Front Matter Content

- What is e-waste?
    - E-waste refers to any electronic device that is unwanted, nonfunctioning, or at the end of its useful life. As our piles - or mountains - of discarded electronic devices reach impressive heights, it is clear that e-waste is the fastest growing trash stream. Improper disposal of e-waste raises concerns about resource efficiency as well as immediate concerns of human health and the environment.
- Who plays a role in e-waste recycling?
    - Governments, recyclers, consumers and manufacturers are key players in e-waste management. More governments and municipalities are evaluating e-waste recycling systems and are considering how to manage e-waste as part of their waste disposal systems. Increased consumer demand, technology uptake rates and shorter replacement cycles are contributing to the growth of e-waste. Recycling participation rates demonstrate that consumers are motivated to recycle but are unempowered in their efforts due to barriers they face. On the manufacturing end, electronic devices are designed to become obsolete or nonfunctional very quickly due to frequent changes in aesthetics. Manufacturers are now being encouraged to develop products with longer life spans as one component of the e-waste management strategy.
- Why is e-waste recycling important?
    - Electronic devices are a fertile source of valuable raw materials. The ability to obtain and recycle valuable materials from e-waste limits the need to extract them from Earth and helps conserve natural resources worldwide. Electronic devices also contain toxic chemicals that are hazardous to the environment and human health if improperly disposed of at landfills. Recycling e-waste cuts down on toxic chemical emissions while disposing of the devices and within the process of making new devices. Manufacturers using recycled materials to make new electronic products contribute to lower levels of greenhouse gas emissions.

Problem Space (maps)

- Why are my consumer electronic devices difficult to recycle?
    - *Parts of a cell phone graphic:* cover rare metals, planned obsolescence in hardware and software, aesthetics of devices and their packaging
- What is planned obsolescence?
    - In hardware…
        - Manufacturers are almost entirely driven by the prospect of higher profits, which is maximized by matching mainstream aesthetics. This causes devices to be less reparable or recyclable than they could be. This phenomenon causes added fragility in existing consumer electronic devices and is called planned obsolescence.
    - In software…

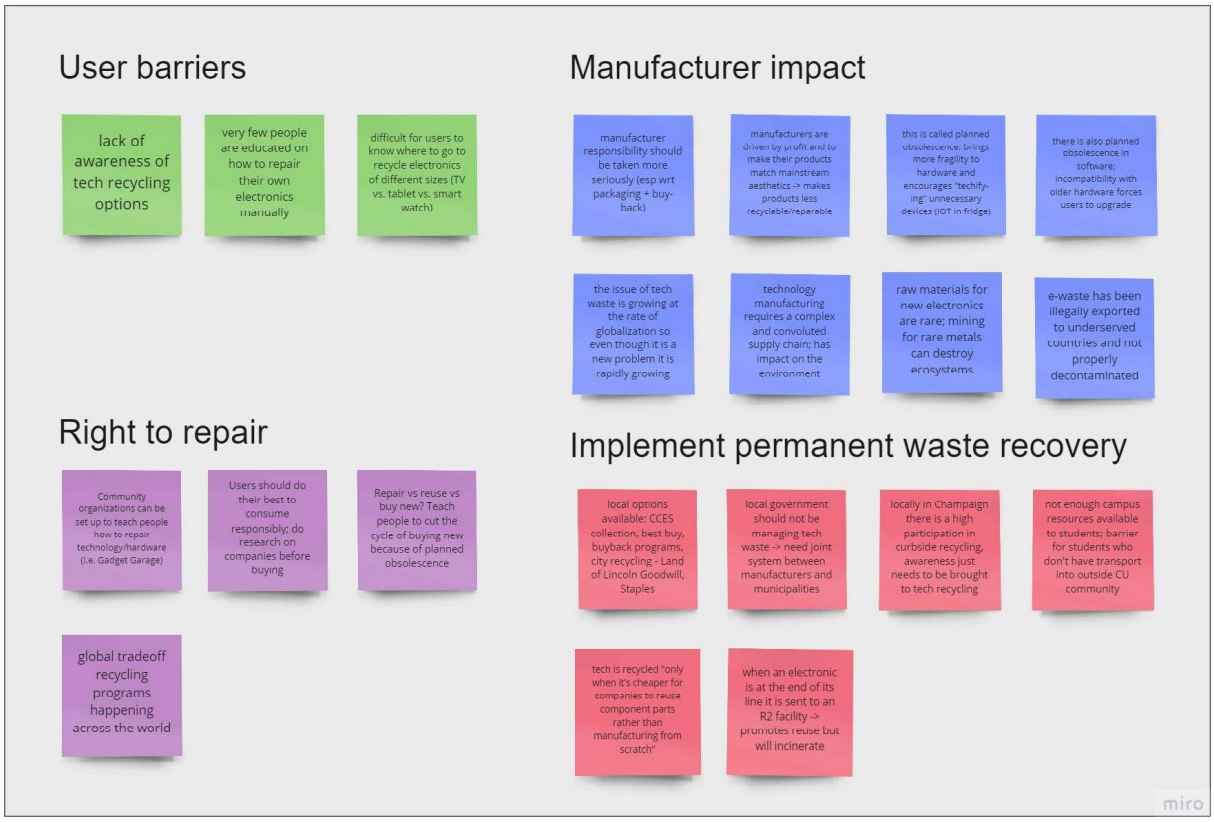
        - Planned obsolescence relies primarily on the presence of planned obsolescence in hardware. Software is intentionally developed to be incompatible with older hardware, which forces users to upgrade their devices. The prevalence of planned obsolescence in software helps fuel consumer culture.
- Where does my e-waste go?
    - *Potential flow chart:* show options of where waste leaves the hand of the consumer (recycled, kept in a drawer, donated, trash, etc) and moves to a certified recycling center (best case) or is improperly disposed (exported or not properly taken apart) -> make the point of supposed to be reused until *must* incinerate properly!
- Why don't people recycle their e-waste?
    - *Reinforcing loop:* cover low awareness on repair/recycle options, consumer mindsets about planned obsolescence, environmentalism becomes a concern but not an actionable one

Solution Space

- Mini Stakeholder map: the blame is to be placed on companies, and the problem is growing at the rate of globalization
- Organize actions/awareness based on global, local, personal
    - Awareness on three levels of scope

Back Matter Content

- List of resources
    - https://e-stewards.org/data/list-recyclers/
    - https://epeat.net/search-mobile-phones
    - http://www.urbanaillinois.us/U-cycle
        - Go to "Where do I recycle it?"
        - CCES
- Citations
    - Interviewees
    - https://news7h.com/iphone-13-pro-teardown-reveals-battery-capacity-confirms-qualcomm-x60-5g-modem/
    - https://ewaste.education/pdf/E-M@S_IVL_eminingbook_English.pdf
    - E-stewards flowchart
    - https://www.azom.com/article.aspx?ArticleID=8012


User barriers
lack of awareness of tech recycling options
very few people are educated on how to repair their own electronics manually
difficult for users to know where to go to recycle electronics of different sizes (TV vs. tablet vs. smart watch)
Manufacturer impact
manufacturer responsibility should be taken more seriously (esp wrt packaging + buy-back)
manufacturers are driven by profit and to make their products match mainstream aesthetics -> makes products less recyclable/reparable
this is called planned obsolescence. brings more fragility to hardware and encourages "techify-ing" unnecessary devices (IOT in fridge)
there is also planned obsolescence in software: incompatibility with older hardware forces users to upgrade
the issue of tech waste is growing at the rate of globalization so even though it is a new problem it is rapidly growing
technology manufacturing requires a complex and convoluted supply chain; has impact on the environment
raw materials for new electronics are rare; mining for rare metals can destroy ecosystems
e-waste has been illegally exported to underserved countries and not properly decontaminated
Right to repair
Community organizations can be set up to teach people how to repair technology/hardware (i.e. Gadget Garage)
Users should do their best to consume responsibly; do research on companies before buying
Repair vs reuse vs buy new? Teach people to cut the cycle of buying new because of planned obsolescence
global tradeoff recycling programs happening across the world
Implement permanent waste recovery
local options available: CCES collection, best buy, buyback programs, city recycling - Land of Lincoln Goodwill, Staples
local government should not be managing tech waste -> need joint system between manufacturers and municipalities
locally in Champaign there is a high participation in curbside recycling, awareness just needs to be brought to tech recycling
not enough campus resources available to students; barrier for students who don't have transport into outside CU community
tech is recycled "only when it's cheaper for companies to reuse component parts rather than manufacturing from scratch"
when an electronic is at the end of its line it is sent to an R2 facility -> promotes reuse but will incinerate
miro

From Prof Hodgin-Jones:

Team ICap content and links:
https://icap.sustainability.illinois.edu/project/address-electronic-waste-e-waste

Illinois Department of Central Management Processing Procedures (state-inventory-wide):
https://www2.illinois.gov/cms/agency/recycling/Pages/E-Cycle.aspx

ILEPA Electronics Recycling:
https://www2.illinois.gov/epa/topics/waste-management/electronics-recycling/Pages/default.aspx

LEPA Beyond the Bin Search Tool (Consumer CEDs):
https://illinois-epa.maps.arcgis.com/apps/webappviewer/index.html?id=1e86d9a5913a4ca49fb0cfd64f1c2872

Recycling Standards that may exceed ILEPA mandates

Gold EStewards:

- https://e-stewards.org/
    - No child / prison labor, no incineration, Basel Convention compliant

Silver R2 Standards: https://sustainableelectronics.org/r2/r2-standard-development/

- Find an R2 Certified facility: https://sustainableelectronics.org/find-an-r2-certified-facility/
- R2v3: https://sustainableelectronics.org/find-an-r2-certified-facility/ Downstream vendor qualifications changes to standard
- Specialty Process Requirements: https://sustainableelectronics.org/specialty-process-requirements/

EU Right to Repair and Reuse Policy Leading:

- EU Votes to support Right to Repair: https://appleinsider.com/articles/22/04/08/eu-votes-to-back-right-to-repair-proposals
    - Full proposal here: https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/IMCO/DV/2022/03-16/MfR_RighttoRepair_EN.pdf

Apple to allow consumer repairs in 2022:
https://appleinsider.com/articles/21/11/17/apple-will-allow-customers-to-repair-iphones-and-macs-in-2022

Common charger for phones:
https://techcrunch.com/2021/09/23/europe-will-finally-legislate-for-a-common-charger-for-mobiles/