Assistants : Beatrice Scarioni and Peter Böhni

DESIGN OF A SILO FOR RURAL AFRICAN FARMERS

Main issue:

Food loss:

- 1/3 of all food produced is wasted
- 30% of all food produced gets lost from field to fork

Context:

•Develop a low cost silo for rural African farmers with integrated sensors

•Reduce food loss due to bad storage conditions

•Give more power to small holder farmers

Info about the farmers:

•Each farmer has an average of 1.6 acres of land

•They live on an average of 1400 $/year

•They live in small communities

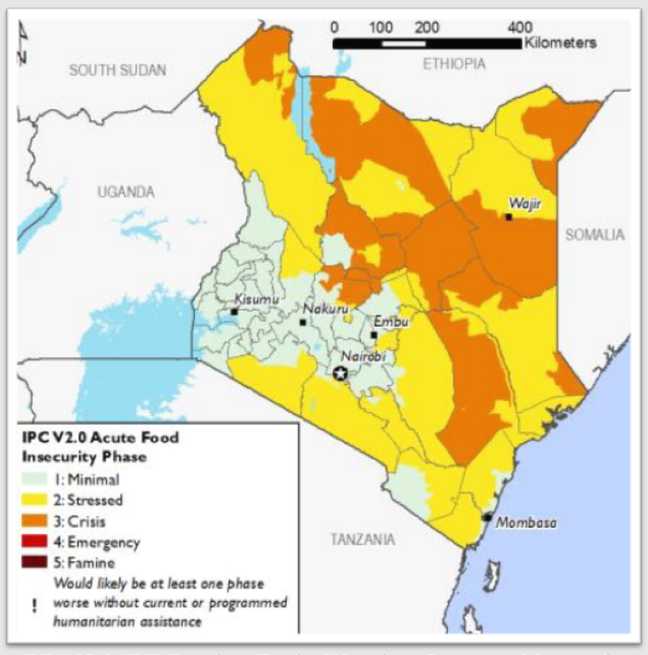
Hypotheses:

•Make it under 50 $/farmer

•Focus on Kenya : Rift Valley, the region with the most appropriate climate for agriculture and the best cell phone coverage in Kenya

•Focus on maize: most produced and consumed type of crop in Kenya

•Make it for a group of 10 farmers.



FEWS-NET Famine Early Warning Systems Network

Silo:

Main Idea:

•Should be filled, emptied and stirred manually.

•Engineless mechanisms

•Emptied every week

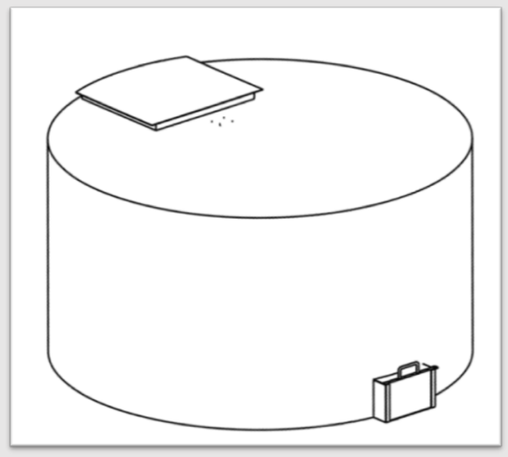
•Must be hermetic

Material:

Locally produced and relatively cheap : Steel because of its good mechanical properties, its availability (local steel facilities) and it's price

The Design:

An optimized cylinder with two openings, one in the roof for the filling, the other on ground level with and opening mechanism that can be locked



Sensors:

Different sensors and chips used to measure the most important parameters to keep the crops safe:

Temperature & Humidity sensor:

Measure the temperature and humidity gradient therefore allowing the farmer to detect the air quality and the potential growth of moisture. *DTH 22 (1)*

GSM communication:

On board chip that gives access to 2G Network and allows communication via text messages. *A6 Breakout Board (2)*

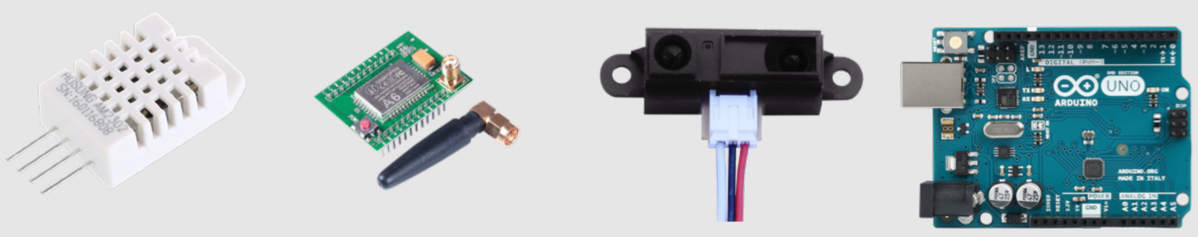
Capacity sensor:

Measures the fullness level so each farmer is aware of the quantity of crop inside the silo. Infrared *Proximity sensor Sharp 2Y0A21 (3)*

Arduino Uno:

Open source computer hardware chip. (4)

All the data will be sent to the farmers. and can be transferred later on to the Buhler Cloud



(1) (2) (3) (4)

Future developments:

Communication with the Buhler Cloud

Field testing and NGO financing

Priscilla ABOU-KARAM, Youssef EDDEBBARH, Benoit FONTANAZ, Mathieu ISTAS, Oscar JENOT, Arnaud RUBIN