



Final Presentation: Five Alive



Presentation by: Sam Stano, Aidin Moradi, Ziyi Wang
and Owen Kaine

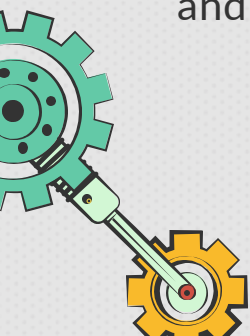




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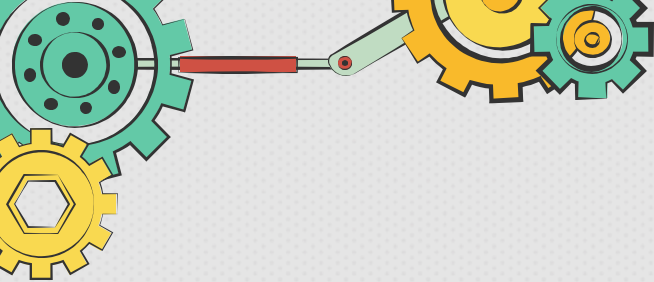
Project Plan and Cost Estimate (BOM)

Complete bill of materials

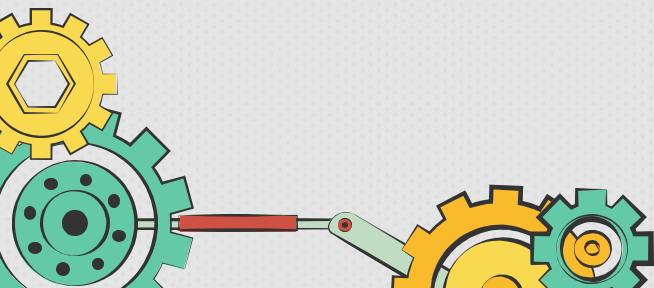
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Next Steps and Prototype III

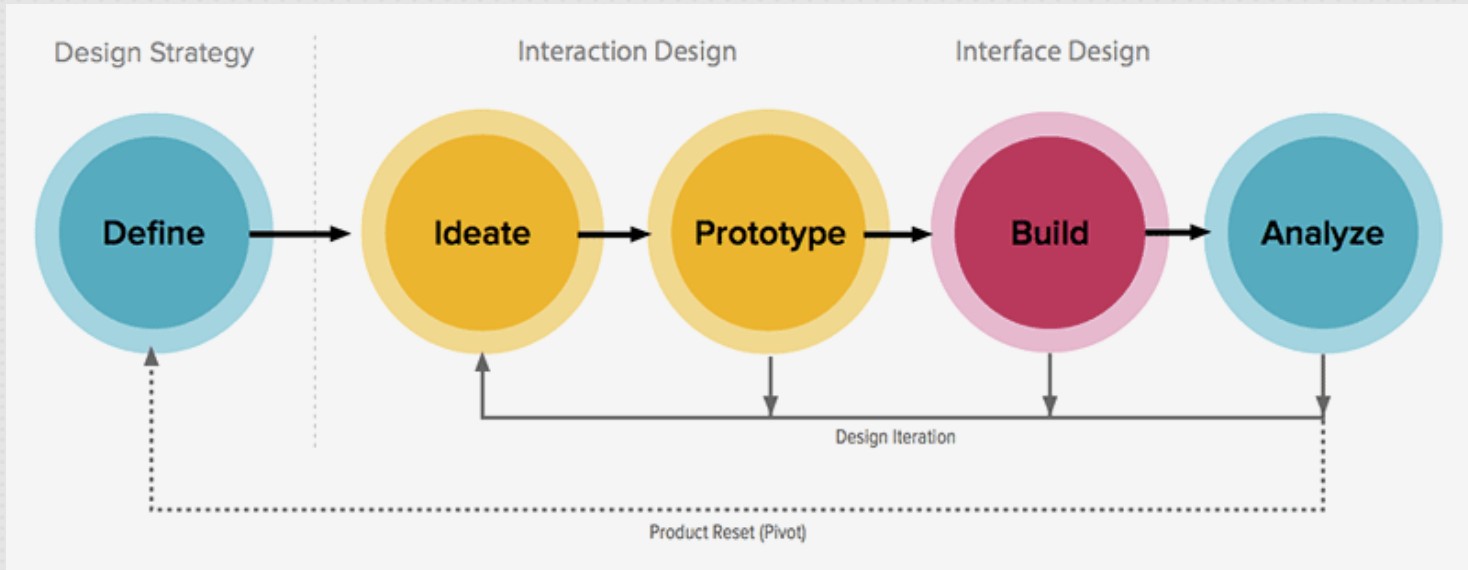
Plans for the Third Prototype



01 Introduction



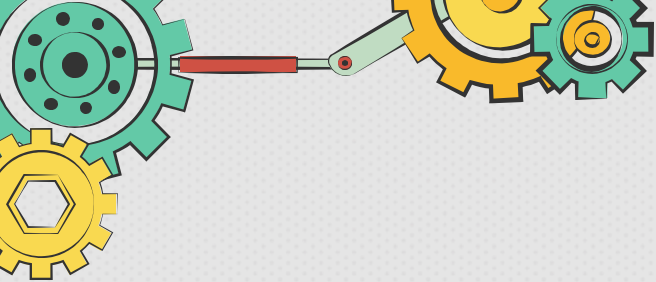
DESIGN PROCESS



A decorative border surrounds the text, featuring stylized mechanical components. At the top, two green pistons with red rings are connected by a thin line. The sides are decorated with large teal gears and vertical green shafts with small circular details. The bottom corners feature clusters of yellow and teal gears.

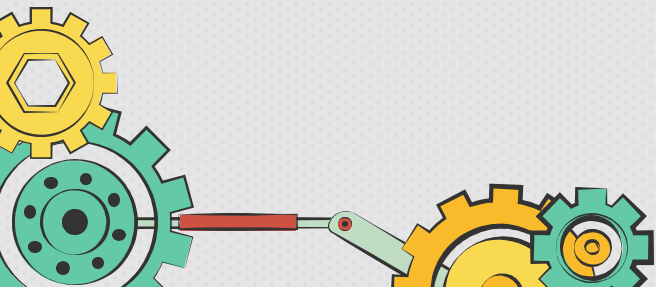
What is the Problem?

Design a modular, fail-safe samplings tool for CNL that can extract metal samples from pipelines under high radiation conditions while keeping the operator safe with industry regulation accuracy. Offer moderate feedback to confirm the operation of the tool and process status.



02

Benchmarking Summary





Anemone Retrieval and Sampling Tool by Orano

Anemone has been designed to grip any solid element, whether for sampling purposes or more generally for recovery and removal.



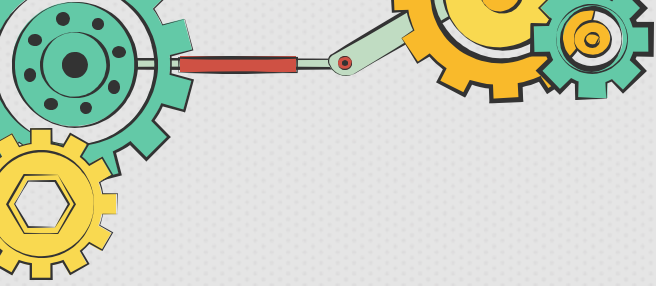
Fusion QLD Uniprep Pipe Scraping Tool

Works as a handheld scraping tool, able to scrape pipes from the full inner circumference.



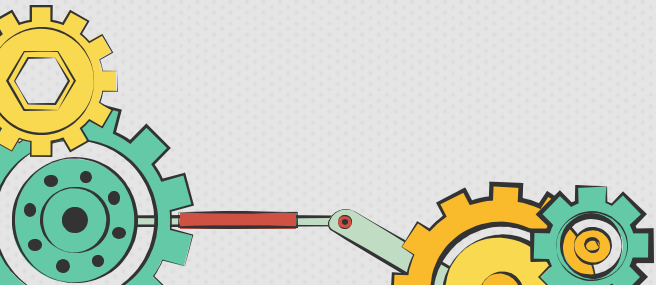
Circumferential Wet Scraper Tool (CWEST)

Enables monitoring of deuterium uptake in pressure tubes of CANDU reactors by collecting samples during shutdowns.



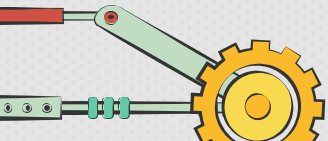
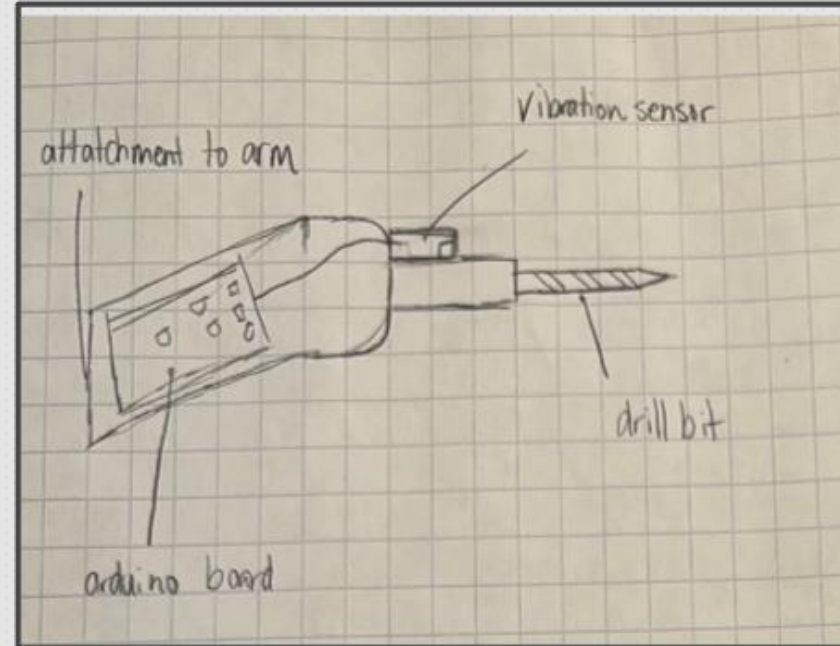
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Conceptual Design and Past Prototypes



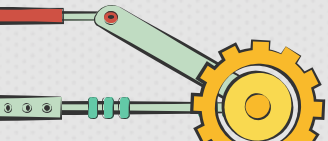
Concept Designs : Drill

- Original goal: Electric drill
- A vibration sensor would give feedback to the operator
- Drawback: not enough room to work with or too expensive for budget
- Feedback: client explained the drill would create particles and it would be hard to collect



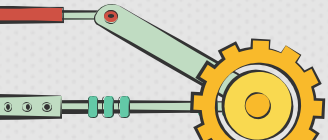
Concept Designs : Precision Balance System

- Original goal: weighing system using an Arduino load cell within the collection container
- Bluetooth or wire connection to lights by operator for collection feedback
- Drawback: precision and size of Arduino load cell
- Client didn't see this as a necessary system



Concept Designs : Control System

- Original goal: Programmed controller connected to Arduino.
- The controller would control angle of attack from drill and rpm.
- Drawback is that it would be difficult to code



Prototype I

Design Process

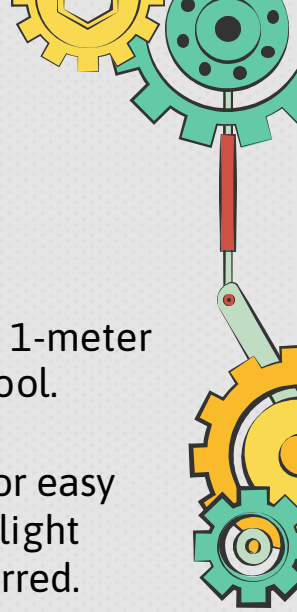
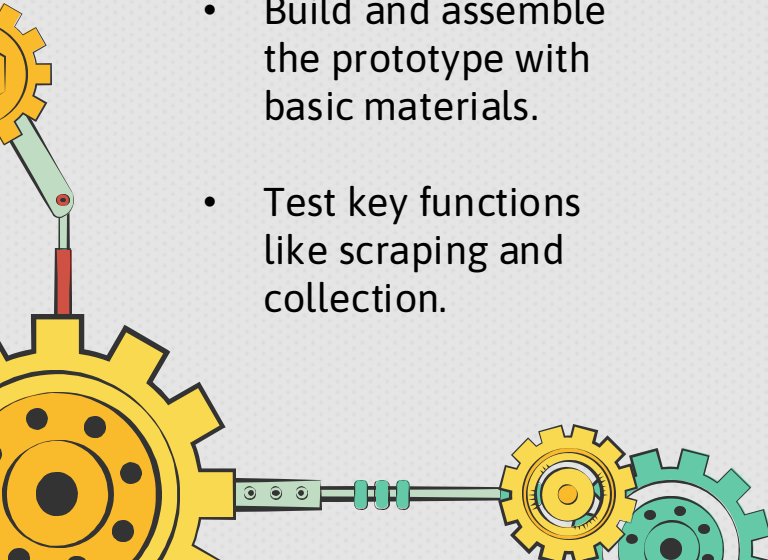
- Sketch designs and modifications based on feedback.
- Build and assemble the prototype with basic materials.
- Test key functions like scraping and collection.

Components

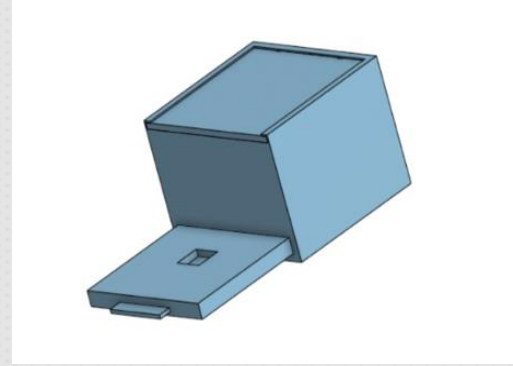
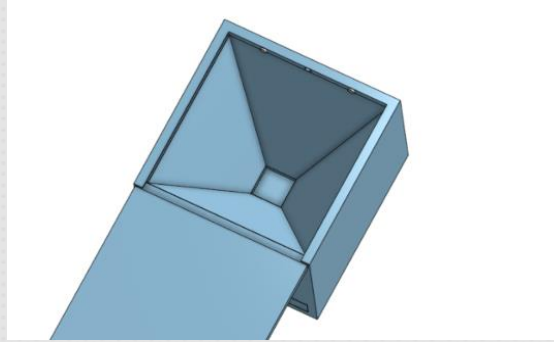
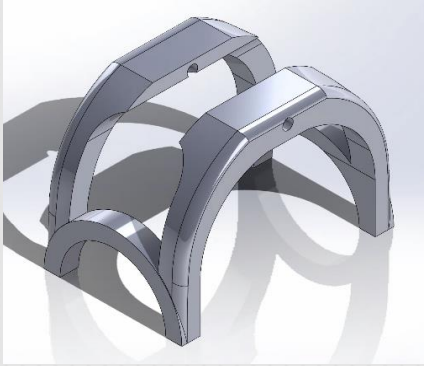
- Scraping System
- Collection System
- Feedback System
- Wheel & Mount

Results

- Successfully built a 1-meter replica of the full tool.
- Modular sections for easy assembly, though slight misalignment occurred.
- Depth measurements were visible, but slight calibration may be needed.
- The scraping system functioned well to remove simulated debris.



Prototype I





Prototype II

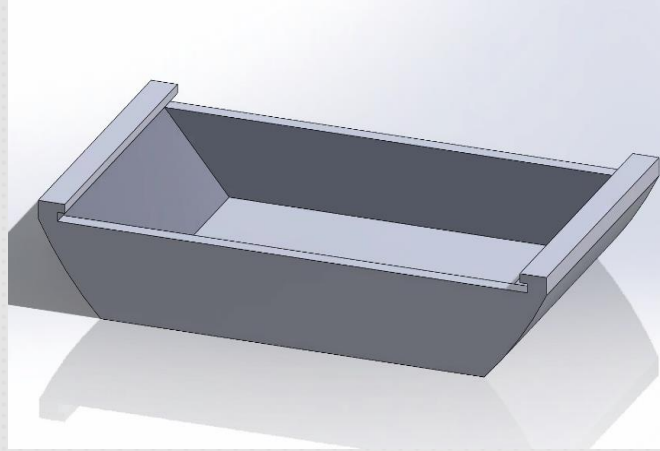
Development

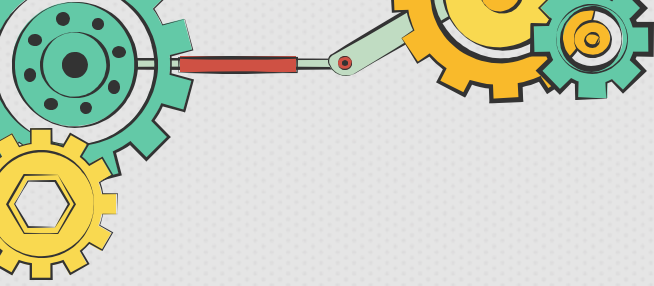
- Use a chisel instead of the knife for scraping.
- Improve collection system with more secure lids.
- Enhance wheel mount design for stability.

Components

- Scraping Tool
- Collection System
- Wheel Mount & Wheels

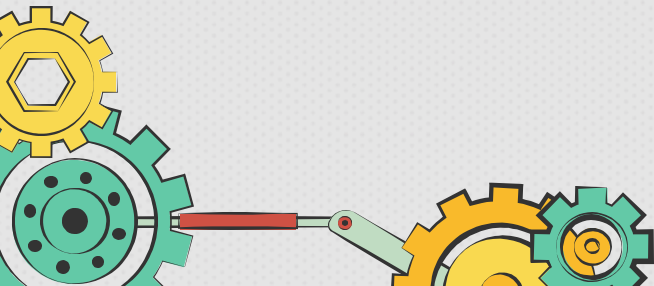
Prototype II





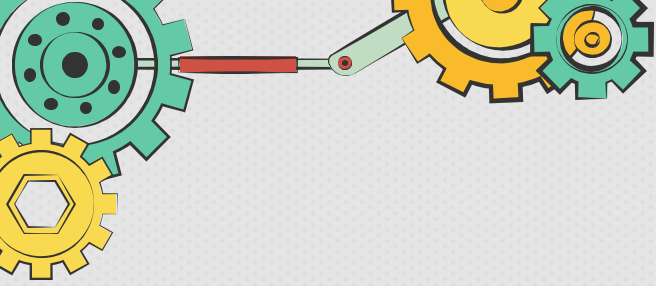
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Project Plan and Cost Estimate



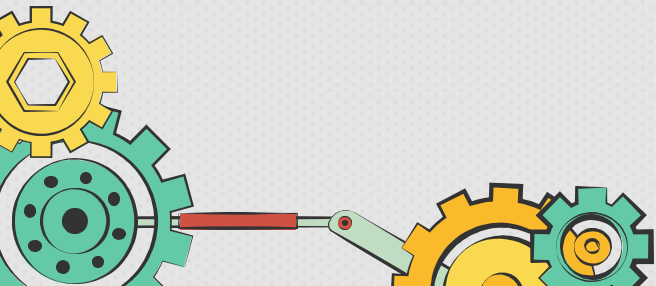
Cost Estimate (BOM)

Item	Amount	Cost (no tax included)
1 inch PVC pipe 10'	2	19
PVC coupling	4	7.2
Chisel	1	10-25
3d printed parts	10-20	Free
Magnets	60 pack	7.00
5' Aircraft wire (steel wire)	3	6.15
½ inch PVC pipe 5'	3	13
Total		65-80

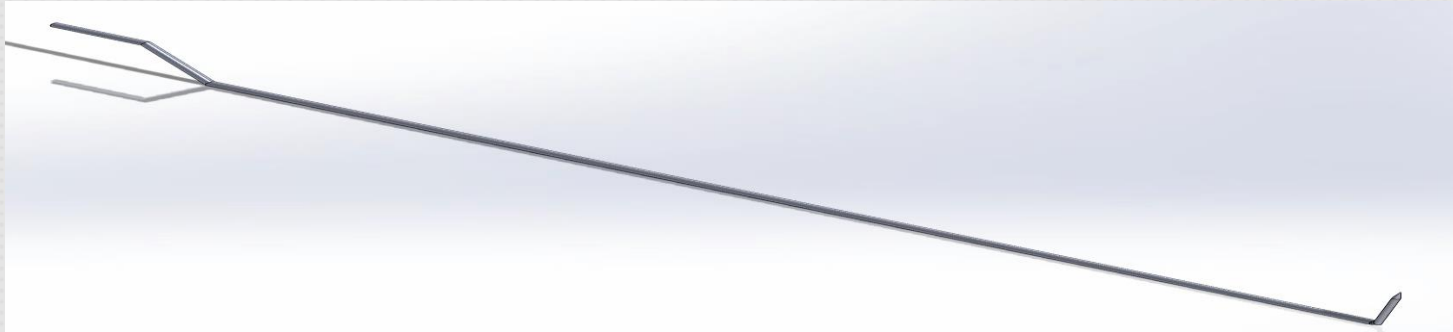
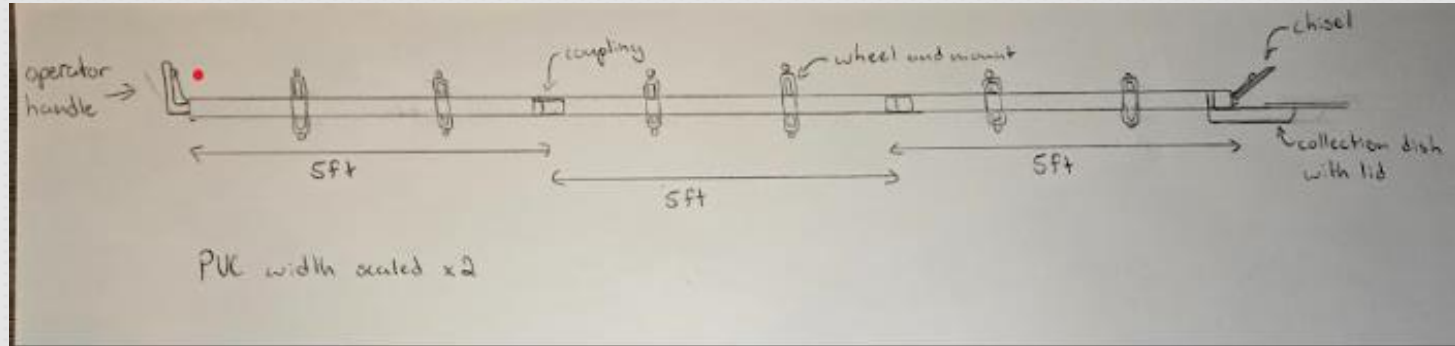


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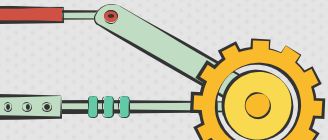
Next Steps and Prototype III



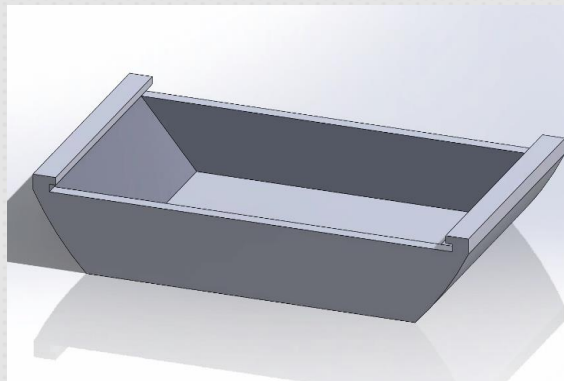
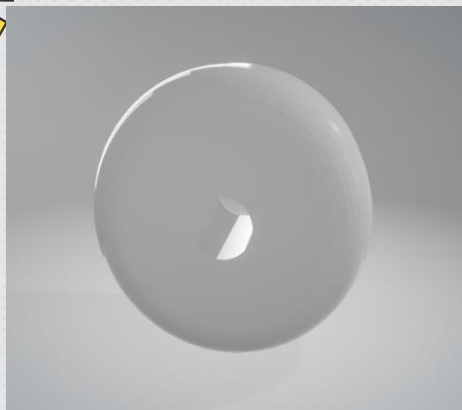
Final Concept Design



The CAD image above represents the inner PVC pole that would link the user handle to the chisel for circumferential scraping motion.



Prototype III Plans





Lessons learned and next steps

#1 Lesson:
Keep our design simple

Purchasing:

1. PVC pipes
2. Couplings
3. wire
4. chisel

3D Printing:

- wheels
- wheel mounts
- user handle
- the collection containers

Laser printing:

- distance measurement panels
to glue to the tool for feedback

March 21st-23rd: ASSEMBLY OF PRODUCT!