

# Farm Co-op Utility Bicycle





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# Mission

An opportunity exists to create an all terrain electric assist utility bike for The New Roots for refugees organization. An electric farm utility bike would help the members of the program **increase their efficiency** and allow them to be **more productive**.

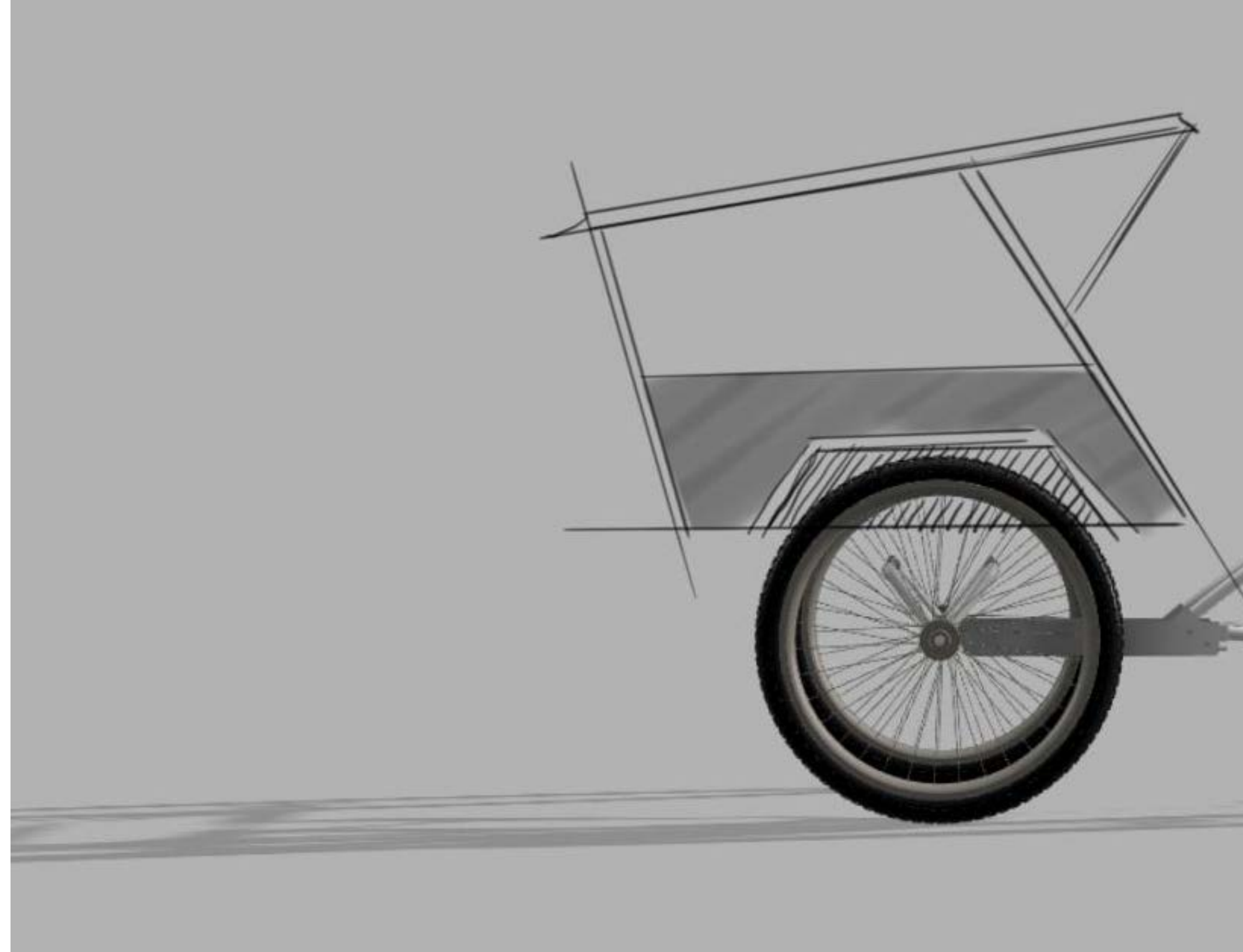
## Considerations

- The bike should be relatively affordable and replicable
- The bike should take to additions and modifications easily
- The bike will live most of its life outdoors and off road
- Cargo will consist mostly of crops and equipment



# Precedents

Cargo Bikes & Farm Programs



# Produce Container Precedents



## Bin Examples

Various bins are on the market here are some examples



**Harvest Crate**  
20"x 12"x 8.25 "

<https://www.tranpak.com/handheld-plastic-crates/agricultural/harvest-crate/>



**OmniCrate**  
24"x 15"x 7"

<https://www.tranpak.com/handheld-plastic-crates/agricultural/omnicrate-full-vented/>



**VersaCrate**  
24"x 20"x 4.5"-10.5"

<https://www.tranpak.com/handheld-plastic-crates/versacrates/>



**Returnable Plastic Crate**  
Dimensions: 24"x 16"x 11.61

<https://www.tranpak.com/handheld-plastic-crates/returnable/>

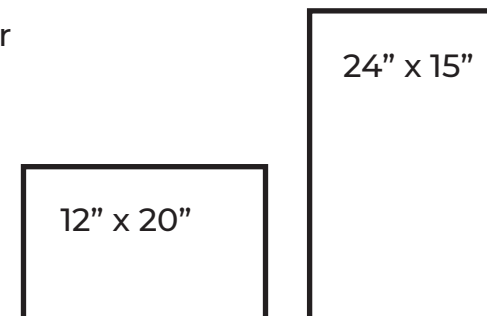


**Probin collection**  
47 3/4" x 47 3/4" x 21.5 to 52.5

<https://www.universalpackage.com/probins>

## Optimal Sizes

Any Container with a width of 24" would be optimal for a bike possibly. This would allow plenty of room for maneuverability without overloading the rider.

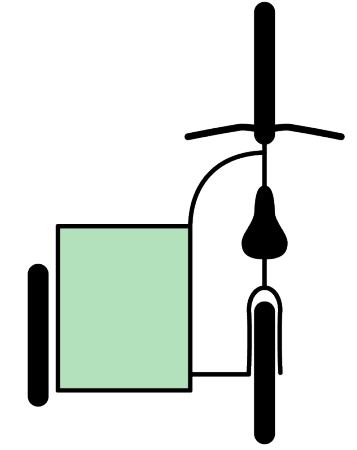
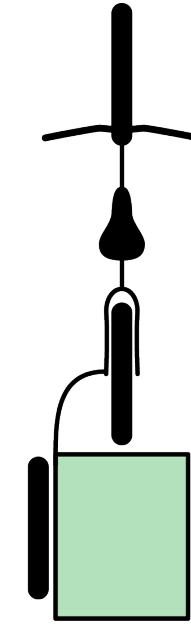
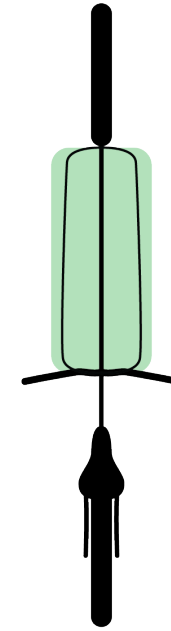
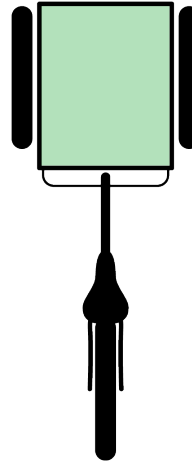
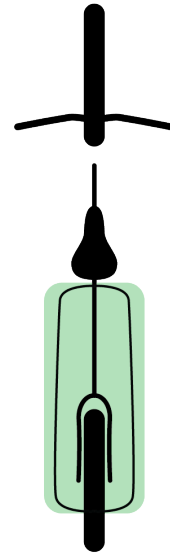
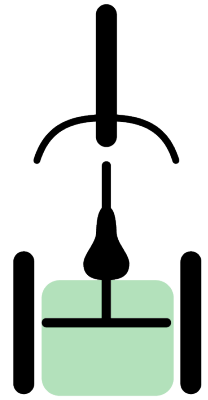


## Best Choice for Container: Versa Crate

Stackable and collapsible, these crate are cheap and easy to find. Unified footprint with different heights offers versatility for users.



# Cargo Bike Layout Precedent



## Tricycle

- pros
- weight distribution
- stability
- availability
- cons
- steering
- stability at speed

## Long-Tail

- pros
- storage
- speed
- manueverability
- cons
- balance
- bicycle experience

## Front Tricycle

- pros
- weight distribution
- storage
- cons
- steering
- availabilty

## Longjohn

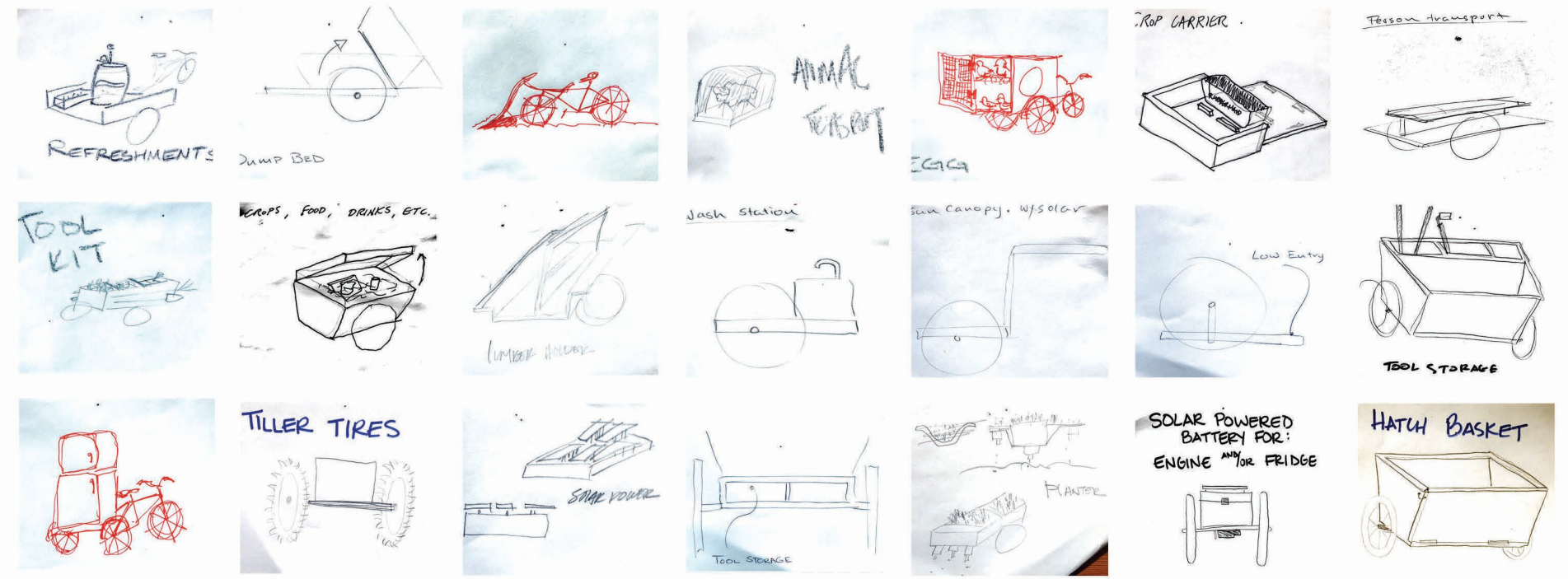
- pros
- speed
- storage
- cons
- rideability
- complexity

## Bike with Trailer

- pros
- system opportunity
- universal
- versatility
- cons
- weight
- connection point

## Bike with Sidecar

- pros
- versatility
- balance
- cons
- weight distribution



# Process

## What goes on top?

The group sat down to brainstorm possible attachments for the rear of the trike. No was not an answer, so anything and everything was considered.

## Rear Trike Build



Using plywood as a testing material to determine distance and strength of connection



Testing load capacity for back load component and attachability of flat base



Extended back wheels of trike for longer cargo component



Welding of flat base component for the attachment of various cargo components

## Front Trike Build



Attached the grocery cart handle to the head of the bike.



Started with a grocery cart using the stock grocery cart wheels



Stability of the final design was greatly improved.



Attached burley wheels to solid rod axle.

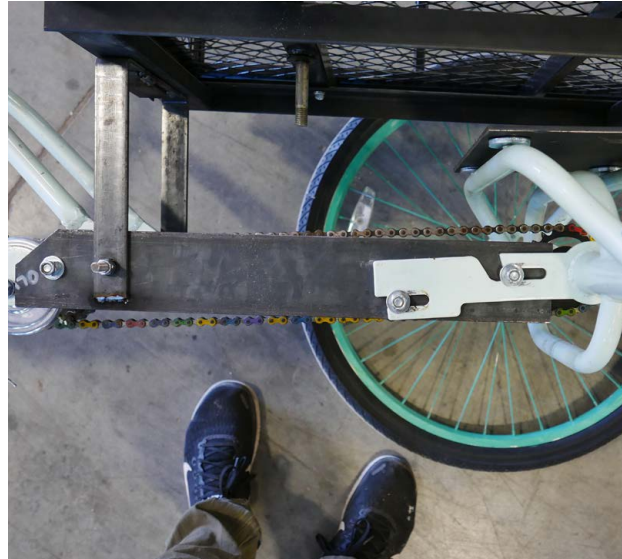


# Test Vehicles



# Constructing Testable Prototype

In order to properly test the usability of our extended tricycle we constructed a steel prototype using dimensions from our previous wood model.



# Testing

## Show it to the people

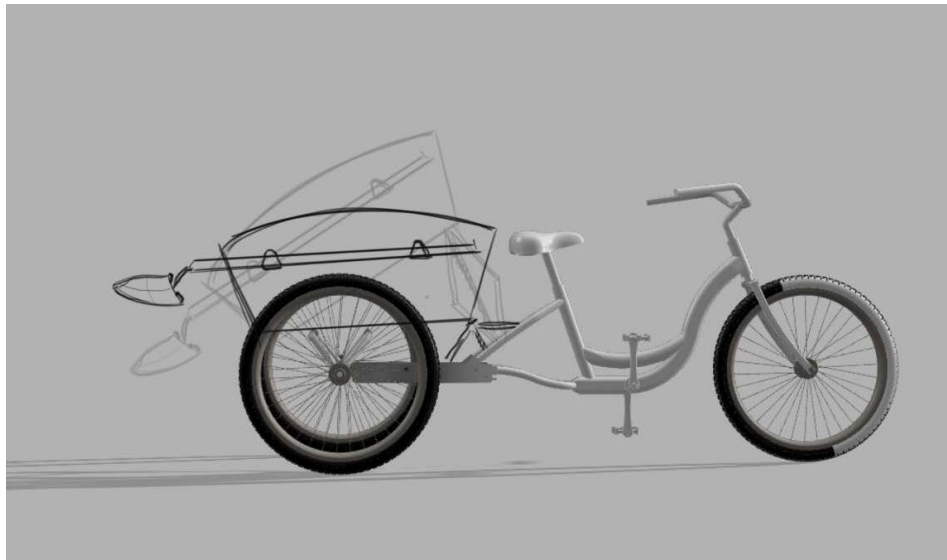
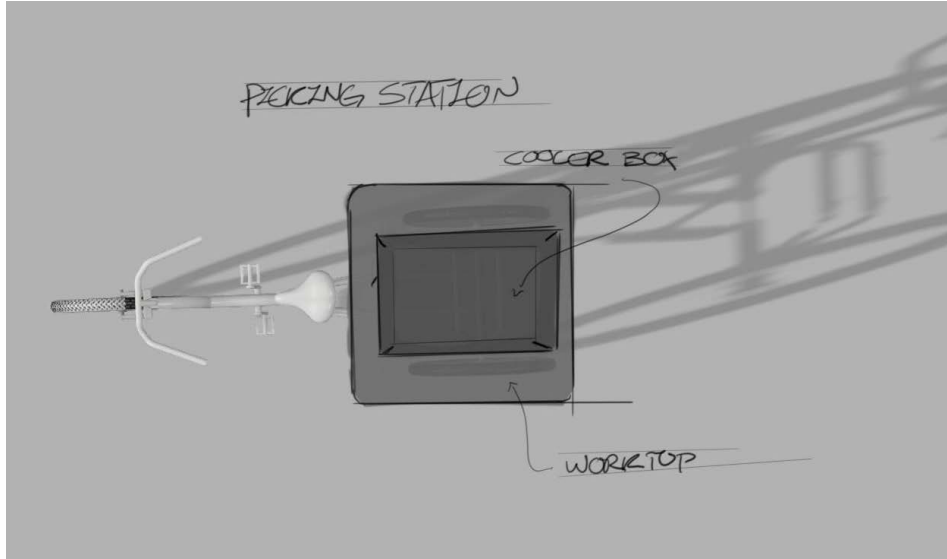
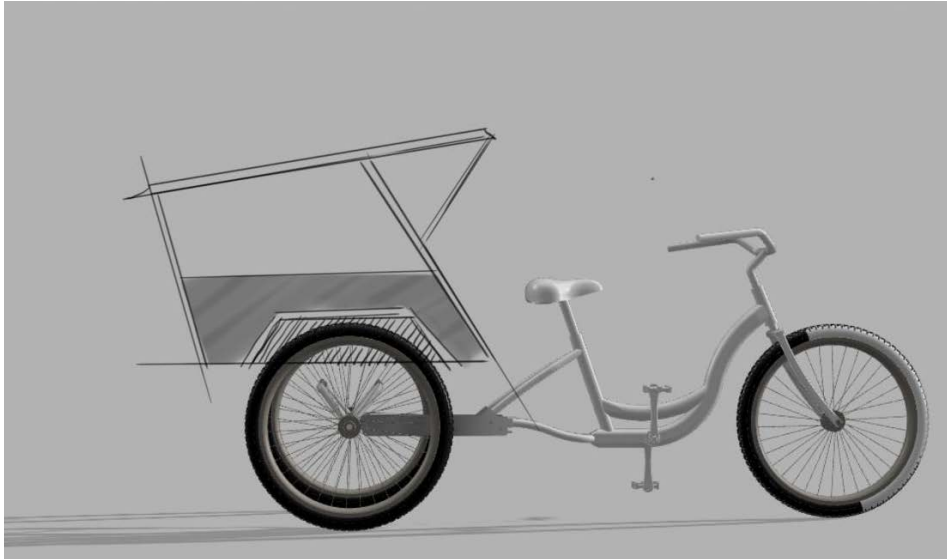
A prototype bike was presented to the participants in the new roots for refugees program for feedback from the people that would actually be using the trike. Feedback was taken into account for stage 2.



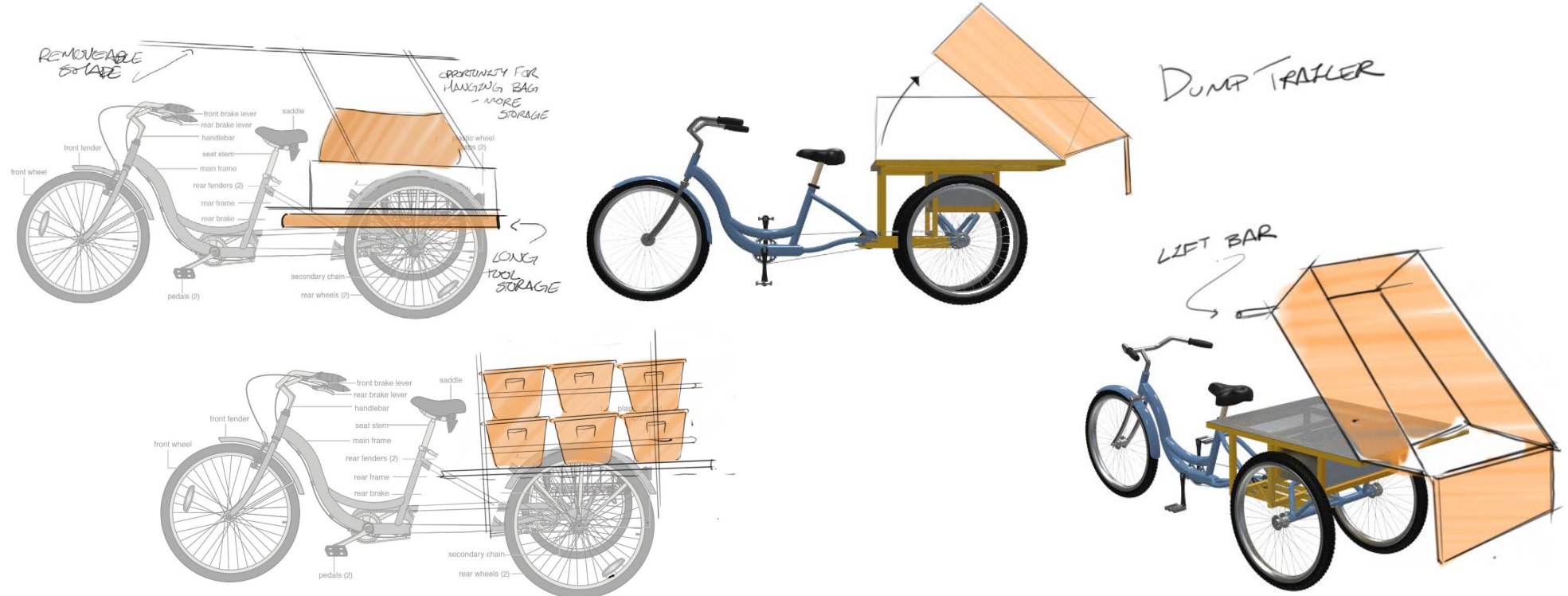
## Let the people use it

Bike was work tested hauling mulch at the Lawrence community garden. This led to more real world feedback that shed light on some of the problems.





Sketch Ideation  
Ideation around task-specific  
cargo attachments

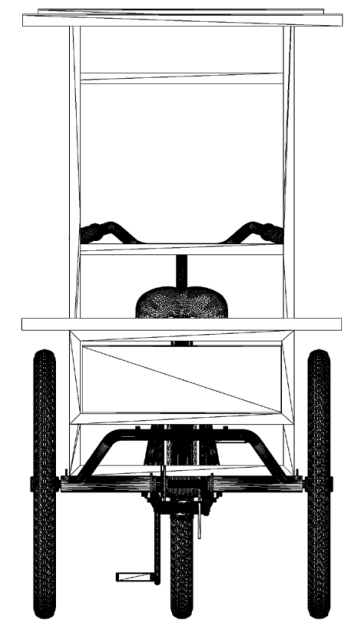
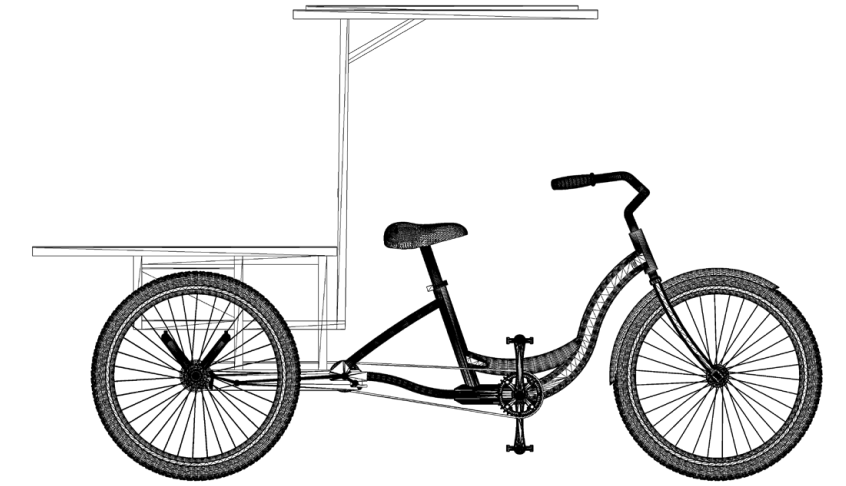


# Future Designs

Looking towards three function-specific cargo attachments

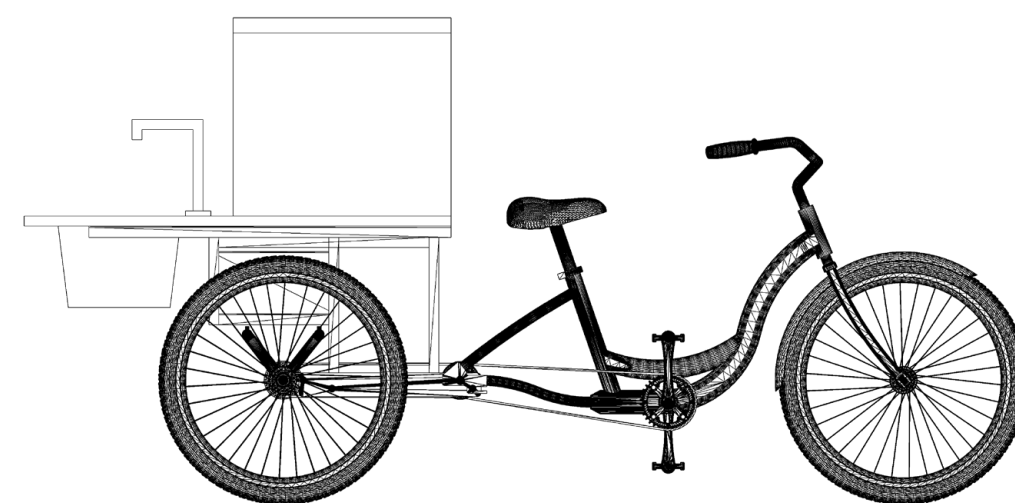
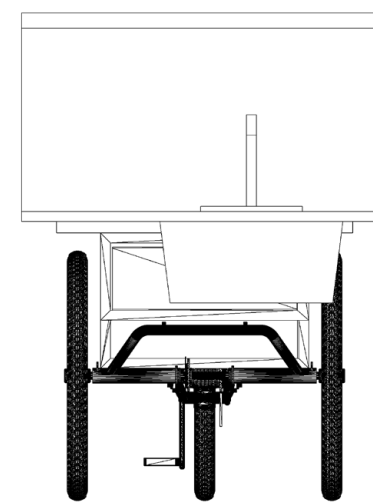
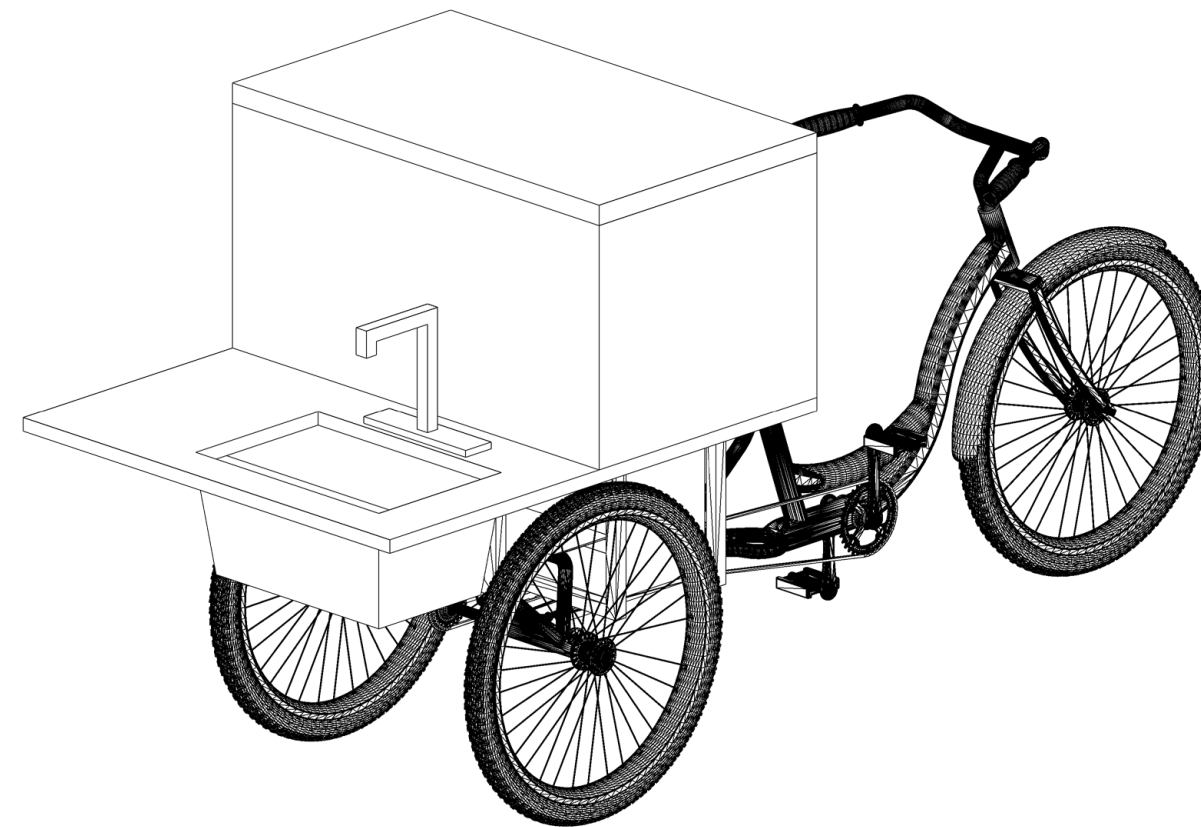
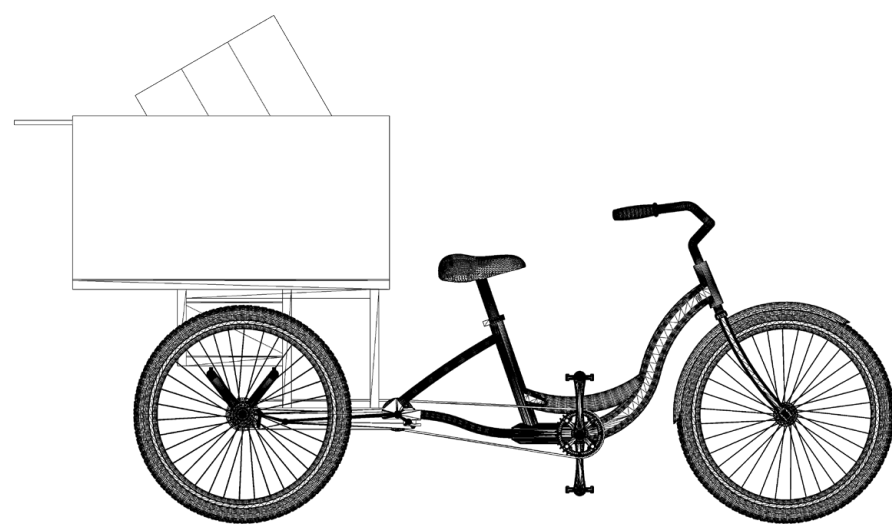
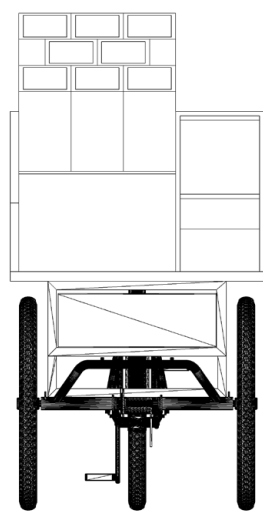
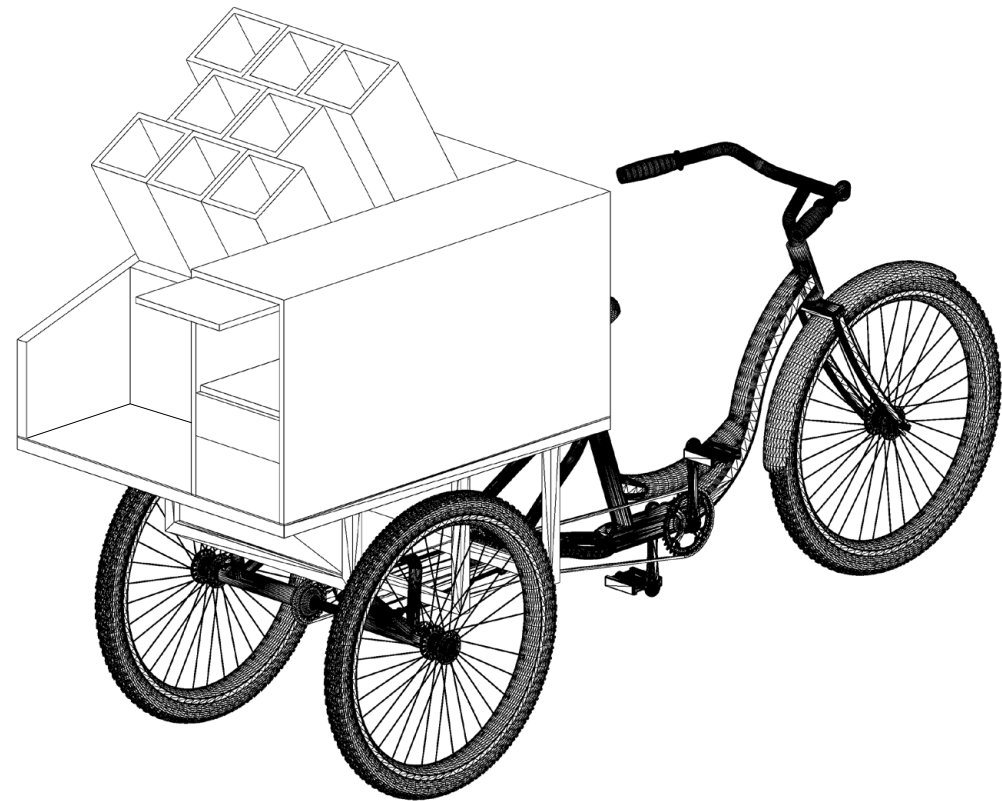
Platform bed with solar panel canopy

For general purpose moving similar in function to pickup truck bed, the solar panel is used to aid electric assist motor



## Tool and equipment holder

Carrying tools and supplies to the plant site for planting, maintaining, and harvesting crop.



## Insulated produce wash and storage station

Increases shelf-life of produce as well as speed/quantity of produce harvested and refrigerated.

Thank You

