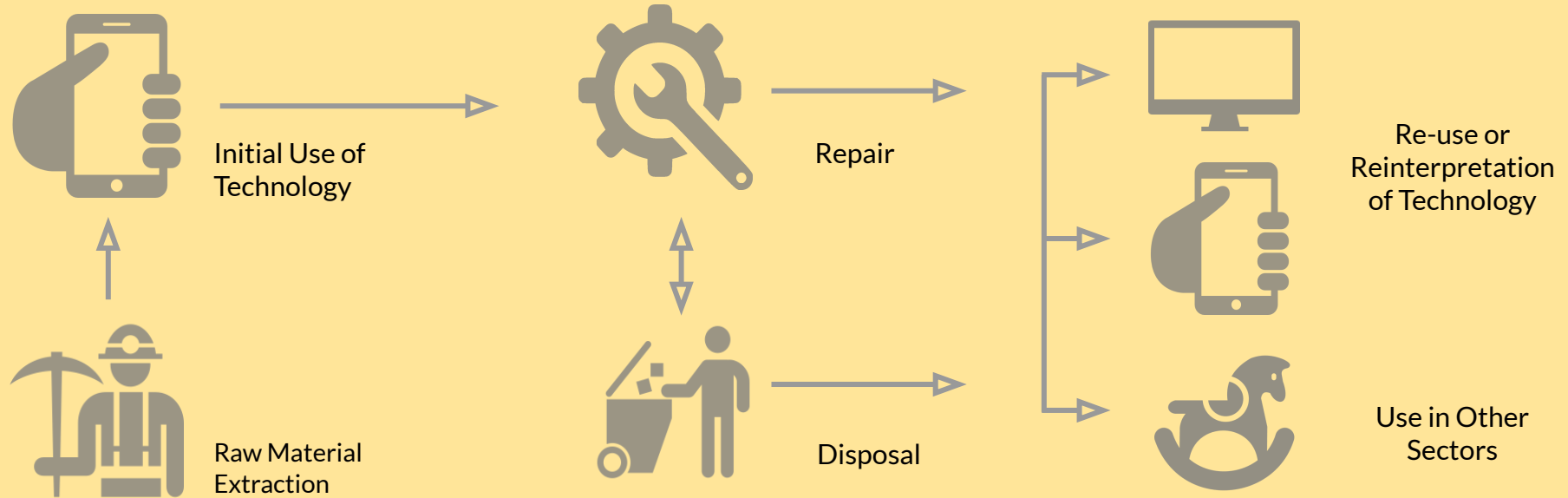




Conclusion: Point of Analysis

- Technology materials can be analyzed at various stages.
 - **Point of extraction** - raw materials
 - **Point of repair** - rethinking innovation
 - Care located at the site of the hand as with Bangladeshi e-waste recyclers
 - **Point of disposal** and subsequent value creation by refurbishing the technology
 - Environmental/Health Concerns
 - Social Justice Concerns - ex. Skilled craft-based work but lacking the equipment, additional training, and safety precautions necessary to further develop their skills and protect the workers

Conclusion: Technology Life Cycle Revisited





Thank You!