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Design for Eldelry

Taking a Human Factors Approach to Design

Student Name - Harshal Hingonia
Student ID - 202014003
Guide - Prof. Binita Desai
M.Des - Graduation Project

Dhirubhai Ambani
Institute of Information & Communication Technology

Feedback Page

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Introduction

"The world population is changing: for the first time, there are more people over 64 than children younger than 5."

We are all aware of how rapidly demographics are changing in most countries, where improved health care, changing birth rates, and improvements in housing, water, and energy infrastructure have resulted in an increase in the number of older people in their populations. Over 139 million people in India are over the age of 60, accounting for more than 10% of the total population. With 319 million people over the age of 60, the proportion of older people is expected to nearly double to 19.5% by 2050. This means that one in every five Indians is likely to be over the age of 60. Our societies and governments face significant challenges as a result of these changes. Too often, political debate has framed population aging as a problem to be solved. Employer prejudice reflected in the rejection of people over the age of 55–60 reflects a broader community prejudice against older people, namely that they are invariably slow, resistant to change, and prone to serious health issues.

All of these stereotypes persist, but they are incorrect. Increasing life expectancy is beneficial to the economy. Longevity has a significant economic impact. Older people contribute to economic growth as both producers and consumers of goods and services. The over-60s in India make up 10.5% of the population but control more than 30% of the country's economic assets. They contribute billions of dollars to the economy through volunteer work, care for the elderly and disabled, and child care. According to surveys conducted in several countries, the majority of older people want to remain independent in their own homes for as long as possible. Older people have a great influence over policy decisions. The emphasis has to be on aging-in-place. Rapid technological advancements, particularly those driven by information and communication technologies, provide a plethora of opportunities to support this strategy.

In a country like India, ethnicity and language differences present unique challenges to inclusion and access to aged support services. In addition, there are significant socioeconomic differences and regional variations that must be taken into account. As the world becomes more urbanized, the needs of the elderly must be addressed appropriately. In general, rural areas and indigenous communities have unique transportation, health-care, and social-communication needs. Collaboration and cooperation with older people from a variety of backgrounds, interests, and experiences can lead to novel approaches to assistive technology.

Acceptance and use of such assistive technologies, on the other hand, are dependent on the perceptions and attitudes of potential customers. Younger technologists frequently fail to consult with older adults when developing these technologies and associated devices, and as a result, their products are market failures. The issues surrounding older adults' adoption and use

of new technologies are complex, and this is the major theme I tried to explore throughout this project. There is a wide diversity amongst older people which needs to be recognized.

It is critical to gain a better understanding of older people's contributions, capabilities, needs, and aspirations. This rapidly changing field provides an innovative, critical, and comprehensive approach to technological and social issues. This collection fills the void by focusing on the knowledge that is missing in a comprehensive and multidisciplinary manner.

This is an attempt to contribute to the development and application of assistive and social technologies for older people by enlisting the help of sociologists, doctors, computer scientists, engineers, and design practitioners to investigate the design, implementation, and evaluation of these technologies.

Problem Statement

“Why is designing for older adults important?”

Why this topic is still relevant.
One reason is they are becoming a larger and larger part of our population. Older adults are also active users who participate in all aspects of life.
Age-related changes in abilities, needs, and preferences, on the other hand, have far-reaching implications for the design process. When developing these technologies and associated devices, younger technologists frequently fail to consult with older adults. The number of products people use or the activities they engage in are not necessarily limited by their age.
Because these changes in design are not taken into account, older people and their families lose their independence and quality of life, which is both financially costly and a burden on society. Although adults of all ages use a wide range of products, those products are not always simple to use.
Systems are also dynamic and ever-changing, so we can’t assume that just because people are familiar with one version of a product (specially Screen based digital products), they’ll be able to use a newer version without any training or support. Although older adults face unique usability challenges compared to younger adults, these issues are frequently shared by people of all ages. When usability for older adults improves, it improves for younger adults as well.

Initial Research on the Adoption of Mobile Phone Technology by Older Adults

Abstract - Although mobile technology has potential benefits, there are challenges and barriers to older people adopting it. This exploratory study took place in Jaipur, Rajasthan in 2022. It used a questionnaire and an interview to learn more about how older people use mobile technology. The adoption of mobile technology by older people has been studied and concluded from four perspectives: obtaining, learning, using, and adopting mobile technology.

1. Introduction

Two widely reported global trends are aging and rapid technological advancement. According to various studies, ICT can help older people achieve social and self-understanding goals (e.g., increased access to current events and health information), interaction goals (e.g., increased connectivity and social support), or task-oriented goals (e.g., ICT-assisted work, travel, shopping, and financial management). ICTs have many benefits, but they also present challenges and barriers to older people adopting them. Poor vision and motor ability, as well as resistance to change brought on by new technology, potential cultural influences, and so on, have all been reported as barriers to ICT use. Mobility, connectivity, and the 'carry principle,' (which means devices that are small, personal, communicative, multifunctional, battery-powered and always on.) which refers to small and ubiquitous technologies, are all features of mobile technology, which is a rapidly growing area of ICT.

The proportion of older adults in India who only use devices other than a PC/laptop to go online has increased significantly, indicating that these devices are beginning to replace, rather than PCs/laptops. As a result, in order to better understand how older people adopt and perceive mobile technology, this study focused on the mobile medium (smartphones/tablets).

Because mobile technology is still relatively new in the lives of older people, rather than forecasting, this study aims to better understand how new technology is adopted. Mobile technology adoption is a long process, according to the Innovation Diffusion Theory, which explains how an idea, practice, or object diffuses and is accepted by people. It involves going through the Knowledge stage, Persuasion stage, Decision stage, Implementation stage, and Confirmation stage. As a result, this study looked into the adoption of mobile technology by older people from a variety of perspectives, including how to obtain, learn, use, and adopt mobile technology.

The following are the study's research questions:

1. How do senior citizens learn about mobile technology?
2. What is the best way for older people to learn about and use mobile technology?

3. Why do older people use mobile technology, or why don't they?

2.Methods and Tools

This study took place in Jaipur, Rajasthan, in both rural and urban constituencies.

2.1 Participants

According to the World Health Organization's convention for the definition of "aging" people, "older people" are usually defined as people over 60 years old. Participants aged 60 to 80 years old, on the other hand, were chosen because this age group has had some experience with the Internet and has been exposed to a variety of technologies, which could provide us with some predictive inspiration for future design and research projects. People over the age of 80 were excluded from this study because few of them chose to have very limited access to smartphones or other technological devices. This study had a total of 25 participants. They were diverse in terms of gender and employment status, as well as educational levels and living arrangements.

2.2 Process

Participants were drawn from a variety of backgrounds (urban and rural), genders, and living situations (nuclear family, joint family, with or without spouse, and old age home). They had all given their consent and agreed to participate in the study. Each participant was given a printed questionnaire to fill out first. The questionnaires were completed face-to-face because some of the technical terms were unfamiliar to some of the older people. Each questionnaire took 15 to 30 minutes to complete. It was used to figure out how widely older people are adopting mobile technology. Then, based on the answers in the questionnaire, interview, and mobile interactions, each questionnaire was followed by an interview and their interactions with their devices. Its goal was to figure out why older people use mobile technology and why they don't.

Table 1 : Basic Information of Participants

Characteristics		N	%
Age	60-64	7	28
	65-69	6	24
	70-74	7	28
	75-80	5	20
Gender	Male	12	48
	Female	13	52

Living Arrangements	Alone	5	20
	With spouse only	4	16
	With child only	3	12
	With partner and child	6	24
	With other relative	2	8
	In old age home	5	20
Education Level	Postgraduate/ Higher studies	7	28
	Graduate /Diploma	10	40
	High School	6	24
	Other (Reading & Writing/ Numberically literate)	2	8
Employment Status	Employed full time	4	16
	Employed part time	6	24
	Pensioners	20	80
	Unemployed	15	60
Locality	Urban	16	64
	Rural	9	36

* employed elders were engaged in either business or other gainful activities after their retirement from previous job.
All the elders who worked under any legal organization(governmental/ non governemntal) were beneficiaries of pension.

3. Mobile Technology Information Channels

This study took place in Jaipur, Rajasthan, in both rural and urban constituencies.

3.1 Mobile Technology Information Channels

People's early adoption of a new device or App is aided by access to information channels. People usually require information before deciding whether or not to use devices or apps. Tables 2 and 3 show the information channels that older people use to learn about a new mobile device and new Apps as a result of this study.

Table 2 : Information about various Mobile Platforms (applications)

Information Channels	N	%
Word of mouth by friends and family	20	80
App Store (Play Store, Apple Store)	11	44
Billboards, posters, street advertisements	6	24
TV or Radio	5	20
Newspaper or Magazines	8	32
Social Media (facebook, whatsapp, youtube)	13	52
Relevant Websites	9	36
Advertisement in Public places	4	16
Doesn't pay attention to these information	5	20
Valid N	25	100

3.2 First Impressions of a New Mobile Device or App

When confronted with a new mobile device, such as a smartphone or tablet, 56% of participants believe they will have no difficulty using the device or app. 28% of respondents said they'd like someone to explain and teach them how to use new devices or apps (the results vary depending on the apps chosen). Different people prefer different methods for learning a new function or app on their mobile devices (especially smart ones). Table 4 shows the preferences of the participants in this study. Participants who did not have a mobile device or only had a simple cellphone were excluded from the study because they had no or little demand for this type of learning.

3.3 The Adoption of Mobile Technology by Seniors

The Adoption of Mobile Devices

All 25 participants have smartphones with active internet connections, 5 have personal tablets (20%), and 2 have smart wristbands (8%).

The participants assigned a number from 1 to 4 to the frequency with which they used each item:

1 = Never

2 = Occasionally

3 = Every day in less than 4 hours

4 = More than 4 hours per day

Table shows the final result. As shown in the table, Smartphone usage has surpassed Cellphone usage and is nearly equal to computer usage. Only two of the participants in this study have smart wristbands. Both of them were using apple watch. One received the wristband from her daughter and only wore it on rare occasions, while the other was a retired IT employee who wore it on a daily basis. One participant received the smartphone as a gift from his son and had never used a mobile device before.

Table 4 : Preferences of learning a new function or a new app

Methods	N	%
Try it myself	14	56
Watching an introduction video	8	32
Reading on introduction guide	3	12
one to one help fro friends and family	7	28
one to one help from professionals	6	24
Learning within a group of people (like a training course)	3	12
Search Online	9	36
Valid N	25	

Table 5 : Frequency of ICT usage

ICT	Min	Max	Mean	SD
Internet	2	4	3.30	0.702
Computer	1	4	2.90	1.029
Cellphone	1	4	1.67	1.028
Smartphone	1	4	2.83	0.986
Tablet	1	4	2.20	1.301
Smart Wristband	1	4	1.13	0.571
Valid N	25			

Adoption of mobile apps

In total, 12 (48%) of the participants were able to install apps from the app store on their own.
Out of the 25 participants, 5 (20%) had never downloaded an app and only used the apps that came pre-installed on their smartphone or tablet.
2 (8%) of the participants had never downloaded the apps but frequently used the apps that came pre-installed on their smartphone or tablet.
17 (68%) of the participants have downloaded apps on their own, but they occasionally require assistance.

Social apps like Whatsapp, Twitter, and Facebook have been downloaded, as well as ride/taxi booking apps like Ola/Uber, bus and train booking apps, video apps like Youtube Player, and music apps like Spotify. Some people download pdf readers to read ebooks or articles on their mobile devices, and some people can't recall the names of the apps they've downloaded.

Adoption of Different Functions

A growing number of functions are being integrated into today's mobile devices. Some people use mobile devices solely to communicate with others, while others consider them to be a small computer. As a result, in order to comprehend people's adoption of mobile technology, their adoption of various functions must also be considered. Because many functions are only available on smart mobile devices, only the responses of 20 participants who use smart mobile devices for purposes other than calling and alarm are considered. Table 6 shows the results.

Table 6 : Adoption of different functions

Functions	N	%
Making a phone call	25	100
SMS, Text Messaging	22	88
E mail	21	84
Video chat	13	52
Social media (facebook, twitter, instagram)	11	44
Taking a Photo	25	100
Taking Video	13	52
Listening music	14	56
Games	4	16
Online Shopping (groceries, Amazon, etc)	9	36
Reading News and books	11	44
Browsing/surfing websites	14	56
Mapping, Navigation (google maps)	10	40
Online Banking or Payment Apps	8	32
Setting reminders, alarms	18	72
Steps tracker	5	20
Health monitor (sleep quality, calories etc.)	4	16
Voice message	7	28
Cab/Taxi/train/ bus booking	11	22
Ordering Food	14	56
Educational	8	32

3.4 Reasons for Mobile Technology Adoption and Non-Adoption

Among the Elderly In this study, only one participant had never used a mobile device. He was a retired teacher from the public school system. He only uses a computer and telephone to get contact with people. The “half-hour walk from home to the office” will be the only time he will be unavailable to those he needs to contact. He was satisfied with his lifestyle without mobile devices. 4 of the participants lacked any externally installed applications that allowed them to access a wider range of services than just making phone calls. Table 7 summarizes the reasons for not purchasing this type of device.

Table 7 : The reasons for not getting a smartphone

The following are some of the reasons why you should not get a smart mobile device: (Similar expressions have been calculated as one reason)	N	%
The price of a smartphone/tablet – I don't want to spend a lot of money on a smartphone/tablet. A smartphone or tablet, in my opinion, is not necessary.	4	66.67
After my working hours, I want peace and quiet.	4	66.67
I have other devices that can perform as well as or better than a smartphone or tablet, such as a laptop or a netbook.	3	50
A smartphone or tablet is too complicated and difficult to use, and learning it takes a lot of time and effort.	3	50
I have no idea how to use a smartphone or tablet, and I have no idea what to do if I have problems with it.	2	33.3
My lifestyle does not allow for the use of a smartphone or tablet."	2	33.3
I find it difficult to work with small screens and keyboards.	1	16.7
I'm concerned about the negative consequences of performing incorrect operations, so I avoid using new devices.	1	16.7
It is difficult for me to use.	2	33.3
Valid N	6	

Table 8 : The reasons for planning to get a smartphone or tablet

The reasons for wanting to buy a smartphone or tablet (one reason is that similar expressions have been calculated).	N	100%
My friends and family all have smartphones or tablets, and they've persuaded me to get one as well.	10	100
I want a new /tablet with more features, such as the ability to take photos, film, and surf the internet.	9	90
Smartphone help me to develop my hobby (travel, cooking, gardening etc.)	4	40
I can get notified when i get pension or money from my kids.	3	30
I watch news, spiritual videos, movies, play games on phone.	3	30
I want to use a smartphone or tablet to stay in touch with my friends and family	8	80
Valid N	10	

Table 9 : The following are some of the reasons why people dislike using smart phones:

The reasons why smart mobile devices aren't fun to use	N	%
I'd rather not spend too much time in a virtual world and instead enjoy real life.	4	80
Things on mobile devices are constantly changing, and I'm tired of learning new figures.	4	80
I'd like someone to explain and teach me how to use new functions or apps every now and then.	2	40
I can't remember how to use some apps because they're too complicated.	2	40
I don't want a mobile device to control my life.	1	20
Valid N	5	

4. Discussion & Conclusion from Research

This study looked into how older people learn about mobile technology and how they use it, from how they learn about it to how they use it. According to this study, more older people are using smartphones rather than simple cellphones. Normally, the rapidly expanding smartphone market will play a role in this.

4.1 How Do Seniors Learn About Mobile Technology?

"Word of mouth by friends and family" (72%) and "relevant website" (50%) are the primary sources of information for older people about various mobile phone applications. They get information about mobile devices primarily from the "App Store or Platform" (56%), which is "embedded in the smartphone or tablet" (such as Play Store, Galaxy Apps). Mobile app information sources include "word of mouth from friends and family" (50%) and "relevant website" (45.8%).

4.2 How Do Seniors Acquire Mobile Technology Skills?

About 36% of those polled believe they will have no trouble using a new device or its apps. It suggests that older people are gaining a surprising amount of experience with mobile devices, but this could be due to the limited types of apps and functions they use. About 40% of those polled said they'd like someone

to explain and teach them how to use new devices or apps. However, 28% of participants prefer to “try it myself” when learning a new function or app. Mobile devices and apps are easier to learn than computers and software, but they contain more personal information. This is the quickest and safest way to learn how to use a mobile device or mobile apps, especially for those who are confident and have prior experience with the device.

This learning method is followed by “One-on-one help from friends or family” (24%) and “One-on-one help from professionals” (20%), indicating that one-on-one help is the most preferred method for older people seeking assistance with new mobile technology.

4.3 How Do Seniors Use Smartphones?

According to this study, many older people are already comfortable using touch screens, including “tap,” “slide to scroll,” “swipe,” and even “zoom in and out.”

Typing text is still the most popular way for older people to input information (Mean = 4.03). Taking photos or scanning with a mobile device’s camera (Mean = 3.60) is also very popular among older users. However, older people have yet to prefer using voice as an input (Mean = 1.73). Approximately 68% of those who own a smartphone or tablet have downloaded an app.

Although older people prefer functions such as “making phone calls” (100%), “SMS, Text messaging” (88%) and “WhatsApp Call” (84%). Other functions, such as “taking a photo” (100%), “mapping, navigator” (44%), and “browsing/surfing website” (60%) have also become popular among the elderly. This could indicate that an increasing number of older people are beginning to explore their smart devices, seeing their phone as more than just a phone, and attempting to make full use of it.

4.4 Why do older people use mobile technology, and why don’t they?

In two points, the reasons for not purchasing a smart mobile device can be summarized. The most important is that older people do not see the device as being sufficiently useful – not useful enough for them to pay a premium for it, and not useful enough in comparison to other devices. The second point is that mobile devices cause discomfort, both physically and mentally. Devices are adopted first, followed by functions and apps. However, attractive functions and apps appear to be strong enough to promote device adoption in reverse, based on the reasons for planning to get a smartphone or tablet. Despite the fact that the majority of participants use smart mobile devices, many of them are dissatisfied with them. In order to avoid future abandonment of mobile technology, the reasons for not enjoying

5.Conclusions and Insights

Heterogenous Group

1. Physical, perceptual, and cognitive abilities, as well as health, living arrangements and where they live, and culture and ethnicity, all differ among older adults.
2. A number of demographic and cognitive factors influence how people use technology. Some people have always lived in a digital world, while others have "transitioned" from an analog to a digital environment.
3. Although "older adults" as a group have less technology experience and ownership than younger adults, some older adults are extremely tech savvy, use a variety of technologies, and are even early adopters of new technology.
4. Many older adults from lower socioeconomic backgrounds have less technology experience and access or have used technology less frequently in the workplace. Individuals with a lower level of education and income use and own technology less frequently.
5. In terms of geographic location, rural areas have less access to technology and technology infrastructure than urban areas. The socio-cultural and physical technological environments of older adults must be considered when attempting to understand and predict their technology use, proficiency, ownership, and access.

Ageing and technology

1. Ageing is a complex process with structural (e.g., social class, education) and agentic (e.g., individual action, attitudes, and dispositions) dimensions. As a result, more research into the challenges of designing and studying new technologies is required.
2. There is a need to break down dualisms about the effects of technology, such as positive versus negative, by prioritizing contextualized approaches that look at both positive and negative effects and how they interact.
3. Depending on the context, ICT and emerging technologies can both empower and disempower individuals. As a result, ethical considerations, responsible research, and reflexivity must all be taken into account.
4. There is a need to think about technology as a socio-technical process. Furthermore, these critical intersecting and complementing challenges and opportunities arise while studying technology through various disciplinary lenses.

Based on the research and experience,

- what are the main [empirical, theoretical or methodological] current issue(s) for researchers designing and evaluating digital technologies for older adults?
- What will be the most important issues for researchers in this field in the future?

Barriers in technology adoption

1. Despite the fact that older adults can benefit from using and adopting technology, many older adults do not do so.
2. In general, older adults are less likely to have used or own a variety of ICT devices. They expressed a lack of interest, skill, and the belief that using the internet is too difficult or frustrating.
3. Poor design has a negative impact on perceived ease of use, reducing the desire to use technology. When compared to younger adults, older adults use fewer technologies and report a narrower range of technology use.
4. Education, cognitive ability, and technology self-efficacy are all positive predictors of elderly technology use, while age and technology anxiety are negative predictors.
5. A multidisciplinary approach that captures multidimensional knowledge is required for the effective design and evaluation of emerging digital technologies that address the needs and aspirations of older adults.

Elderly Interactions with technology

1. It's important to think about general principles that underpin technology use, acceptance, and adoption in order to understand how older adults interact with specific systems or devices.
2. Two factors appear to be the most important predictors of technology use and adoption:
3. the degree to which older adults consider technology to be useful,
4. the degree to which older adults believe technology is simple to use
5. Comfort with technology and cognitive abilities are both predictors of technology use and attitudes.
6. When broad categories are considered, two attitudinal factors, perceived lack of usefulness and usability concerns, explain many of their reported reasons for lack of adoption.
7. Technology that is perceived as useful for completing a task and simple to use is more likely to be accepted and adopted.
8. ICT is used by older adults for a variety of tasks, including banking, shopping, leisure, and finding health information. In addition, older people are more likely to interact with healthcare technology.
9. Older adults have a wide range of technology experience, proficiency, and ownership. Some senior citizens are technologically savvy, while others have never used a computer. The use of technology by older adults is negatively correlated with their socioeconomic status, disability, advanced age, and living in a rural area.

Elderly Perspectives

1. Because advanced age is associated with diminished abilities and a shorter time frame, older adults must be more selective in how they spend their time and resources. Individuals prioritize social relationships and interactions over opportunities to gain new experiences, information, and skills as they grow older.
2. Different aspects of social connectedness are experienced by older adults, and technology programs can be tailored to address specific aspects of social connectedness.
3. In technology design and evaluation research with older adults, ethical issues arise. Ethical issues arise during the research process and are brought to the attention of the researchers. Ethical encounters allow researchers to broaden their research agenda.

Media & Form

The purpose of this “design manual/style guide” is to provide readers with an overview of the factors to think about when designing displays, systems, products, or environments for the elderly. Because the target audience is the design community, and the objective is to provide design guidelines that are accessible to a wide range of readers and immediately applicable to the design process. There is a large body of academic research on age-related changes in abilities, learning, and performance, as well as how these changes are linked to technological interactions. The goal was to turn data into guidelines and present the most important information in a comprehensible manner. The manual takes a different approach than most academic books and research papers.

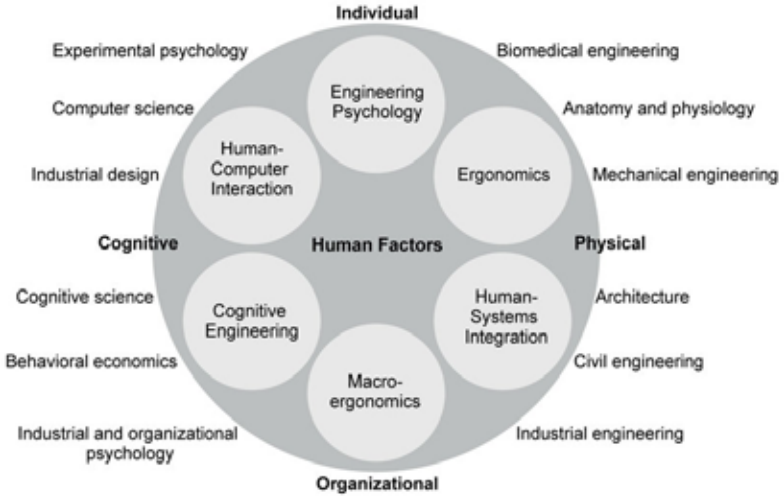
The information presented is intended to be specific enough to be immediately useful while also being broad enough to apply to future technologies. Despite the fact that future cohorts of older adults may have more experience with specific technologies, general age-related changes in capabilities will still occur, and due to the dynamic nature of technology, older adults will always be required to learn new technologies.

It is evident from research that successful design for older adults should be based on a thorough understanding of a variety of factors, including typical aging changes, how awareness of these changes should influence the design process, and a human-factors approach to product development and testing.

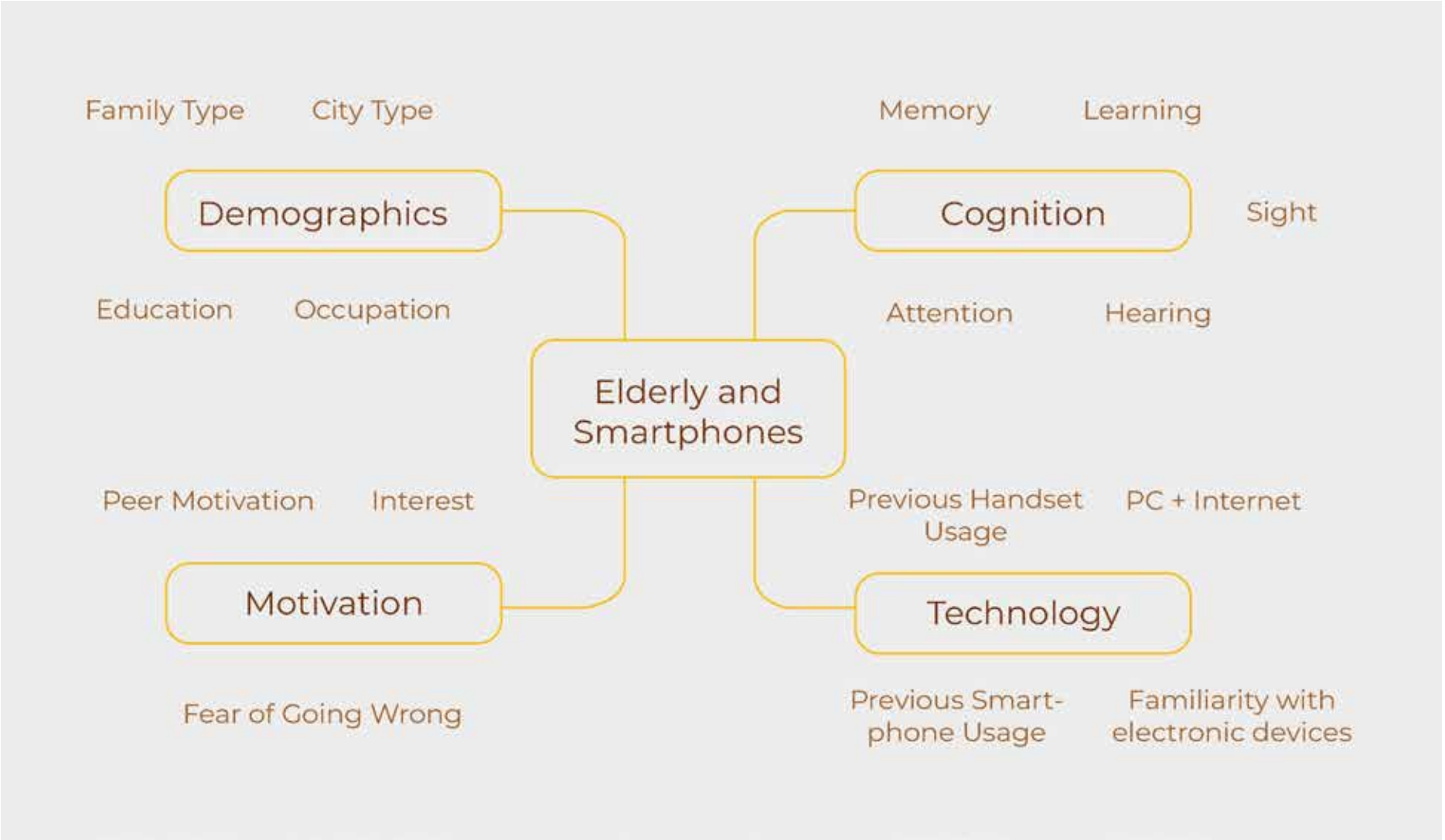
Product Ideation & Design

Successful design for older adults will be based on a thorough understanding of a variety of factors, including typical aging changes, how awareness of these changes should influence the design process, and a human-factors approach to product development and testing.

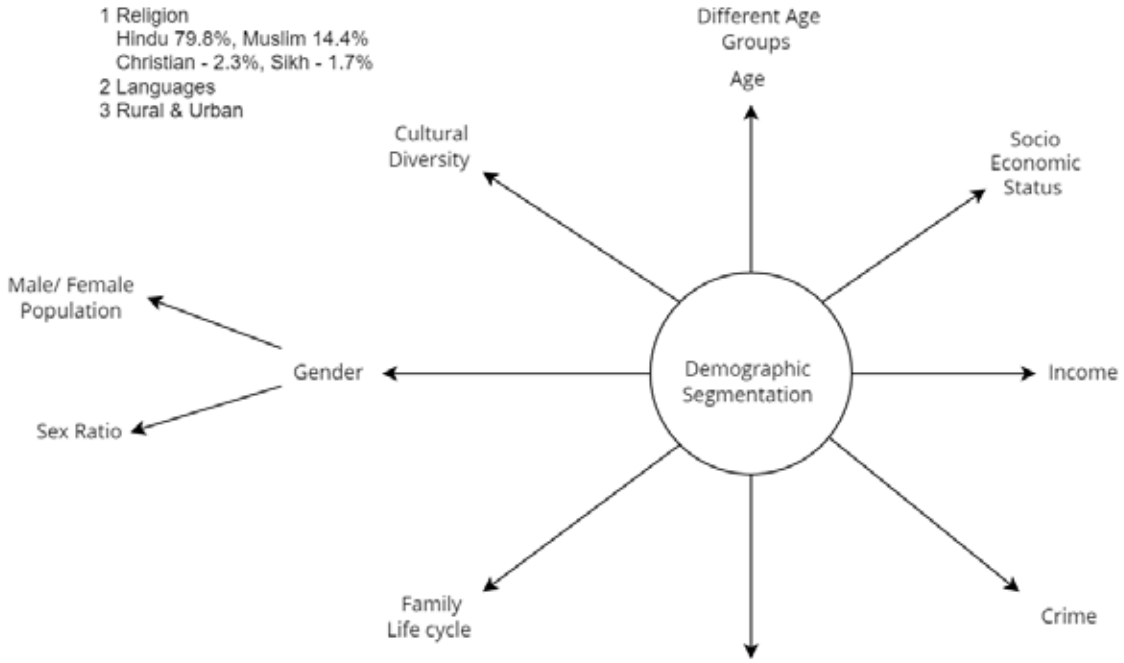
Human factors is a multidisciplinary design discipline that puts the user at the center of the design process so that user-system interactions are safe, effective, and efficient. This multidisciplinary effort includes engineers (industrial, mechanical, and computer science), doctors (psychiatrists, and general medicine), UX designers, and sociologists.



Stage 1


Family Type
City Type
Demographics
Education
Occupation
Memory
Learning
Cognition
Sight
Attention
Hearing
Elderly and Smartphones
Peer Motivation
Interest
Motivation
Fear of Going Wrong
Previous Handset Usage
PC + Internet
Technology
Previous Smart-phone Usage
Familiarity with electronic devices

Stage 2



1 Religion
Hindu 79.8%, Muslim 14.4%
Christian - 2.3%, Sikh - 1.7%
2 Languages
3 Rural & Urban

1 Expenditure Pattern
2 Financial Literacy
3 Unpaid Labour
4 Gainful Activities
5 Old Age Dependency- 15. 7 (2021), 20.1 (2030)

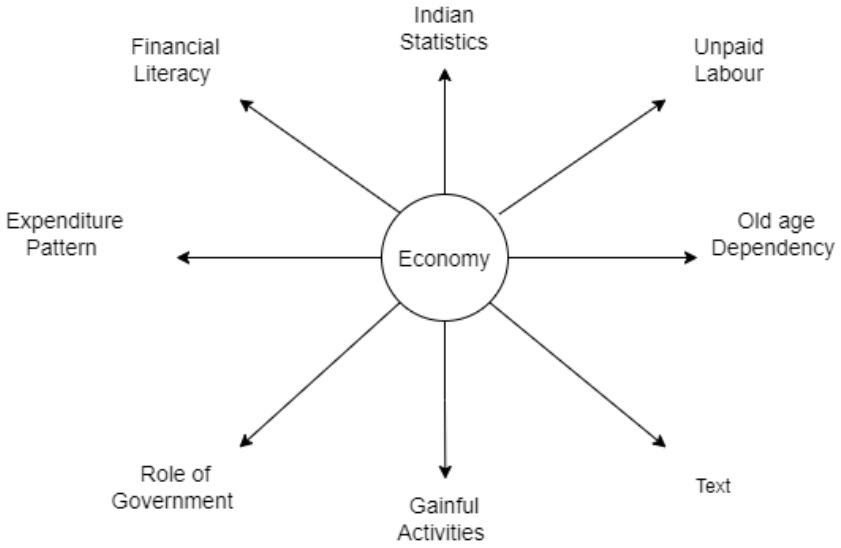
Source of Income
Pension- 28%
Interest / rent - 7.6%
Gainful activity - 21%
Business - 14%

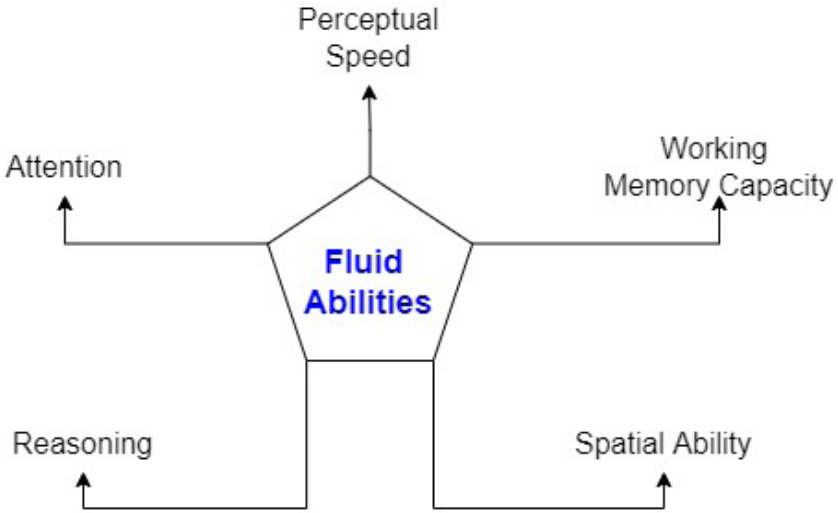
Financial State
Poor - 19%
Very Poor - 21%
Average- 24%
Good- 22%
Better- 14%

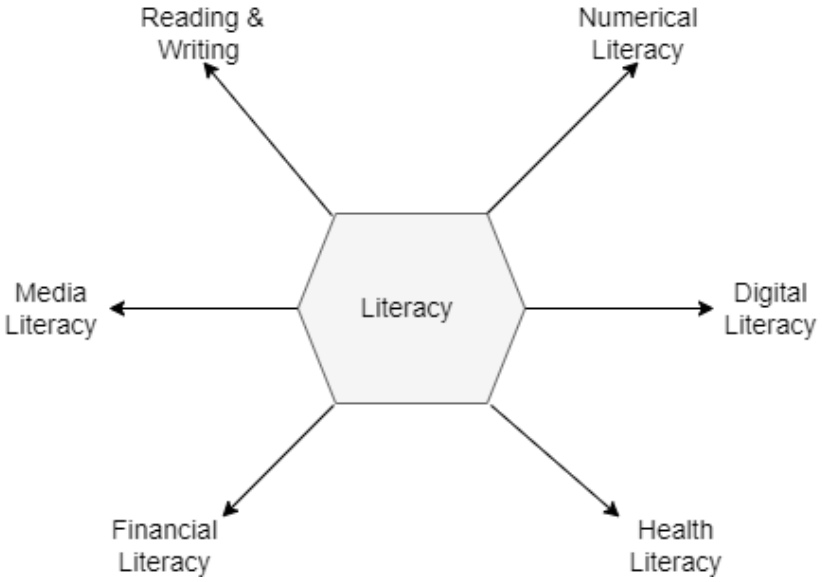
1. Birth rate - 2.20 births per woman
2. Death Rate- 7.3 per 1000 people
3. Life Expectancy- 69.9 years
4. Marital Status - 76% married, 24% widow
5. Family Structure - 35% Alone. 45% with spouse, 20% joint family

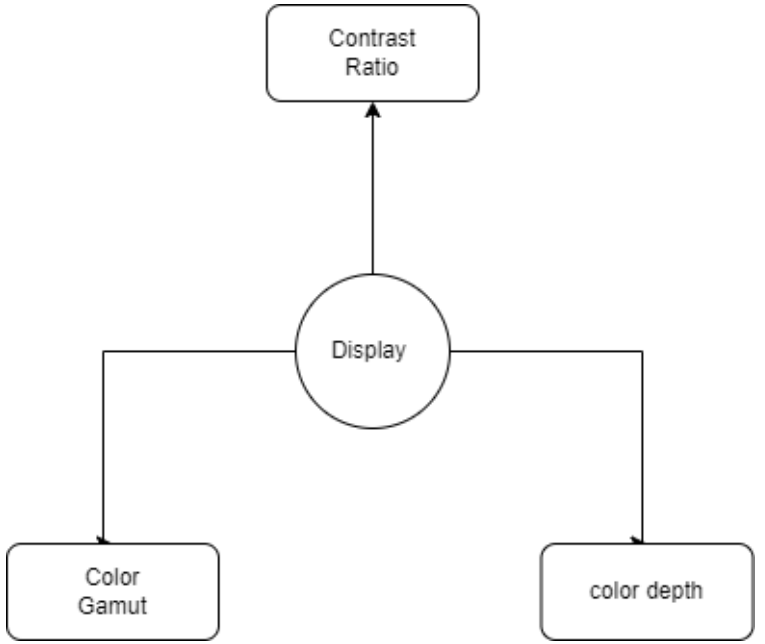
Literacy - 44% (59 male, 28 female)
Financial Literacy
Health Literacy
Digital Literacy
Reading & Writing
Numerical Literacy

Murder
Culpable Homicide (Amounting to murder or not amounting to murder)
Hurt (simple/grievous)
Assault
Kidnapping and abduction
Rape
Theft
Extortion
Robbery
Dacoity
Criminal Trespass
Criminal Intimidation


Indian Statistics
Financial Literacy
Unpaid Labour
Expenditure Pattern
Economy
Old age Dependency
Role of Government
Gainful Activities
Text

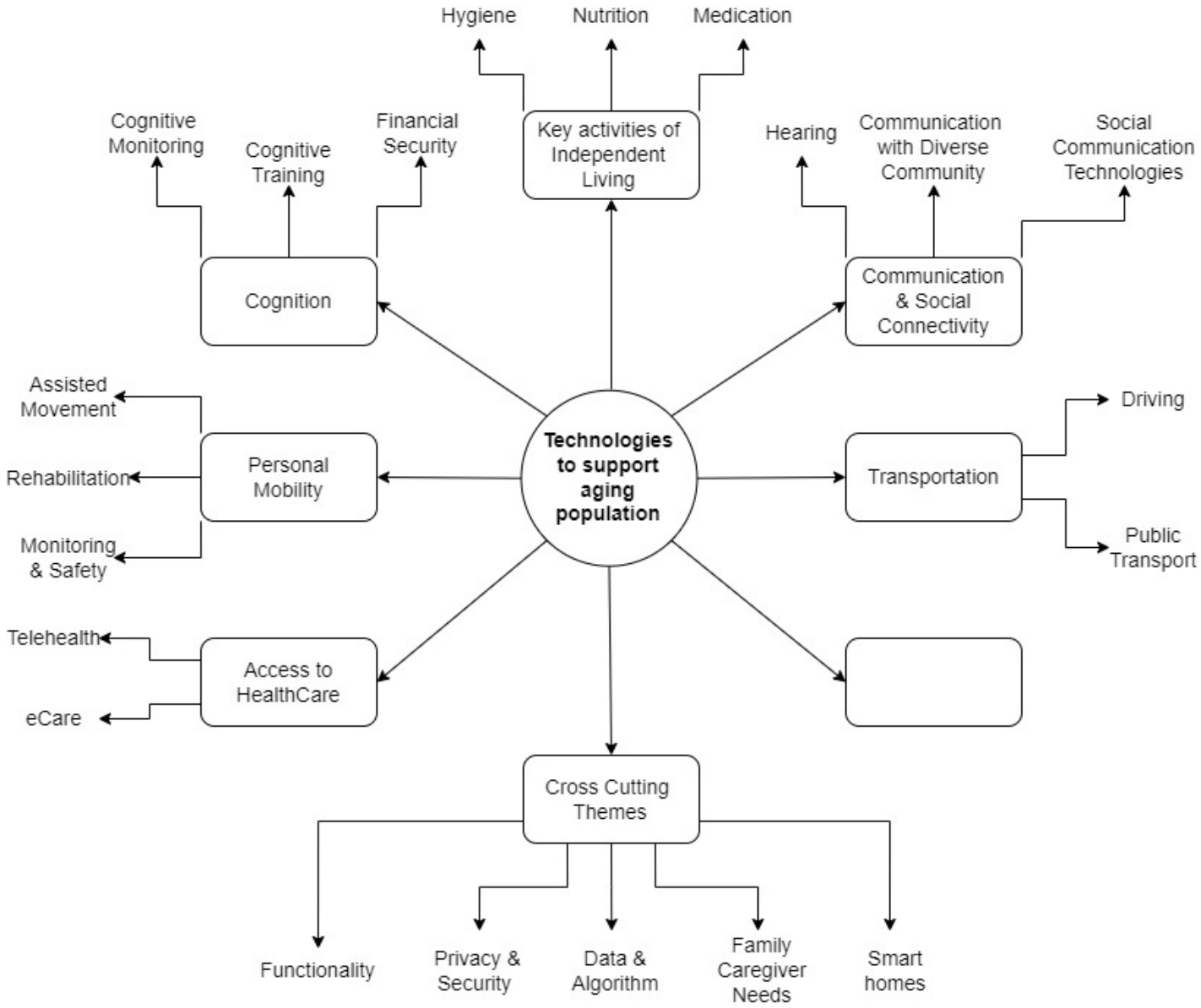

Perceptual Speed
Attention
Working Memory Capacity
Fluid Abilities
Reasoning
Spatial Ability


Reading & Writing
Numerical Literacy
Media Literacy
Literacy
Digital Literacy
Financial Literacy
Health Literacy


Contrast Ratio
Display
Color Gamut
color depth

1. Insurance Covered
2. Non-Insurance
3. Drug Cost
4. Govt Aid
1. Health Insurance
2. Long-term care insurance
3. Dental Insurance
4. Automobile Insurance
5. Home owners insurance
6. Life insurance
7. Annuities
1. Reverse Mortgage
2. Financial Strategies
3. other types of mortgages
Healthcare Cost
Mortgage Strategies
Different Types of Insurances
1. Budgeting & Saving Money
2. Insurances
3. Healthcare
4. Mortgages
5. Taxes
6. Consumer Protection
7. Wills & Trusts
Other financial Resources
Elderly & Finance
Tax & Tax Planning
1. Retirement Accounts
2. Social Security Taxation
3. Special tax deductions
4. Ask on Attorney
Budgeting & Saving
Benefits & Social Security
Elderly care Institutions
1. Outline your Budget
2. Build your budget
3. Tracking & Updating
4. Determine service goals
5. tips and guidelines for saving money
1. Retirement Income
2. Disability Benefits
3. Benefits for Family
4. Survivor Benefits
5. Death Benefits

Financial Freedom
Investments
Security
live below your means
Assisting adult about planning
What money means to you ?
Entrepreneurship
Financial freedom as a woman
Finding a new job
rent a space, photography, copyrighting, handmade products, fiverr,, life coaching
Self-isolation/ introvert seniors and money making
Turning hobby into business
part time jobs
Expert's advice
Social Security
Balance life and financial portfolio
cost of living

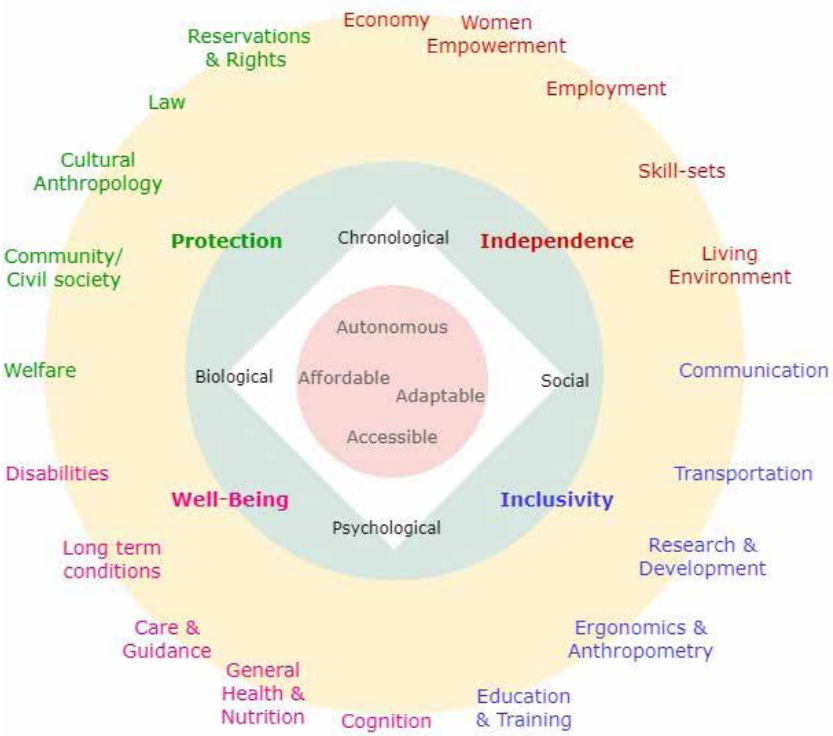

Technologies to support aging population
Key activities of Independent Living
Hygiene
Nutrition
Medication
Cognition
Cognitive Monitoring
Cognitive Training
Financial Security
Communication & Social Connectivity
Hearing
Communication with Diverse Community
Social Communication Technologies
Personal Mobility
Assisted Movement
Rehabilitation
Monitoring & Safety
Transportation
Driving
Public Transport
Access to HealthCare
Telehealth
eCare
Cross Cutting Themes
Functionality
Privacy & Security
Data & Algorithm
Family Caregiver Needs
Smart homes

Stage 3

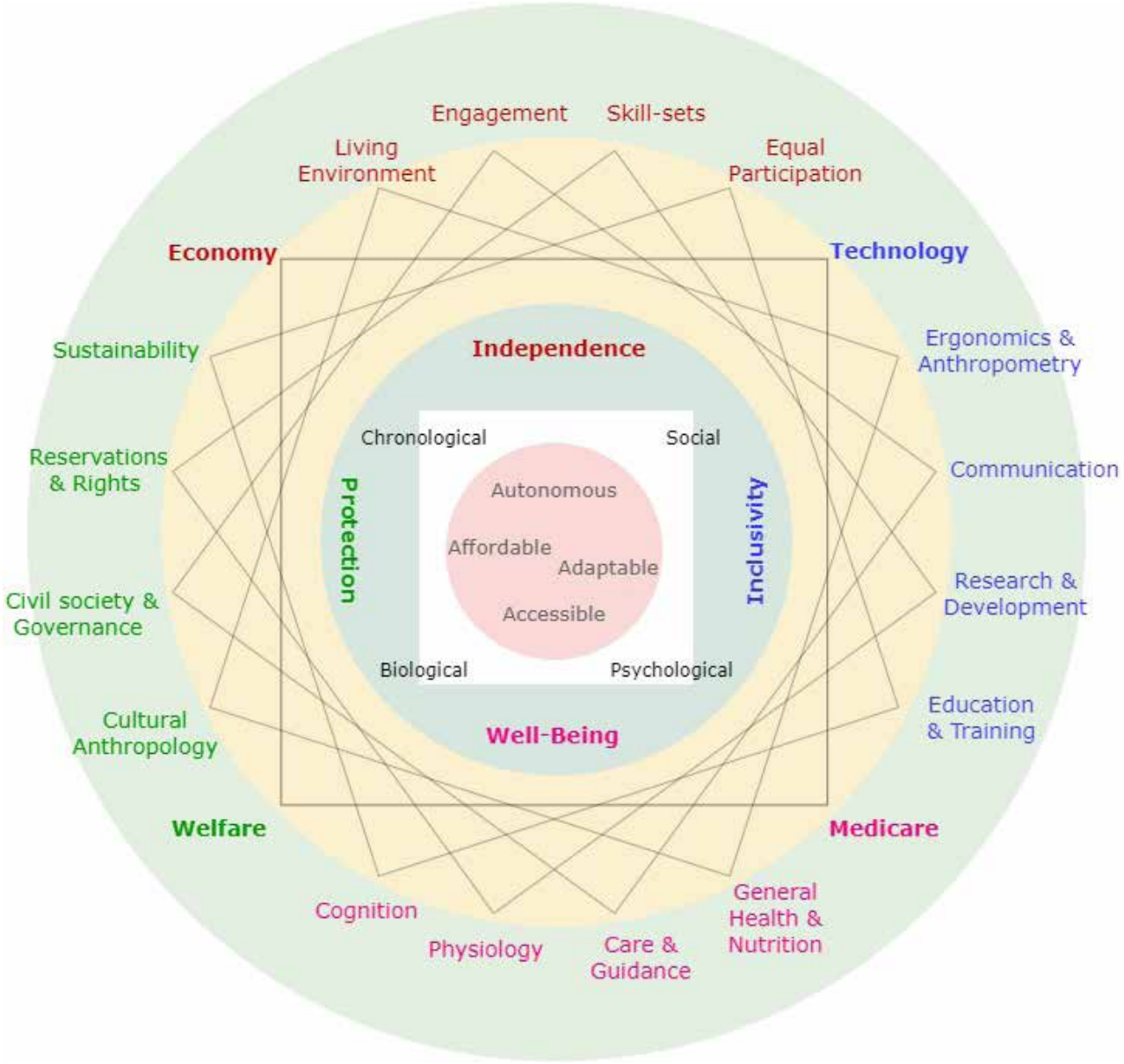
Developing the core diagram

The most difficult task was developing the core diagram;
to do so, we began by looking for individual terms such as demography, technology, government role, design and content, and application areas. The complexity arises when all of the terms are influenced by each other, either directly or indirectly. Usability, for example, is associated with Design and Content rather than technology, so the sections are divided according to their close relationship with their parent term.

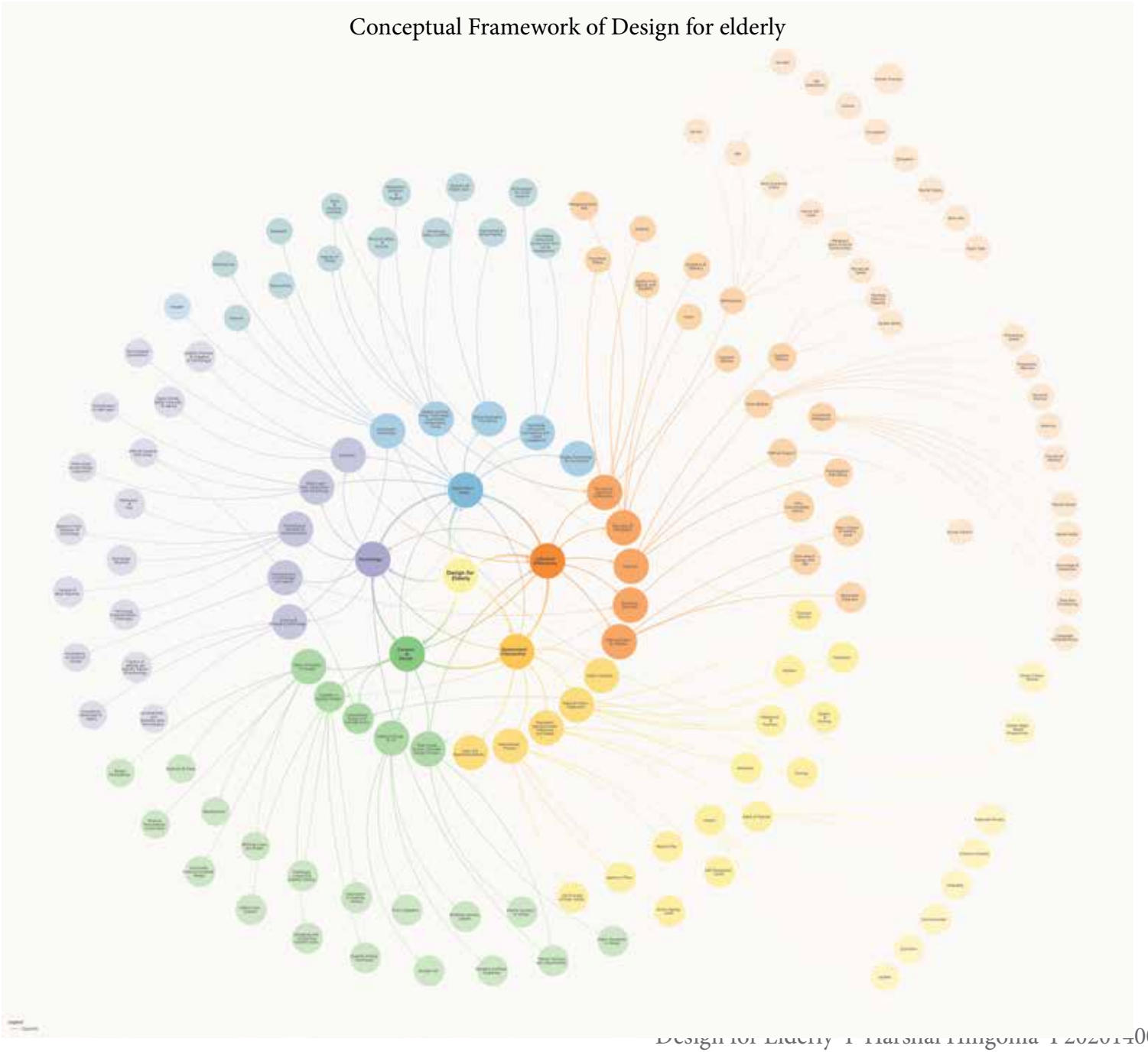
Each section depicts the interconnections and relationships between the other four sections, demonstrating the complexity of design in this field.

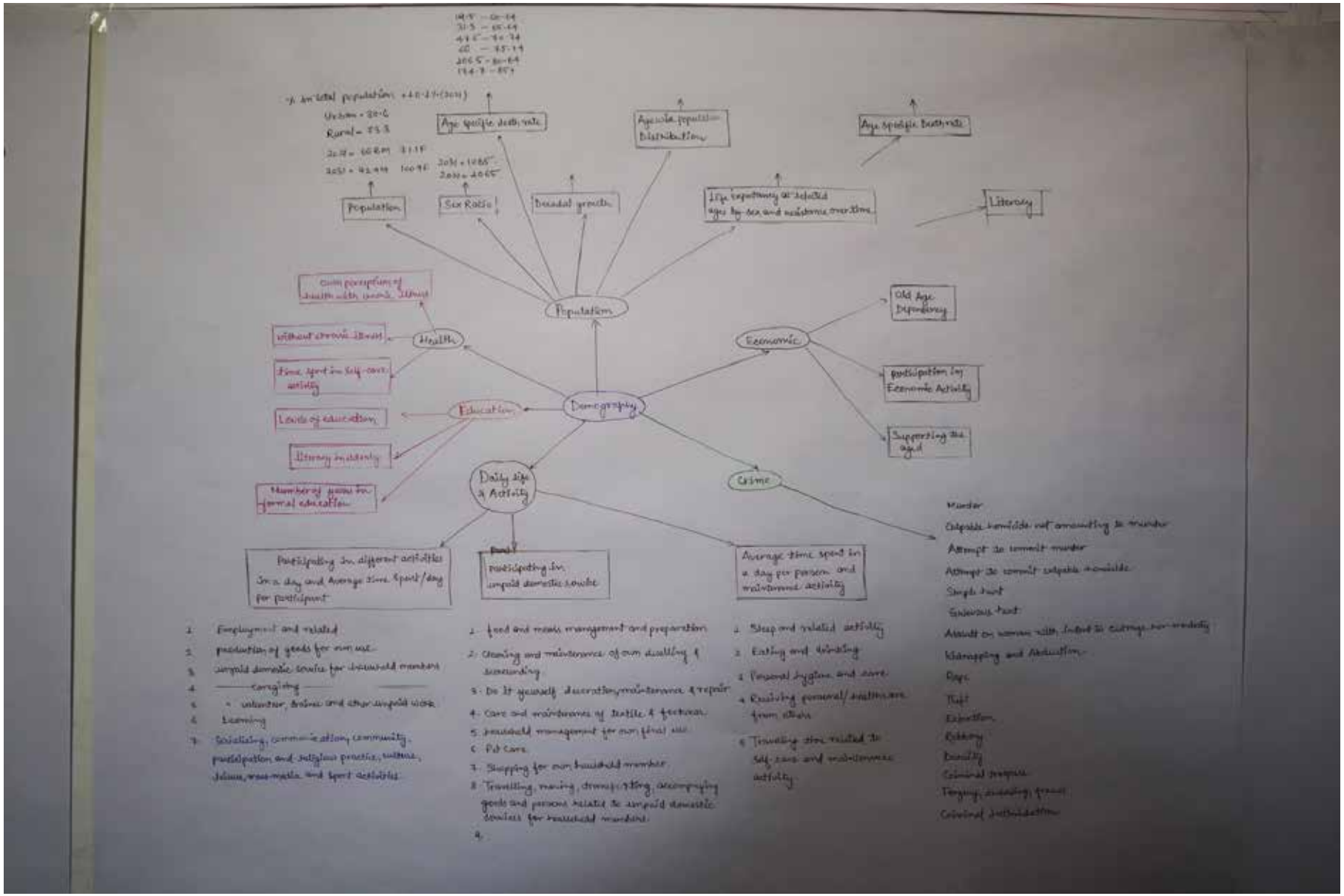


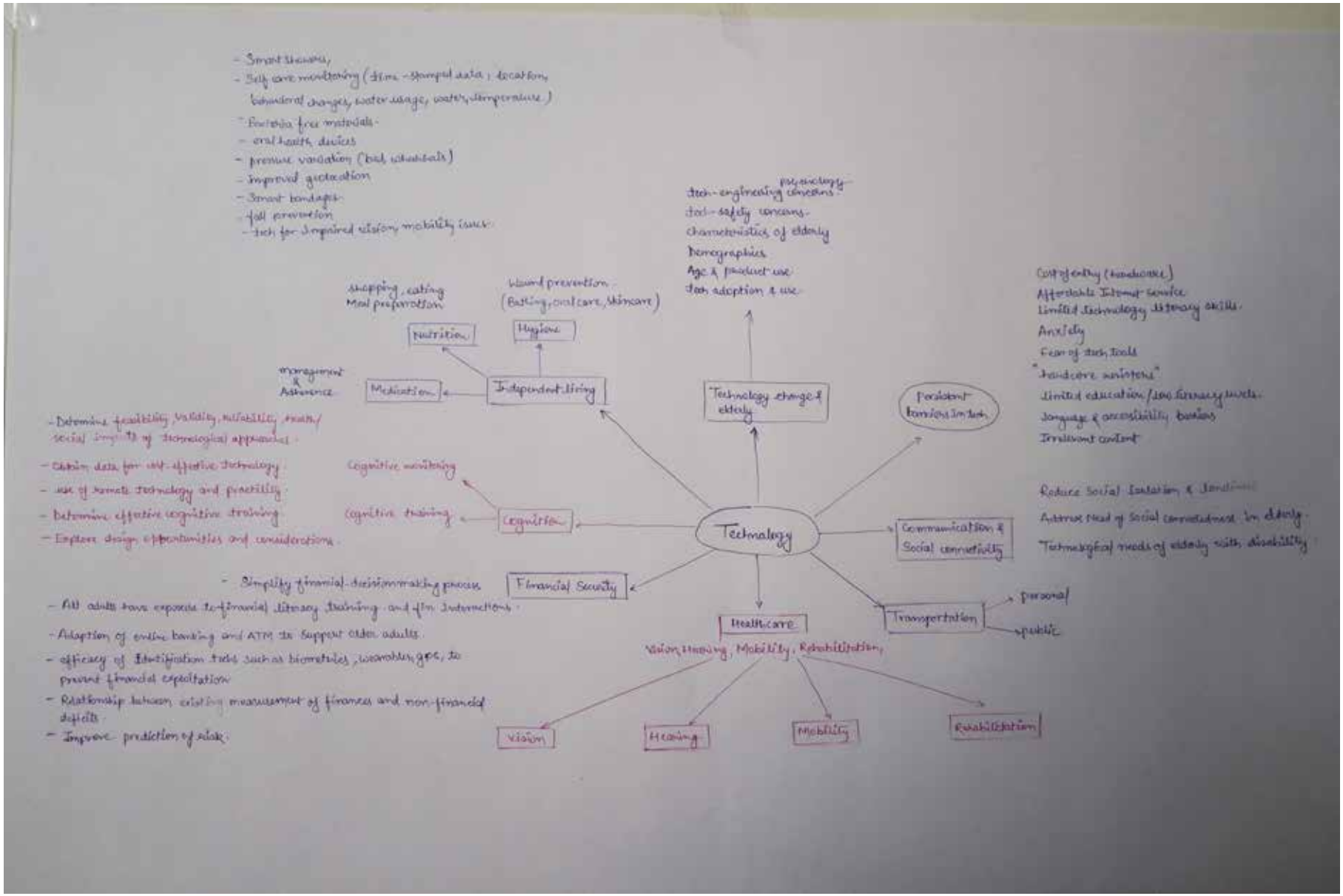
Link - https://kumu.io/daiict202014003/design-for-elderly#untitled-map/application-areas

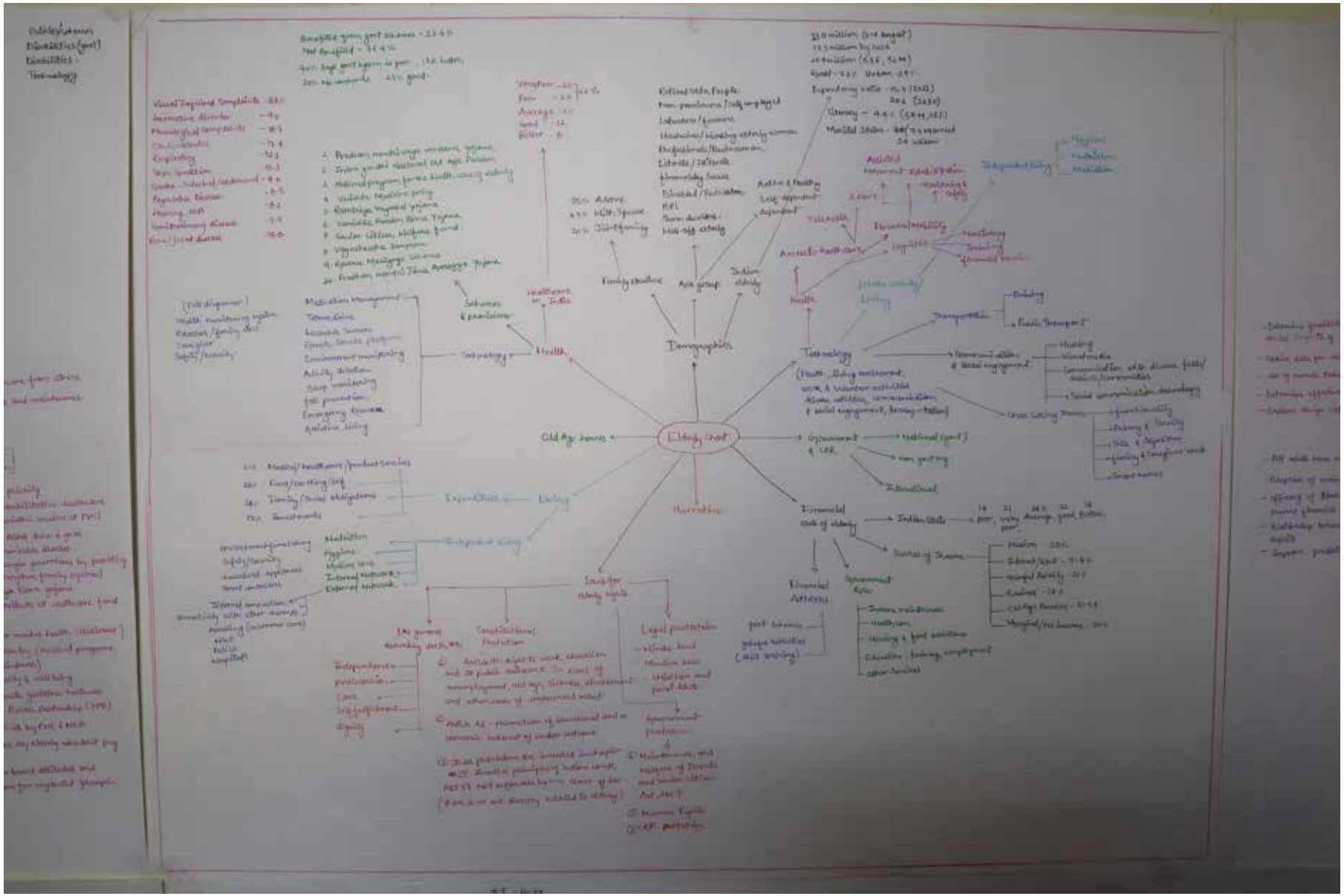

Engagement
Skill-sets
Living Environment
Equal Participation
Economy
Technology
Sustainability
Ergonomics & Anthropometry
Independence
Chronological
Social
Reservations & Rights
Protection
Autonomous
Inclusivity
Communication
Affordable
Adaptable
Civil society & Governance
Accessible
Research & Development
Biological
Psychological
Education & Training
Cultural Anthropology
Well-Being
Welfare
Medicare
Cognition
General Health & Nutrition
Physiology
Care & Guidance

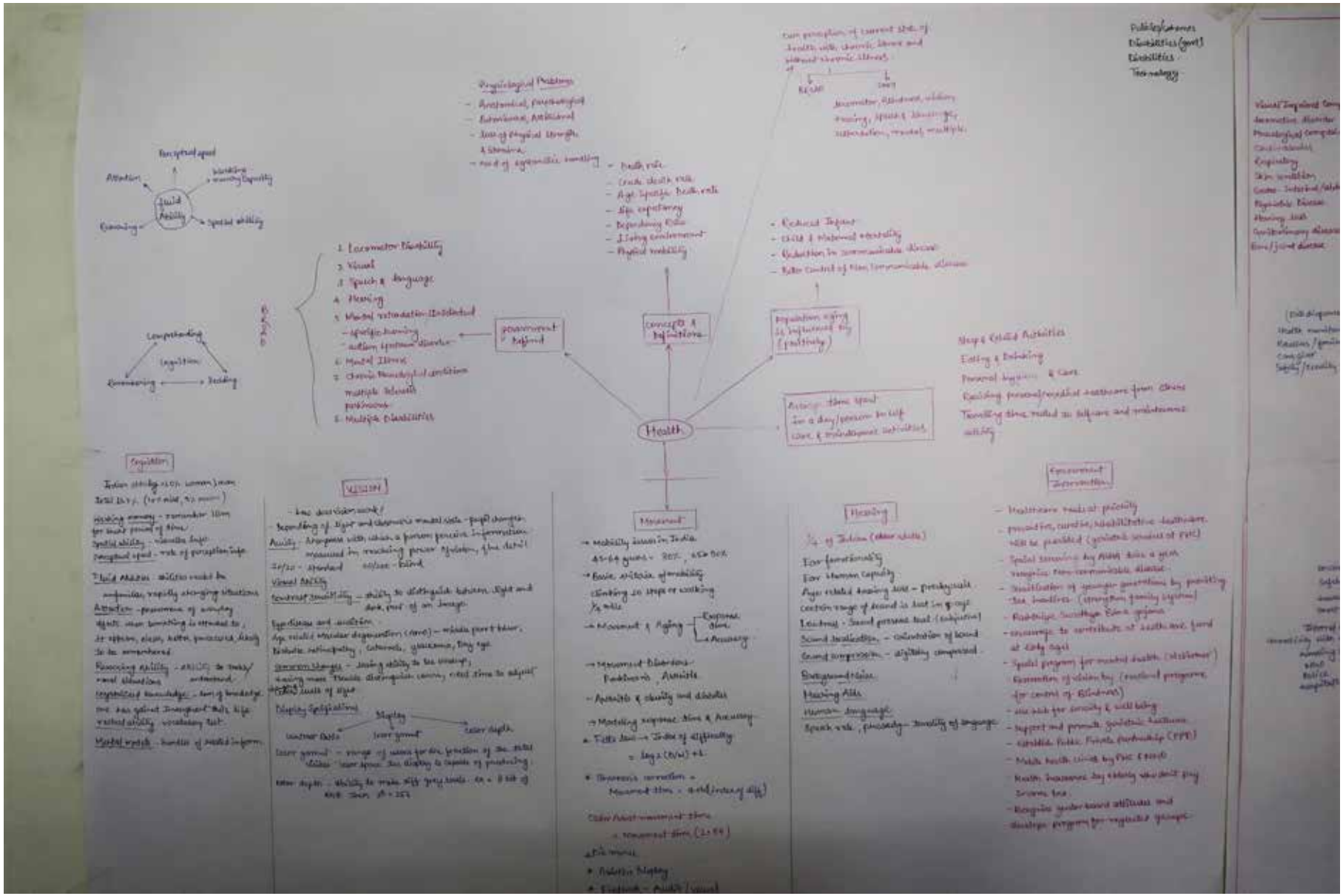
Conceptual Framework of Design for elderly

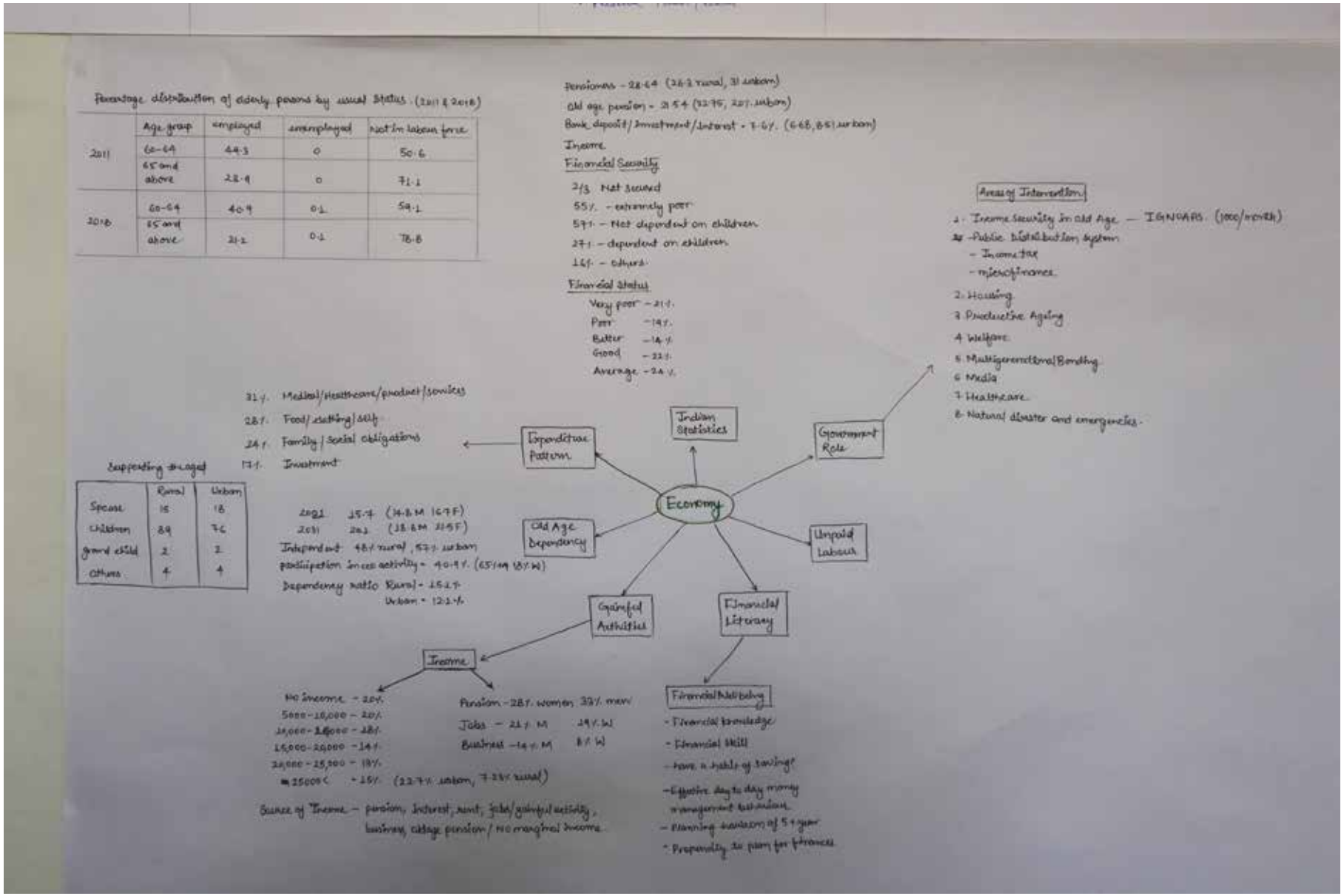


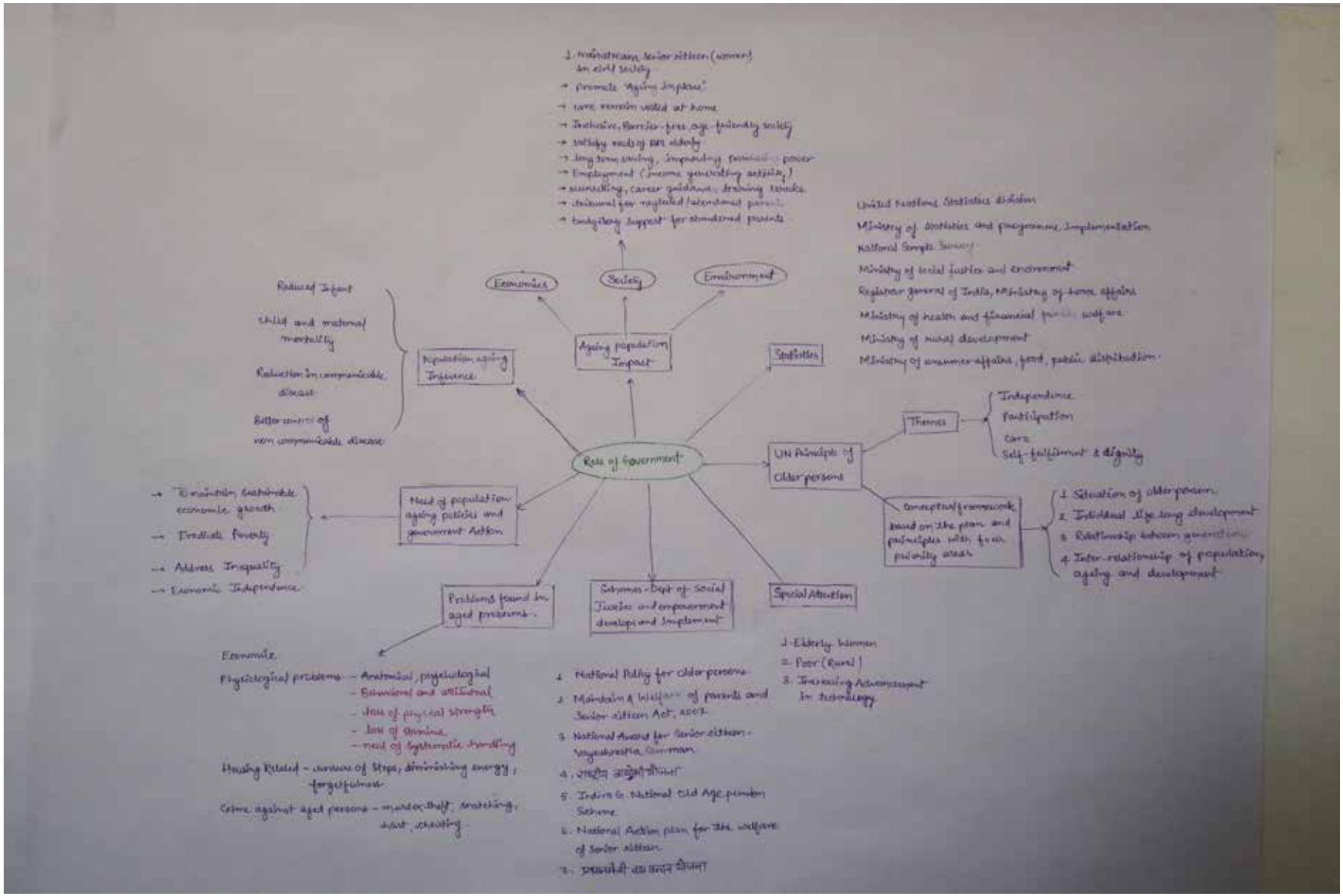

Population
Age specific death rate
Age wise population Distribution
Age specific Death rate
Population
Sex Ratio
Decadal growth
Life expectancy at selected ages by sex and resistance over time
Literacy
Population
Health
Own perception of health with chronic illness
without chronic illness
time spent in self-care activity
Education
Levels of education
literacy in elderly
Number of years in formal education
Demography
Economic
Old Age Dependency
participation in Economic Activity
Supporting the aged
Daily life & Activity
Crime
Participating in different activities in a day and Average time spent/day per participant
participating in unpaid domestic service
Average time spent in a day per person and maintenance activity
1. Employment and related
2. production of goods for own use
3. unpaid domestic service for household members
4. caregiving
5. volunteer, trainee and other unpaid work
6. Learning
7. Socializing, communication, community, participation and religious practice, culture, leisure, mass-media and sport activities
1. food and meals management and preparation
2. Cleaning and maintenance of own dwelling & surrounding
3. Do it yourself decoration, maintenance & repair
4. Care and maintenance of textile & footwear
5. household management for own final use
6. Pet care
7. Shopping for own household member
8. Travelling, moving, transporting, accompanying goods and persons related to unpaid domestic services for household members
1. Sleep and related activity
2. Eating and drinking
3. Personal hygiene and care
4. Receiving personal/healthcare from others
5. Travelling time related to self-care and maintenance activity
Murder
Culpable homicide not amounting to murder
Attempt to commit murder
Attempt to commit culpable homicide
Simple hurt
Grievous hurt
Assault on women with intent to outrage her modesty
Kidnapping and Abduction
Rape
Theft
Extortion
Robbery
Dacoity
Criminal trespass
Forgery, cheating, fraud
Criminal intimidation


- Smart sensors,
- Self care monitoring (time - stamped data ; location, behavioral changes, water usage, water temperature)
- Bacteria free materials
- oral health devices
- pressure variation (bed, wheelchair)
- Improved protection
- Smart bandages
- fall prevention
- tech for impaired vision, mobility issues
tech - engineering psychology concerns
tech - safety concerns
characteristics of elderly
Demographics
Age & product use
tech adoption & use
shopping, eating
Meal preparation
Wound prevention
(Bathing, oral care, Skincare)
Nutrition
Hygiene
management & Adherence
Medication
Independent living
Technology change & elderly
Persistent barriers in tech
Cost of entry (hardware)
Affordable Internet service
Limited technology literacy skills
Anxiety
Fear of tech tools
"hardcore resisters"
limited education / low literacy levels
language & accessibility barriers
Irrelevant content
- Determine feasibility, validity, reliability, exam./ social impact of technological approaches
- Obtain data for cost-effective technology
- use of remote technology and practicality
- Determine effective cognitive training
- Explore design opportunities and considerations
Cognitive monitoring
Cognitive training
Cognition
Technology
Communication & Social connectivity
Reduce Social Isolation & loneliness
Address need of social connectedness in elderly
Technological needs of elderly with disability
- Simplify financial decision making process
- All adults have exposure to financial literacy training and fin interventions
- Adoption of online banking and ATM to support older adults
- efficacy of Identification tools such as biometrics, wearables, geo, to prevent financial exploitation
- Relationship between existing measurement of finances and non-financial deficits
- Improve prediction of risk
Financial Security
Healthcare
Vision, Hearing, Mobility, Rehabilitation
Transportation
personal
public
vision
Hearing
Mobility
Rehabilitation

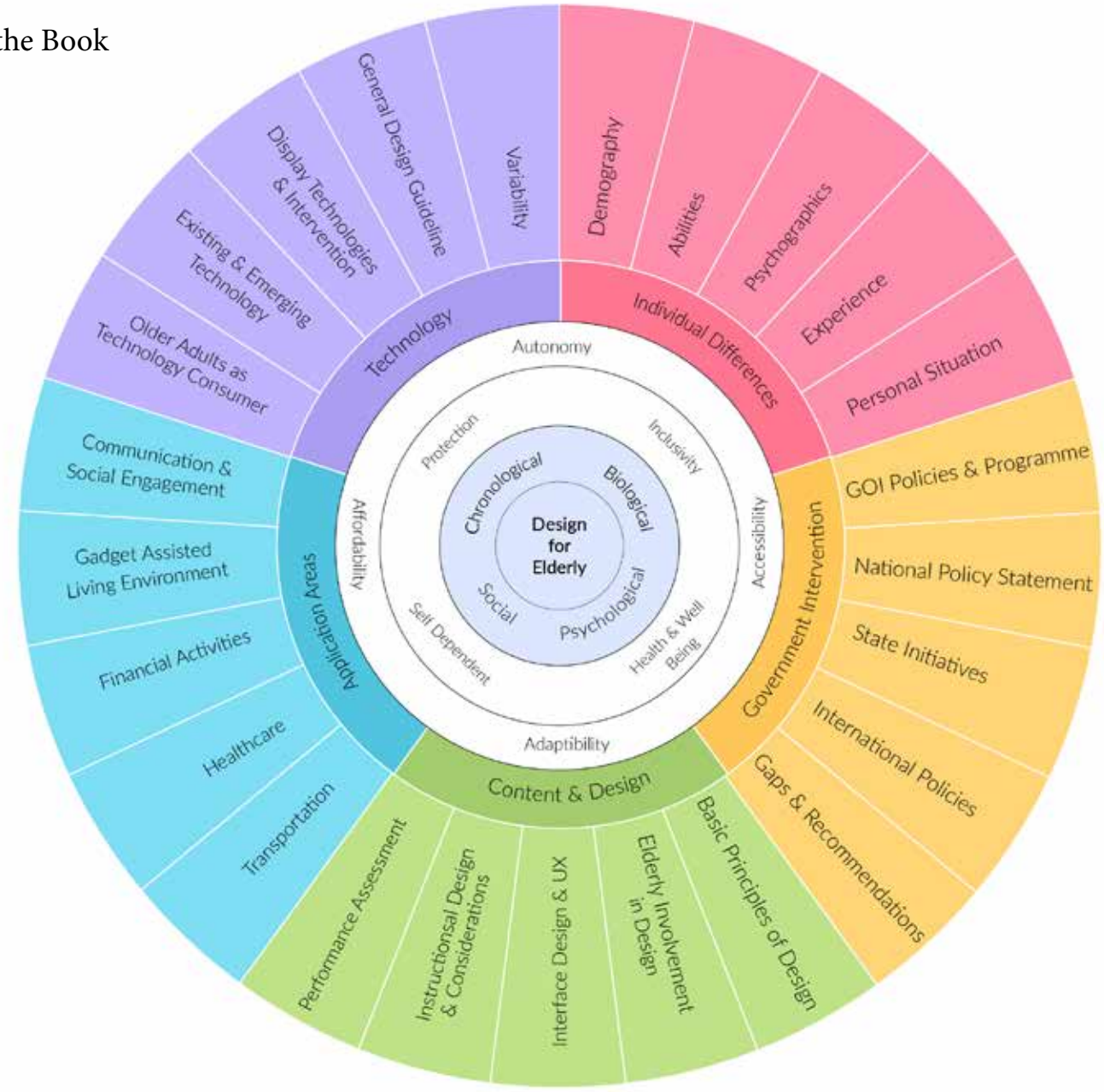

Elderly chart
Demographics
Health
Technology
Living
Harmonics
Old Age homes
Financial
Financial Activities
Legal protection


Health
Movement
Hearing
Vision
Cognition
Fluid Ability
Attention
Reasoning
Spatial ability
Perceptual speed
Comprehending
Cognition
Reasoning
Reading
Physiological Problems
Anatomical, physiological
Behavioural, Attitudinal
Loss of physical strength & stamina
Need of appropriate counselling
Health risks
Crude death rate
Age Specific death rate
Life expectancy
Dependency Ratio
Living environment
Physical mobility
Concepts & definitions
Assessment & Refined
1. Locomotor Disability
2. Visual
3. Speech & language
4. Hearing
5. Mental retardation (Intellectual
- specific learning
- autism spectrum disorder
6. Mental Illness
7. Chronic Neurological condition
multiple Sclerosis
parkinsons
8. Multiple Disabilities
Equation aging is influenced by (positively)
Reduced Injury
Child & Maternal mortality
Reduction in communicable disease
Better Control of Non communicable diseases
Average time spent in a day/person in self care & maintenance activities
Basic & Skilled Activities
Eating & Drinking
Personal hygiene & Care
Visiting doctor/medical institutions for illness
Travelling time related to leisure and maintenance activity
Public/Government Disabilities/Govt Liabilities Technology
Cognition
Indian elderly (60+ women) have little less (not mild, not severe)
Working memory - remember little for short period of time
Spatial ability - handle shape
Perceptual speed - rate of perception info
Fluid Reason - ability to deal in unfamiliar, rapidly changing situations
Attention - persistence of viewing effort when something is stressful to be, to appear, alert, active, processed, likely to be remembered
Reasoning ability - ability to make/ reveal distinctions understood
Crystallized knowledge - sum of knowledge one has gained throughout life, life related ability, vocabulary test
Mental speed - number of mental info-proc.
Vision
- has deterioration with
- Regarding of light and depends on mental state - pupil changes
Acuity - Response with which a person perceive information measured in reaching power of vision, fine detail
20/20 - standard
Visual Ability
contrast sensitivity - ability to distinguish between light and dark part of an image.
Age related macular degeneration (rare) - vision part blur, Diabetic retinopathy, cataracts, glaucoma, long age
Sensory changes - losing ability to see orange, losing more flexible distinguish colors, need time to adjust
Display Specifications
Display
Color depth
Color gamut - range of colors for one, portion of the total color space the display is capable of producing
Color depth - ability to make slight gray levels. ex - 8 bit of RGB Color, 2^8 = 256
Movement
→ mobility issues in India
45-60 years - 20%, 60+ 50%
→ Basic criteria of mobility (Walking 20 steps or walking ½ mile)
→ Movement & Aging - Response slow, Accuracy
→ neuromuscular Disorders - Parkinson's, Arthritis
- Arthritis & obesity and disorder
→ Matching response time & Accuracy
• Fitts law → Index of difficulty = log2(A/W) + b
• Response correction = Movement time = a+b(Accuracy diff)
Color Adult movement time = movement time (2.54)
• Robotic Display
Hearing
½ of Indians (above 60yrs)
For functionality
For human capacity
Age related hearing loss - presbycusis
Cochlear range of sound is lost in groups
Hearing - Sound pressure level (subjective)
Sound localization - calculation of sound
Sound suppression - slightly compressed
Background noise
Hearing Aids
Human language
Speech rate, processing - tonality of language
Government Intervention
- Healthcare needs at priority
- preventive, curative, rehabilitative healthcare will be provided (geriatric wing of PHC)
- Special attention by ASHA also a given complete non-communicable disease
- Sensitization of younger generations by providing free medicines (strengthen family system)
- Knowledge Sovereign Elder's yojana
- encourage to contribute at work age, fund at Early Aged
- Special program for mental health (Alzheimer)
- Prevention of vision loss (national programme for control of Blindness)
- one visit per annually & visit baby
- support and promote geriatric healthcare
- Corridor Public Private Partnership (PPP)
- Mobile health clinics by PHC Board
- Health Insurance for elderly who don't pay income tax
- Recognize gender based attitudes and develop programs for vulnerable groups


Percentage distribution of elderly persons by usual Status (2011 & 2018)
Age group | employed | unemployed | not in labour force
2011 | 60-64 | 49.3 | 0 | 50.6
65 and above | 28.9 | 0 | 71.1
2018 | 60-64 | 40.9 | 0.1 | 59.1
65 and above | 21.2 | 0.1 | 78.8
Pensioners - 28.64 (26.2 rural, 31 urban)
Old age pension - 2.54 (32.96, 22% urban)
Bank deposit / Investment / Interest - 8.6% (6.68, 8.6% urban)
Income
Financial Security
2/3 Not secured
55% - extremely poor
57% - Not dependent on children
27% - dependent on children
16% - others
Financial Status
Very poor - 21%
Poor - 19%
Better - 18%
Good - 22%
Average - 24%
Areas of Intervention
1. Income security in old age - IGNOAPS (1000/month)
- Public distribution system
- Income tax
- pensions schemes
2. Housing
3 Productive Ageing
4 Welfare
5 Multigenerational Bonding
6 Media
7 Healthcare
8 Natural disaster and emergencies
31% Medical/Healthcare/product/services
28% Food/clothing/silk
24% Family/Social obligations
17% Investment
Expenditure Pattern
Indian Statistics
Government Role
Economy
Old Age Dependency
Unpaid Labour
Supporting arrangement
Spouse | Rural 15 | Urban 18
Children | 89 | 76
grand child | 2 | 2
others | 4 | 4
2021 15.4 (14.8 M 16 F)
2031 20.1 (18.8 M 21.5 F)
Independent participation in economic activity - 40.9% (65-69 18% M)
Dependency ratio Rural - 15.2%
Urban - 12.2%
Gainful Activities
Financial Literacy
Income
No income - 20%
5000-10,000 - 20%
10,000-15,000 - 28%
15,000-20,000 - 14%
20,000-25,500 - 18%
>25000 - 15% (22.7% urban, 7.2% rural)
Pension - 28% women 32% men
Jobs - 22% M 29% W
Business - 14% M 8% W
Source of Income - pension, interest, rent, jobs/gainful activity, business, village pension / no marginal income
Financial Mainstreaming
- Financial knowledge
- Financial skill
- have a habit of savings
- Effective day to day money management techniques
- Planning minimum of 5 year
- Propensity to plan for finances


1. mainstream Senior citizen (women) in civil society
→ promote "Ageing in place"
→ care remain valid at home
→ Inclusive, Barrier-free, age-friendly society
→ Safety needs of the elderly
→ long term saving, improving financial power
→ Employment (income generating activity)
→ counselling, career guidance, training needs
→ Assistance for neglected/abandoned parents
→ budgetary support for abandoned parents
Economics
Society
Environment
Ageing population Impact
Reduced Infant
child and maternal mortality
Reduction in communicable disease
Better control of non communicable disease
Population ageing Influence
Statistics
United Nations Statistics division
Ministry of statistics and programme Implementation
National Sample Survey
Ministry of social justice and empowerment
Register general of India, Ministry of home affairs
Ministry of health and financial family welfare
Ministry of rural development
Ministry of consumer affairs, food, public distribution
Role of Government
UN Principle of Older persons
Themes
Independence
Participation
Care
Self-fulfilment & dignity
conceptual framework based on the plan and principles with four priority areas
1. Situation of older persons
2. Individual life long development
3. Relationship between generations
4. Inter-relationship of population ageing and development
→ To maintain sustainable economic growth
→ Eradicate Poverty
→ Address Inequality
→ Economic Independence
Need of population ageing policies and government Action
Problems found in aged persons
Economic
Physiological problems - Anatomical, psychological
- Behavioral and attitudinal
- loss of physical strength
- loss of stamina
- need of systematic handling
Housing Related - unsure of steps, diminishing energy, forgetfulness
Crime against aged persons - murder, theft, snatching, cheating
Schemes - Dept of Social Justice and empowerment developed and implement
1. National Policy for older persons
2. Maintain & Welfare of parents and Senior citizen Act, 2007
3. National Award for Senior citizen - Vayoshreshta Samman
4. राष्ट्रीय वयोश्री योजना
5. Indira G. National Old Age pension Scheme
6. National Action plan for the welfare of Senior citizen
7. प्रधानमंत्री वय वंदन योजना
Special Attention
1. Elderly Woman
2. Poor (Rural)
3. Increasing Advancement in technology

Organization of the Book



Section 1 - Individual Differences

Section 1 begin by looking at Indian demographics and the elderly, which includes information such as age, race, gender, socioeconomic status, literacy, population growth rate, death rate, and marital status. We took into account regional and cultural/ethnic differences that must be taken into account when designing. In a broader sense, the world's population is rapidly aging as people live longer lives and birth rates decline. The increase in the number of elderly people is a global phenomenon: between 2017 and 2050, virtually every country in the world is expected to see a significant increase in the number of elderly people. In 2012, 562 million people aged 65 and up made up 8% of the global population; by 2015, this number had risen to 617 million, and by 2050, it will have risen to 1.6 billion, accounting for 16% of the global population. Importantly, the number of "oldest old" (people aged 85 and older) is expected to rise 351% by 2050, and the number of centenarians is expected to rise tenfold (United Nations, 2016). However, the rate of population aging varies by country, and in the coming decades, the older population in less developed countries will grow at a faster rate. In 2012, 562 million people aged 65 and up accounted for 8% of the world's population; by 2015, that number had risen to 617 million, and by 2050, it will have risen to 1.6 billion, accounting for 16% of the world's population. Importantly, the number of "oldest old" (people aged 85 and older) is expected to rise 351% by 2050, and the number of centenarians is expected to rise tenfold (United Nations, 2016). Older women outnumber older men, especially in the older cohorts. The number of centenarians (people who have lived for 100 years or more) will continue to rise. As a result, not only is the population aging, but people are also living longer lives, posing unique challenges to the design community. Perception, cognition, mobility, and movement control all change as people get older.

Section 2 - Technology

Technology section discusses existing and emerging technology trends, technological trends, its implications and various variable factors which are relevant for eldelry. Emerging technologies, particularly mobile and wearable technologies, have the potential to play a critical role in meeting the needs and aspirations of an increasing number of older adults (65+) and the oldest elderly (80+). Social inclusion and participation, civic inclusion, and access to government services can all be aided by technology. As a result, these technologies can improve well-being and quality of life, support independence and autonomy, and assist with

age-related impairments and other limitations if they are well-designed and easily accessible.
Although adoption and use of new technology among older adults has increased significantly in the last decade, older adults are still less likely to adopt new digital technologies and are more likely to discontinue use with age when compared to other age groups. However, the so-called digital divide is complicated by factors such as social class, education, income, gender, and living circumstances.
Design and evaluation of technology should be approached from the following perspectives: social structure diversity, later-life agency, and giving older adults a voice and valuing their contributions. The main focus should be on how to design, implement, and evaluate digital technology to meet the needs and aspirations of older adults in a holistic and nuanced way. Because of the inherent diversity of aging, designing for and studying older adults presents unique challenges that should be thoroughly explored.

Section 3 - Content & Design

This section covers the fundamentals of human factors design as well as various design philosophies. There's also an overview of data collection and research methodologies. It is concerned with involving older adults in user testing. Conducting research with older adults is also covered in this chapter.

Section 4 - Government Intervention

This section discusses various government schemes, Self-Development Goals, and various government and non-governmental organizations that work to develop and improve the well-being of the elderly population. It provides guidelines for how a designer can incorporate the role of government and other organizations while also benefiting the elderly.

Section 4 - Application Areas

The examples in the Application Areas section show how the design guidelines can be used in domains that are important to independence and daily living.

References

1. https://ourworldindata.org/age-structure
2. https://kumu.io/daiict202014003/design-for-elderly#untitled-map/application-areas
3. https://unece.org/digitalization/press/ageing-digital-era-unece-highlights-key-actions-ensure-digital-inclusion-older
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9. https://www.assistedliving.org/ultimate-guide-to-senior-finance/#wills_and_trusts
10. https://www.toptal.com/designers/ui/ui-design-for-older-adults