Problem Formulation (Ash)

Needs Assessment (Miguel)

* We used google forms to conduct our survey
* Initial survey was weak and was more about solutions rather than finding out user needs
* Was sent to students, professors, and external labs in setting such as hospitals
  + Many respondents had no system of ensuring that the doors stay closed, some had built in alarms or door handles that were difficult to leave open-> ties into accessibility
  + Labs that don't have more modern systems wont have to fully upgrade their entire storage system
* Needs flow chart:
  + Affordability + longevity
  + User Log
    - -major benefit to making this type of system, gap in the market, ties to state of the art
  + Accessibility + User friendliness
    - One hand operation, easy installation
    - Easy to operate=easy to maintain
  + Security
    - Not a big priority based on survey results

State of the Art (Brayden)

* I will go over the state of the art portion of the presentation. This state of the art contains previous similar products to a digitized refrigerator lock. There has been a limited amount of digital locks for refrigerators that are available to the public. However, none of the products have remote connectivity from a digital app, nor are they widespread. I will discuss these in the next few slides.
* First product -> cooler and freezer lock, the lock system is controlled by a microcomputer that electronically unlocks and locks the device, pro -> electronic components can inspire us with our digital lock design connections, con -> lock can intimidate and confuse users
* Second product -> field retrofittable lock with audit trail, has a digital phone like system that can lock and unlock via password, pro -> connections on how to digitize lock can be inspired by this phone setup since this is set up similar to how a phone based lock would be if the iphone or samsung was connected to the system and it does audit the user via the remembering of passwords embedded onto the device, con -> it’s an aged system, phones don’t really look like this anymore
* Third product -> remotely actuated refrigerator lock with thermal spoilage protection, system can be remotely accessed via computer in order to lock and unlock, pro -> remote connections of this device can inspire our product since the digital lock setup would be unlocking/locking remotely through an app, con -> this is a rather large device that takes up space, a preferred digital lock would not be large
* These products are rather old systems that would not correlate with the modern age due to changes in technology. The next two were made more recently.
* Fourth product -> refrigerator locking system, this is a lock that can lock multiple compartments at once, a pro is that it has multifunctional locks in order to be able to lock three chambers or more at once, con -> not digital
* Fifth product -> becton dickinson pyxis es refrigerator, this is a refrigerator system that has a digital lock/unlock component where the user has to sign in, in order to get access to the medicine in this refrigerator, pro -> has audit log of different medicines and even patients who use those medicines, con -> it has appeared on MAUDE reports on the FDA website for the system failing to unlock more than once
* These devices are not really available in the consumer market.
* This is our additional patents chart we made, which lists out the patent numbers, the title, the inventor, the current assignee, and the source.

WRITE KEY NOTES ON SLIDES AND REFORMAT AND BREAK UP SLIDES AND HIGHLIGHT MAJOR FUNCTIONS

Switch patents chart to the appendix

Add answers to question slides

Design Specifications (Vance)

* Researched Accessible products
  + BEOL Biological Refrigerator Smart Lock
    - Digital Lock that was designed for biological refrigerators. Includes temp monitor, and can lock based on temperature
  + Sifely Smart Lock
    - Has an unlock/lock feature connected to an app on your phone
  + YEYA Refrigerator Lock
    - Non-digital
    - Held by adhesive

Before we start looking at the design specifications, we should first look into the three main products that we researched as easily accessible to the public.

The Beol Biological Refridgerator Smart Lock is possibly the best of these products as it is a refrigerator-based lock. This digital lock includes a temperature sensor that can help lock the door if the sensor detects an increase in temperature

The Sifely Smart Lock is a door lock rather than a refrigerator lock. The reason we look at this product however is because of this unlock and lock feature that can be accessed through an app on your phone, we really want this quality from this lock as this may help with alerting people whether a refrigerator door is remained open. Then they may be able to close the door through the app

The last lock is the YEYA refrigerator Lock, which is the best-selling refrigerator lock on amazon. It shows to be not digital and be held by a thick wire to protect from opening the door

* Benchmarking
  + Purpose of the Benchmark table: To collect ideas of metrics and units based off other similar devices
    - Explain metrics: Explain the Functional Requirements we have and then Needs shown below
  + Main points to explain:
    - Cost
    - Method of attachment (helps with user friendliness) →Method of Verification (Accountability)
      * Alarm to notify if it left
    - Power delivery (use of digital will be a problem)
    - Remote connectivity (helps keeps doors close)
    - Used outside of labs (User friendliness)
      * Another problem shown to be Energy Source as well
  + BEOL Biological Refrigerator Smart Lock
    - While heavily preferred as the best refrigerator lock, it shows to be expensive and still struggles with checking with verification,
    - also very specific, while it is stated that there should be a lock for user friendliness
  + Sifely Smart Lock
    - Struggles with just being a doorlock
    - Our Goal, to include access to locks based on access from iphone
    - Has alarm
  + YEYA Refrigerator Lock
    - Struggled with being accessible digitally, key only
    - Appears weak
    - Best Selling refrigerator lock on amazon

From here we can lock at this benchmarking table we made which contains metrics that we want to focus on from these three products. The numbers shown on the needs column are shown below after the metrics. There is a lot of content in this table but we will look closer on six main metrics.

* Based of the benchmarking we can make an EDS(Engineering Design Specifications)
  + Metrics are shown again, along with the most important Corresponding User Needs.
    - Explain
      * Cost
      * Remote Connectivity
      * Notification
    - For security/ durability (While security atm doesn’t seem to be of greatest importance…)
      * Method of Attachment
      * Strength of Attachment
      * Strength of Material
* Able to combine both tables created and make a HOQ(House of Quality)
  + Overall combination of benchmarking and EDs
  + Write down correlation table on slides
    - New info shown in the correlation and importance between needs and functional requirements
    - Go into detail the red dots as those are the main/biggest importance to notice

I forgot about relative weight and technical important rating