Agbogbloshie Competition Handbook

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Rationale for the project

Agbogbloshie is the largest e-waste dumping site in the world; however, to view it in this light is a failure to recognize all of the extensive and elaborate systems of manufacturing around the site. From the urban mining perspective, Agbogbloshie is a unique source of numerous resources and raw materials. E-waste processors extract these resources and sell them to local makers and repair shop owners, some of these resources are processed on-site, some of them are shipped away. However, due to a lack of financial resources and the dangerous nature of these activities they are unable to turn them into a sustainable source of income.

Our goal is to bring together local e-waste processors, Worcester Polytechnic Institute students and the Academic City College community to stimulate innovation and generate solutions to recover the economic value of the e-waste. Transdisciplinary teams will participate in a multi-stage competition through which they identify a problem faced by the Agbogbloshie e-waste processors, generate prototype concepts, and present their ideas through a poster presentation.

Competition Details

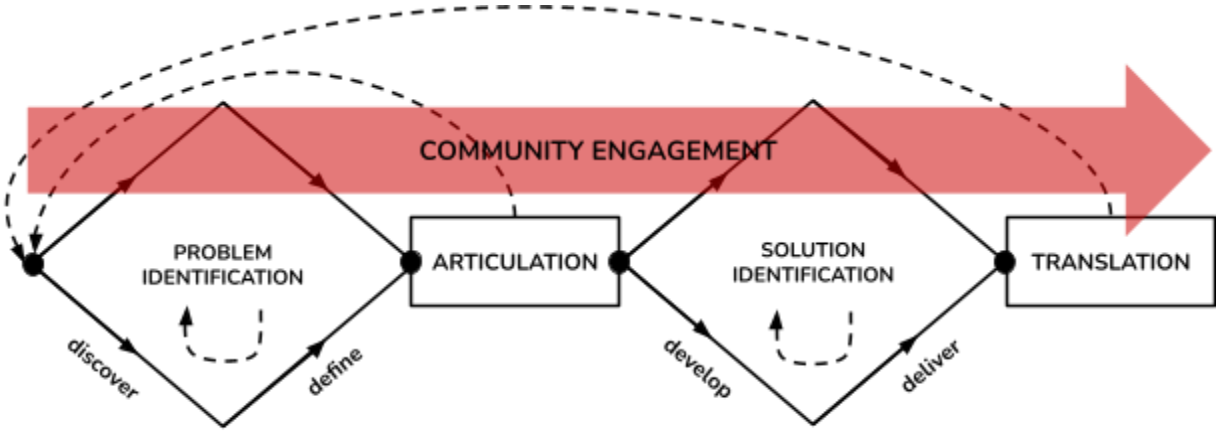
How: Organize an e-waste competition that encourages local innovation and transdisciplinary co-design.

Competition Prompt

Teams of Academic City College students, Agbogbloshie e-waste processors and WPI students will work together on developing a solution utilizing scraps from Agbogbloshie. A multi-stage competition between teams will be organized through which participants identify a problem, generate prototype concepts, and present their ideas through a poster presentation. The problem statement for the competition is open ended. For instance, solutions could be aimed at improving e-waste dismantling processes or developing a product that e-waste processors could sell for profit. The teams will understand the challenges faced by the Agbogbloshie e-waste processors, develop a problem definition and outline a solution that would address that problem. After this stage, we propose that the efforts are continued to develop a prototype and implement the product at Agbogbloshie scrapyard.

Overview of the Design Process and Co-design principles

Throughout the competition teams will be expected to adhere to the principles of co-design. To ensure that co-design is properly implemented, we propose that the teams follow the following design process.



The design process above represents a model that teams in the competition can potentially follow to aid their solution development. The process starts with problem identification which allows the teams to understand the problems faced by the community better. The articulation step in essence, serves as a checkpoint where the designated problem is thoroughly articulated, evaluated, and ensured to be representative of the true problem. At this step, it may be useful to have an outside specialist evaluate the proposed problem. Most importantly, the identified problem should be presented to the community members for feedback. In the solution identification stage, the teams generate design-driven solutions. Teams generate multiple different solution ideas, those possible solutions are then evaluated and converge upon a single proposed solution. During translation all of the project components are tied together and translated into a final product.

A crucial part of this design process is community engagement which entails interacting with the local people, gaining their perspective, learning from them at every stage of the process, and ultimately making them a part of this design process. It is extremely important to recognize that the individuals that deal with the problem on a daily basis are the true experts. The community, in the case of the competition, the e-waste processors, should be involved in implementing this solution and should be made aware of any maintenance procedures required to ensure that the solution is sustainable.

Visits To Agbogbloshie

When first interacting with e-waste processors groups should be clear about their intentions and goals so no one is suspicious of underlying motives. The goal of the first visit is to understand the challenges faced by the e-waste processors and start building relationships with the Agbogbloshie community. It is crucial that the e-waste processors understand that teams are working with them to ultimately improve the working conditions at Agbogbloshie.

Introduction

Begin by introducing yourselves to the e-waste processors and allowing them to do the same. Some points of discussion could be where you are from or your personal interests. Allow the e-waste processors to speak freely, and don't pressure them to share more than they are comfortable. Remember to approach the conversation with an open mind and to remove yourself from any preconceived notions you may have about the e-waste processors and their work.

Goals of the Project

While speaking with the processors keep in mind the overall goal of the project is to benefit the e-waste processors. Therefore, involving the processors in every stage is crucial and their input is valuable to the success of the project. Inform the processors about the competition and the goal of utilizing e-waste to produce a potential solution to a problem. Again, transparency is crucial to build trust.

Potential questions to guide the conversation:

- What does your typical day look like?
    - How early does your day start?
    - What area of Agbogbloshie do you usually work in?
    - What problems do you face on a day to day basis?
- How can your workload be made easier?
    - What could make disassembly faster?
    - Are there any tools you are lacking?
- What e-waste product is most common on Agbogbloshie?
    - What condition do they usually arrive in?
    - How do you protect the resources from the weather conditions?

Competition Outline

Stage 1: Group Formation, Problem Identification, and Idea Generation

- Academic City students go and meet e-waste processor(s) to better understand their problems following the advice outlined above
- Academic City students are paired with e-waste processor(s) and students from WPI

Stage 2: Poster Presentation and Elevator Pitch of Idea

- Teams generate ideas with e-waste processor(s)
- Teams will work with their e-waste processor to further develop their solution

Stage 3: Gathering parts and materials / Initial Prototype

- E-waste processor will help students gather materials from Agbogbloshie
- Teams will start to assemble initial products

Stage 4: Working Prototype and Final Goals

- Revisions will be made to prototype based on feedback and challenges faced

Stage 5: Final Product / Presentation

- The product is implemented at the Agbogbloshie scrapyard

Potential Timeline

Week 1 (2/28)

- Group formation and involvement with the Agbogbloshie processors
- Produce a clear problem definition

Week 2 (3/7)

- Generate possible solutions and evaluate them

Week 3 (3/14)

- Decide upon the best idea and start working on creating a visual representation of the proposed solution.
- Poster presentation and elevator pitch for the ideas are due

Our project term concludes on 3/18/21. If participants wish to continue with their project past this date, here is a suggested timeline.

Weeks 4, 5 & 6 (4/11)

- Have final solution outlined
- Begin working on prototype
- All the necessary resources are collected from the scrapyard

Week 7 (4/18)

- Have an initial prototype ready
- Conduct prototype testing & evaluation

Weeks 8 & 9 (5/2)

- Revise the prototype

Week 10 (5/16)

- Final presentation of solution and the prototype

Agbogbloshie Competition Stage 1 & 2 Rubric

	0	1	2	3
Feasibility				
Implementation	The solution cannot be implemented at the Agbogbloshie scrapyard in any capacity	The solution will be difficult to implement at Agbogbloshie because it would use extensive resources/time	The solution can be implemented with the help of incentives or funding	The solution can be implemented with the tools available at the scrapyard without the need for outside expertise
Longevity	The solution does not address the needs of e-waste processors, and thus will not be sustainable for a long period of time	The solution will not be able to last for a significant period of time (due to lack of resources, lack of usability, need for maintenance, etc.)	The solution was well thought out but not predicted to last long-term as of yet	The solution is predicted to have a long-term positive effect on the Agbogbloshie scrapyard community
Use of E-waste resources				
Repurposed e-waste	Utilizes no waste from the scrapyard	The solution incorporates minimal e-waste that isn't essential to the design	Utilizes some of the e-waste but most of the parts are new	The solution utilized e-waste as an essential part of the design
Manufacturing costs	A large and unrealistic budget spent on parts and tools for the design	Moderate budget spent on design that could potentially take away from its market value	A small budget in comparison to the estimated value of the solution is utilized	Additional materials cost is minimal
Presentation				
Organization	Poorly structured presentation	Organized but the structure does not fully support the content	Well structured with minor flaws	Well-organized and easy to follow, structure supports the message
Design	The presentation does not explain essential parts of	The presentation explains the most important aspects	The presentation gives an explanation only	The presentation gives an in-depth explanation for all

	the design process	of the design	for some of the aspects of the design or does not give a rationale for the major design choices	the aspects of the design and gives a rationale for the major design choices
Process				
Problem definition	Missing or inconclusive problem definition	Area for improvement identified but problem definition is vague	Good concept, but problem definition is still not precise	Clear and precise problem definition
Idea generation	The team came up only with a single idea and did not support their choice with a rationale	The team came up with only a few (2 -3) ideas or did not support their final choice with a rationale	The team generated numerous ideas, but their evaluation was lacking, they provided some reasoning for their final choice	The team generated numerous ideas and evaluated them, providing reasoning for their final choice
Co-design	Students and e-waste processors did not work together	Students mostly worked independently from e-waste processors	E-waste processors input is clear, they were consulted both at the generation stage problem definition stage and solution	E-waste processors were deeply involved in the development of the solution
Innovation & Creativity				
Uniqueness	A nearly identical solution already exists	Minor alterations were made to an existing solution	The solution was a complete redesign of an existing solution	The solution is unique and innovative

Appendix 1. Common E-waste Available at Agbogbloshie

Sourced from: https://qamp.net/library/

This database possesses disassembly guides for each of the common items with the following information:

- Material composition
- Scrap valve in Agbogbloshie
- Step by step instruction for disassembly
- Tools needed for disassembly
- Potential health hazards
- Parts that can be salvaged
- Urban mining
- Etc.

Air Conditioner

- Primary materials
    - Aluminum, Copper, Steel, plastics
- Parts
    - Blower
    - Control Panel
    - Adjustable Louvres
    - Fan
    - Partition
    - Condenser coil
    - Expansion valve
    - Compressor
    - Filter
    - Evaporator coils

CRT Television and Monitors

- Primary materials
    - Aluminum, Copper, Gold, Iron, Plastics
- Parts
    - Plastic Housing
    - Panel Glass
    - Electric Gun
    - Focusing Coil
    - Funnel Glass Cone

    - Television Switches
    - Speaker
    - Circuit board

Desktop Computers

- Primary materials
    - Aluminum, Copper, Glass, Gold, Iron, Plastics
- Parts
    - Monitor
    - Central Processing Unit (CPU)
    - CD ROM
    - Hard Disk
    - Floppy Disk Drive
    - Power Supply
    - Stainless Steel Case
    - Power power
    - Motherboard
    - Fan
    - Memory Chips
    - Hard Disk

Microwave Oven

- Primary materials
    - Copper, Glass, Steel
- Parts
    - Steel covering
    - Fan
    - Magnetron
    - Capacitor
    - Transformer
    - Circuit board

Mobile Phones

- Primary Materials
    - Aluminum, Copper, Glass, Iron, plastics
- Parts
    - Power IC
    - Battery
    - Circuit Board
    - Microprocessor

    - Earpiece
    - LED display
    - Camera

Washing Machines

- Primary Materials
    - Aluminum, Copper, Glass, Steel
- Parts
    - Agitator
    - Stainless Steel Covering
    - Water level Control Assembly
    - Tub
    - Water Supply Hoses
    - Water Inlet Valve
    - Supply Hose to tap
    - Spin Pulley
    - Water Pump

Refrigerator

- Primary Materials
    - Aluminum, Copper, Glass, Plastic, Polyurethane, Steel
- Parts
    - Evaporator Fan
    - Freezer Evaporator Coil
    - Fridge Evaporator Coil
    - Fan
    - Compressor
    - Stainless Steel Body
    - Condenser