Research and Understanding the Problem

DEP302 : Systems Design Project

Padma | Final Report

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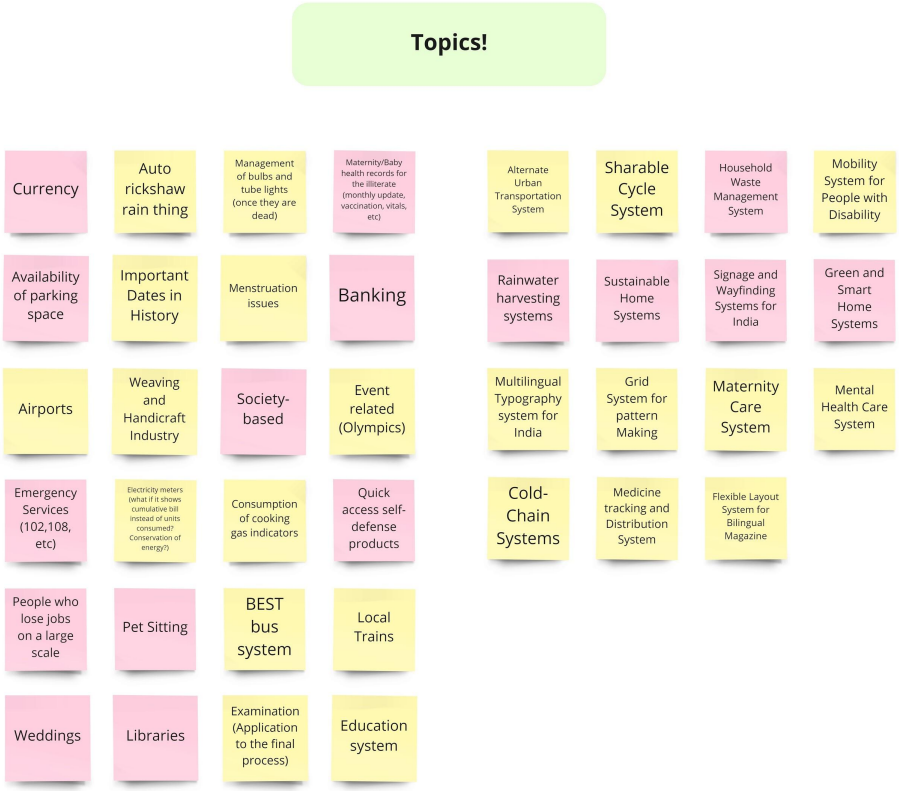
This report summarizes the work that we have done and the progress that we have made regarding our Systems Design Project from 15/03/2021 to 27/03/2021.

1. Hunting for our Area of Focus

For the first couple of days, we looked up projects and videos explaining what a system basically is, and what exactly is the system design process. Once we got a basic understanding of the kind of areas we should look at and the type of research we should do, we started hunting for our areas of focus. At the end of the day, we compiled a list of 39 topics including the 15 suggested topics in the brief.



1.1 Thought Process

1.1.1 Time Table

A Time Table was of great importance since we had a fully packed timeline to follow and putting something off would mean that the whole schedule would have to be adjusted. So we made ourselves a timetable for the week and tried our best to stick to it.

1.1.2 Picking Favourites!

Out of the 39, we picked 15 of our favorite topics and assigned five each to each of us. We did surface-level research on each of the 15 topics and explained the assigned five to the rest of the team.

1.1.3 The Research

The research was pretty basic at this point. We started out with mind maps for each of our topics and came up with as many sub-topics as possible for each category. This helped us look at each aspect of our topic. We mainly looked at existing alternatives and the problems, if any within the system. We grouped these insights and linked references to understand the weightage of these problems. We later explained each of our five topics to the rest of the team. Here is a synopsis of our findings on each topic.

- **Emergency Services**
    - Helpline numbers are inconsistent throughout the country
    - Numerous amount of helplines, more than one can remember
    - Lack of awareness on how to contact an emergency service
    - Huge population in India, non-stop emergency calls
    - Seekers asked to call a different number instead of redirecting
    - Easily get confused even if the numbers are looked up: eg Disaster management and earthquake/flood have different numbers
    - Sub-optimal response time and calls not being attended
    - The response time of the caller and that of the service provider are long

  Even though the topic was pretty interesting and the problems were solid, there was very little information available on the internet regarding emergency services in India. Even if we could, we didn't have a defined source to get first-hand information from as none of us

had contacts who are in the field and even if we did, they would always be on their toes because that is the kind of work they do.

- **Availability of Parking Spaces**
    - Lack of indicating safe lines on the road
    - Won't know about the availability until you take one round
    - Careless Drivers take up excess area for parking
    - Available space may not be enough
    - Two-wheelers and four-wheelers require separate parking areas on roadsides
    - Parking opposite to the U-Turn divider holes
    - Only those who are familiar with the place know it's kind of parking area
    - Hard to visualize the distance between the footpath and the wheel
    - Breaking Parking Rules not strict enough in less urban areas

  Existing solutions mainly included a person for guidance, guidelines on the roads, and the parking assist feature in new cars. This was a pretty common problem that everyone faces and pretty relevant given the current scenario where people refrain from using public transportation.

- **Banking**
    - Some situations demand a visit to the bank
    - Unnecessary overload of information to the customers on the forms
    - Bad online Customer Service and changing rules
    - Lunch break of most banks coincide with the lunch break of the working people
    - Having multiple ATMs in a given vicinity, good or bad?
    - Unreliable Token Systems
    - Lack of proper maintenance and updating of websites
    - Hard for the old people to visit banks for dealings and unaware of how to use tech
    - Banks in multistoried buildings without lift services
    - A large number of people visiting, lack of waiting area

  Most of the problems that we came across regarding banks were easily solvable with a quick update to their existing online services. The rest called for improvement in infrastructure, but all Indian Banks are already fully packed?!

- **Quick Self Defense**
    - How quick access are the products that already exist?
    - How do you ensure the product is with you at an easily accessible place at all times?
    - Keychains exist, but what if it’s attached to a bag or something?
    - Is there a self-defense system for animal attacks at all?
    - What happens when the attacker strips you of the self-defense products?

- Multiple person attacks are usually planned
- So many aspects even within a two-minute time frame
- Should the possession of products related to self-defense be a secret or not?
- What if the attacker uses the very product to harm you?
- How do you escape Bondage?
- Working women and all the single ladies and kids are more prone to attacks

This field was already well worked on, with a bunch of products and solutions already out in the market. The main problem here was that whatever is out there has not reached everyone in need of them, neither are they aware of the fact that they need these products. And if at all they are in possession of something for defense, they will go into shock and not be able to use the weapon at the time of an attack.

- **Maternal/Baby Health of the Illiterate**
    - People in Rural areas keep having babies
    - Child mortality is partly due to a lack of awareness in certain regions
    - People still unsure of what pregnant people are allowed to do and not
    - Poverty is another major factor
    - Premature and prolonged labor was reported more by mothers in villages
    - The possibility of treatment for infertility is unknown to a lot
    - Traveling aids. Most skip visiting a hospital because of the additional cost of a taxi
    - Unaware of contraceptives; have babies even are old and prone to risk
    - The illiterate only know what they are told by the medical officials that they visit rarely

There are a bunch of aspects to this area to focus on, but it seemed very hard to get first-hand information given the current situation.

- **Libraries (urban perspective)**
    - Public libraries were knowledge centres
    - information was not very accessible earlier
    - now information/knowledge becomes obsolete very quickly
    - books aren't the best medium
    - Libraries act as a repository of old books, preserve local literature, but old books are not accessible to public to avoid wear and tear
    - Librarian
    - Community/ public knowledge centres equivalent in current changing times - different media, new types of interaction etc
    - books are being digitized by the day and all the info is available right at our fingertips. We are moving away from books whether we like it or not and in that case what happens to the tens of thousands of books already available that may have obsolete information?

- Library as an ambiance (silent, atmosphere, good for concentration etc)
- funds for library

- **Pet Sitting**
  - Travelling with pets - don't know about the local pet stores or vets nearby
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  - Over time people develop relations with the vets and pet sitters in their locality
  - There are multiple facilities people use like pet hostels, individual pet sitters, organisations that manage pet sitters etc
  - Pet hostels and even organisations don't have branches everywhere and hence not accessible to many
  - People rely on their neighbours or relatives to take care of their pet. At times this is not possible
  - People also find it difficult to trust individuals who volunteer to be pet sitters
  - A lot of vet students do pet sitting as a side source of income
  - Can become a source of income to other pet loving individuals with proper
  - training etc and forming a network

- **Sustainable Home Systems**
  - Energy and resource consumption - people aren’t conscious - Gas, water, electricity, fuel, etc
  - Use of renewable energy - solar, biogas, etc
  - Lots of sustainable solutions/approaches are available but people don’t use them. Why?
  - Sustainable solutions are mainly focused towards individual houses. How can a group/society/housing complex be sustainable collectively
  - Urban farming/gardening - growing locally - transport costs saved - fuel saved
  - Household waste management practices of recycling, segregation - no motivation
  - people give newspapers to raddi wala or old things to kabadi wala - get money
  - House materials - resources used - cost to env - construction demolition
  - Cooling system and ventilation - natural ventilation
  - Rain water harvesting
  - Long lasting furniture or nature friendly furniture
  - Modular house - multifunctionality - saving resources

- **Household Waste Management**
  - Different types of waste - organic, dry, kitchen waste, toilet waste etc
  - Waste water from the bathroom, washbasin can be reused?
  - No motivation for people to follow segregation - there needs to be a change in behavior/attitude/lifestyle

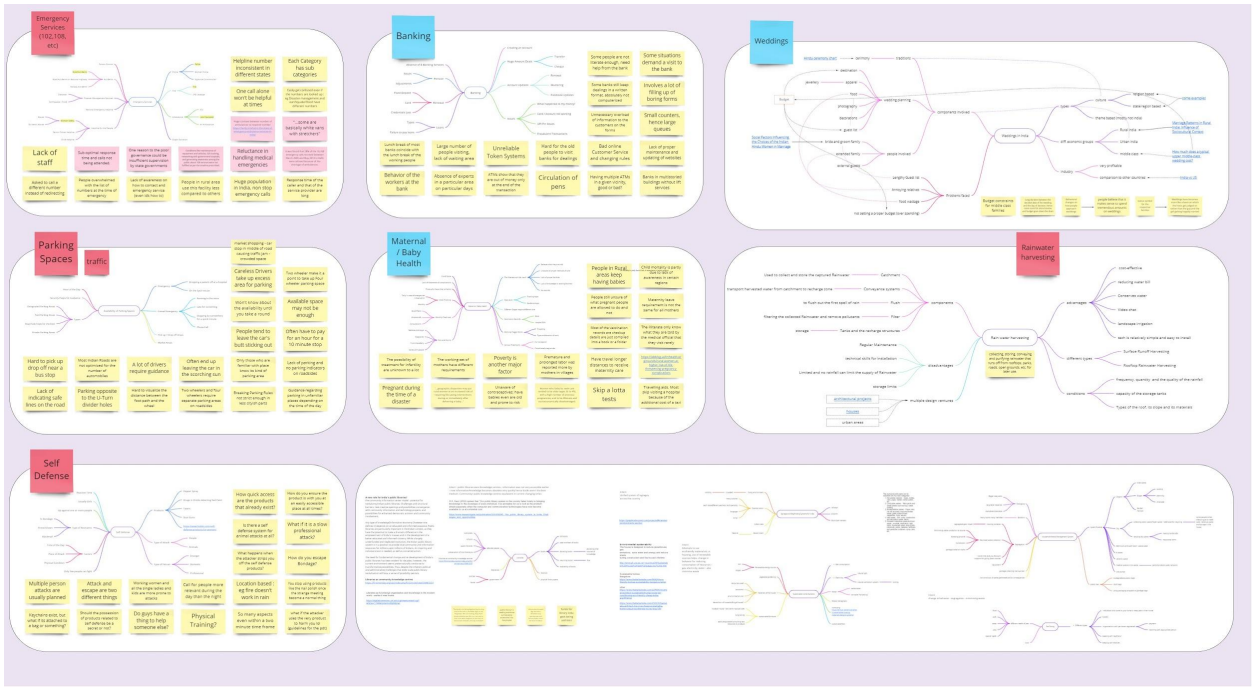
- Even if some members in a housing society follow segregation but the society doesn't have separate bins, the waste would get mixed. So it has to be a collective effort
- Various renewable energy - biogas, solar, etc
- Ragpickers play an important role in segregation in india
- *Raddi walas* and *kabadi walas* recycle waste - people give them things for some money
- Organic composting and urban farming
- Minimising waste production at source
- Sustainable packaging - bigger size packs or better materials etc
- Dustbins - Many rooms - different purposes - kitchen - bedroom - washroom etc
- Drainage System

- **Signage and Wayfinding - Indian Road Network**
  - No unified system of road network signages
  - Municipal markets - vary random
  - Name of roads are of little help to find the directions to important locations nearby
  - have to rely on google maps to understand your location
  - Lot of traffic and so lot of pollution and dust
  - India is very populated
  - Diverse nation - many cultures - each state has a different aesthetic and speciality and language and script
  - Indian-ness

- **Weddings**
  - Weddings can be categorised based on culture, state/region and economic status.
  - Most of the components come under traditions/rituals, wedding planning and the people involved
  - Us Indians tend to spend a lot on weddings irrespective of the budget constraints.
  - Hence, the wedding industry in India seems the most profitable while in comparison to other countries.
  - While most of these are based on urban india, the struggles of weddings in rural india is quite a different story.
  - The common problems faced during weddings are lengthy guest lists, annoying relatives, food wastage, and the worst, not setting a proper budget (overspending)
  - We would have to consider behavioral changes as to how us indians approach weddings (people think that it makes sense to spend tremendous amounts on it).
  - It has also become a status symbol for respective families involved.

- **Rainwater harvesting**
    - It is basically the collecting, storing, conveying and purifying of rainwater that runs off from rooftops, parks, roads, open grounds, etc. for later use.
    - The main aspect that we discovered was how it could be implemented as a part of our daily lifestyle and as a society in the name of sustainability.
    - There are multiple po=rojects (mostly architecture related) on how it has been incorporated into modern buildings and open areas.
    - Of course it has its own limitations and necessities (and steps that would help set up the process) and are mentioned in the mindmap.

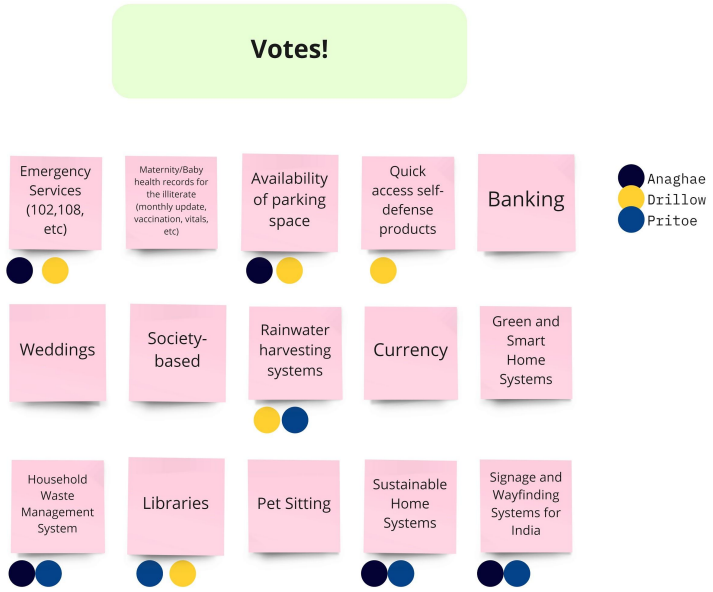
- **Currency**
    - Research based on currency mostly involved the recent changes because of demonetization, the decisions behind it and why certain combinations make more sense.
    - We also looked into the official rbi website to learn more about how our indian currency has involved over time, how they're manufactured and taken care of, and different ways transactions take place in urban and rural india separately.



1.1.4 Dot Voting

To choose our final area of focus, the three of us decided that each of us pick our top five favorite areas from the mind maps that we had created. We did have common favorites, which made our process slightly easier. After the voting session, we narrowed our list of topics down from 15 topics to seven. They were Emergency Services, A Parking System for the Country, Sustainable

Home Systems, Libraries, Rainwater Harvesting Systems, Signages and Wayfinding for India, and Household Waste Management Systems.



At this point, we realized that Some of our favorite systems fell under the same category. For example, Sustainable Home Systems, Rainwater Harvesting Systems, and Household Waste

Management Systems come under one category, and Parking Systems for the Country and Signages and Wayfinding for India could come under another since they are interrelated.

1.2 Feedback Session on Thursday

- Sustainable Home Systems seem to be a good idea
- Take a large scale into consideration, maybe 200 families
- The sustainability aspect of an apartment seems interesting
- Reimagine huge sustainable societies
- Thinking of systems from a time point of view

1.2.1 Some suggestions and direction about the sustainable housing complex

- Various factors apart from waste management like electric vehicles, etc in sustainability
- Interconnected behaviors that affect each other and factors of interdependency
- Economics concept of externality - increasing utility for one might diminish utility for other eg- smoking gives pleasure to one person but passive smokers only get harm from it
- Effects get magnified when the scale is large and so the nature of it can change drastically

Topic chosen based on Feedback : Sustainable Home Systems

2. Thorough Research in order to understand the Area of Focus

2.1 Mapping the aspects of a Society

We realised that beating around the bush was not helping so we decided to dig deeper. We created a Mind Map which maps out aspects of an existing society, which we could build up on to create a better, sustainable one. We broke down each aspect to get the most basic elements of a society.

2.2 Research on Individual Aspects of a Society

- **Existing Sustainable Solutions**
    - Most stressed areas : Build, Water and Energy Conservation and Waste Management
    - Prefab houses are factory made houses which can be assembled and are cheaper
    - Using Recycled materials for construction would bring about a tremendous change
    - Passive House buildings allow for heating and cooling related energy savings of up to 90% compared with typical building stock.
    - The Use of Zero VOC Paints keep the air quality liveable
    - More efficient water systems
    - Sustainable alternatives to build components like organic wallpaper
    - Most sustainable home solutions come at a huge initial cost

    Thoughts
    - *Imo, at this point I think it is nicer to look at the future, a new society instead of building up on an existing one*
    - *How is our thing going to be different from all these existing alternatives?*

- **Energy**
    - Find out more about how Tidal, Geothermal and Wind energies can be applied
    - Biomass seems like promising Source of energy
    - Gyms that can power themselves already exist
    - The mechanical torches! Can something of this sort work for some basic aspect like lighting? Cycles? Cycling can charge your phone?
    - Sparking some minor changes in lifestyle can lead to tremendous conservation of energy like using energy efficient appliances and using electricity only for necessity
    - Replacing Fossil Fuel Powered Cars? Solar powered and electric cars?

    Thoughts
    - *What are new innovative uses that we can come up with which make better use of Solar energy and Biomass energy?*

- **Landscape**
    - Alternatives to cement like decomposed granite prevent water run off to a certain extent
    - Plants alone, offer a bunch of opportunities
    - Sustainable Materials could be used for the simplest of aspects, like the stone path to your doorstep
    - More aspects of the society should be aimed at serving multiple functions at a time.

- For example, certain plants serve beauty, shade, wood, air purification, soil erosion, nutrient replenishing etc., at the same time. Similarly A lot of products aimed at rainwater harvesting and other materials like decomposed granite help conserve water while serving the aesthetics of the landscape at the same time.
- Sustainable lighting can also be used as outdoor lighting adds to light pollution. Lighting which adds less to light pollution are available in the market and such kinds of lights can be used to light gardens and other landscaped areas.
- Alternatives to lawn like artificial grass help save unnecessary wastage of water and are maintenance free.

Thoughts

- *How can something add to beauty as well as serve a purpose?*
- *Can electricity be eliminated for Night street lighting?*

- **Plants**
  - Potted Plants can be rotated, within and between indoors and outdoors.
  - Come with an added advantage of portability, can even be hung, hence saving space
  - National Wildlife Federation encourages the use of reduced lawn making more room for shrubs, in turn encouraging the flora wildlife
  - Planting of Plants native to the location aids to lush growth at a lower maintenance
  - Certain plants serve beauty, shade, wood, air purification, soil erosion, nutrient replenishing etc., at the same time
  - Medicinal plants can be grown at home for maybe a quick homemade Ayurvedic panacea

  Thoughts

  - *Can the growing of plants be any more sustainable than efficient irrigation methods and planting?*

- **Vehicles**
  - The number of Vehicles in the world are unnecessarily high
  - People still hold on to old cars which cause a lot of pollution
  - Lots of Measures available to reduce carbon footprint. People don't follow any of that and it is not lack of awareness
  - Some measures to reduce carbon footprint from vehicles are yet to be reality, like a universal switch to electric cars, even though they are fully functioning in some places.
  - It is hard to change people's mindset, including ours, when it comes to a point where they have to choose between convenience and sustainability

  Thoughts

- *How can one get the world to go back to a world where the number of vehicles at a given time are less?*
- *So many alternatives already exist, but why does no one practice them?*
- *How do you get the society to take up measures to reduce carbon footprint?*
- *What would be the most ideal solution to this metal world on wheels problem?*

- **People**

  Residents

  - People used to commute to work each day - People don't like commuting to work as it takes up too much time especially in metro cities
  - Work from home now - would people live away from the cities - those who can work from home - many people are going to different holiday destinations and working from there right now - How will life change in this aspect in the future?
  - If people are working from home, the home system would also transform gradually and architecture would also incorporate that
  - There is decreased social interaction between people
  - Various categorisation possible - children, young adults, middle aged, old people, people with disabilities and special needs
  - All aspects of daily lifestyle of residents need to be considered and how it fits into the system

  People who work to make life better for people in the society and earn a living from it

  - Some societies have intercom facilities. The security guard informs the resident to anticipate the visit of the person visiting for their security. At times they do this even before letting the person enter
  - Some of these visit regularly like Newspaper man, househelp ladies (kaamwali bai), etc while other are irregular like hawkers, postman, delivery guys, repairwork
  - Some societies do not allow hawkers to enter the complex for security reasons and to avoid disturbance to the residents
  - Watchmen generally live in the society and keep a watch on things like who is visiting, collecting and keeping parcels, circulating notices, etc as well as do things like turning on the pump at the time of supply of water. They may not be the best at handling conflict/security concerns the way security guards can who are trained specially for security and guarding
  - People have letterboxes at the bottom of the apartment sometimes
  - Postman go on cycles or walking - nearest post office
  - Sometimes go till the house also - drop inside door

- **Animals**
  - We mostly divided them into domestic and stray. Eg: dogs, birds, even rodents.

- Considering how these animals are currently fed, which is either from garbage or when offered to them by some of us (strays).
- Even domestic ones seem to have it easier now that their existence has come under its owner, although we could look at all of these owners as a whole and what issues they face for their put, for example, pooping on the sidewalk (which also impacts people living in nearby hoses.
- But for let's say, birds and even insects and rodents, is it right to resent them and not have them around because we do not certainly enjoy their company.
- What about disease causing and fear inducing creatures, we can't entirely eliminate them, what do we have to offer to them as a society?

- **Houses**
    - We categorised houses into different kinds based on architecture, structure based, even function based and the kind of residents living.
    - They would involve apartments, rental services, even hostels etc.
    - It would also involve considering individual components present in a house, like separate rooms; interiors, and additional spaces like terrace, gardens and other facilities.
    - The sustainable options here could involve looking into alternate construction materials, even structure-wise, to make sure less of that material is used.
    - We could also consider space occupied by an individual or a group (namely families) to make sure to house around 200 families in a more sustainable manner.

- **Amenities**
    - The amenities that a complex has depends on the class of people residing there because the more the amenities, the more is the monthly maintenance bill.
    - A lot of rebuilt apartments of considerable size have the gym facility. Some even have a swimming pool which is on the terrace or mid terrace mostly. In case of a new project maybe they plan it on the ground. There are a lot of restrictions placed during redevelopment of an existing complex.
    - There are technologies of gyms that convert mechanical energy into other forms of energy. As well as walkways built with piezoelectric material as a concept can be looked at. Piezoelectric material converts pressure/force into electric current
    - New style of natural gyms - exercise among nature can be of multifunctional nature that can take multiple forms saving resources and fulfilling multiple purposes
    - In the redeveloped apartments in urban areas, terraces also have other things - water tanks are now shifted to the bottom instead of on the top and the terrace is utilised for various activities. The terrace is an open space and open spaces are not found in cities.

- Some people put up solar panels on their terrace- tv dishes are also put up on the terrace. There are often multiple because different people use different - cable guy still provides tv and you don't need to put up your individual dish for that.
- On terraces of some buildings mobile phone towers are erected.
- Underground parking is becoming common and more and more societies are planned considering underground space to maximise space available
- Underground space can't be used for residential purposes but can be used for other purposes
- People start various clubs/groups within the society - this is especially common within the homemaker women and senior citizens
- Various cultural events are celebrated on festivals or special occasions as a society gathering

- **Shops**
  - There are a variety of shops and market places that are present to serve all our needs like for apparels, food, vegetables, medical requirements and general stores etc.
  - While a lot of these shops are present in the housing complex itself if it is too big, the rest of them are present close to it in nearby areas.
  - The main point is for people (residents) to have easy access to them wherever necessary.

- **Waste Management**
  - Municipality collects waste from each society.
  - If a housing society follows segregation, there is a separate municipality truck that collects it. You have to inform them about this - incentive for societies to follow segregation
  - Paani foundation's water cup competition encouraged people to solve the water problem for themselves
  - Swachh Bharat Abhiyan also encouraged people to pay attention to cleanliness of their surroundings
  - There is possibility of using biogas plant if availability of space - but people need to be encouraged to segregate even for that
  - The garbage collecting man/woman is responsible for the cleanliness aspect. They collects waste from all the houses in large bins and keep near the entrance of their respective society in the morning the municipality truck collects waste from the entrance of each society - if someone fails to give their waste to the lady, they will have to go to the nearest public bin to throw waste or if the society has a waste bin they can throw there.
  - Some people collect plastic wrappers/ newspapers and give it to the raddi wala. Raddi walas and rag pickers play an important role in segregation and recycling in India

- Composting and urban farming is also possible

Waste management solutions followed in other countries:

- Reducing waste produced - disposing off or reusing
- Using dried leaves as manure or in biogas plant
- Charging for more waste produced - some towns in new jersey do that
- Toxicity - awareness about chemicals used in detergents etc
- Materials exchange or donation - if someone wants to dispose off something - someone else might want to use it - scrap
- Waste generated by fliers and advertisements reduced by digital boards

2.3 Findings

- Most of the Existing Sustainable Solutions come at a huge cost of installation
- Most of the solutions focus on the sustainability aspect of a single house rather than a society on a large scale
- The areas of intervention range from creating minor changes in lifestyle to switching to a completely new system in certain areas
- Even though a lot of sustainable alternatives exist at multiple levels, people are not willing to sacrifice convenience and their inherited lifestyle for saving the environment
- There is no motivation/incentive for people to adopt sustainable practices.
  For example, various competitions like Paani Foundation's Water Cup Challenge encouraged people to solve the water problem for their village
- Availability of space is a concern in urban cities which can be a hindrance for setting up sustainable like biogas plants or solar panels
- The pandemic has changed the way people live. How will this affect future housing?

2.4 Questions to Self

- Do we design an ideal society for a better future?
- Or do we suggest improvements to an existing society to make it more sustainable?
- If the latter, do we focus on a society that is familiar to the three of us?
- How is our project going to be different from all these existing alternatives?

2.5 Plan for the Next Week

- Doing further in depth research
- Understanding how various activities are carried out
- Mapping the interactions
- Understanding breakdowns in the systems

2.6 Feedback received after Week One Presentation.

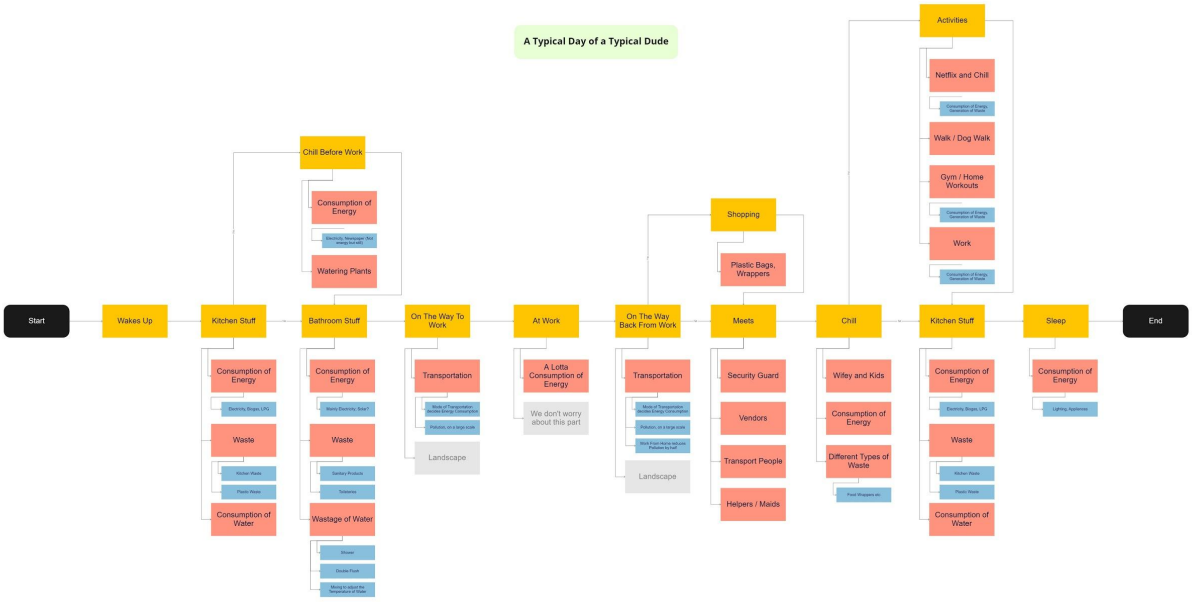
- (fluctuating between) micro-macro interactions
- (intangible and regulatory rules for sustainability)

- Research on creating sub-systems and built-in environment
- Look at practices theory - Elizabeth Shove and Davide Nicolini
- Eg Segregation of wet and dry waste
- Practices at the level of community
- Set of proper mappings expected by Thursday
- Map variables one on top of the other - sustainability + housing societies
- Put down the main variables, eg Housing society
- Mapping of the variable on the independent
- Include ATMs (money-related), Dog walking zones in our thought process
- Could get in contact with sustainable housing facilities (stakeholders)

3. Mappings

3.1 Mapping interactions within a household during a Typical Day

We started out by mapping the activities a middle-aged individual could perform during a typical day from morning to night and the things they would be interacting with, what areas are not sustainable and can be made, where there is a consumption of resources, where there is the generation of waste, etc.



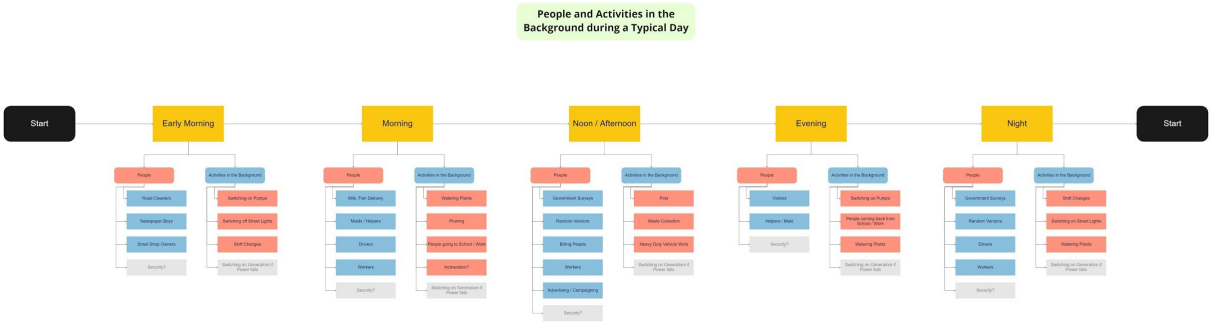
In the morning people would wake up and use the washroom and after that the kitchen, maybe do some exercise, some leisure activities before going to work. Take their pets outside. There are multiple places where resources are consumed and some waste is generated and in the whole process waste from one activity can be used as a supply in some other.

After that they would go to work. Now after the pandemic there are more people working from home, interaction between people is reduced and there are issues related to mental wellbeing. There is an increase in use of some services like getting things delivered to your home instead of going out to purchase it. So there is a shift in the way people live. When people physically go to the office they tend to purchase things on the way back home so multiple tasks are completed in the same round.

After work, they want to relax so evenings and weekends are spent in leisure activities like watching movies, spending time with their family, playing with their kids, and some people like going to the gym. People have dinner and then sleep which is equally important for wellbeing.

3.2 Mapping interactions with people within at a Society Level during a Typical Day

Here we mapped out an average person's interactions with the outside world at a society level and have also considered daily activities that run in the background which are essential.



In the society during the morning, activities like cleaning, collecting waste from houses, turning on the pump for getting supply of water etc. take place.

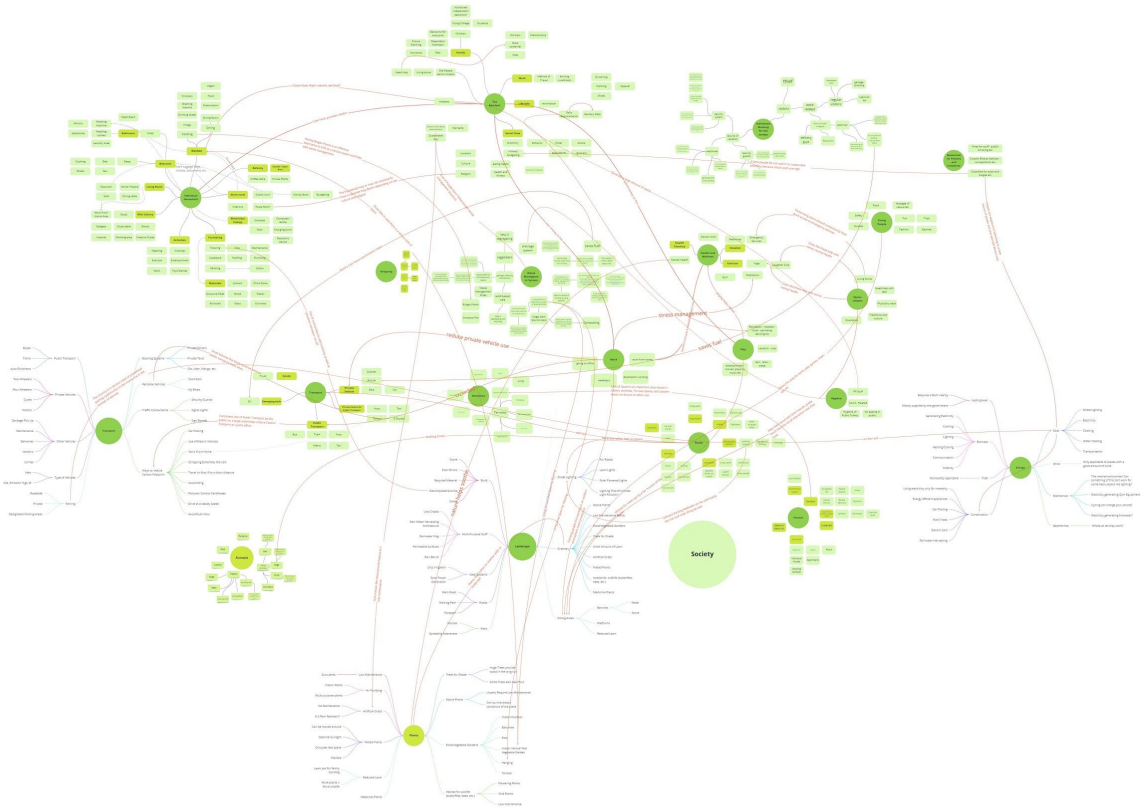
There are a number of people visiting the housing complex for work, like maids, security guards changing their shifts, milkman, newspaper man, and some other people providing different services and earning a livelihood from that.

In the evening and night there are activities like switching on street lights, there is more movement of people in the society during this time as they return back home from work. At night there are also increased security concerns.

3.3 Giga Map - Mapping interactions considering the Society as a whole System

Before starting out we tried understanding the importance of creating a Giga Map on a large scale, the methods used to create one, and how that would be relevant to our topic. We realized how mapping out micro-interactions would help us understand problem areas and identify areas of intervention.

We started out by listing down the immediate subsystems of a society, considering it as a unified system. We further listed down the individual elements of each subsystem and tried to establish connections between the elements. This helped us understand certain variables, the factors deciding how they change with time and changing trends, and why the country is not moving forward, at a society level, in terms of sustainability.



3.3.1 Inferences from the Giga Map

- People don't follow proper waste management practices like segregation or burn waste because it is convenient, and that’s what they’ve been following for ages.
- Work from homemade the home space of work and not just relaxation. Plants can help in maintaining mental health apart from being good for the environment - people go to green spaces to relax and relieve stress and anxiety. Vegetable gardening can also be considered.
- Lack of Space is an important issue faced in today's societies. Terrace spaces are used for multiple purposes. Similarly, garden areas can be put to multiple uses. Making spaces have multiple purposes can be helpful.
- Systems like solar energy or biogas plants require space and can cause hindrance in the existing way of living and using space. Is there a possibility of adding modularity to it, and make them fit better in existing ways of using space or have an added value to it?
- It is generally difficult to implement sustainable options in an existing space and it is easier if it is planned from the beginning. Can there be an intervention to solve this?

- Some places face water scarcity during summers. And hence have no option but to depend on the private supply of water which is not sustainable economically and also environmentally and also can be hazardous to health. At times, the problems aren't fixed because some people in positions of power may have larger ulterior motives. Can we reduce this dependency and help societies have more agency?
- Sustainable solutions are not accessible enough for them to become a common thing. People need to take efforts, go out of their way and someone would do this only if they really want that thing and that intrinsic motivation is not present.

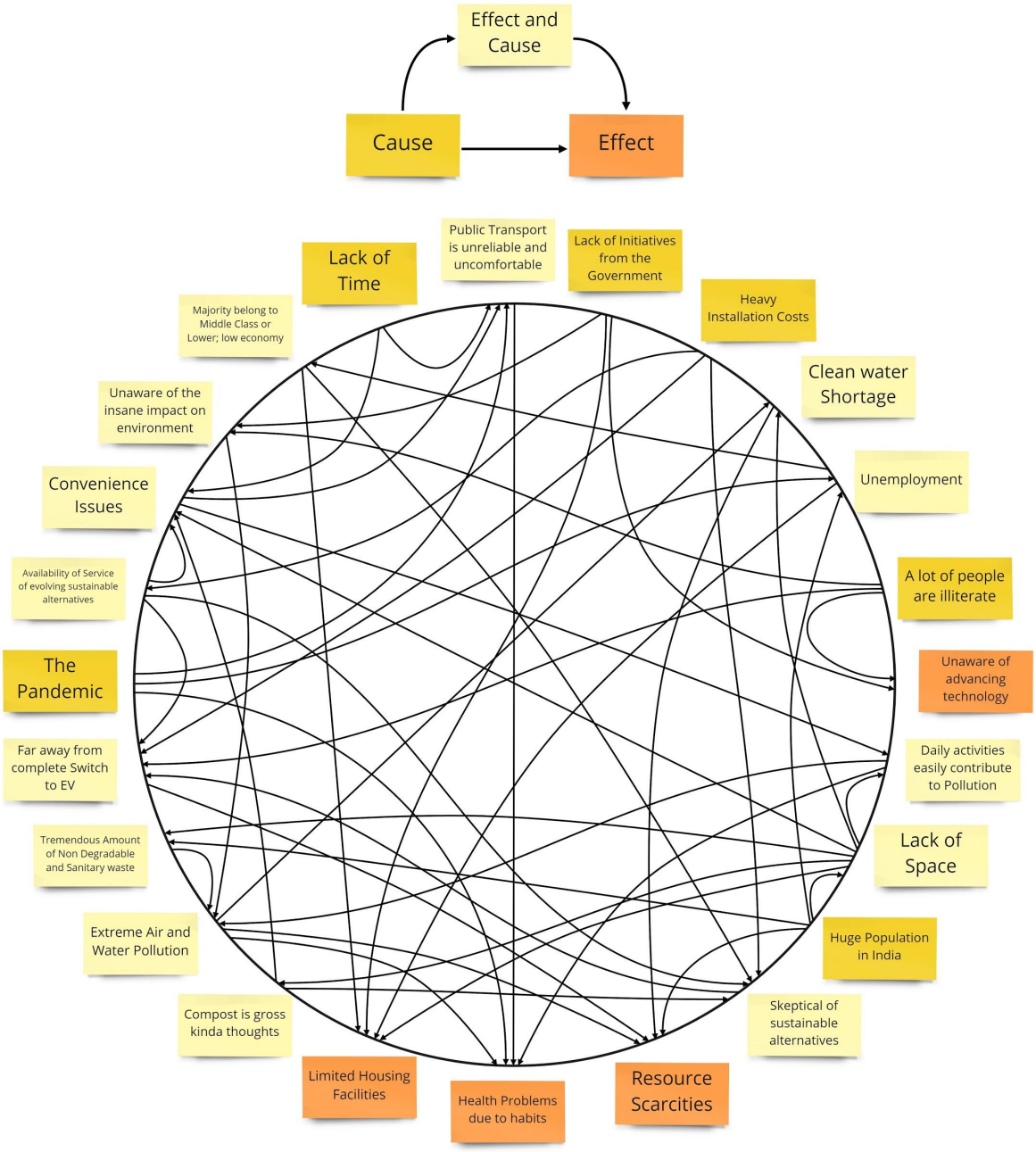
3.4 Feedback received on Thursday

- Identifying a connection and identifying how a connection works - what influences what - large systems difficult to handle hence think in terms of subsystems and find connections and influences between subsystems
- Causal loop diagrams
- Select a focus - one subsystem to start with(do not ignore other things) and see where it connects and expand
- Some connections are stronger - some are weaker - one way to look at subsystems
- Some strategy to focus on certain issues - solvable issues - need more solving than other issues - prioritize some of these
- Try out systems tools on smaller systems to get the experience of it and then apply them to our project
- Behavior of system over time

3.5 Connection Circle

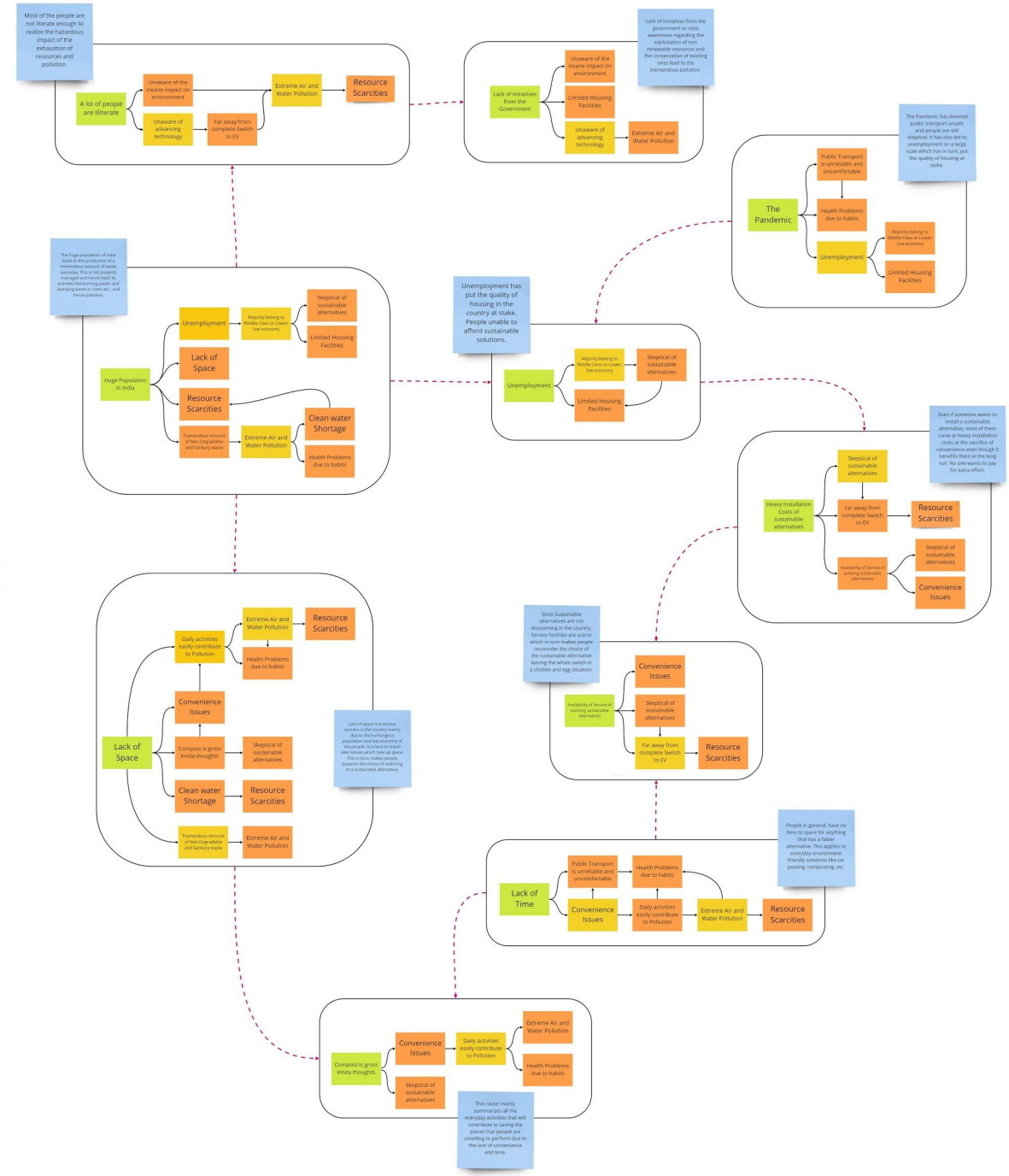
We created a connection circle on why Sustainable Solutions are not becoming popular in India. For this, we listed out the factors that could be the reason for our statement and tried

understanding what could be the cause and the effect.



In some cases, the effect of a particular cause was the cause of another effect. So from the circle, we separately mapped out the root causes and the final outcomes. These individual root causes were again interrelated in terms of cause and effect, one leading to the other, so we further mapped that out.

Connecting the Derivations



3.5.1 Inferences from the Connection Circle

- Most of the people are **not literate** enough to realize the hazardous impact of the exhaustion of resources and pollution.

- **Lack of initiatives from the government** to raise awareness regarding the exploitation of nonrenewable resources and the conservation of existing ones lead to tremendous pollution.

- **The Pandemic** has deemed public transport unsafe and people are still skeptical. It has also led to unemployment on a large scale which has, in turn, put the quality of housing at stake.

- **The huge population of India** leads to the production of a tremendous amount of waste every day. This is not properly managed and hence leads to activities like burning plastic and dumping waste in rivers etc., and hence pollution.

- **Unemployment** has put the quality of housing in the country at stake. People unable to afford sustainable solutions.

- Even if someone wants to install a sustainable alternative, most of them come at **heavy installation costs** at the sacrifice of convenience even though it benefits them in the long run. No one wants to pay for extra effort.

- Since Sustainable alternatives are not blooming in the country, **Service facilities** are scarce which in turn makes people reconsider the choice of the sustainable alternative leaving the whole switch in a chicken and egg situation.

- **Lack of space** is a serious concern in the country mainly due to the humongous population and low economy of the people. It is hard to install alternatives that take up space. This, in turn, makes people question the choice of switching to a sustainable alternative.

- People, in general, have no time to spare for anything that has a **faster alternative**. This applies to everyday environment-friendly solutions like carpooling, composting, etc.

- Everyday activities that will contribute to saving the planet that people are unwilling to perform due to the **lack of convenience and time**.

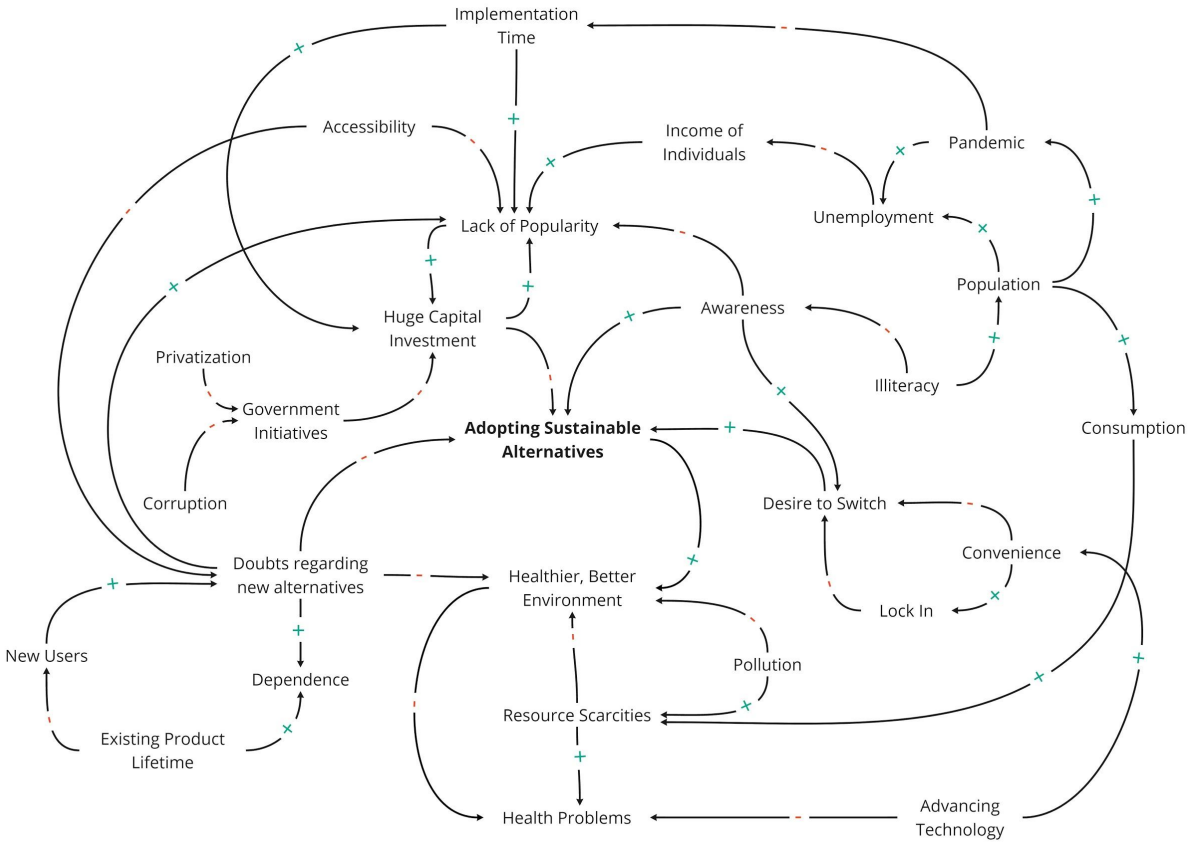
3.6 Causal Loop Diagrams

The Thinking Complexity course that was shared with us at the start of the module was able to give us some insights on how we should take our research and mappings ahead and how to benefit from them.

3.6.1 Factors influencing the Adoption of Sustainable Alternatives

Here, we have again mapped out the main factors affecting the adoption of Sustainable Alternatives and the kind of impact they have, whether it is positive or negative.

Causal Loop Diagram on why Sustainable Alternatives are not gaining popularity



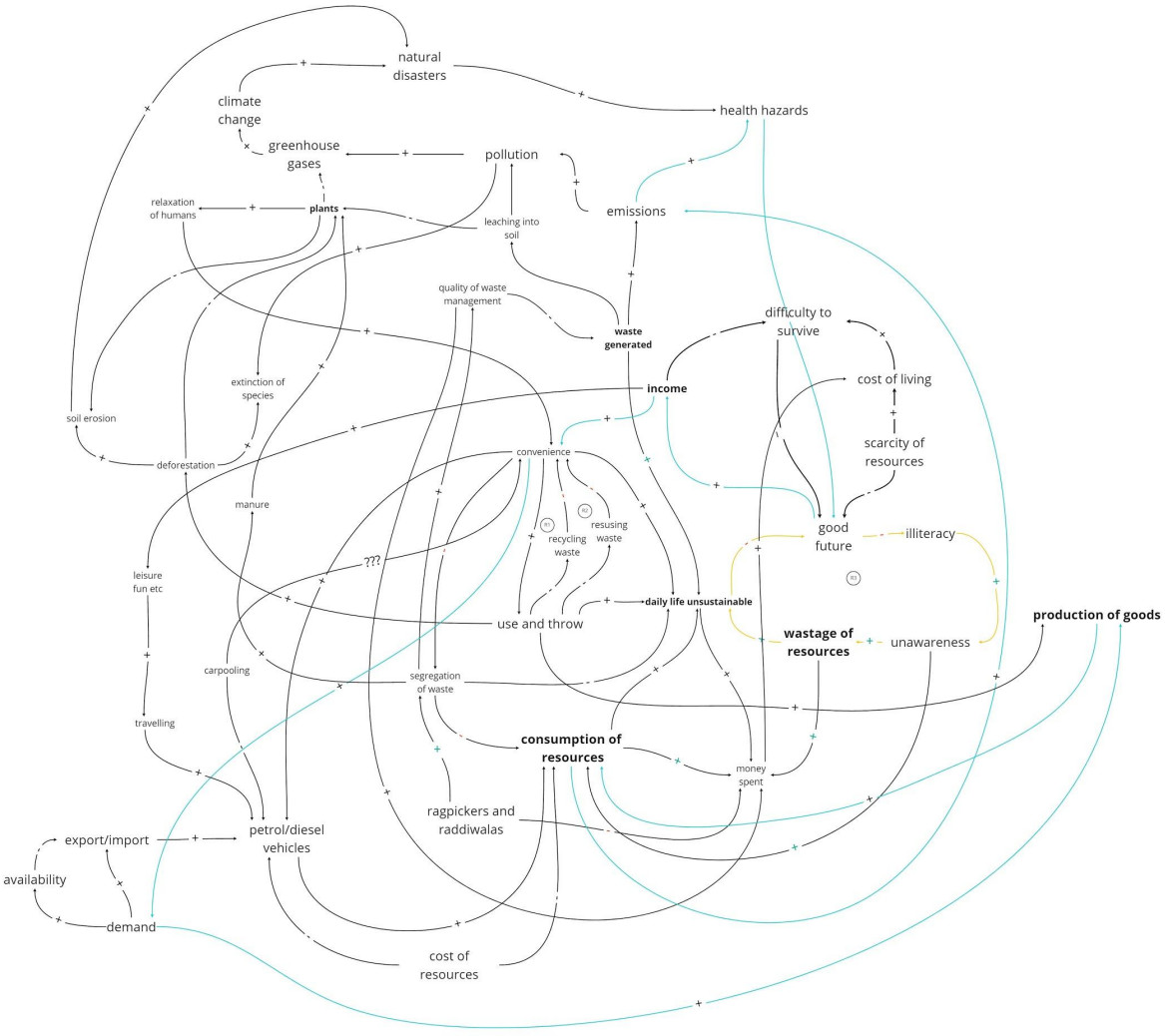
3.6.1.1 Inferences

The Existing products already offer quality even with time and have proven to be worth the money spent, hence causing a lock-in preventing the shift to a new alternative. This increases our dependence and further reduces our desire to switch.

3.6.2 The factors that make our existing daily life unsustainable

We created a causal loop diagram to understand why our daily life is unsustainable and what affects what.

Causal Loop Diagram on why daily life is unsustainable



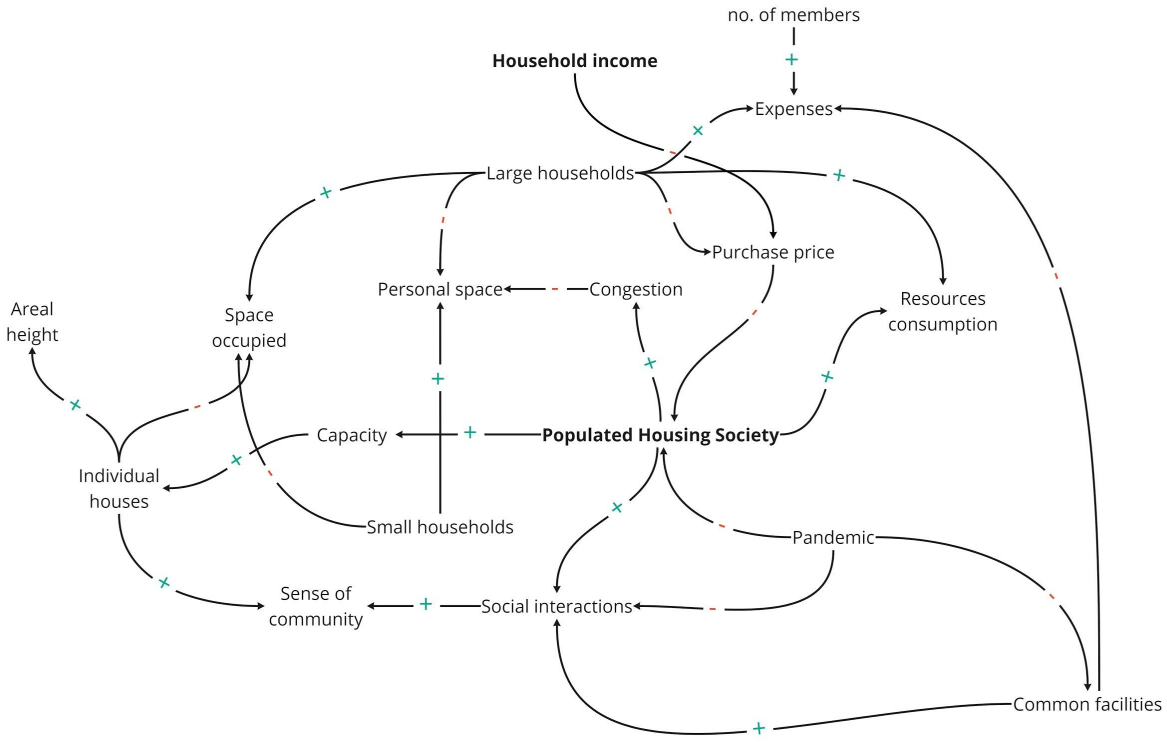
3.6.2.1 Inferences

There are a number of things that lead to the consumption of resources and at times this leads to pollution, health hazards which in turn affects the quality of future life. If people's income increases, they have more purchasing power and so demand for goods increases which

decreases their availability and increases export which increases the number of vehicles used for transport and so hence the fuel consumed also increases. Practices like segregation of waste can be encouraged if they are incentivized and would help in better management of waste and decreased costs and reducing soil, air, and water pollution.

3.6.3 Reasons (and downsides) for going for populated affordable housing societies.

Causal Loop Diagram on why populated housing society are sought after today (and their downsides)



3.6.3.1 Inferences

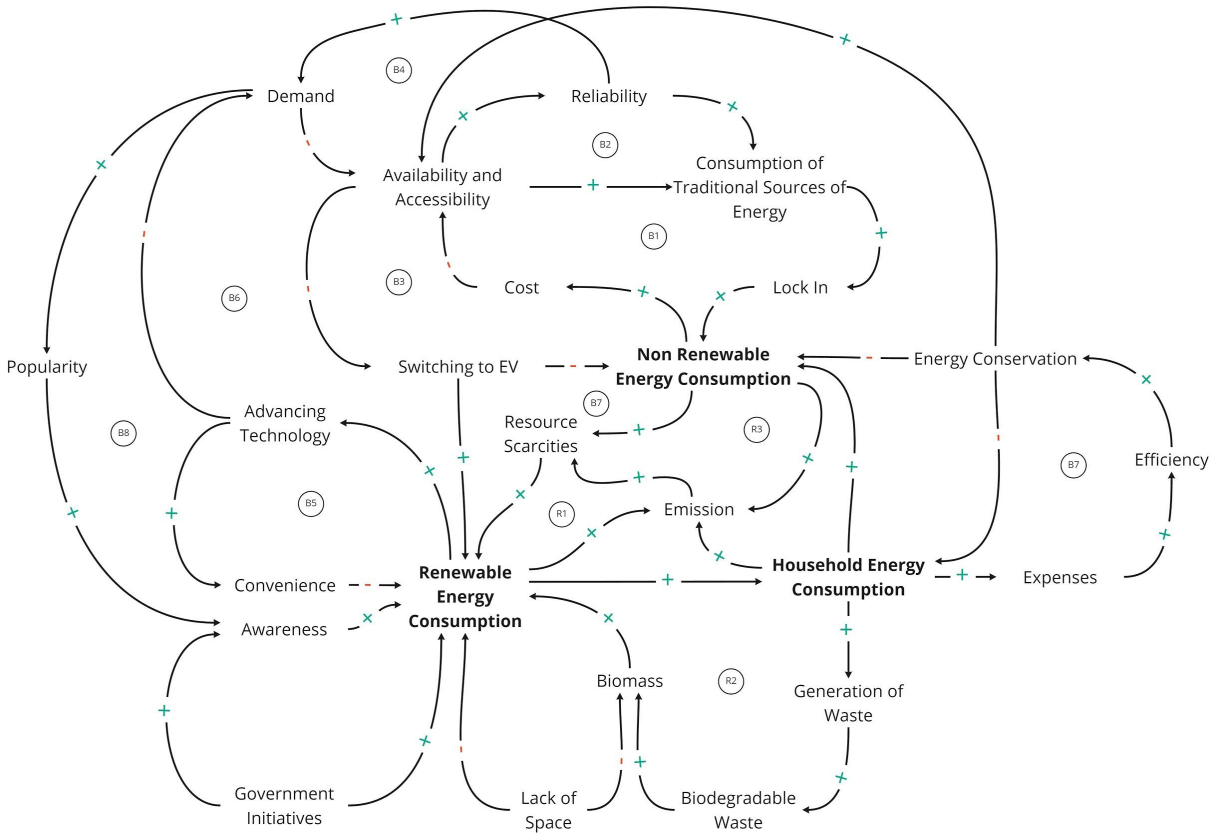
These kinds of housing societies with high capacity come under the term affordable housing as they are ideally targeted towards households with minimal, basic income (lower middle class). Space occupied is a major factor while considering these living conditions, especially households with more members, which leads to higher expenses, resource consumption, and reduction in our personal space.

Also considering the current pandemic situation, the structure and livelihood could be affected as the common facilities are closed and hence, social interactions have decreased.

3.6.4 Household Consumption of Energy

Here we tried to understand the factors influencing the switch from the Consumption of Renewable Energy to the Consumption of Non-Renewable Energy in a typical Household.

Causal Loop Diagram on Household Consumption of Energy



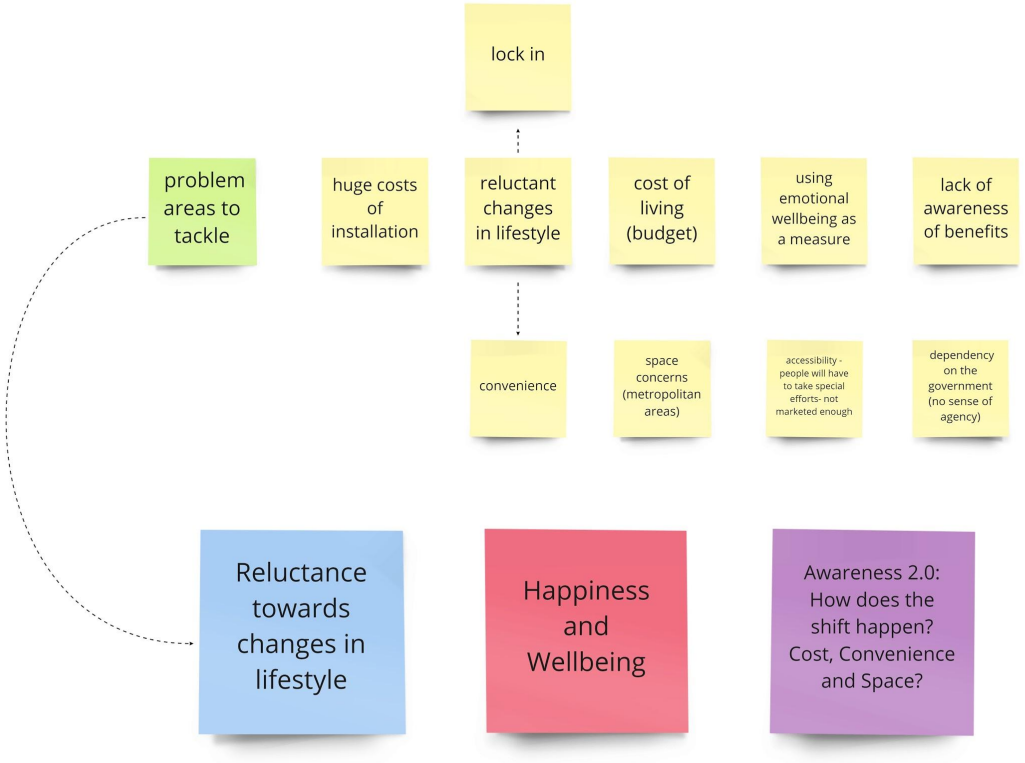
3.6.4.1 Inferences

People are locked into using the traditional sources of energy which are mostly non-renewable which in turn cause an increase in demand, hence reducing the availability, further causing the prices to rise. This increase in expenses further encourages the efficient consumption of energy adding to conservation.

4. Figuring out our Area of Focus

4.1 Listing Down Areas with Possibility of Intervention

We narrowed down possible problem areas to focus on, from the macro-level research that we had done so far.

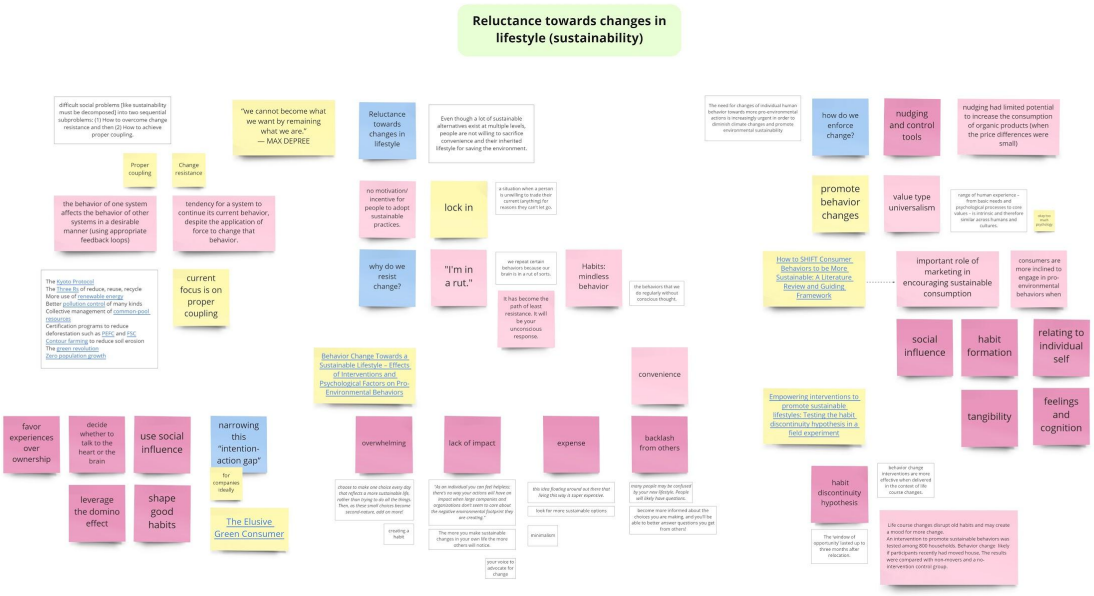


4.1.1 Happiness and Wellbeing

A lot of times when we think of sustainability we consider environmental and economic sustainability but not social sustainability and the wellbeing of people. Happiness is what is the ultimate goal for people and happiness is different from the small fleeting emotion that we feel when we buy a product, It is much more on a deeper level. Happiness and wellbeing can actually be used as a driver for bringing about change.

Due to the pandemic life has changed a lot and working from home has become like a normal thing. Earlier the home space was solely meant for relaxation but now people work here and people need to get into the mindset of working and after that, they should be able to switch off from work and relax. There are multiple stress and anxiety-related issues created because of this and there is a possibility of some intervention in the future home systems to address these things.

4.1.2 Reluctance towards changes in lifestyle



We looked into why people resist change, and how would it basically impact people shifting to different housing backgrounds. For example; would it make sense to just provide them with a better, sustainable home and facilities? How do we know that they won't go back to living the way they are used to aka their current, more unsustainable, lifestyle.

While considering a more psychological perspective of why we resist change, the term "I'm in a rut"- mindless behavior comes up often, and hence the need for understanding habitual behaviour and how it could be influenced. We then looked into certain reasons, in a more sustainability context, as to why change is yet to come out.

Then we also considered current measures and studied papers on how people have tried to enforce change, and certain terminologies as well like Value type universalism and habit discontinuity hypothesis from some papers and even considered areas like marketing having an impact in this process.

4.1.3 Spread the right kind of Awareness

People are aware of the hazardous impact of the existing unsustainable methods in practice and are aware of the ideal sustainable solutions that are available but they don’t exactly know how to

shift. Here, we have listed down the possible reasons that may raise questions regarding a shift to a sustainable alternative. We further looked into the most common sustainable alternatives and listed down the tiny details that concern the user but are unaware of.

We found that a few aspects were common to all of the alternatives, namely Space, Cost breakdown for installation in a particular household, Benefits for the individual rather than the planet, Durability, Balance between the alternative and the existing methods, Maintenance, and Expenditure in the long run. We further gave a quick look at how this can be tackled.

4.2 Feedback received post Week Two presentation

4.2.1 From the Professors

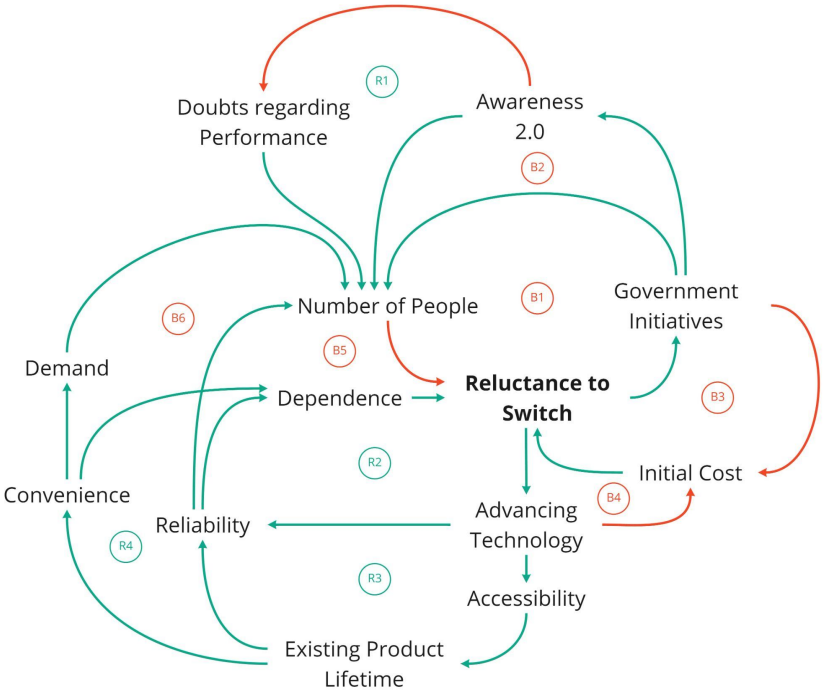
- Individual vs community; small city vs big city; housing complexes vs individual housing
- Human/ Life centric (initial mapping) Don't let go
- GNH - Bhutan (limit you needs) (carbon neutral)
- Recategorize => initial map as a blueprint (along with reluctance and awareness) and happiness as an ultimate principle (goal)
- Under Housing complexes Governance structure and social dimension (behavioral change theories)

4.2.2 From Peers

- "Whatever you attempt to do you're gonna want EVERYONE on board. and that means including people of all lifestyles. so maybe mapping out stakeholders with different lifestyles (rely heavily on daily-wage/migrant workers / middle class with minimal savings etc) and seeing how your solutions or other aspects affect each of them." - Zaid
- Transtheoretical behavior model - Ishaan

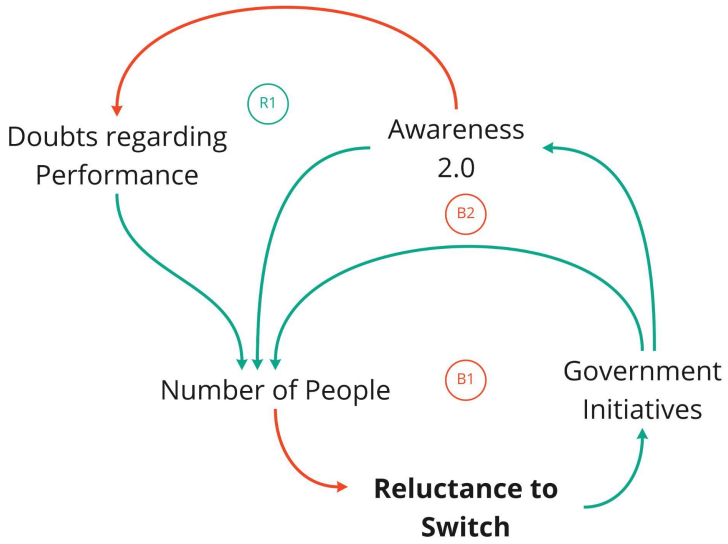
4.3 More Causal Loop Diagrams

Causal Loop Diagram on People's Reluctance to Shift



We were asked to revisit and retouch our causal loop diagrams to identify stronger loops. We also created a new one based on the areas of focus which we had come up with. Here we have looked into people's reluctance to shift and the factors influencing it.

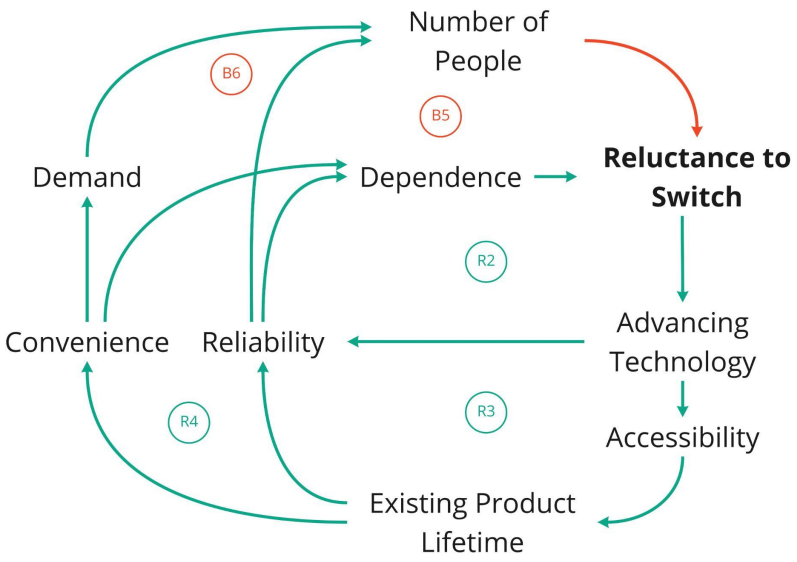
4.3.1 The Role of the Government



The first half of the loop addresses the role of the activities and aid from the government in increasing the number of people shifting to sustainable options. **(Balancing Loops)** Government

Initiatives like raising the right kind of awareness, issuing subsidies, introducing new villages for households on the way to becoming sustainable, etc, **(Reinforcing Loop)** would naturally rid people of the doubts they have, mainly regarding the efficiency and durability of the alternatives. This, in turn, increases the number of users. This increase in the number of users aids the spread of the word, further leading to a reduction in the reluctance to shift.

4.3.2 The Role of the Existing Methods



This half of the loop stresses the key factor for people's reluctance to shift. **(Reinforcing Loops)** People have used the methods and related products for years now and this has led to a lock-in right there, because of the amount of trust that has been built over the years. This had led to advancing technology to come up with newer lines of existing products which have gone through years of rework and improvement. This, in turn, leads to easy accessibility due to the availability of a vast variety in stores and service options. This further increases the lifetime of existing products resulting in an increase in convenience and reliability. This leads to dependence, and later, a lock-in and **(Balancing Loops)** rise in demand, hence increasing the number of users causing a reduction in people's reluctance to switch in the long run.

4.4 Analysing Feedback

We looked into the feedback that we had received on Monday, once again since we were a little lost on how to proceed. We discovered the Environmental Performance Index where the countries of the world are rated based on their takes and actions on the environment. We also found the main attributes that are considered for the assessment, namely, Performance, Air Quality, Sanitation, and Drinking Water, Biodiversity and Habitat, Ecosystem Services, Fisheries, Climate Change, Pollution and Emission, Agriculture, Water Resources, and Methodologies. We also looked into the Gross National Happiness of Bhutan as suggested and discovered their four pillars, namely, Good Governance, Sustainable Development, Preservation and Promotion of

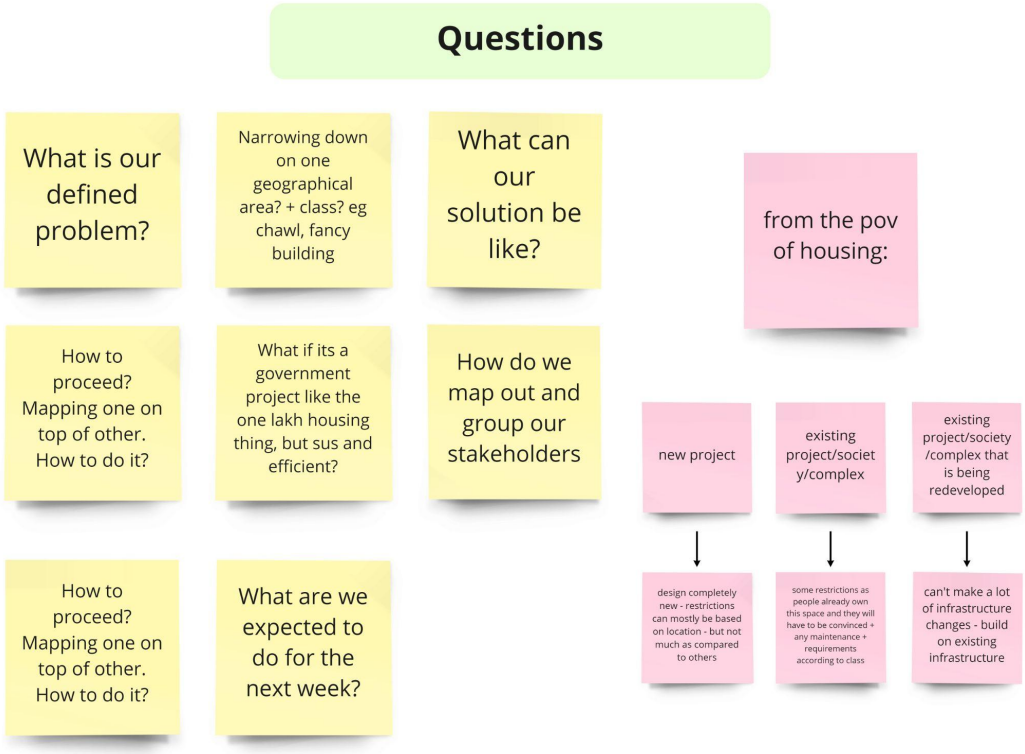
Culture and Environmental Conservation. We were not shocked to find India to be in the 168th position.

4.5 Questions

We were extremely clueless on how to proceed at this point as we could understand how to lay the mapping that we had done during week two over the work that we had done during week one. This gave rise to a few questions which we intended to clarify during our feedback.

- What is our defined problem?
- Do we narrow down on one geographical area?
- Do we also consider class?
- What can our solution be like?
- How do we proceed?
- How do you map one variable on top of the other?
- There could be three types of housing, namely, new projects, those under renovation, and already existing housing, each coming with different constraints. How do we pick one to work with?

- What if it's a government project like the one lakh housing project, but sustainable and efficient?
- How do we map out and group our stakeholders?
- What are we expected to do for the next week?



4.6 Feedback received during the session on Thursday

- Our focus area has become too broad, that's why we have issues. Define the problem.
- Ideally, we could focus on metropolis areas (agrees with focusing on chawls)
- Decide on one (don't pause)
- Start with creating a subsystem
- Look up the paper by Marc Hassenzahl on "be goals" and "do goals"
- Do goals is mainly what people will do, their actions and be goals is making them believe, the goal of living in a clean environment, the abstract entity like the quality of life.
- Going with something unfamiliar is a little risky and we don't have time for that.
- Slums are different from chawls. They are random and unorganized making it harder for intervention.
- There is no such thing as a blank canvas for a new project. A Completely new hypothetical solution does not exist.
- Most of what we do will be a buildup of something existing.
- When asked about considering a completely new society or an existing one, he told us to not consider the inability to make changes in the infrastructure as constraints. Look at the

constraints as possibilities of interventions. Constraints could be the reason why the system is behaving the way it is.

- “There is no such thing as creating a new system when it comes to Systems Design. It mainly deals with making Interventions to an existing system.”

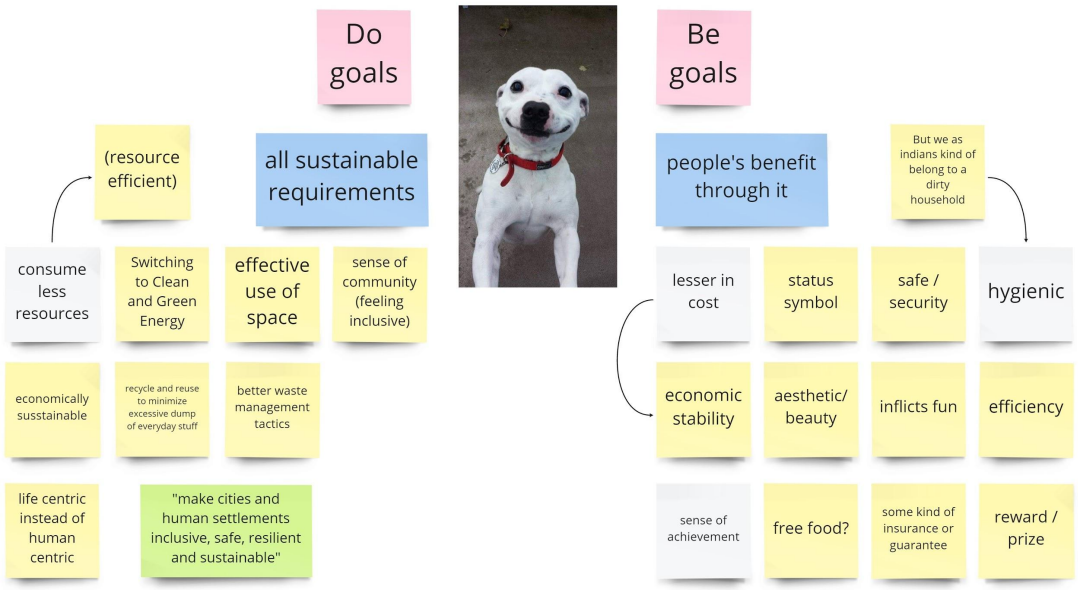
4.6.1 *Do-Goals and Be-Goals*, Marc Hassenzahl

A Brief Summary of the Paper:

- Addressing needs beyond the mere practical level
- A hierarchy; with do-goals being derived from be-goals
- Capability to full do-goals (i.e. their pragmatic quality) and be-goals (i.e. their hedonic quality)
- Hedonic well-being is based on the notion that increased pleasure and decreased pain leads to happiness. Hedonic concepts are based on the notion of subjective wellbeing. ... It is proposed that an individual experiences happiness when positive affect and satisfaction with life are both high.
- A person who is pragmatic is concerned more with matters of fact than with what could or should be. A pragmatic person's realm is results and consequences.
- Attributes related to usability, such as ‘easy’, ‘predictable’, or ‘clear’, signal the potential fulfillment of particular do-goals
- Attributes such as ‘cool’, ‘beautiful’, or ‘original’, signal direct fulfillment of be-goals.
- People perceive pragmatic and hedonic aspects as independent of each other.
- People may perceive products as primarily hedonic (a be-product), primarily pragmatic (a do-product), both, or even neither hedonic nor pragmatic.
- Lay functionalism is a bias in human choice, which systematically over-emphasizes the core function of a product (the do-goal level) and discount more peripheral attributes (the be-goal level)
- As long as hedonic quality attributes are directly related to be-goals, and thus closer to the user’s Self, they may the driver for ‘emotional product attachment

- Of course, a product can exert a certain amount of functional attachment, if it is the only available product performing a particular do-goal.
- It seems easier to justify the expenses for something practical compared to something primarily hedonic. This is problematic, since because of this bias, we may end up with a product that felt appropriate at the moment of decision but lacks important experiential, hedonic qualities.
- a level of granularity in attributes, which makes sense for an expert in interactive products, may not be understood by users.

So our do goals were quite apparent, where we basically listed down our possible sustainable requirements from an individual lifestyle and in context of housing. Coming to be-goals, (it was a little tricky) we realised that since we would want most people to be on board with these do-goals, we looked at how people could relate to them, (as in what would unintentionally make people go for them). So we decided to list out what possible benefit people could have from these options and hence put down under be-goals. Our next step would involve trying to connect the two sides based on how it could be relevant.

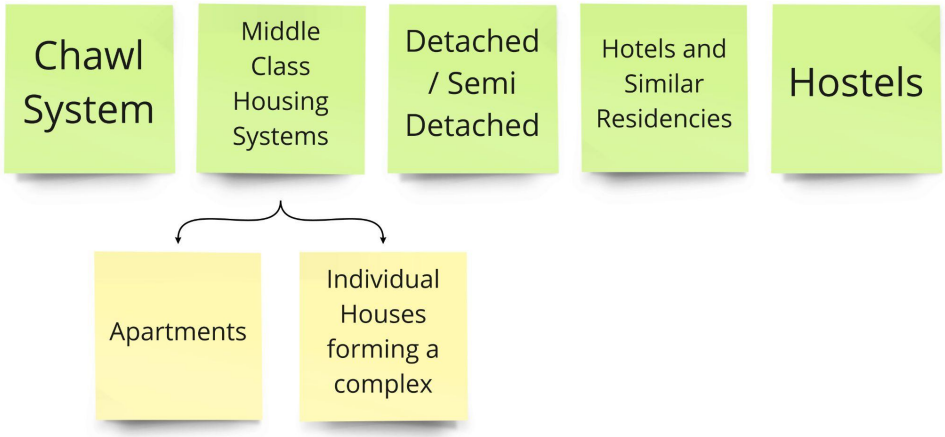


We also came across this **United nation goals for Sustainable Cities and Communities** (Goal number 11) and they had listed down this list as a target for 2030, so we considered points from in here and maybe a possibility of following this as a timeline.

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums
11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons
11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries
11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage
11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations
11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management
11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities
11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning
11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels
11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

4.7 Further explorations before the Definition of our Problem



We tried to narrow down the types of housings that we would like to consider and maybe narrow them down further. We tried to go a little deeper into each of those to understand the scope of intervention and existing sustainable aspects if any.

- **Chawl System:** We were able to find a lot of information regarding Chawls online, but one major drawback was that none of us have ever been to Chawl. So there was no first-hand experience and a lot of difficulty for primary research. However, we found a lot of already existing sustainable practices that the residents of a Chawl follow. The most important ones included the use of limited resources even though the population of chawls is tremendous, their exchange of culture, and their way of living in harmony with animals. We thought we could refer to the Chawl System while coming up with interventions for the subsystem we decide to go ahead with.

- **Middle-Class Housing Systems:** Like the Professors had mentioned during our feedback session, this was an area that we had proper knowledge about since we all come from middle-class housing societies. But the main issue that we faced here was the fact that the houses were so varied that you can come up with further subsystems within this topic itself.

- **Detached / Semi-Detached:** This was not a system of housing. It was more like a type of house. The house, whether detached or attached depends on the mindset of occupants. This could be considered but could not be considered as a system of sorts.

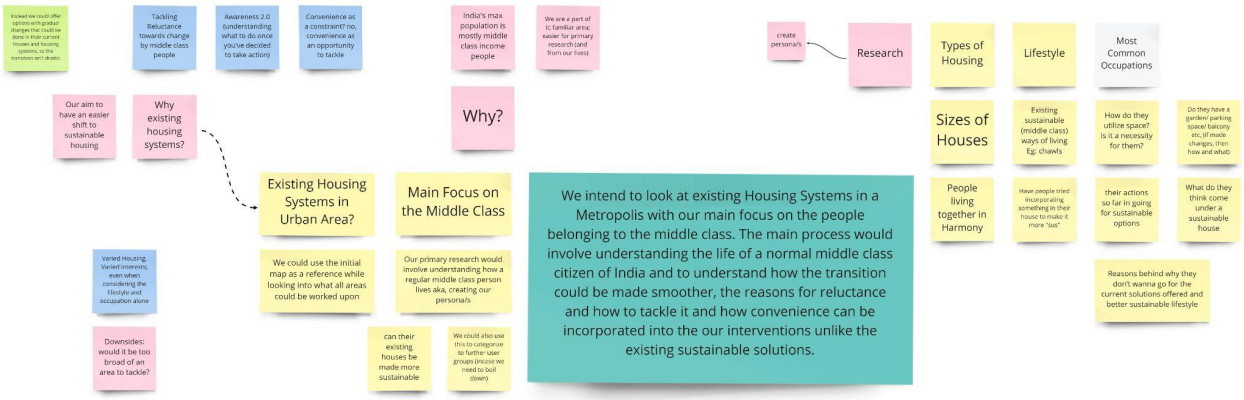
- **Hotels and Residencies:** They are also considered residential buildings but the fact that people live here only for an extremely short period of time made the focus suddenly shift to a business point of view. Whatever intervention we make would immediately be considered as a way to attract people and promote the business rather than the creation of a sustainable environment.

- **Hostels and Co-living Spaces:** There is a small difference between the two regarding the levels of comfort and the rules and regulations but they are basically the same. Even though we have the first-hand experience with hostels, our area would be more focused on the management and not the occupants alone. So we are a little stuck here as well.

We realized that the more we research about it, the sustainability of Different Housing Systems keeps underlining the parent line, **"Sustainability comes at the sacrifice of Convenience."**

5. Defining Our Boundaries

5.1 Condensing our Research Information



Main thoughts

- What all are the existing Housing Systems in Urban Areas?
- The Main Focus should stay on the Middle-Class Population.
- We could use the initial map as a reference while looking into what all areas could be worked upon.
- Our primary research would involve understanding how a regular middle-class person lives aka, creating our persona/s.
- Can their existing houses be made more sustainable?
- We could also use this to categorize further user groups (in case we need to boil down).
- Downsides: would it be too broad of an area to tackle?

5.2 Deriving Possibilities

- We could offer options with gradual changes that could be done in their current houses and housing systems, so the transition isn't drastic
- Our aim to have an easier shift to sustainable housing
- Tackling Reluctance towards change by middle-class people
- Awareness 2.0 (understanding what to do once you've decided to take action)
- Convenience as a constraint? no, convenience as an opportunity to tackle

5.3 Compiling a Brief

"We intend to look at existing Housing Systems in a Metropolis with our main focus on the people belonging to the middle class. The main process would involve understanding the life of a normal middle-class citizen of India and understand how the transition could be made smoother, the reasons for reluctance and how to tackle it and how convenience can be incorporated into our interventions, unlike the existing sustainable solutions."

5.4 Research Areas

5.4.1. Understanding the Chawl System

Background

- Chawls as an urban translation of the rural wadi housing type - *wadis* have some spatial similarities to chawls in that the rooms are arranged along a common corridor with toilets outside the living areas.
- One joint family would live in one wadi but gradually as the population in Mumbai increased, various rooms were occupied by different families.
- Vernacular buildings are climate responsive

Characteristics of a chawl

- Buildings having rooms of nine feet by nine feet used as multifunctional areas
- Typically have two to four stories with ten to twenty units of around 150- 200 sq ft each on each floor
- Each unit has one or two rooms and opens in a common corridor
- Toilets are outside the units. The overall placement of the toilets differ from chawl to chawl but typically, four to five toilets are located towards the end of the chawl
- One common bathing area or a common washing area.
- Every unit also has one bathing area called ‘mori’
- The living room is typically used for entertaining, studying, sleeping, sitting, watching TV, chatting and so on
- The kitchen is used for cooking, dining, bathing, sleeping, sitting, changing and storing

Desirability

- Housing affordability combined with location to make the chawls desirable for their residents. It is very difficult for the residents to afford any other apartment type of housing in the same locations. Old chawls are seen next to tall multistory apartment buildings.
- The Rent Control Act has frozen the rent rates to the rates of the 1940s and this makes living in chawls very affordable.
- The residents do find using the common toilets awkward and inconvenient, especially the women, but they have become accustomed to this condition.

Maintenance

- Residents of chawls have maintenance funds which shows that the residents are willing to take care of the chawls in which-ever way they can.
- In the past, all residents on one floor had one electric meter and the final bill was divided between residents. After the use of electrical appliances increased, every dwelling unit had its own meter. Only the light fixtures in common areas are taken care of by the landlord.
- Lack of initiative from landlords for maintenance is related to the high labor and material costs in the city as against low rents the tenants pay their landlords. The residents therefore form funds for maintenance, security and garbage.

- Municipal water was available from the common tap only for an hour every morning. Every member of the family had to stand in a queue with drums to fill with water. Residents at Naigaon chawl contributed extra money in the maintenance fund and put up a tank in the open space around the building and by the help of a pump would fill individual tanks

Social Aspects

- The internal courtyards form a very significant part of the chawl complexes from a social as well as spatial point-of-view.
- Residents of chawl feel secure when they can see their children playing within the community in the internal courtyard and not on the street, by stepping in the corridor, they are almost in their homes but are in touch with the rest of the community outside.
- Common corridor is a very interactive space. It is used for sitting, sleeping, reading, storing and playing. The families often make a sitting cabinet with storage in it and keep it in the corridor. This can be used by a family member to sleep on, in case a guest comes.
- All the neighbors are like family and they know that with one call for help, everyone would be there. This is the reason many of the participants do not lock their houses. The residents know their neighbors so well that they even know when they normally use the toilets and adjust their own use accordingly.
- Many women who don't work outside the home come together and babysit for those who are working. Since all the resident families are known, the mothers keep their children with these women without hesitation.
- Most of the children in the respective chawls go to the same school, they study together and go to school together. They would talk across their corridors and discuss homework.

Environmental Aspects

- They have common toilets, washing areas, and spend most of the time in common spaces like the corridor. The behavior of the residents reduces the consumption of water, electricity and other energy. The sitting area in the open corridor also provides natural ventilation, reducing the need to use fans thus saving electricity.
- There is a lot of exchange of items between families. Anything not of use to one family is used by the other. This reduces wastage and promotes optimum use of available resources.
- The chawls also go close to the concept of co-living which is considered a sustainable way of living.

5.4.2 Understanding Apartments

Background

- Old style of Mumbai houses began to disappear and in response to the ever-increasing demand for accommodation, builders divided the houses into many compartments without any consideration for light and ventilation

- Lakhs of unsold or unoccupied high-end apartments and millions of poorer citizens living in squalid and dehumanised housing - locked up funds worth Rs 13 lakh crores, resulting in huge unpaid loans to banks
- Despite discounts and freebies offered by builders and relentless seductive advertising promising unimaginably utopian lives to buyers, the number of unsold apartments has hit its highest mark

Maintenance

- Housing complexes have a fixed amount that they need to pay each month as the maintenance charges. These can be different from household to household depending on the facilities availed by them
- There is a committee that looks after the maintenance grievances and allocates funds whenever and wherever required
- Generally the majority of the members are considered to make any decision.

Social Aspects

- In the book A Pattern Language: Town-Buildings-Construction, the authors refer to Dr. Cappon's clinical experiences which relate mental health to high rises which says that mothers often become restless if they cannot see their young ones playing on the street.
- Dr. Cappon also says that living in high rise buildings deprives children of kinetic activity leading to lethargy and antisocial behavior.
- In A Pattern Language: Town-Buildings-Construction the authors suggest how buildings can be configured to create successful social spaces. Every building, for example, needs a space where people are still in the building but are in touch with the outside and windows are not enough.
- As Friederike Schneider mentions in his book Floor Plan Manual: Housing, in contemporary housing “floor space is typically dedicated to achieve a maximum of pure dwelling-unit floor space” and is not used for common spaces that 64 create social connections between neighbors.

Environmental Aspects

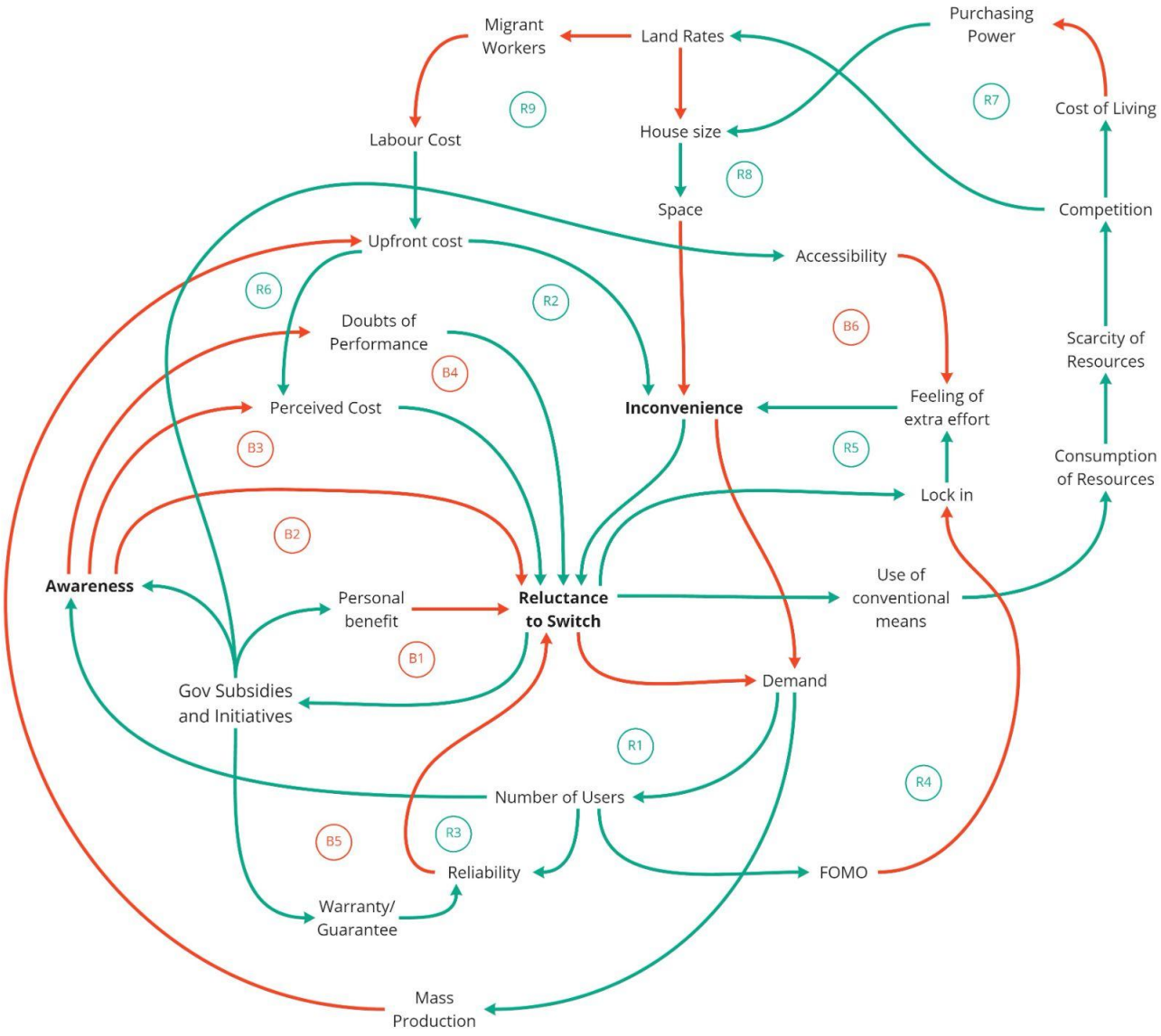
- Because of concretisation, open soil patches are covered and water can’t seep into the ground. Groundwater is already depleting at an alarming rate and this makes it even more difficult for water to seep into the ground
- Generally people living in apartments are financially in a better position and have enough to fulfill their needs. They have more purchasing power and tend to choose to live a comfortable life which some times may not good for the environment
- Sometimes to maximise area available to develop buildings, trees in vicinity are killed
- Some housing complexes have gardens. While these are mostly for beautification, they trees and plants selected can be such that they support the entire housing ecosystem

5.4.3 Conclusion

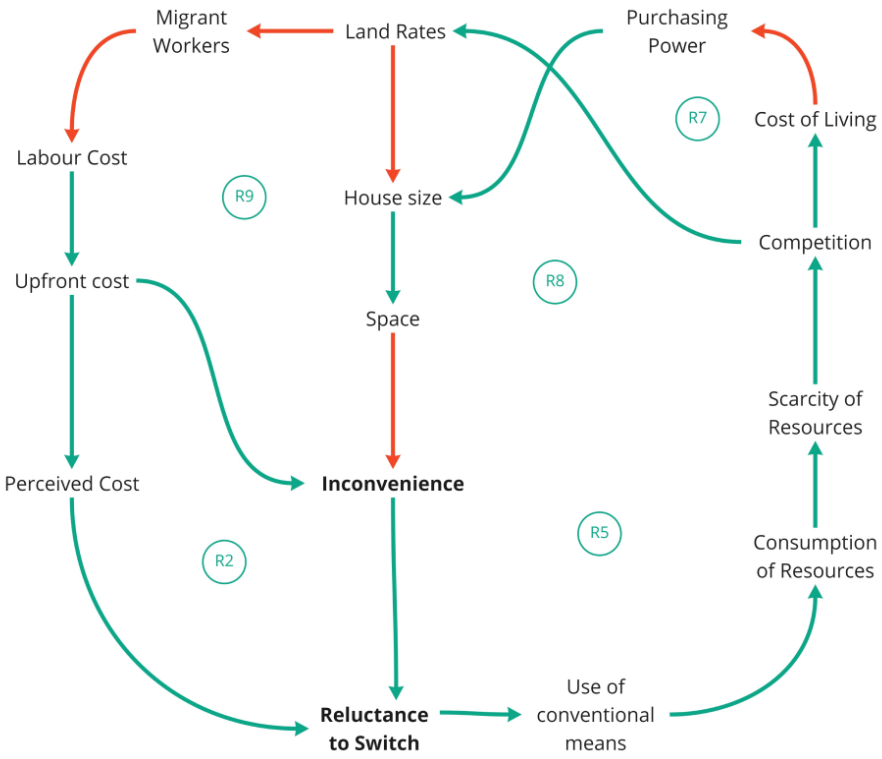
- The chawls provide the middle class with affordable living, security, friendly neighbors, play areas for children, social interaction and a future outlook based on sharing and maximizing assets.
- Location, close-knit community social support systems and affordability are the three main reasons why the residents of the chawls want to continue to live there. Some chawl residents earn enough to afford a slightly bigger place in the suburbs but are too attached to the location and the people in the chawl to move elsewhere.
- Combination of shared spaces and spatial optimization enable affordable lifestyles that are highly functional within the crowded and expensive city of Mumbai. The spatial configuration of the chawl creates opportunities for the residents to come closer as one social unit.
- By comparing these two types of housing we realised that convenience is also a major factor that affects the adoption of sustainable practises.
- The lifestyle in chawls is more sustainable but is also very inconvenient, but the residents don’t have much choice as there are no other affordable options and they get used to it over time. People who have a choice would prefer a life of convenience.

6. Understanding the System and Deriving Possibilities

6.1 Causal Loop - Understanding the connection between Convenience, Awareness and Reluctance to switch



6.1.1 Parent Causal Loop 1 - Reluctance to Switch mainly influences the availability of resources, cost of living, space and Inconvenience

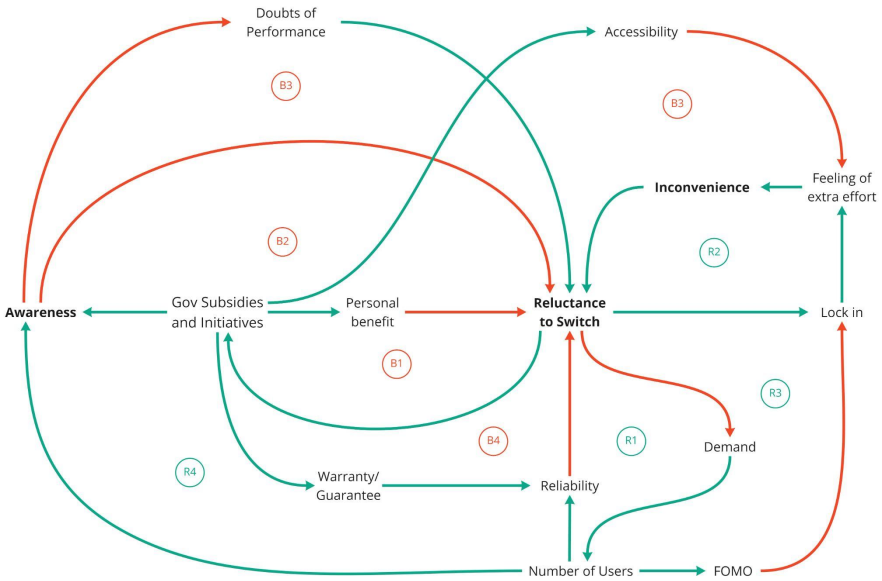


The first parent loop looks into how reluctance to switch leads to and influences these variables, along with inconvenience.

Main Insight was how, because of reluctance (on our part), our use of the conventional existing options continue which well lead to scarcity of resources, hence increasing the cost of living as an individual, while also influencing land rates (because of the competition) which in turn increases its upfront and perceived cost. So at the end, it causes inconvenience to us, the people around us and the world.

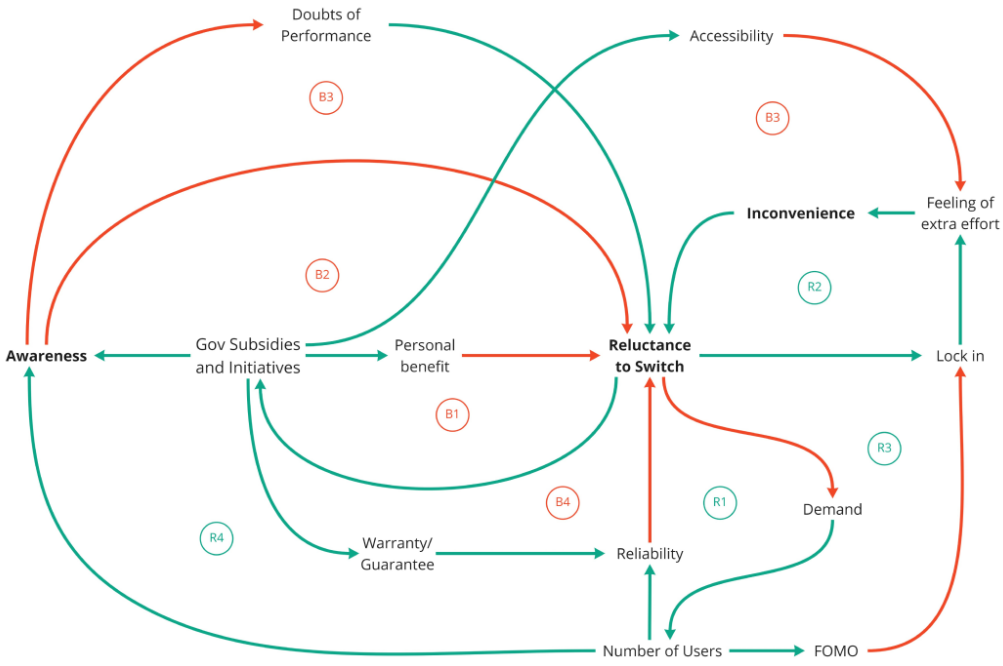
6.1.2 Parent Causal Loop 2 - How the three major factors influence the demand, cost and the number of users involved

The second one looks at the same three factors on how the existing sustainable options behave as a product/ in the market.



We realise how reluctance and inconvenience reduce their demand, and hence it's mass production and the no. of users decrease, which ends up increasing perceived cost and decrease in awareness.. (and hence the loop).

6.1.3 Parent Causal Loop 3 - Involves effects of variables like Personal benefit, Accessibility, Lock in, Inconvenience, Reliability and Awareness



The third diagram looks at this situation from the perspective of human resources.

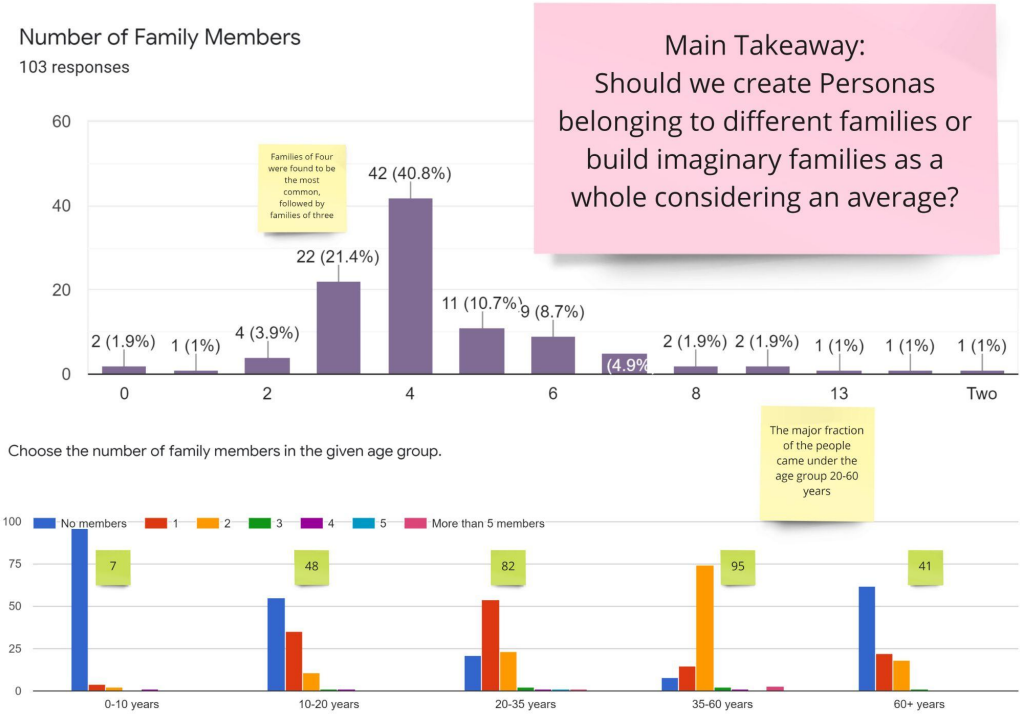
With reluctance among the public, there is more of the government's involvement as initiatives hence creating awareness, clearing possible misconceptions and doubts. While on a more personal level, Reluctance creates a "lock in" in our head, which makes us unable to change from our current state of mind, hence leading to inconvenience.

6.2 Primary Research

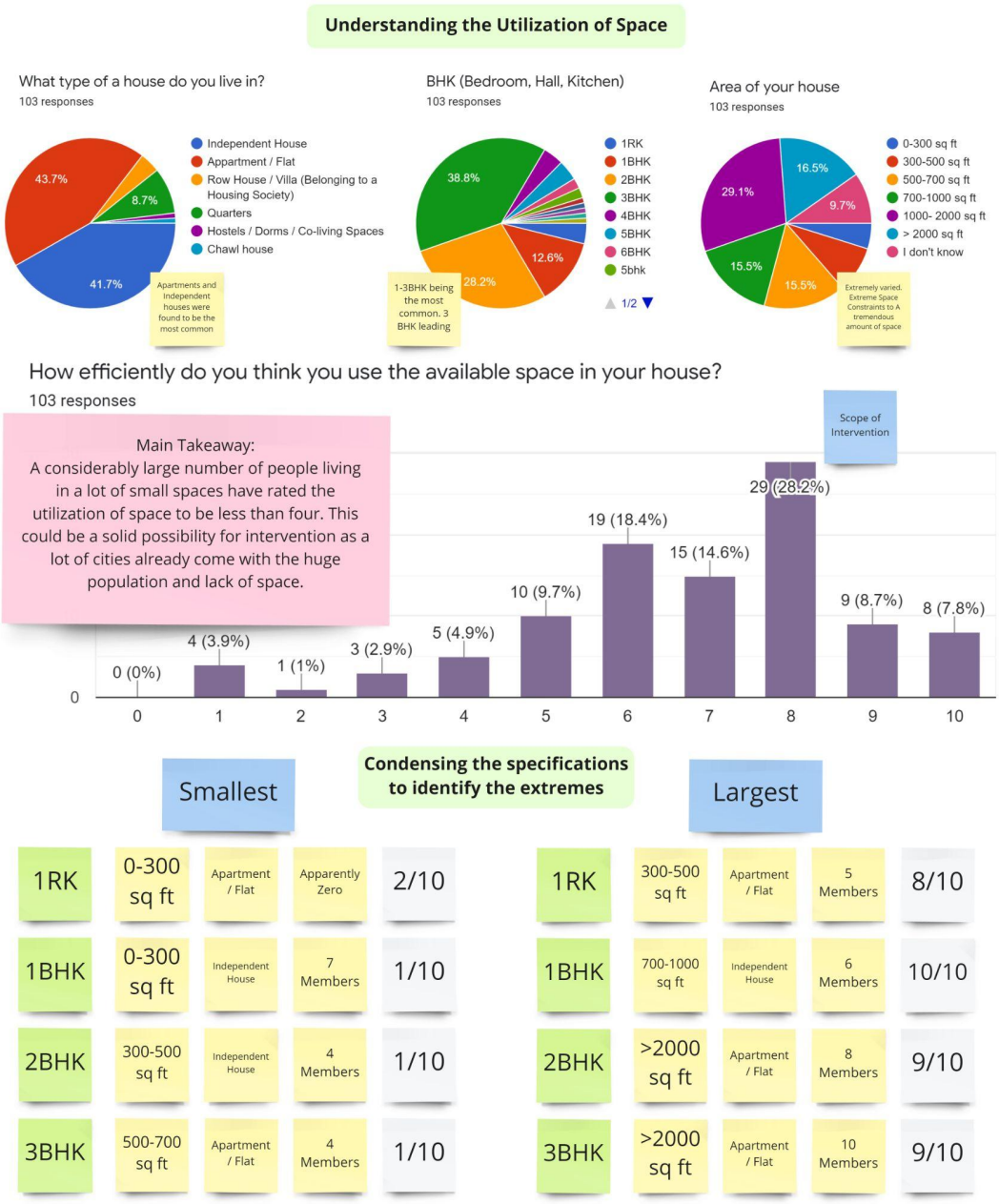
We created a Survey on Google Forms to understand people's take on Sustainability. It was focused on the housing of people belonging to the Middle Class.

6.2.1 The Demographics

- Families of Four were found to be the most common, followed by families of three
- The major fraction of the people came under the age group 20-60 years
- There were
    - 7 people belonging to 0 - 10 years
    - 48 people belonging to 10 - 20 years
    - 82 people belonging to 20 - 35 years
    - 95 people belonging to 35 - 60 years
    - 41 people older than 60 years



The major question at this point was whether to create Personas for different kinds of people belonging to different families or build imaginary families as a whole considering an average?

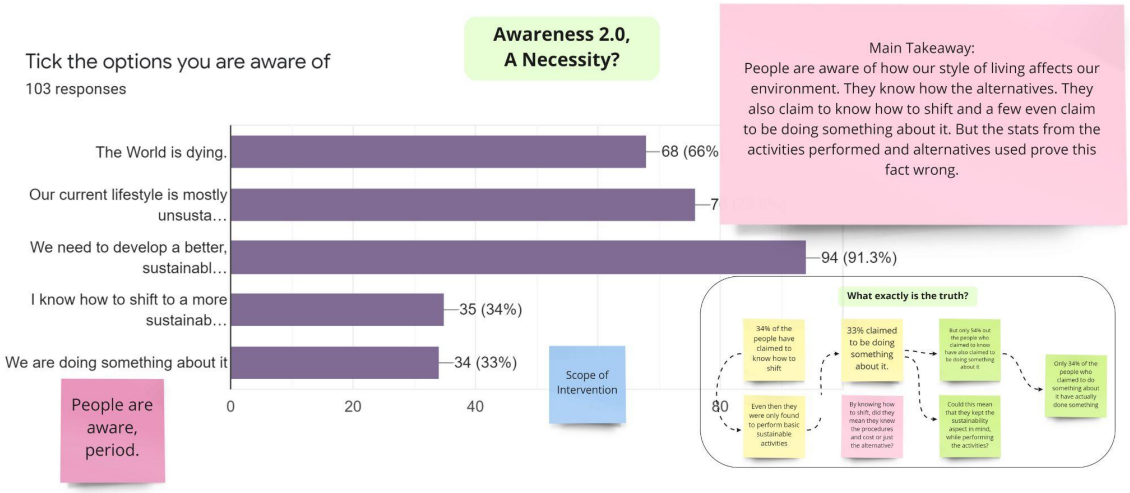


6.2.2 Current Housing and Space

- Apartments and Independent houses were found to be the most common
- 1-3BHK being the most common. 3 BHK leading
- Extremely varied. Extreme Space Constraints to a tremendous amount of space

A considerably large number of people living in a lot of small spaces have rated the utilization of space to be less than four. This could be a solid possibility for intervention as a lot of cities already come with a huge population and lack of space.

6.2.3 Analysing their Awareness



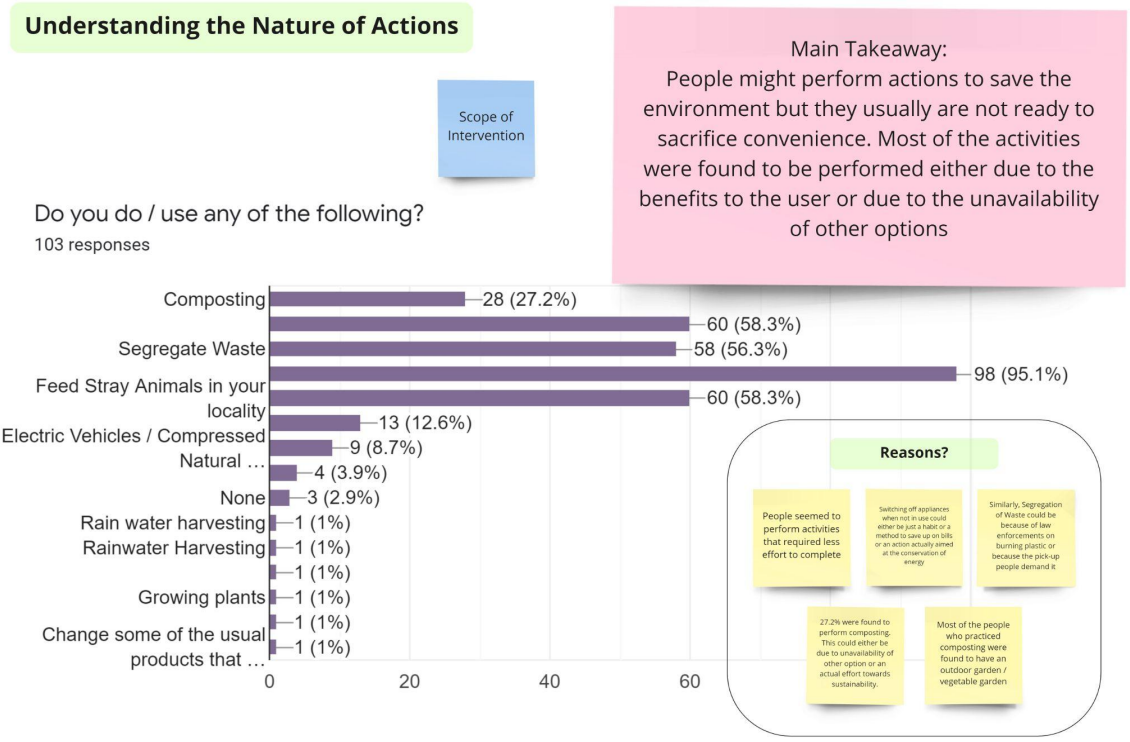
- **People are aware, period.**
- 34% of the people have claimed to know how to shift
- Even then they were only found to perform basic sustainable activities
- 33% claimed to be doing something about it.
- By knowing how to shift, did they mean they knew the procedures and cost or just the alternative?
- But only 54% out of the people who claimed to know have also claimed to be doing something about it
- Could this mean that they kept the sustainability aspect in mind while performing the activities?
- Only 34% of the people who claimed to do something about it have actually done something

People are aware of how our style of living affects our environment. They know the alternatives. They also claim to know how to shift and a few even claim to be doing something about it. But the stats from the activities performed and alternatives used, prove this fact wrong.

6.2.4 Understanding the Nature of their Actions

- People seemed to perform activities that required less effort to complete
- Switching off appliances when not in use could either be just a habit or a method to save up on bills or an action actually aimed at the conservation of energy
- Similarly, Segregation of Waste could be because of law enforcements on burning plastic or because the pick-up people demand it
- 27.2% were found to perform composting. This could either be due to the unavailability of other options or an actual effort towards sustainability.

- Most of the people who practiced composting were found to have an outdoor garden / vegetable garden

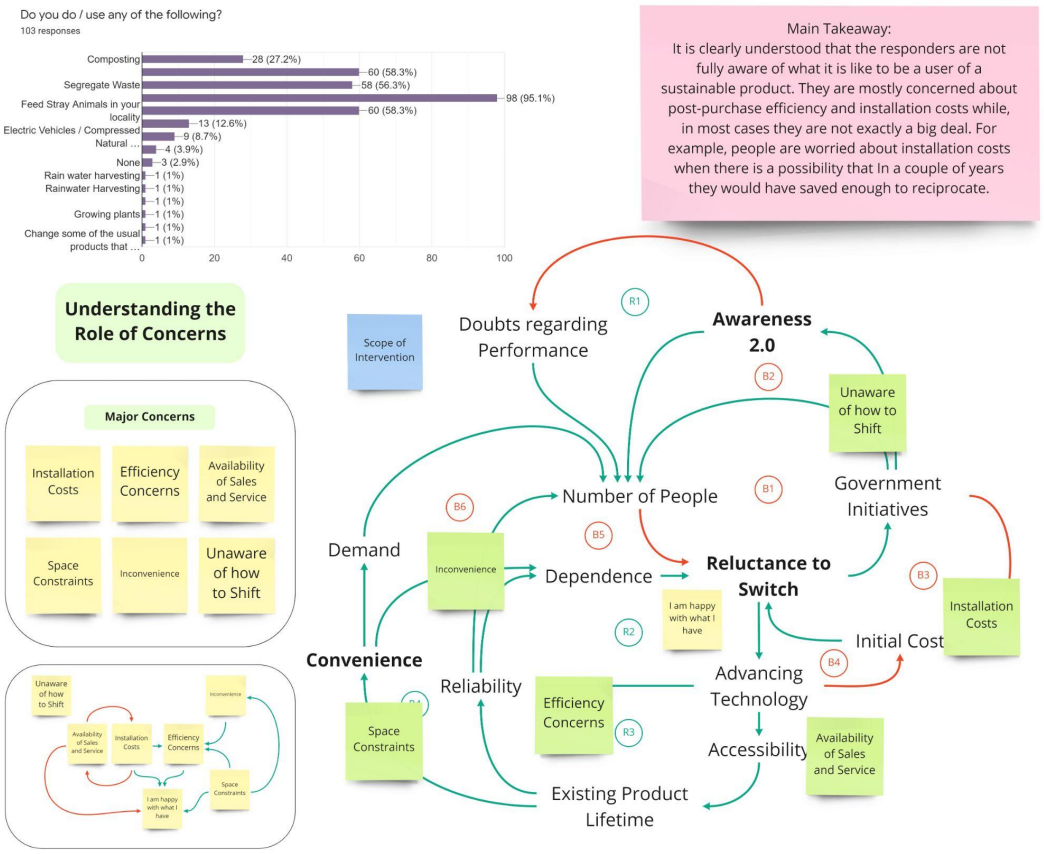


People might perform actions to save the environment but they usually are not ready to sacrifice convenience. Most of the activities were found to be performed either due to the benefits to the user or due to the unavailability of other options.

6.2.5 Understanding the Role of Concerns

- The major Concerns were
    - Installation Costs
    - Efficiency Concerns
    - Availability of Sales and Service
    - Space Constraints
    - The Lack of Convenience
    - Lack of Awareness on How to Shift

It is clearly understood that the responders are not fully aware of what it is like to be a user of a sustainable product. They are mostly concerned about post-purchase efficiency and installation costs while, in most cases, they are not exactly a big deal. For example, people are worried about installation costs when there is a possibility that In a couple of years they would have saved enough to reciprocate.



6.3 Deriving Possibilities of Intervention

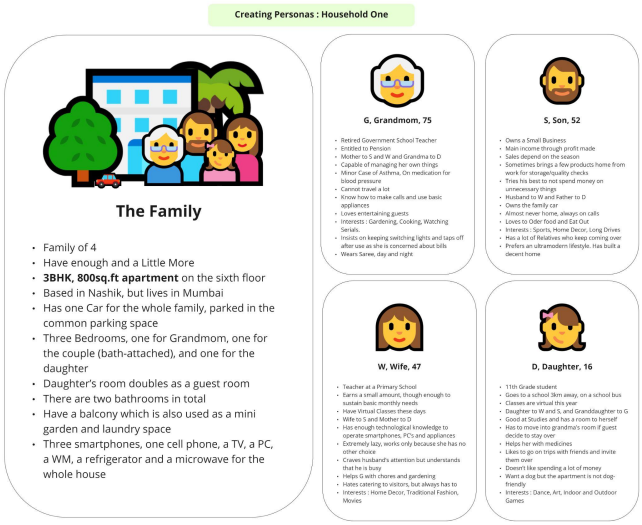
We then moved to exploring the factors that would influence our possible interventions, for example, how our interventions would age (considering how it is a gradual process), understanding how people would perceive these changes, how we can make it more life centric (also includes social factors), looking at the surrounding environment, their financial status and finally, their own home space.

We then tried to explore possible areas, mostly looking into the home space in particular. as we mapped out rooms, activities that take place in a house, common dedicated spaces, categories of objects at home. We also considered the governance aspects, along with the locality, preservation of culture and environmental conservation.

6.4 Personas

With the data in place, we created three persona groups. We tried to cover the most common types of housing, financial status, age groups and level of awareness.

6.4.1 Household One



The first household consisted of an upper-middle-class family of four living in a 3BHK apartment. Here we had the least number of constraints.

- **The Family**
    - Family of 4
    - Have enough and a Little More
    - 3BHK, 800sq.ft apartment on the sixth floor
    - Based in Nashik, but lives in Mumbai
    - Four Members : Grandmom, Son, and his WIfe, Teenage Daughter
    - Has one Car for the whole family, parked in the common parking space
    - Three Bedrooms, one for Grandma, one for the couple (bath-attached), and one for the daughter
    - Daughter's room doubles as a guest room
    - There are two bathrooms in total
    - Have a balcony which is also used as a mini garden and laundry space
    - Three smartphones, one cell phone, a TV, a PC, a WM, a refrigerator and a microwave fo the whole house

- **G, Grandmom, 75**
    - Retired Government School Teacher
    - Entitled to Pension
    - Mother to S and D and Grandma to GD
    - Capable of managing her own things
    - Minor Case of Asthma, On medication for blood pressure
    - Knows how to make calls and use basic appliances
    - Interests : Gardening, Cooking, Watching Serials.

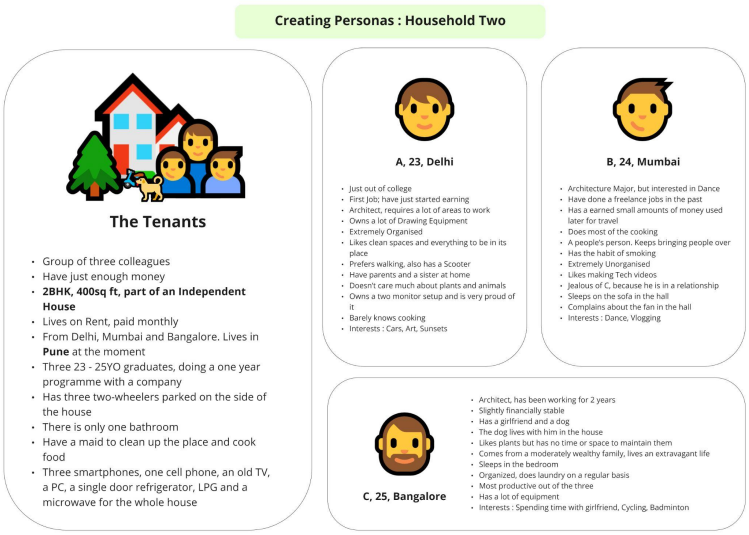
- Insists on keeping switching lights and taps off after use as she is concerned about bills
- Wears Saree, day and night

- **S, Son, 52**
  - Owns a Small Business
  - Main income through profit made
  - Sales depend on the season
  - Sometimes brings a few products home from work for storage/quality checks
  - Tries his best to not spend money on unnecessary things
  - Husband to D and Father to GD
  - Almost never home, always on calls
  - Loves to Order food and Eat Out
  - Interests : Sports, Home Decor, Long Drives
  - Has a lot of Relatives who keep coming over
  - Prefers an ultramodern lifestyle. Has built a decent home

- **W, Wife, 47**
  - Teacher at a Primary School
  - Earns a small amount, though enough to sustain basic monthly needs
  - Have Virtual Classes these days
  - Wife to S and Mother to D
  - Has enough technological knowledge to operate smartphones, PC's and appliances
  - Extremely lazy, works only because she has no other choice
  - Craves husband's attention but understands that he is busy
  - Helps G with chores and gardening
  - Hates catering to visitors, but always has to
  - Interests : Home Decor, Traditional Fashion, Movies

- **D, Daughter, 16**
  - 11th Grade student
  - Goes to a school 3km away, on a school bus
  - Classes are virtual this year
  - Daughter to W and S, and Granddaughter to G
  - Good at Studies and has a room to herself
  - Likes to go on trips with friends and invite them over
  - Doesn't like spending a lot of money
  - Want a dog but the apartment is not dog-friendly
  - Interests : Dance, Art, Indoor and Outdoor Games

6.4.2 Household Two



The second household consisted of three employees of an architecture firm living in a small 2BHK independent house along with a pet. They have just started earning and don't have a lot of money to spare.

- **The Tenants**
    - Group of three colleagues
    - Have just enough money
    - 2BHK, 300-500sq ft
    - Lives on Rent, paid monthly
    - From Delhi, Mumbai and Bangalore. Lives in Pune at the moment
    - Three 23 - 25YO graduates, doing a one year programme with a company
    - Has three two-wheelers parked on the side of the house
    - There is only one bathroom
    - Have a maid to clean up the place and cook food
    - Three smartphones, one cell phone, an old TV, a PC, a single door refrigerator and a microwave fo the whole house

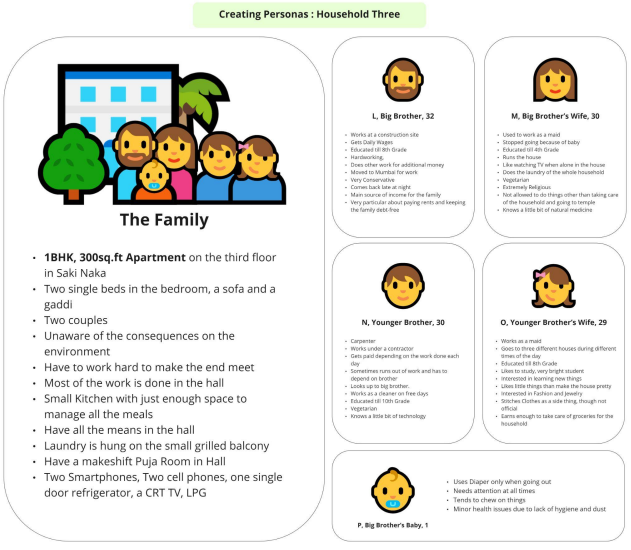
- **A, 23, Delhi**
    - Just out of college
    - First Job; have just started earning
    - Architect, requires a lot of areas to work
    - Owns a lot of Drawing Equipment
    - Extremely Organised
    - Likes clean spaces and everything to be in its place
    - Prefers walking, also has a Scooter
    - Have parents and a sister at home
    - Doesn't care much about plants and animals
    - Owns a two monitor setup and is very proud of it
    - Barely knows cooking

- Interests : Cars, Art, Sunsets

- **B, 24, Mumbai**
  - Architecture Major, but interested in Dance
  - Have done a freelance jobs in the past
  - Has a earned small amounts of money used later for travel
  - Does most of the cooking
  - A people's person. Keeps bringing people over
  - Has the habit of smoking
  - Extremely Unorganised
  - Likes making Tech videos
  - Jealous of C, because he is in a relationship
  - Sleeps on the sofa in the hall
  - Complains about the fan in the hall
  - Interests : Dance, Vlogging

- **C, 25, Bangalore**
  - Architect, has been working for 2 years
  - Slightly financially stable
  - Has a girlfriend and a dog
  - The dog lives with him in the house
  - Likes plants but has no time or space to maintain them
  - Comes from a moderately wealthy family, lives an extravagant life
  - Sleeps in the bedroom
  - Organised, does laundry on a regular basis
  - Most productive out of the three
  - Has a lot of equipment
  - Interests : Spending time with girlfriend, Cycling, Badminton

6.4.3 Household Three



The third household consisted of a family of five which is not financially stable. They are not well educated and live in a small 1BHK apartment.

- **The Tenants**
    - 1BHK, 0-300sq.ft Apartment on the third floor
    - Two single beds in the bedroom, a sofa and a gaddi
    - Two couples
    - Unaware of the consequences on the environment
    - Have to work hard to make the end meet
    - Most of the work is done in the hall
    - Small Kitchen with just enough space to manage all the meals
    - Have all the means in the hall
    - Laundry is hung on the small grilled balcony
    - Have a makeshift Puja Room in Hall
    - Two Smartphones, Two cell phones, one single door refrigerator, a CRT TV, LPG

- **L, Big Brother, 32**
    - Works at a construction site
    - Gets Daily Wages
    - Educated till 8th Grade
    - Hardworking,
    - Does other work for additional money
    - Moved to Mumbai for work
    - Very Conservative
    - Comes back late at night
    - Main source of income for the family
    - Very particular about paying rents and keeping the family debt-free

- **M, Big Brother's Wife, 30**
    - Used to work as a maid
    - Stopped going because of baby
    - Educated till 4th Grade
    - Runs the house
    - Like watching TV when alone in the house
    - Does the laundry of the whole household
    - Vegetarian
    - Extremely Religious
    - Not allowed to do things other than taking care of the household and going to temple
    -
- **N, Younger Brother, 30**
    - Carpenter
    - Works under a contractor
    - Gets paid depending on the work done each day
    - Sometimes runs out of work and has to depend on brother

    - Looks up to big brother.
    - Works as a cleaner on free days
    - Educated till 10th Grade
    - Vegetarian
    - Knows a little bit of technology
    -
- **O, Younger Brother's Wife, 29**
    - Works as a maid
    - Goes to three different houses during different times of the day
    - Educated till 8th Grade
    - Likes to study, very bright student
    - Interested in learning new things
    - Excellent Cook,
    - Likes little things than make the house pretty
    - Interested in Fashion and Jewellery
    - Stitches Clothes as a side thing, though not official
    - Earns enough to take care of groceries for the household
    - Knows a little bit of natural medicine

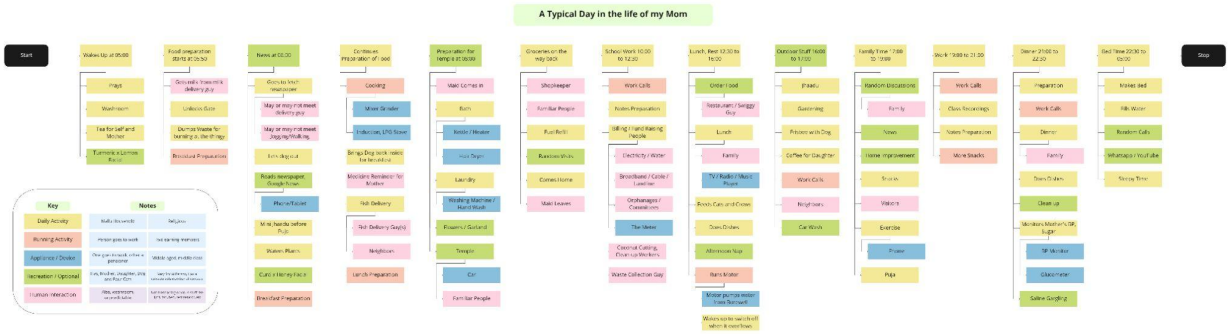
- **P, Big Brother's Baby, 1**
    - Uses Diaper only when going out
    - Needs attention at all times
    - Tends to chew on things
    - Minor health issues due to lack of hygiene and dust

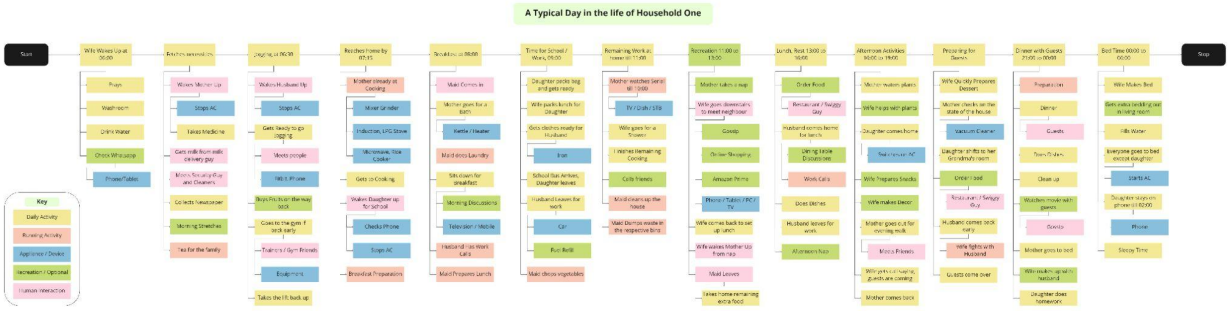
6.5 Feedback Received post Week Three Presentation

- Haven't done Ideation yet but analysis was pretty detailed.
- Work has been nicely done, but can't get a sense of where it is going.
- We probably know where we are going but are finding it difficult to compile and put into words
- There is a lot of material and now it is time to derive a coherent picture
- The foundation and framework has been nicely done. Now focus on specific personas and specific scenarios.
- Don't take money constraints way too seriously. The reason why someone could be living in a not so well off place could also be because of reasons other than money constraints.
- Re-check our assumptions regarding people's way of living.
- Bring in the coherence.
- The do goals and be goals make a lot of sense.
- Try mapping out a day in the life of 3-4 people belonging to different types of housing societies.

6.6 Mapping days and Activities of people belonging to different households

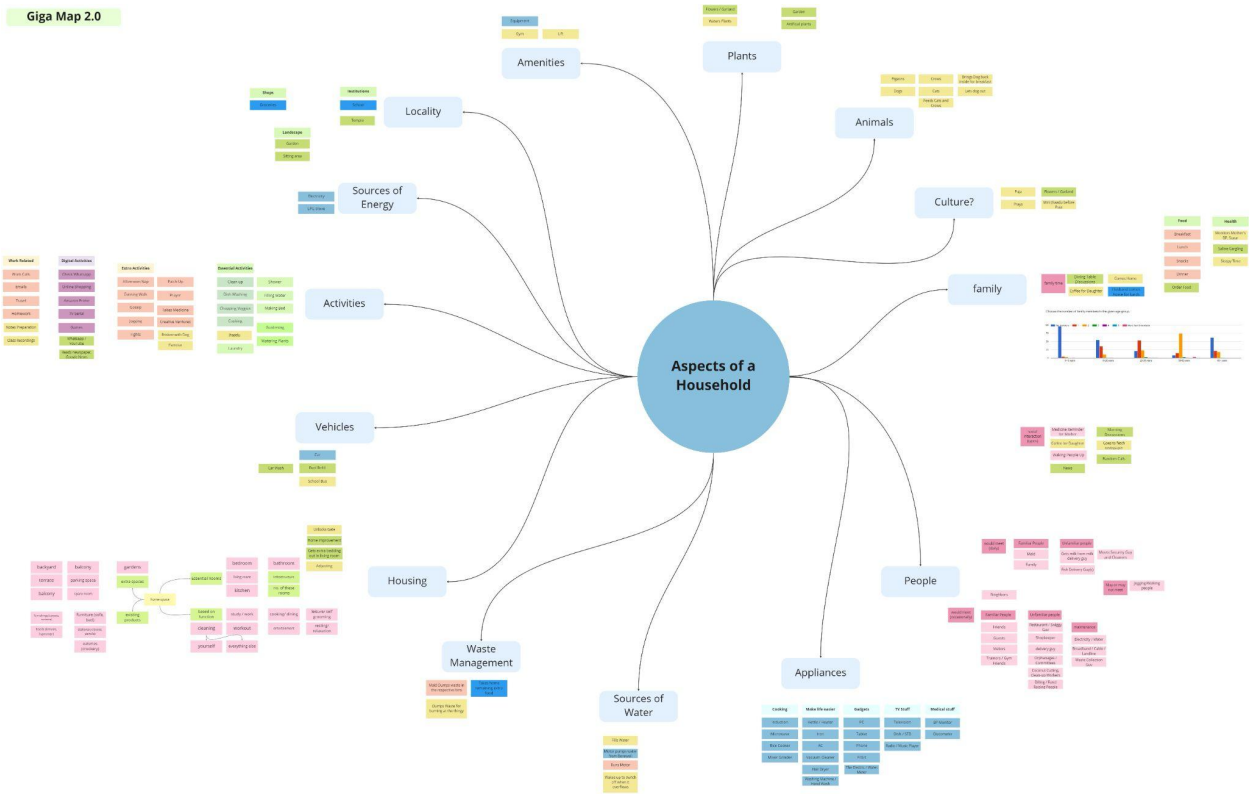
Considering the feedback received, we tried to map out the days in the lives of different households. We looked at the households that we are from and also those of the personas that we had created. This was mainly done to identify opportunities for intervention.





6.7 Aspects of a household

Identifying the relationship between the main touchpoints from the day in the life maps that we had created and the initial framework covering all the aspects of a society boiled down to that of a household, resulted in a newer version of the Giga Map.



6.8 Feedback from the Session on Thursday

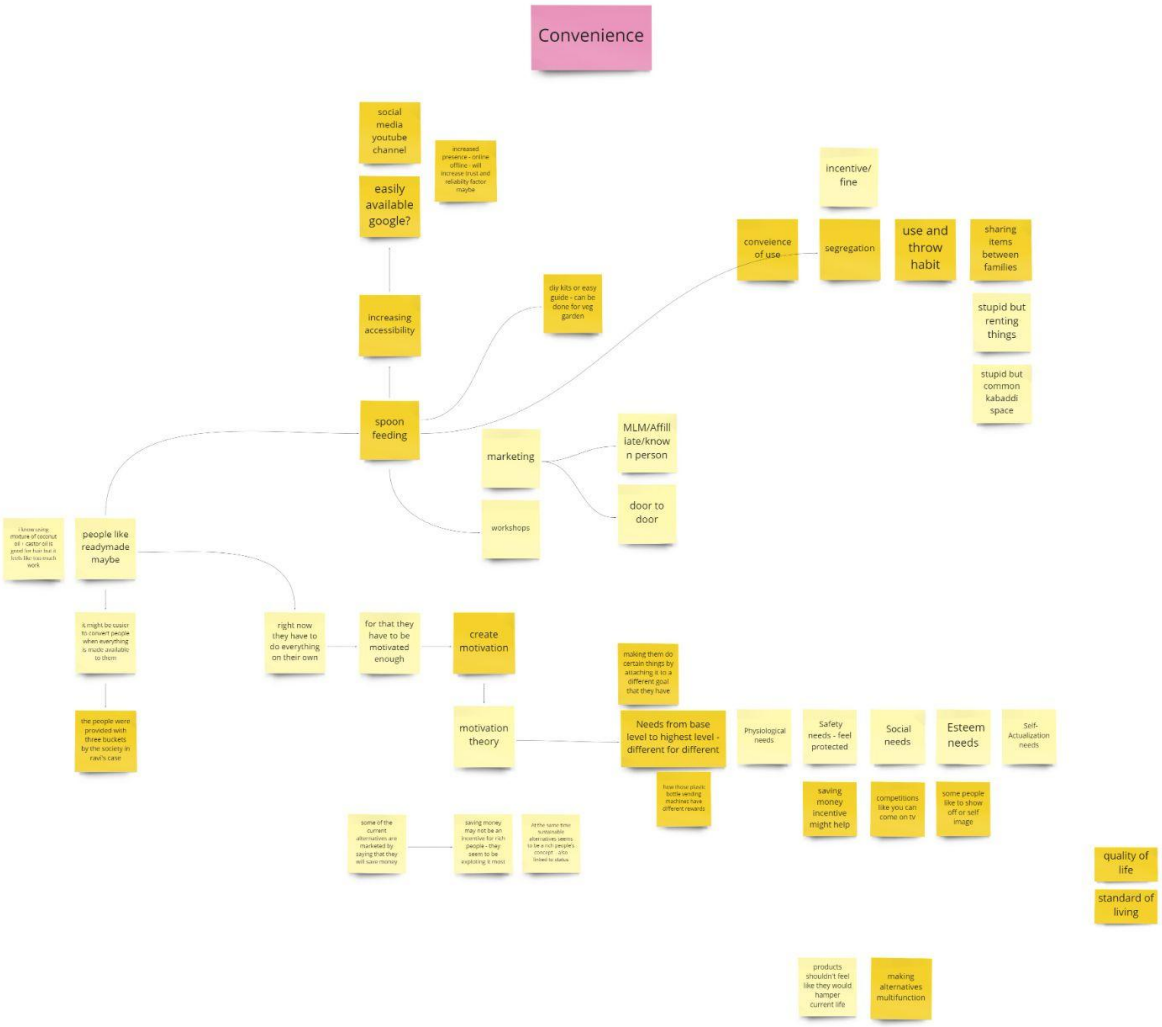
- You have a set of problems in housing society connected to sustainability issues, so one output can be guidelines. Creating awareness among youngsters can be one of the objectives within that. It can even be a social media group that you set up or posters. Detail out one or two ideas see how they fit into the system
- Maybe there is space available in society. How to utilize it? How can you make activities for kids to learn? Eg- in Prof Khambete's society they do vermiculture. Residents get extremely cheap price and also tell friends, becomes the identity of society
- You have enough data so start ideating, don't over analyze
- Didn't know what system to get - how to get - visited some other place and figured out

7. Ideation

7.1 Ideating on the three sub areas of our problem area

We did some quick preliminary ideation on each of the problem sub areas of convenience, reluctance and awareness.

7.1.1 Convenience



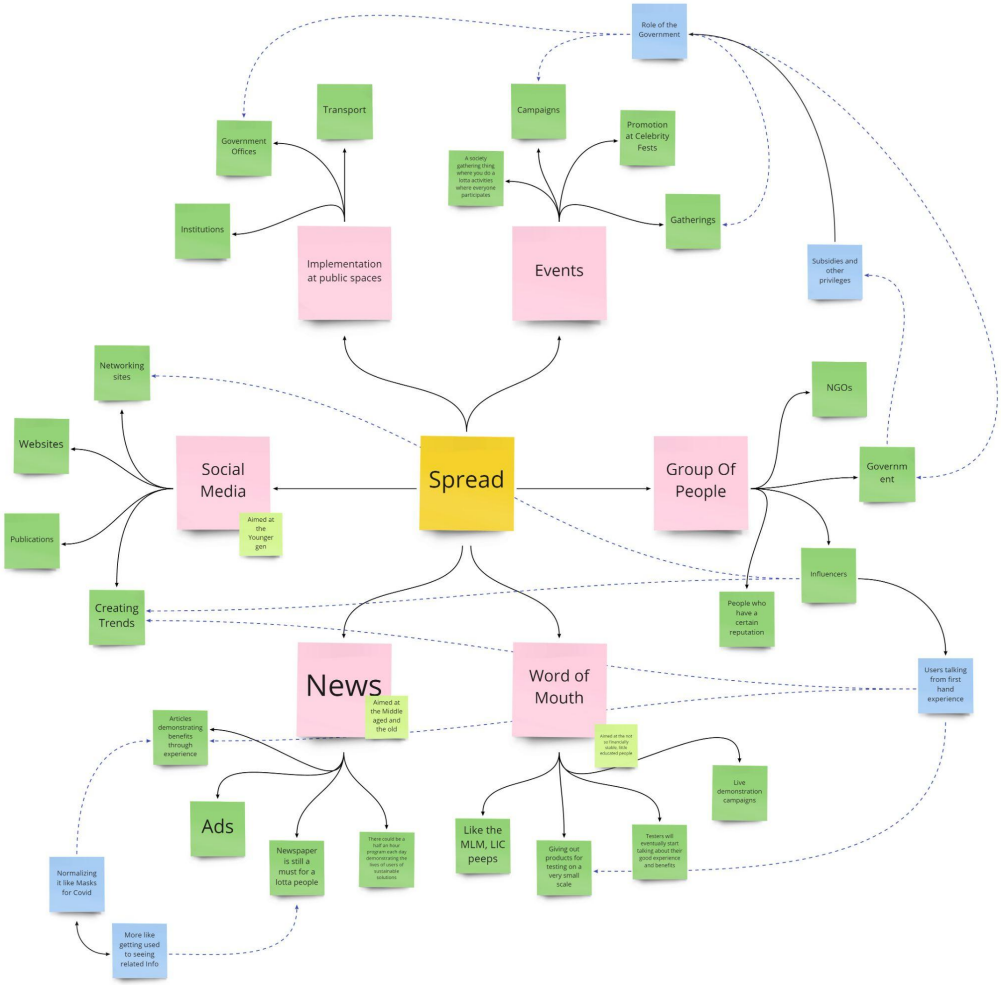
Reaching out to appropriate facilities for sustainable products/ services is tedious and people need to have a lot of motivation to put that much effort. To make that more accessible and convenient, some sort of spoon feeding intervention can be brought in like increasing presence of the products in speech through affiliate marketing especially through housewives or even retired people. There can also be some sort of a ‘kit’ that is readymade for smaller level alternatives or products. Motivation of people can be increased by incentivising practices or alternatives. Also refer to motivation theory that tells about the 5 levels of needs that are fulfilled in order to keep us motivated.

7.1.2 Awareness 2.0

We further looked into awareness 2.0 and listed down a bunch of possible questions that we intended to cover. They included

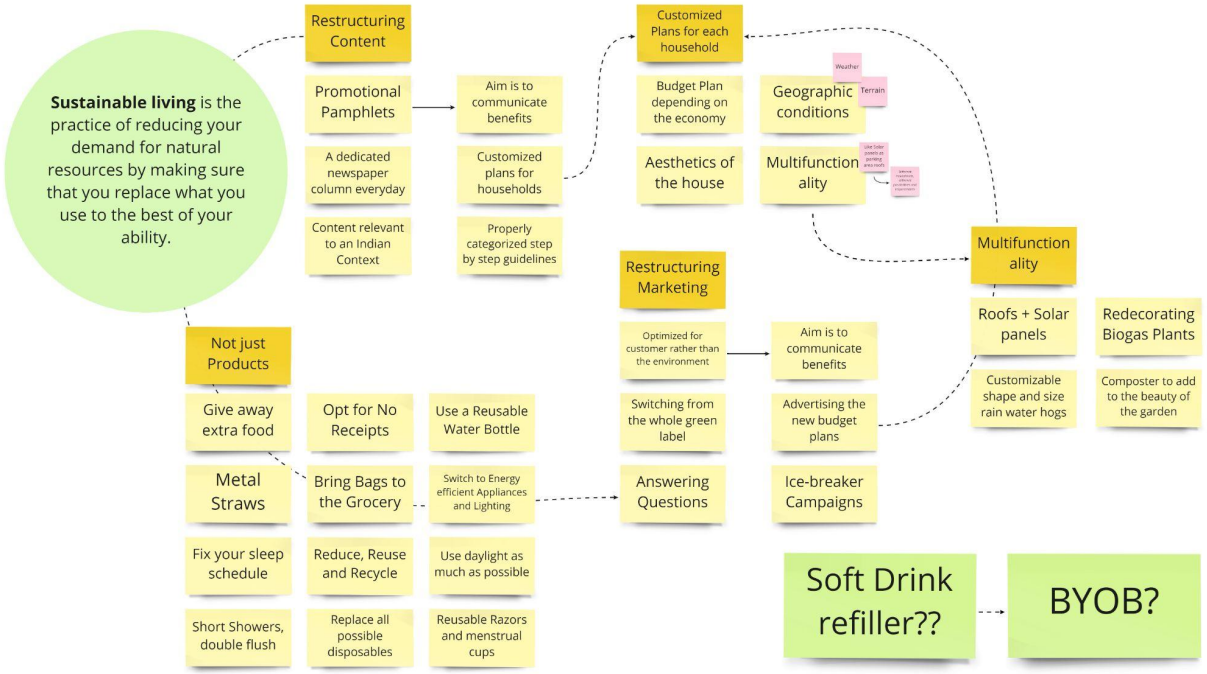
- How do you shift?
    - Who do I call?
    - How do I adapt?
    - What happens to my existing thing?
    - Where do I go?
    - Cost Breakdown?
- What are the personal benefits?
    - Saving money in the long run?
    - Saving Time?
    - Ease of use?
    - Durability in the long run, hence saving money on maintenance?
- Assurance that the alternative is viable in the long run?
    - Where do I go for sales and service?
    - Will maintenance be expensive?
    - How often do I have to do maintenance?
    - What do I do if it stops working and I have no back up?
    - What happens if I decide to shift to a new location?
- How well does it fit into my daily lifestyle?
    - Does it take up a lot of space?
    - Can it be multi-functional?

    - Does it involve a change in my lifestyle?
    - Will it be compatible with the rest of the family?
- How well is it accessible / feasible, given the economic and geographic conditions?
    - Space and Terrain constraints?
    - Weather conditions?
    - Customized location based planning?

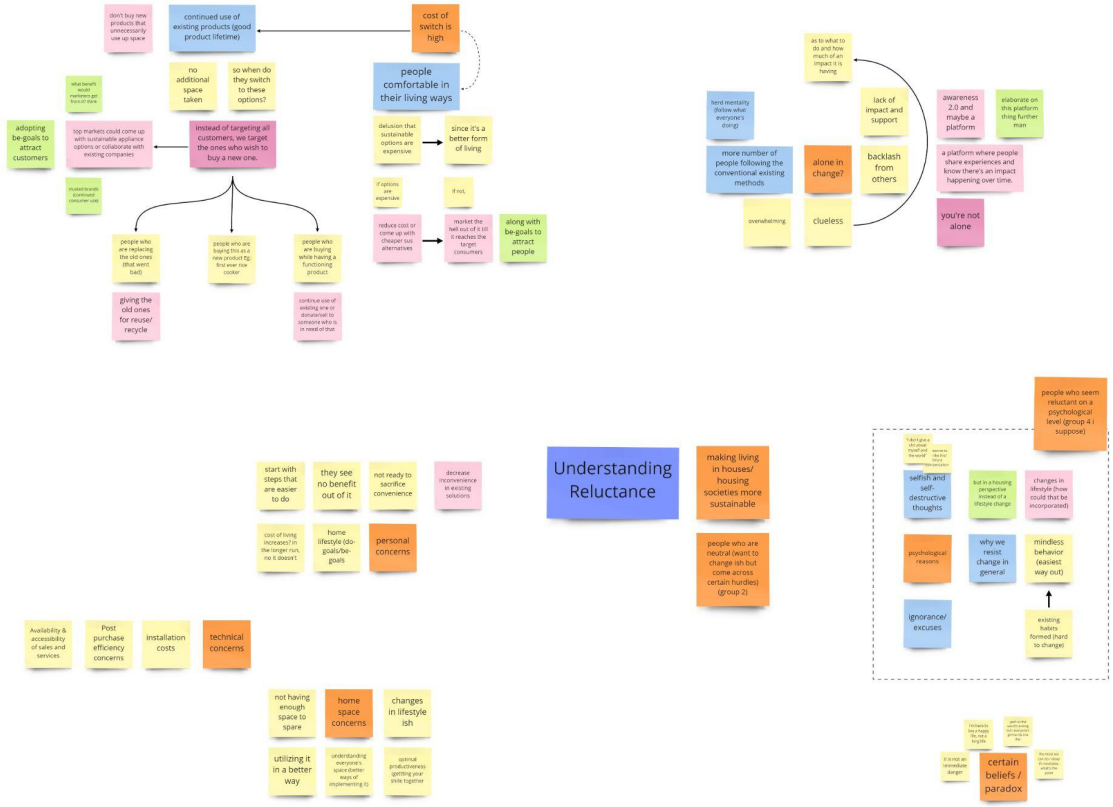


Once we had the questions in place, we looked into the various possible media which could be responsible for the spread of this information as shown above.

We further looked into the aspect of society that people didn't know about. The one which reaffirms that sustainability is not always about switching off lights and installing solar panels. We looked into various workarounds that could help a user to start at the most basic level in a household and society level as can be seen below.



7.1.3 Reluctance



Why do people resist change, and how would it impact people shifting to different housing backgrounds. Would it make sense to just provide them with a better, sustainable home and facilities. How do we know that they won't go back to the ways their current (more unsustainable) lifestyle.
A more psychological perspective of why we resist change, the term "I'm in a rut"- mindless behavior. We then go to certain reasons (in a more sustainability context) as to why we do that which involves reading such as being alone in the change, not knowing how much of an impact is happening based on their actions or feeling like what they're doing is not having an impact, not willing to sacrifice the convenience and familiarity of our current lifestyle, people questioning and dominating tier lifestyle into yours because they don't understand it and so on.
Then we also considered current measures and studies on how people have tried to enforce change, and certain terminologies as well. (Value type universalism) and (habit discontinuity hypothesis) from some papers; even areas like marketing and so on.

7.2 Approaches

We ideated various approaches we could implement as a framework

7.2.1 Approach One

Product / Method Based (change in existing terms)

- Convey information to the public regarding the products and the shift
- Things to consider
    - Economic Condition
    - Culture
    - Geographic Conditions
- Information to be conveyed
    - About
    - Installation
    - Time Required
    - Cost Breakdown
    - Time taken to get the money back as savings
    - Maintenance
    - Contacts (Sales, Service)
- Basically everything in the weird blue sticky notes

Changes in Lifestyle? (change in our own ways of living)
For the long run (The 10 years maybe?)

7.2.2 Approach Two

Guidelines (different approach): creating guidelines for us to follow, and then taking action and approaching respective stakeholders based on those individual guidelines.

7.2.3 Approach Three (act based on that timeline)

Prita's cause and effect thing, where you initiate something that would be the cause leading to the effect which in turn acts as a cause leading to a more sustainable world - chain

Do some immediate things that would attract some users. Then it would have some effects and build on that. Some people who would not change and they won't change - so they might change because of more number of users- subconscious thing

7.2.4 Approach Four (the mindset of stakeholders)

The classification of People based on their take on sustainability

- People who know and have shifted
- People who know but don't know how to shift
- People who don't know and don't know how to shift
- People who know but don't want to shift

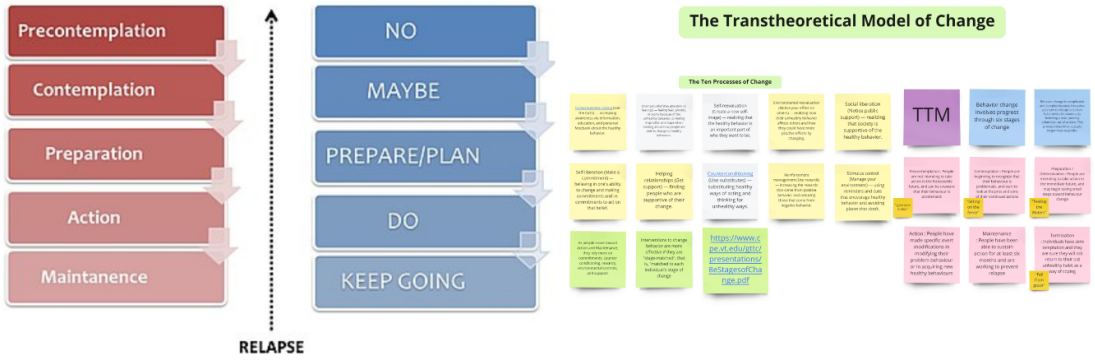
7.2.5 Approach Five

The foot in the door technique

- Approach people first, plant an idea
- Approach marketing people and suggest strategies that would be aimed at making consumers buy the product considering the planted information rather than just for the profit of the company. This would eventually lead to profit for the company anyway.

Then when people start to comply with it, people who don't want to shift would subconsciously start shifting

7.3 Transtheoretical Model and User Groups



The Six Stages of Change

Stage	Precontemplation	Contemplation	Preparation	Action	Maintenance	Relapse
Standard time	more than 6 months	in the next 6 months	in the next month	now	at least 6 months	any time

The transtheoretical model tells about the six stages a person goes through when undergoing change and each stage requires a different kind of action to avoid relapse.

Using this information we came up with our user groups based on the different stages as people can be at different stages and it can change with time and this will also help in creating appropriate interventions.

User Group 1 - People at the action stage that have already adopted sustainable alternatives

User Group 2 - People at the preparation stage that want to adopt sustainable alternatives but don't know how to.

User Group 3 - People at the contemplation stage where they know about sustainability but don't care much about it

User Group 4 - people are at the pre contemplation stage where they are not at all ready to consider adopting sustainable alternatives

8. Our Approach

By considering our preliminary ideation, we formed a framework which is like a broader long term plan, spanning over 10-15 years within which various interventions targeting various user groups based on the transtheoretical model at various stages would work out. It involves some initial actions that would be a trigger to the entire process.

Phase 0 : Setting the ground
Phase 0 is the starting phase and it includes businesses, NGOs or different clubs setting up things for implementation of guidelines or restructuring of marketing strategies to plant the idea of sustainability in the minds of the people. This can involve a weekly column in the newspaper on sustainability which is a subtle way of increasing presence which would subconsciously register in people's mind. The effect of this would be different on different groups. Some would be intrigued by it and would be enthusiastic to know more about it whereas some would just ignore it. However, this will set a ground ready for Phase 1 to take place.

Phase 1 : People who want to shift but don't know how to
This stage would target people who are willing to shift to sustainable alternatives but are clueless about how to go about it. This would be tackled by making a comprehensive collection of information about various aspects like the system, the installation method, space required, the time required, cost breakdown, maintenance, and servicing, etc and

relevant to their economic condition, culture, geographic conditions, etc available to them through some media like workshops, website, social media, etc

This can also include people who have recently retired in activities like tester onboarding and some other activities through which they can spread right information to other people.

The people targeted in this phase are already motivated to shift and we plan on aiding them and making their shift smooth with an aim to minimize loss of potential users due to lack of accessibility.

As these initial actions start working, they will have some effects like the number of users will increase slightly resulting in reduction of some reluctance and happy customer stories will also connect the idea of sustainability with something beneficial in the mind of the rest of the people which can trigger a change in their stage according to the transtheoretical model. This we inferred from our causal loop diagrams.

Our sample size of 115 for primary research might not accurately represent the larger population but given the limitations and scope of the project, we assumed that to be true for the larger population. According to our primary research around 30% of people are willing to shift but don't know how to. 10% are not willing to shift at all and the rest have reluctance due to installation, efficiency concerns, feeling of inconvenience, etc

Phase 2 : Those who know about sustainability but don't care enough about it
Along with Part 1 of solutions and the effect of reduction of reluctance happened as an effect of Phase 1, there would be attempts to further reduce reluctance among people who fall in the 3rd user group in order to motivate them to adopt sustainable alternatives which can be done by introduction of various incentives or personal benefits for using sustainable alternatives

These are the kind of people that are aware of the harmful effects of unsustainable lifestyle but they don't want to switch as it is not affecting them or they are reluctant because of some reasons or they feel it is inconvenient or too much work. This stage is more about convincing people to shift by working on the reluctance factor.

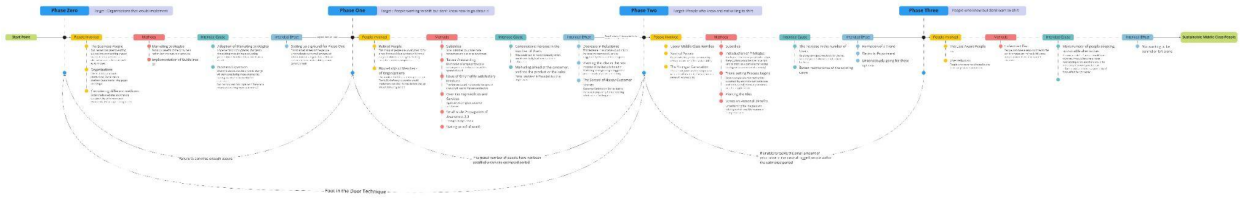
Around 60% of people have reluctance in terms of different aspects.

Phase 3 : People who are adamant about it

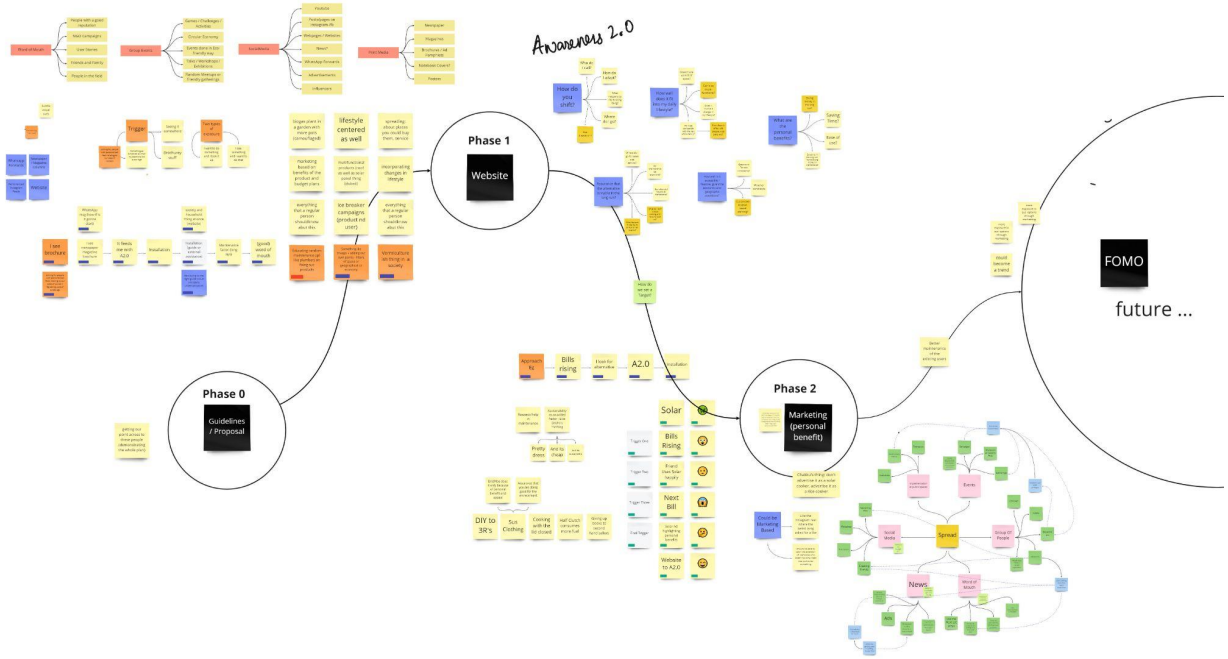
Even after this some people would be really adamant to change. The third phase is about those that are in this pre contemplation stage. For them, we do not have a separate intervention but the system would work in such a way that at a point there would be

enough people that would be using sustainable alternatives that it would be a very normal thing to do and people who are using it are getting benefits from it, as mentioned in the phase 2. Due to this the adamant people might have fomo and might feel left out if they are not using it. So this collective effect from the previous two phases can in turn drive some of the adamant people to start shifting to sustainable alternatives.

8.1 Methods in the Framework



We initially created a timeline as shown above and started off with this. We later used this as a base to create our final framework which can be seen in the image below.



After laying out the main framework we looked at how some of the methods that can be followed with respect to this framework can fit into it.

First there will be a trigger like having a weekly column on sustainability in some newspaper to attract people who wish to change (but are not exposed to how), some of them might include the retired people; or posters and guidelines sent out to housing societies regarding a specific intervention from an organization or company. So that it will feed this concept to people in a

subtle way which can get them interested in it. So because of this trigger some people can try to find out more about it. (Them researching things and looking for alternate solutions and so on)

After this, as mentioned earlier, the next step would be to equip people who are motivated with all the information they require to go ahead and actually do it.

One of our interventions was to have a website which fulfills different functions. One of the main ones was this, giving more information about all sorts of sustainable solutions and also the information about how to go about implementing it, like a guide of sorts. People can see a comprehensive list of products and approaches and can apply various filters according to their demographics like space, climate, family size, etc in order to be able to choose better.

One of the other parts of the website is stories from people and their experiences of going about adopting sustainable alternatives and one best can be published in the newspaper every week or so. We also intended to have a section equipped with guides to, for example, set up vermiculture at home, in a more comprehensive manner and contacts and links related to that so they don't come across any issue while utilizing and maintaining a certain intervention.

So in this way we intend to cater to the needs of the people who want to shift but are not able to understand how to do it and we hope they would start using sustainable alternatives

The happy customers from this could share their experiences on the website and some of the best ones can be published in the newspaper every week or so

Moving on from here to the next phase where we intend to make an intervention for reducing the reluctance among people. Some part of it is covered by the effect created by the previous phase where customers share happy stories and the increased number of users makes it feel normal.

To further reduce reluctance and motivate people to use their sustainable alternatives we decided to link it to some personal benefit that they are getting. Like a social status, or getting your photo in the newspaper for your sustainable efforts or other benefit. This can also be more quantifiable benefits like emphasis on the number of years within which the alternative will start being beneficial when mentioned on the website.

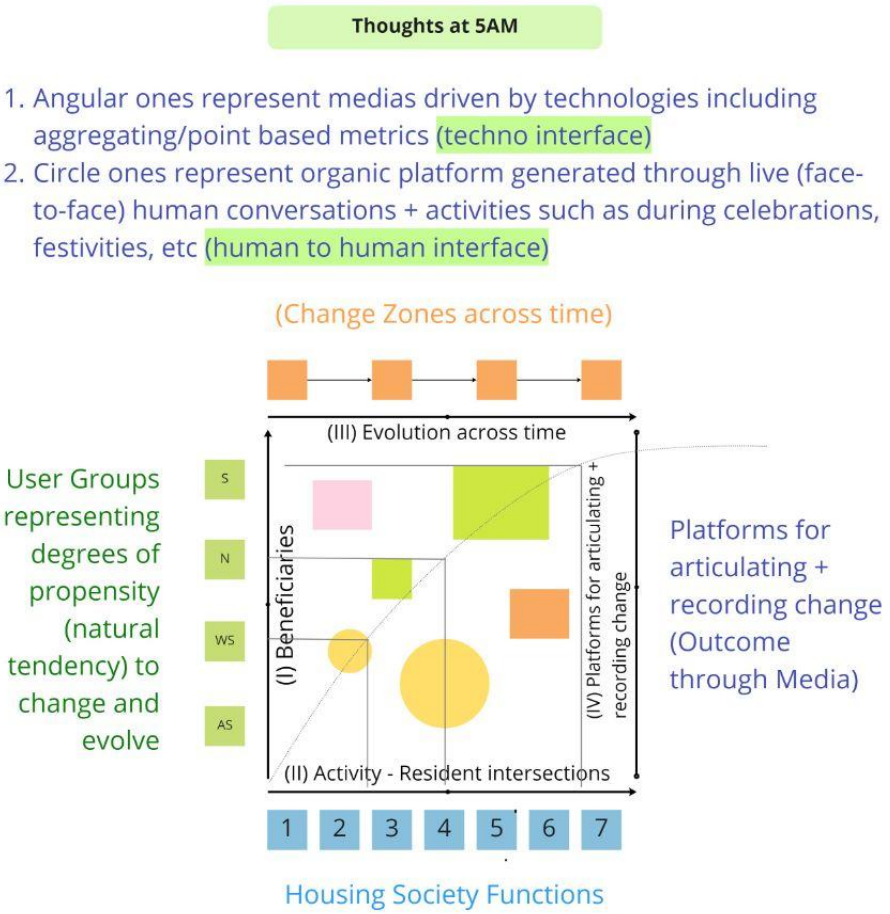
These personal benefits would push a lot of people to adopt sustainable alternatives.

8.2 Feedback Monday 19/4

- Analysis is detailed
- Would phase 1, phase 2, phase 3 turn into a set of guidelines? If yes, how would people access it? Would it be on the internet? -
- What would be design outputs? We initially thought of guidelines - marketing strategies

- Let it remain as a guideline - Can't detail out everything - but can show bits of it - detail out one of the things - we can detail out phase 0 or phase 1? - there are many things in each phase - has different methods - awareness, subsidies, etc which are activities to be done - some are cause and effects like consumer stories to others - take up some issues from this and show how it can be done -
- Asked what our plan was - said we didn't consider much - took inspiration from UN to create our own approach
- If we have to present it is as a blueprint that societies or institutions can follow - how to present it? - like sdg put it in a format that is very easy to follow - broader goals and then details are there - they've created icons - you can make your thing a bit more visible -
- How to put it in a form that it becomes useful

8.3 Bonus Meet with Prof Ajanta



We were able to set up an Emergency Meet with professor Ajanta and we received a lot of valuable insights. She sent us a really important model that shaped our framework later.

I was thinking about what your group presented today. Your group has had some good analysis, mappings, etc. so far.
Within this systems level framework of the housing society ecosystem that you have arrived at, you need to find a very simple problem area that is like a real-felt need for the residents. And see where this fits into the mapping.

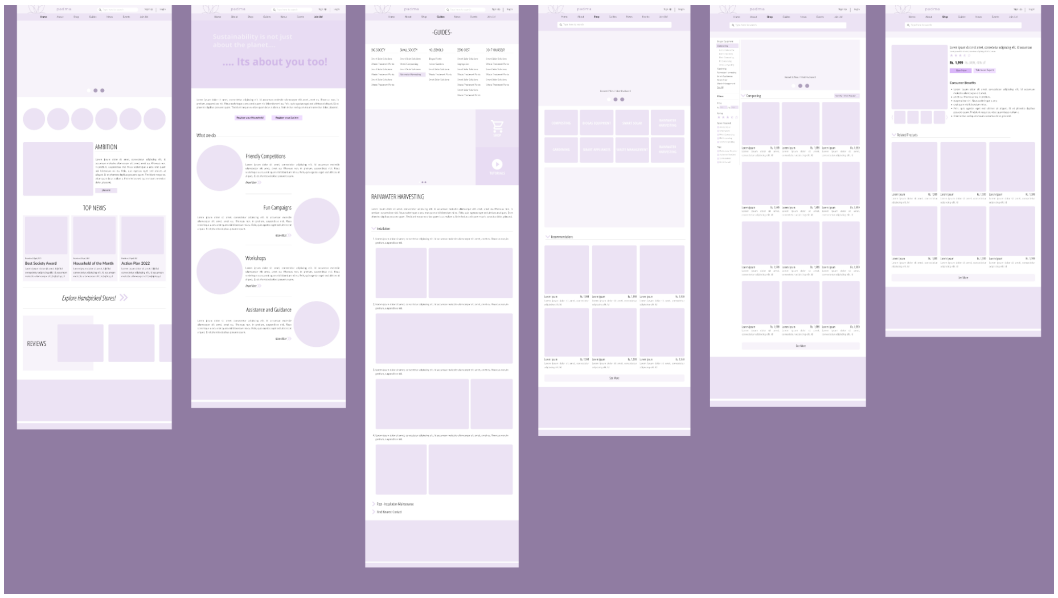
Since you are already grounded situationally into your problem ecosystem (because of all the analysis work), take a step back away from all this cognitive stuff because sometimes it helps at this post-analysis stage close to ideation to become free thinking. In the morning when your group meets up, don't touch your analysis. All three of you by now know your analysis quite thoroughly. Pretend the analysis has got misplaced/deleted, whatever. Since you have already familiarized yourself with the problem area, try to put yourselves into the shoes of the residents. What do you find acutely missing from their point of view?
(your user groupings into four categories is correct), so you could put yourselves into any or all four user groups, and then look at them commonsensical to see what they crave the most for their society to have (or what they seek to eliminate). Since you have put yourself into their shoes, you will also feel empathy (remember, the shoe reference is to a shoe that hurts/bites, hence only the wearer knows how painful that can be).
Spend some time diving into that reality without the charts, etc because that info is deep into your heads by now.
Maybe even take Covid as a filter. Or noise levels (daily/seasonal) etc., that affect exam preparations or the elderly/the ailing residents trying to rest.
It's just an arbitrary example to let you ease into the problem area light footedly. Just pretend there are these serious problems that you have heard your parents and neighbors discuss over some Diwali get together (per-Covid).....
And you say, it is worth a design opportunity.....

When I say dimensions I mean it as four dimensions of the given problem space. You have figured out the exact players for the first two dimensions of the ecosystem. The third one simply requires you to choose which function you wish to take up. And then, having selected a function as a core proposition, place it in the centre and draw a network diagram to understand
(1) its points of intersections with the residents and the built architecture + intangible environment with already existing elements such as signages, murals, posters etc and
(2) what intersections does this function have with the other functions of the housing society
In the process your systems level articulation is taken care of. And all the points of intersections thus identified as (1) & (2) across the entire system become the potential areas of design interventions.
- Prof. Ajanta.

Since we were short on time for the next day's presentation, we could only make use of these valuable insights during the course of the next week.

8.4 The Website

Post the frameworks, we moved on to creating websites. We created five screens for the sake of the presentation and decided to go ahead with it only after getting proper feedback.



8.5 The Infographic

The infographic would represent a society which we will be using as a persona of sorts, where we will have sub personas as different households, each belonging to a particular phase. These would help us in demonstrating the effect that one house would have on the other and how they evolve over time.

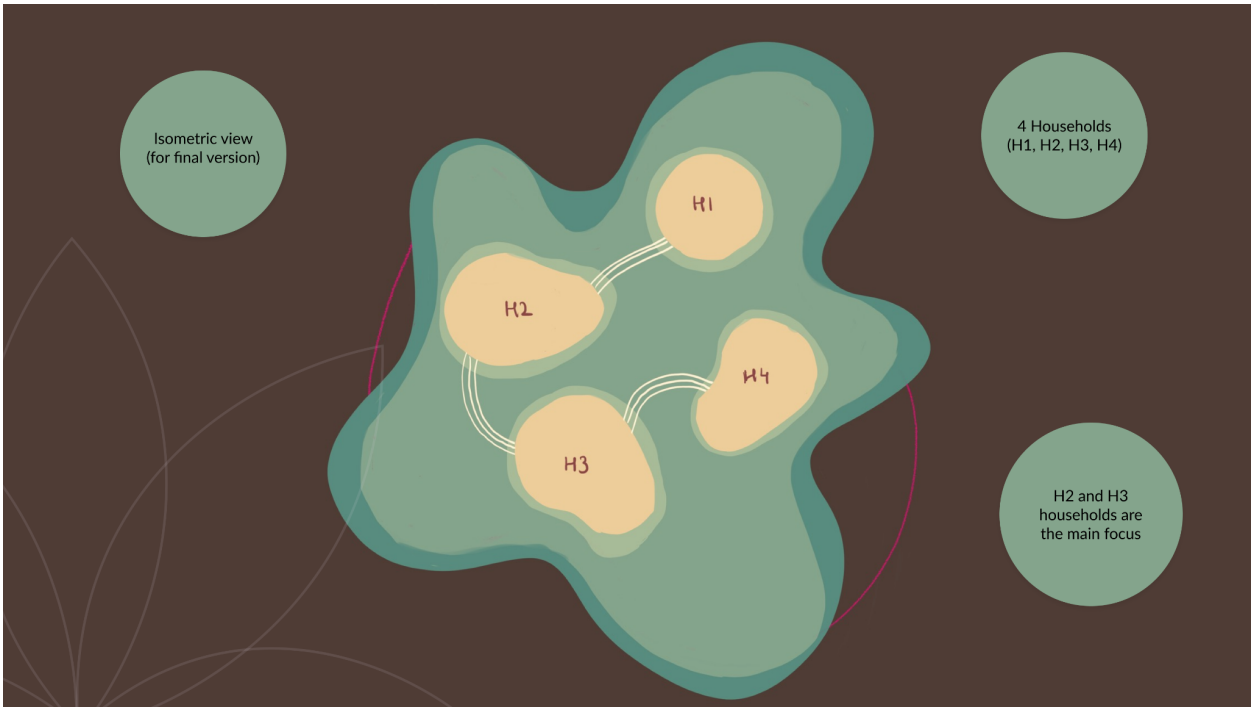
We planned to start with explaining all four households (which is based on our divisions of user groups) in the format of a road map, based on how they would fit in our make-believe society. While considering the infographic we would be mainly focusing on H2 and H3 (H= Household) as we feel like most people would belong to these categories (w.r.t. Where our intervention is possible)

Household one (H1) represents the people in the household that has already shifted or is in the process of shifting to a more sustainable lifestyle. They are at the maintenance stage. As a part of the process, it would start with them either coming across the website by themselves (as it is already part of their lifestyle) or would lead to some kind of direct or indirect trigger. Once they do, they would feel comfortable and familiar enough with those options and don't really find specific issues with incorporating or installing it in their lifestyle, although the website might make

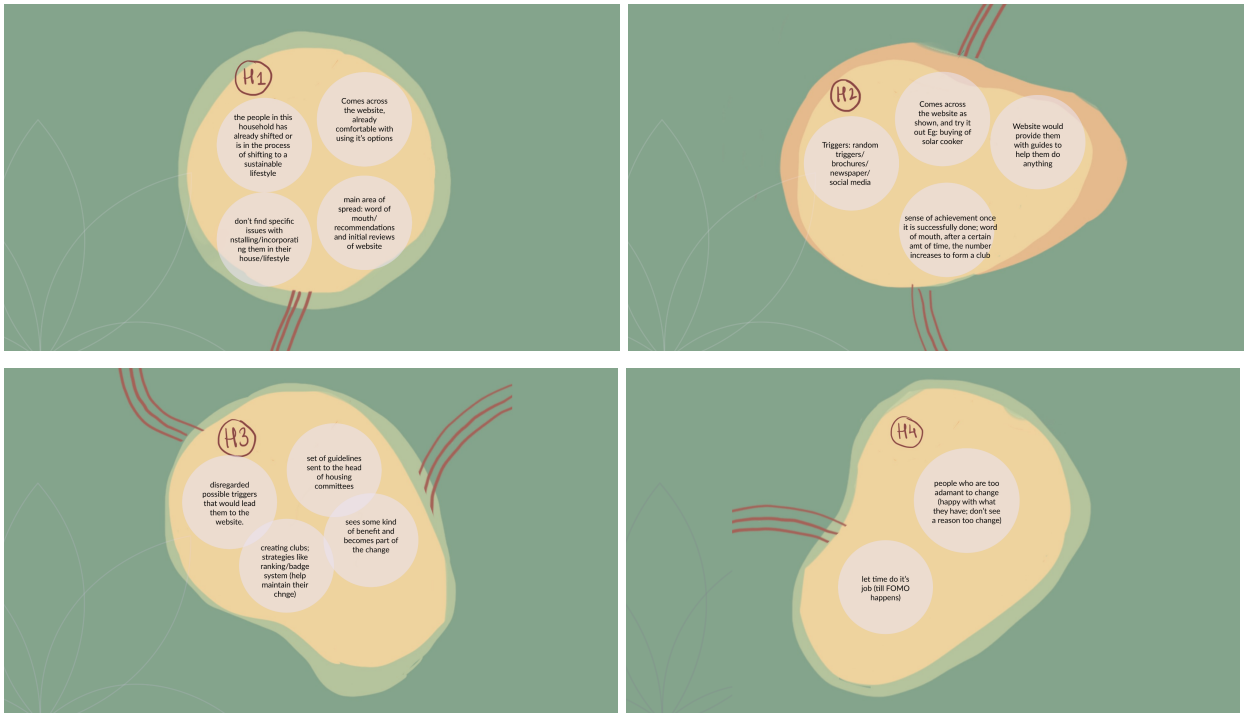
these options more accessible than before. Their main area of spread to other people of the society would be through word of mouth/ recommendations and initial reviews in the website.

Household 2 (H2) represents the people who are willing to shift but doesn't know how. They should ideally be in the action stage. Once household one gets familiarised with these products and through spread of recommendations from word of mouth, H2 finds out about it. It would also come across indirect triggers like social media, newspapers, brochures etc. They hence come across the website and get encouraged by the reviews and the small online community that has formed. So they decide to go for it, while facing a lot of difficulties on the way, which could be cleared based on the guides present in the website. Once it is successfully done, a sense of achievement arises and more words of spread happens. And by a certain amount of time, the number increases and it becomes big enough to form a club.

Then we come across **household 3 (H3)**, which has probably disregarded all possible triggers facing this unless it intrigues him in a way or sees some kind of benefit out of it. The triggers would range and range but getting them into the action phase would be a hassle. Hence there would also be a set of guidelines that is sent to certain households, about how to make societies more sustainable, which would involve aiding them in creating some kind of club and involve strategies like point system, badge system, ranking/ privilege system to get more people involved in this. More or less once a household sees some kind of benefit in it, it becomes a part of the change. A club approach would also help them maintain their lifestyle and have activities that happen periodically to keep track of that.
(We did consider this (guidelines) as a final output as well but due to time and project constraints we decided to not focus on it)



Finally we have **household 4 (H4)**, people who are too adamant to change. They're happy with what they have and don't see a reason to change. We realized the most we can do here is wait, till the number for people who start doing more sustainable actions (as a part of the club) increases and eventually they would be facing (FOMO) (Fear of missing out) and then give in to a better lifestyle.



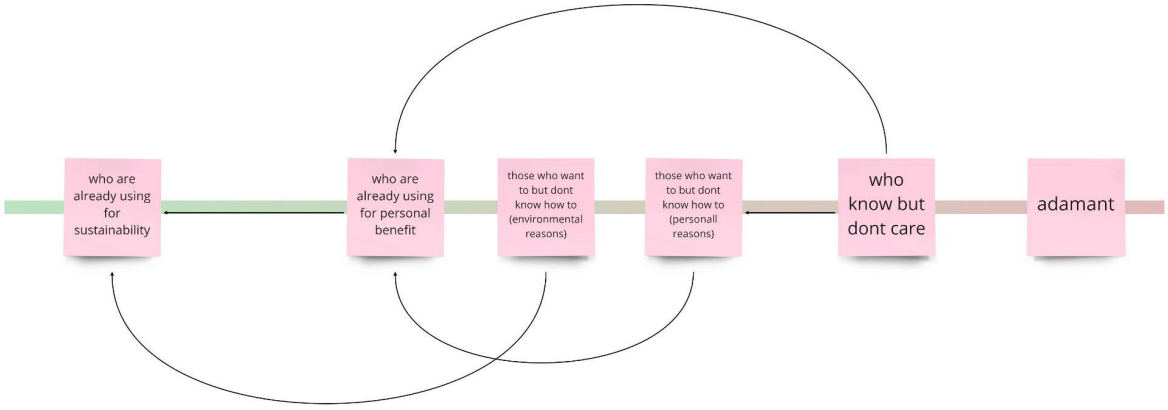
8.6 Feedback Post Week Four Presentation

- Taken integrated view of functions - rain water, vermiculture, etc many others and not concentrating on one to the end - is good/fine
- Four user groups - four households is fine
- Change proposition is also nice and simple now - unlike what seemed complicated earlier
- Platform - website is mechanistic - organic feel of interaction - get together for festivals - sense of presence - physicality of it - sensory presence an application - conversation as organic media - make platform more alive
- Very cognitive - many never go to website - make sure they get interconnected -
- Intent and all is fine - anatomy of media should be looked at
- Someone throwing stuff outside balcony - visceral sensory interaction - not reflected in website
- Squares and circle - look at sensory spaces, social spaces and cognitive spaces - what media will they take on, some will be audio - some can be touch driven - what interactions can
- How to convert shouting from window in website - more imaginative - functions is fine
- More richness in website - which elements very important for interaction
- USP of website

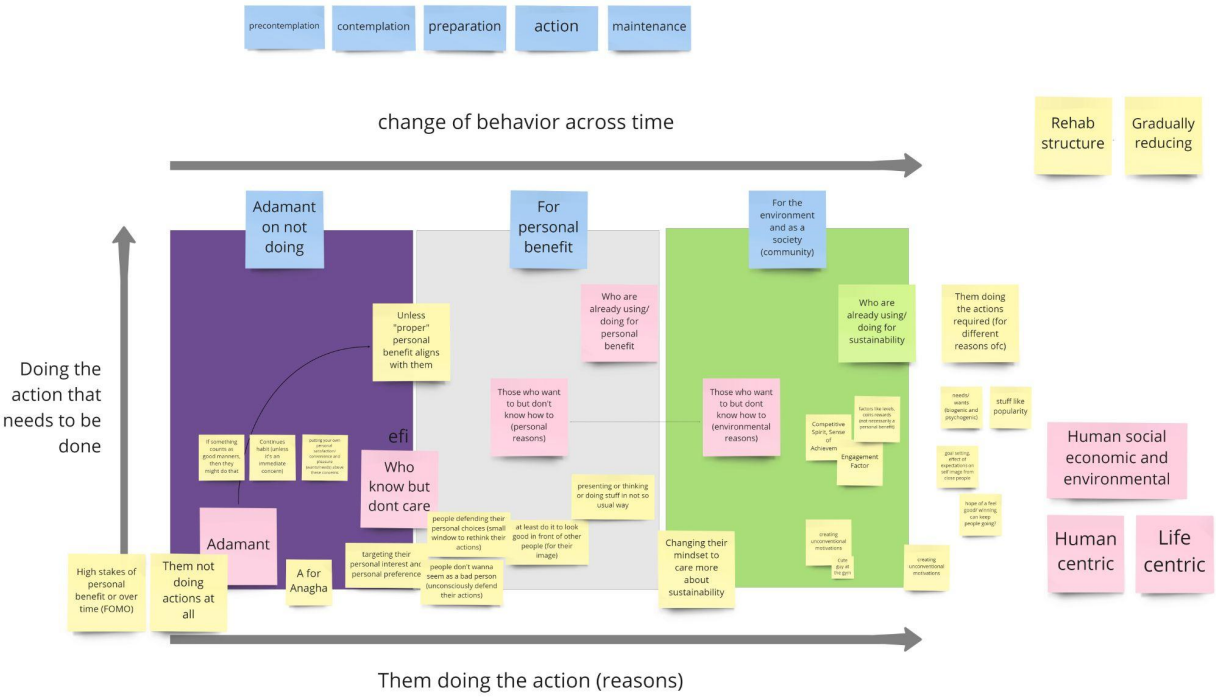
- Translate a sense of community and anatomy of space into a website. how?
- Can be continuity between digital and physical in housing - can carry through posters - sticky notes

8.7 Re-understanding our User Groups

There is a spectrum of different mentalities in society, all of them having varying degrees of reluctance towards adopting sustainable practices The spectrum runs from the most adamant to those who have already incorporated sustainable alternatives in their lifestyle.

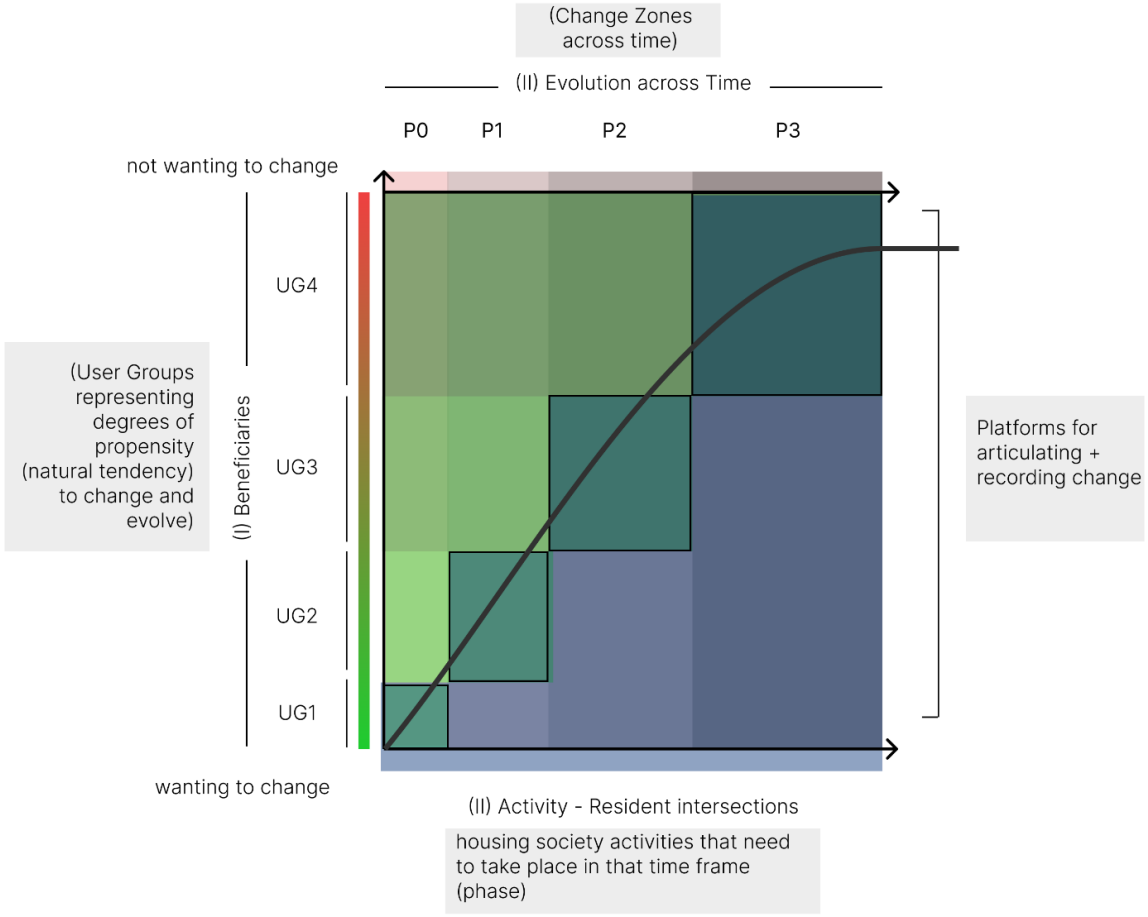


We used Prof. Ajanta's Model as a base for the following.
Since figuring out our user groups and setting a timeline was the first stage in our final solution we then approached Prof Ajanta where she introduced us to this model that basically summarizes the intersections between circular and angular functions and the responses over time.
We started with putting ourselves in the shoes of the four households and looked into what issues we would be facing while living in society. Since our problem as a whole was a tough area, focusing on a simple intervention we could come across and look into how we can implement that among all four households seemed like a more sensible approach to explain things. While we did that, We realised how actions and intention were different things. We could try and try to trick the public to do things for the environment while thinking of their personal benefit but that won't last because at one point they'll have to realise that we should indeed be doing it for the environment. With intention in mind we made another graph dividing them into three areas: intention of doing it for the sake of sustainability; intention of doing it for themselves; intention of putting their personal life and comfort over everything else. (Graph below)
Through ajanta ma'ams' graph we also figured out the other elements that would affect our whole process, such as the timeline we had created (and dividing them into four phases), considering our user group as a spectrum (and dividing them into four phases); co-relating our timeline with the actions/ interventions that has to be done in a more society level, and then once the interventions are layed out, figuring out a platform required to measure the change over time.



From the above model we collected the similar insights and grouped them to identify the core qualities that shape the social human being under four major categories which we later used as targets to achieve our goal (personal benefit/preference, creating an engagement factor, understanding goals and motivation and targeting their social status).

8.8 Redefining the graph



With that knowledge we decided to create a brief diagram that summarises our whole process. We first finalized our four user groups which we've included as a spectrum (along the vertical axis), which represents degrees of propensity to change. We then divided our whole timeline into four phases (horizontal axis) as steps for our interventions, and then we finally have the activity - resident intersections at the bottom, which is basically the housing society activities that need to take place in that given time frame. So the green boxes are hence, the possible interventions that would occur in each phase while targeting a certain user group (and the size specifies how big of an intervention is required.

9. Final Output

9.1 Core Proposition

Our aim is to have a timeline based approach to make the transition from our current lifestyle to incorporating sustainable practices and options, while tackling issues of possible reluctance and enabling awareness on a society level.

9.2 Final Categorisation of Phases

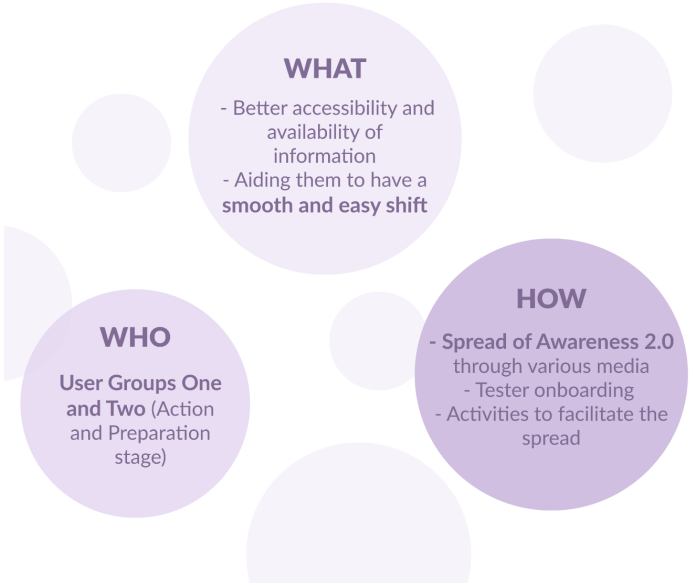
We reconsidered the phases and our plans with respect to the feedback that we received. This reshaped our whole project.

9.2.1 Phase Zero

Based on the Intersections and the spread of the user groups across our Timeline, we created four major phases. Phase Zero is where we lay our groundwork. During this phase we will get in touch with our stakeholders which include NGOs and businesses, to whom we'll propose our plan. The main aim is to plant the idea of sustainability in the minds of people and we mainly hope to achieve this through restructuring marketing strategies, to which we'll get to later.

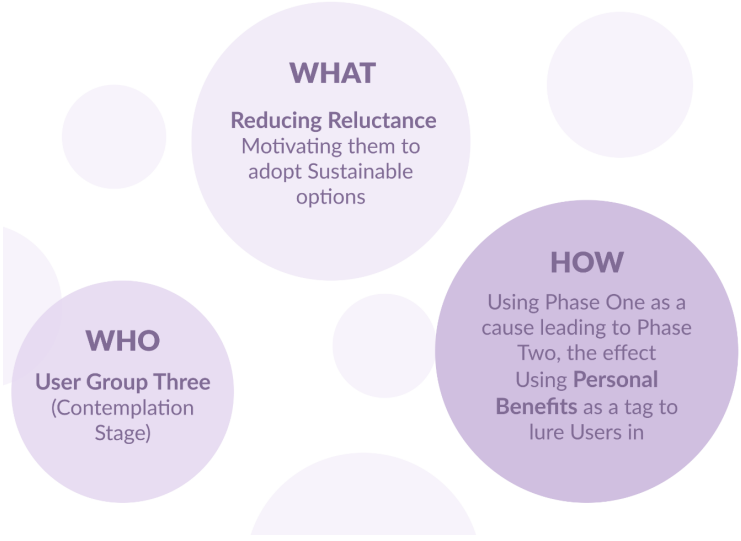
9.2.2 Phase One

Now phase 1 would target the Second User group that is people who are willing to shift to sustainable alternatives but are clueless of how to go about it. This phase mainly focuses on making their shift easy and smooth as they are already motivated and we want to minimise loss of potential users due to lack of accessibility of information. For this, the information about subsidies, the installation method, space required, maintenance and servicing, etc and relevant to their demographic can be made available through newspapers, websites or even social media. This can also include people who have recently retired in activities like tester onboarding and some other activities through which they can spread right information to other people. As these initial actions start working, they will have some effects like the number of users will increase slightly resulting in reduction of some reluctance and happy customer stories will also plant the idea of sustainability in the mind of the rest of the people which can trigger a change in their stage according to the transtheoretical model. This we inferred from our causal loop diagrams.



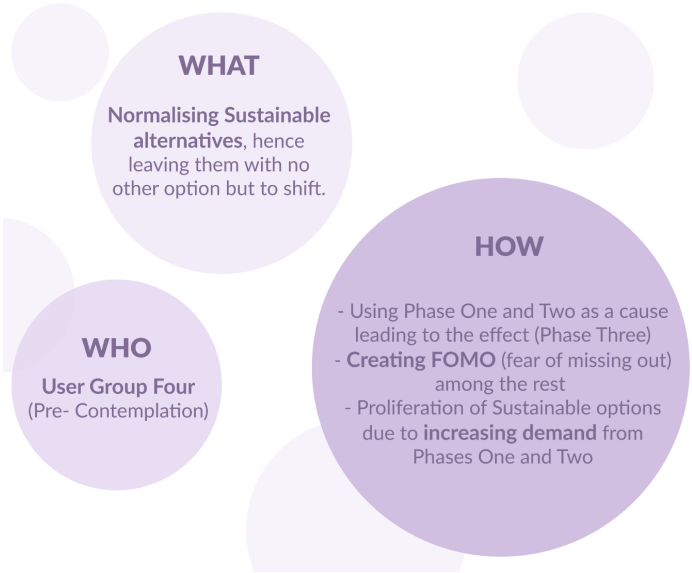
9.2.3 Phase Two

Phase Two deals with the third user group which is in the Contemplation Stage. The main aim here would be to Reduce Reluctance and create some kind of trigger which would help them consider a shift. We hope to achieve this By using phase one as a cause leading to the rise in demand of sustainable options and by using the tag of personal benefits.

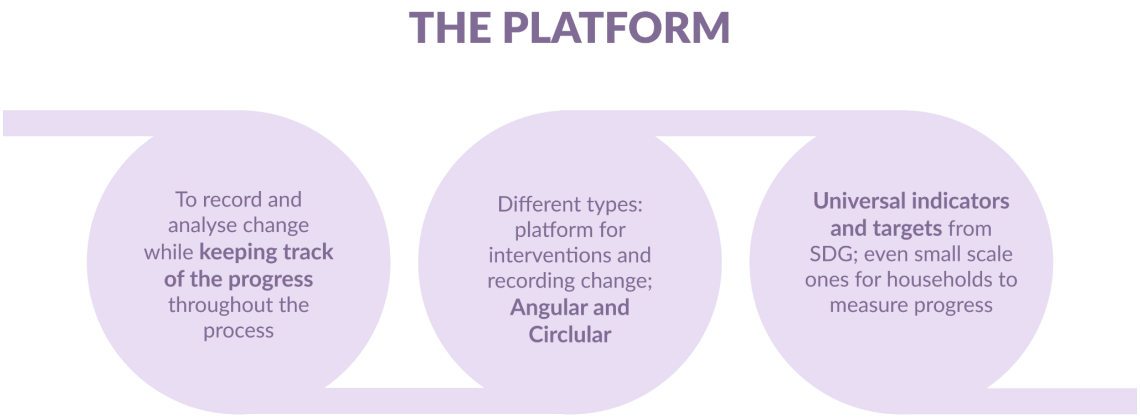


9.2.4 Phase Three

Phase Three focuses on User Group Four, who are the most adamant when it comes to a shift. By this time, Sustainable options should have become normalised and They will be left without an option but to shift. Phase three will be the combined effect of all the previous mentioned phases which creates a fear of missing out, hence driving the adamant people to be part of the transition.



9.3 Platforms to record change



As the final element we intend to measure or record the change which serves as a proof that shows that the transition is showing results which will further motivate people. We aim to do this through various platforms of with some are qualitative (like maintaining score boards or documenting change of emotions) or more quantifiable (like measuring the air quality index, etc) some are angular platforms (angular ones represent medias driven by technologies including aggregating/point based metrics (techno interface)) and circular platforms (Circle ones represent organic platform generated through live (face-to-face) human conversations + activities such as during celebrations, festivities, etc (human to human interface)) and finally through universal

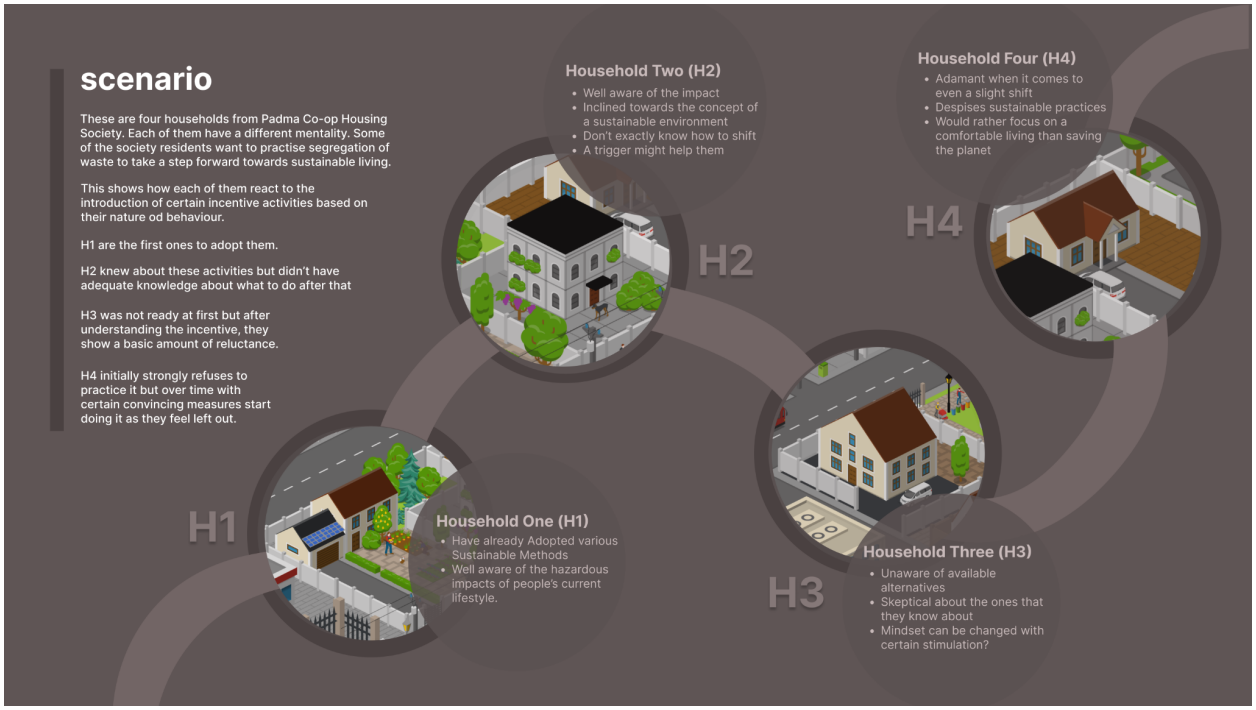
indicators at a household level like the indicators of the Sustainable Development Goals by the United Nations

9.4 Padma Co-operative Housing Society

To get our approach across better, we created a hypothetical, representative, miniature housing society that illustrates how our approach would be set in action. It is also an example of how the approach would differ based on the area/ domain we're dealing with. In this case, we've considered examples and interventions that are possible in a more housing society level while focusing on hurdles that certain households might come across while implementing those actions, hence proposing certain solutions resolving those issues and giving possible parameters to record the change.

9.4.1 Scenario

These are four households from Padma Co-op Housing Society. Each of them have a different mentality. Here we would be trying out three different actions (namely, planting of trees, green energy/ energy bill management and public littering/ segregation of waste) while targeting personal, social, economic and environmental aspects along the way. All four households would hence react differently and hence we provide solutions as to how each concern can be tackled. As like this scenario, this applies to whichever scenario to pic (irrespective of housing related) where you could have comprehensive solutions on how to tackle that as well. All would be considered by filling this customisable form giving to different kinds of organizations and hence come across interventions w.r.t to their situation.



This shows how each of them react to the introduction of certain incentive activities based on their nature of behaviour.

- Household One (H1) is the first to adopt them.
- Household Two (H2) knew about these activities but didn't have adequate knowledge about what to do after that.
- Household Three (H3) was not ready at first but after understanding the incentive, they show a basic amount of reluctance.
- Household Four (H4) initially strongly refuses to practice it but over time with certain convincing measures start doing it as they feel left out.

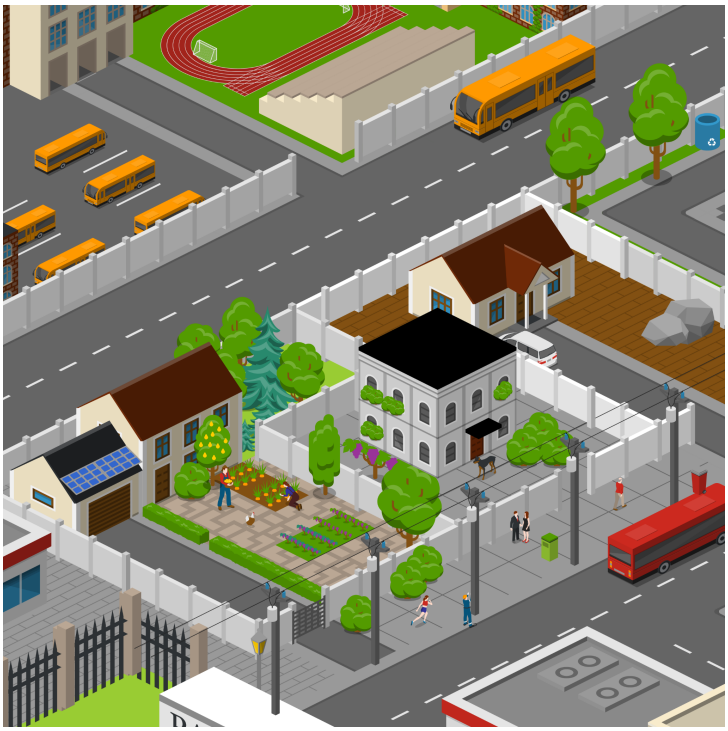
9.4.2 Example One : The Planting of Trees

Tackled Pillar of Sustainability : Social

Our first act is something as simple as planting trees. As we've come across multiple statistics pointing out how if were to plant one tree (okay some fake statistics here). In this area we'd be focusing on the social and community aspects of a society.

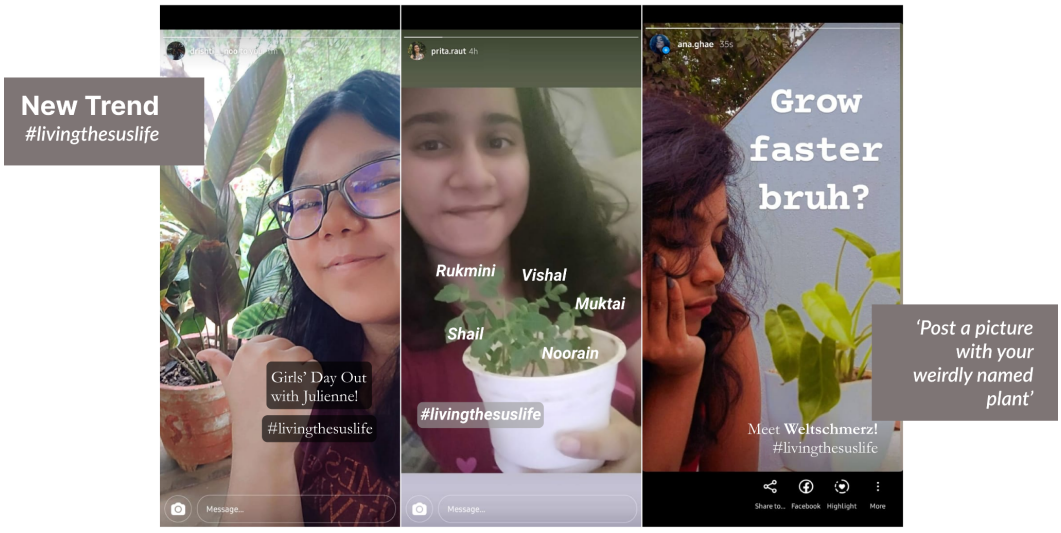
Possible Approaches

- The issues we'd come across is how certain individuals/ households won't be compliant on doing it because it "doesn't affect me" and it "too much of work". Hence some solutions would involve creating a sense of collectiveness (a bunch of people doing it together, friends/ family, neighbours etc)



- (engagement factor) connecting to the plant by naming it and addressing them as a person you can take care of. This again could also become a collective trend on social media
- Being open to alternatives where you can plant anything based on your preferences/ priority (Eg: less maintenance, aesthetics, food? like vegetables, even medicinal plants) But remember to commit to it.

Here's picture of us trying to fit in #livingthesuslife



Indicators

- For a platform to measure a change, a possibility of setting a milestone every 6 months and committing a certain public space to that. (maybe the ones with max contributions and good maintenance get a reward/ advantage.

9.4.3 Example Two : Green Energy

Tackled Pillar of Sustainability : Economic

As our 2nd example we'd be looking into incorporating green energy sources in your households, precisely, solar panels.

Possible Approaches

- In this example we'd be focusing how saving money in the longer run is considered a benefit to households, which most households would be down for.
- But the main issue here is that switching to solar panels is quite large scale for certain households as a first step of saving energy bills, hence providing alternatives to ease them into this transition would make more sense. (Eg: Electricity Efficient products, solar cookers etc)

Indicators

- Bills showing the difference in the amounts due, comparing it with the bill of the previous month (Savings bring about a sense of achievement)

- Electric Meters displaying the Amount due at any point of time rather than the units consumed

9.4.4 Example Three : Waste Management

Tackled Pillar of Sustainability : Environmental

For our example,we'll look into the act of waste management at a society level (public littering and segregation of waste) and see how we can make people participate in this act, considering how it is second nature to just chuck waste (we don't think before doing it).

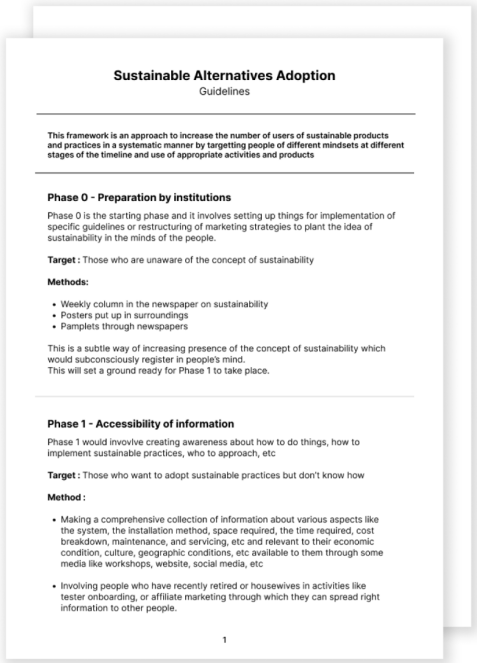
Possible Approaches

- The first step would be to make them realise and confront them doing the action. This would involve having some sort of visual cue as a reminder or praising them for doing it successfully.
- The second is to target their social status/ image. Since it is a public environment, people tend to be conscious of their acts anyway. So maybe a way of keeping an eye on people who are about to throw away waste. One way is to let in a policy of taking a picture or confronting them, or filing a complaint and in return receive some sort of warning system.
- The third step involves beautification. people don't tend to litter a place if it's already clean or beautified (a lot of big cities already use this). hence creating and maintaining a clean atmosphere and society might help. (some crazy examples like the god thing)

Indicators

Now, as a way of keeping track of the change, we could have the cleaners give monthly feedback on how people are maintaining these disposal areas while throwing in waste.

9.4 Immediate Steps



Sustainable Alternatives Adoption
Guidelines

This framework is an approach to increase the number of users of sustainable products and practices in a systematic manner by targetting people of different mindsets at different stages of the timeline and use of appropriate activities and products

Phase 0 - Preparation by institutions

Phase 0 is the starting phase and it involves setting up things for implementation of specific guidelines or restructuring of marketing strategies to plant the idea of sustainability in the minds of the people.

Target : Those who are unaware of the concept of sustainability

Methods:

- Weekly column in the newspaper on sustainability
- Posters put up in surroundings
- Pamplets through newspapers

This is a subtle way of increasing presence of the concept of sustainability which would subconsciously register in people's mind.
This will set a ground ready for Phase 1 to take place.

Phase 1 - Accessibility of information

Phase 1 would invovlve creating awareness about how to do things, how to implement sustainable practices, who to approach, etc

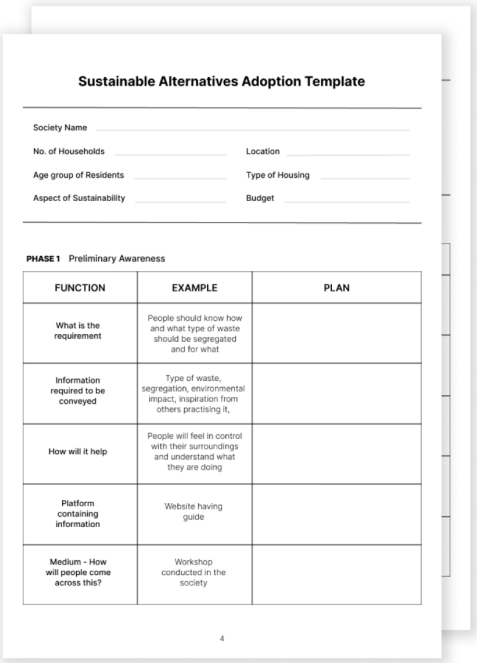
Target : Those who want to adopt sustainable practices but don't know how

Method :

- Making a comprehensive collection of information about various aspects like the system, the installation method, space required, the time required, cost breakdown, maintenance, and servicing, etc and relevant to their economic condition, culture, geographic conditions, etc available to them through some media like workshops, website, social media, etc
- Involving people who have recently retired or housewives in activities like tester onboarding, or affiliate marketing through which they can spread right information to other people.

1

GUIDELINES



Sustainable Alternatives Adoption Template

Society Name

No. of Households | Location

Age group of Residents | Type of Housing

Aspect of Sustainability | Budget

PHASE 1 Preliminary Awareness

FUNCTION	EXAMPLE	PLAN
What is the requirement	People should know how and what type of waste should be segregated and for what	
Information required to be conveyed	Type of waste, segregation, environmental impact, inspiration from others practising it,	
How will it help	People will feel in control with their surroundings and understand what they are doing	
Platform containing information	Website having guide	
Medium - How will people come across this?	Workshop conducted in the society	

4

PLANNING TEMPLATE

As part of the immediate steps we can now approach societies or even NGOs with our infographic of the framework and they can refer to it to understand the process which is basically Phase 0

Examples and possibilities are suggested in the guidelines. The societies can come up with their own activities or products using the template provided which consists of questions that help in identifying key elements required to make relevant decisions when formulating a program suitable to a particular relatively small group of people like in a housing society. It also helps in thinking about the intent and effect of each step in the plan.

The full version of guidelines and template is attached at the end of this report.

10. Conclusion

10.1 Viability Check from Residents' Association Members

For evaluation we presented our Approach to the Council Members of the three different housing societies that we belong to and received valuable insights.

- The approach is quite unique and seems viable
- How do you sustain it in the long run? What if people lose interest?
- The Maintenance aspect of the sustainable practices in daily lifestyle needs more work.
- The maintenance sounds like the maintenance of an appliance and not behavioral maintenance for some reason
- One of the council members liked the idea of planting two trees a year and has considered taking it up as part of the society :)

10.2 Future Steps

Our future steps would involve working on the feedback that we received from the Residents' Association Members and the feedback that we received on Thursday (29/05/2021). Prof. Ajanta had mentioned that she could share a contact of a resident of her society who could be interested in our project and could help shape it further. Ajanta Ma'am and Prof. Ravi had further said that our project is almost a living reality in their society and that this could even be something that could be implemented in a few years.

10.3 Acknowledgements

We thank Prof. Pramod Khambete, Prof. Ravi Pooviah and Prof. Ajanta Sen for providing us with valuable feedback and guiding us throughout the course of the project. We thank all the 115 people who participated in our survey and helped us with primary research. We also thank the Residential Association Council Members of our housing societies for participating in the evaluation of our approach and providing us with valuable insights.

10.4 References

10.4.1 Case Studies and Reports

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10.4.3 Inspiration

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10.4.4 Other

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Cont. Guidelines and Template

Sustainable Alternatives Adoption

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---

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- Involving people who have recently retired or housewives in activities like tester onboarding, or affiliate marketing through which they can spread right information to other people.

Retired people as they age can engage in more conversation based influencing and considering that old people are seen to have a good bond with children they can make them through various playful activities.

They can also involve in activities like tree planting and caring as after-school activities. The retired people can organise various activities in the society for children.

Societies can also form clubs and housewives can take initiative in this and involve other women.

The people targeted in this phase are already motivated to shift and we plan on aiding them and making their shift smooth with an aim to minimize loss of potential users due to lack of accessibility.

As these initial actions start working, they will have some effects like the number of users will increase slightly resulting in reduction of some reluctance and happy customer stories will also connect the idea of sustainability with something beneficial in the mind of the rest of the people which can trigger a change in their stage according to the transtheoretical model. This we inferred from our causal loop diagrams.

Phase 2 - Reducing Reluctance

Along with Part 1 of solutions and the effect of reduction of reluctance happened as an effect of Phase 1, there would be attempts to further reduce reluctance among people who fall in the 3rd user group in order to motivate them to adopt sustainable alternatives

Target : Those who know about sustainability but don't care enough about it

Methods:

- Introduction of various incentives or personal benefits like point system, or lucky winner, public recognition in society for using sustainable alternatives
- Subsidies by government
- Group Discount Schemes for societies
- Referral Program

These are the kind of people that are aware of the harmful effects of unsustainable lifestyle but they don't want to switch as it is not affecting them or they are reluctant because of some reasons or they feel it is inconvenient or too much work. This stage is more about convincing people to shift by working on the reluctance factor.

Phase 3 - Adhering to class standards and FOMO

Target : People who are adamant about it

Even after the first three phases, some people would be really adamant to change. The third phase is about those that are in this pre contemplation stage.

For them, there is no separate intervention but the system would work in such a way that at a point there would be enough people that would be using sustainable alternatives that it would be a very normal thing to do and people who are using it are getting benefits from it, as mentioned in the phase 2.

Due to this the adamant people might have fomo and might feel left out if they are not using it. So this collective effect from the previous two phases can in turn drive some of the adamant people to start shifting to sustainable alternatives.

Sustainable Alternatives Adoption Template

Society Name _____

No. of Households _____ Location _____

Age group of Residents _____ Type of Housing _____

Aspect of Sustainability _____ Budget _____

PHASE 1 Preliminary Awareness

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Platform containing information	Website having guide	
Medium - How will people come across this?	Workshop conducted in the society	

Sustainable Alternatives Adoption Template

PHASE 2 Personal Benefit

OBJECTIVE	EXAMPLE	PLAN
What specific goal in terms of sustainability is to be achieved through this	Segregation at source - Proper waste management and disposal	
What is the current way of doing it?	Collect all waste together and it is collected by municipality	
What is a good enough benefit for the residents of this society	Saving money or recognition among society	
Can this be achieved in a better way collectively or individually ?	segregating individually - collective waste quantity is huge	
Does everyone in the society need to participate in this for it to work?	No, but they should be encouraged to	
Planned activity/product	Inconvenient for individual households to store recyclable waste in their homes. If it is collected and stored in a common space in the society, people can sell it off to kabbadi wala and one lucky winner can get the amount each month	

Sustainable Alternatives Adoption Template

PHASE 3 Collective effect of previous phases

OBJECTIVE	EXAMPLE	PLAN
Could the benefit good enough for adamant people to start practising?	Maybe not	
If no, write down more alternate benefit mechanisms	Getting recognition in the society for good deed on notice board,	

NOTES :