a.a. 2020-2022

Xiaoyi Shu
supervisor   Ioannis Chatzigiannakis
co-supervisor   Viktor Malakuczi

Xiaoyi Shu - Green Thumb

Master of Science in PRODUCT & SERVICE DESIGN

SAPIENZA
Università di Roma

GREEN THUMB

Smart product and service design for the maintenance of indoors plants

SAPIENZA
Università di Roma

Student
Xiaoyi Shu
shu.1955104@studenti.uniroma1.it

Supervisor
Ioannis Chatzigiannakis
Co-Supervisor
Viktor Malakuczi

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Titolo:
**Green Thumb:Smart product and service design for the mainte-
nance of indoors plants**

Autore:
Xiaoyi Shu

Relatore:
Ioannis Chatzigiannakis

Relatore aggiunto:
Viktor Malakuczi

CONTENTS

ABSTRACT

PART ONE
Background

PART TWO
Design Research

PART THREE
Ideation & Proposal

PART FOUR
Final Design

PART FIVE
Appendix

ABSTRACT

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PART ONE

Background

01
INTRODUCTION

This section covers why people choose to grow plants indoors, what is the difference between indoor and natural growth, and what problems people encounter.

01.1
INTRDUCTION

The edge of the city continues to expand to the surrounding area, encroaching on the original natural environment. The creatures that originally lived in the natural environment have reappeared in urban life in different ways. As an important part of the natural environment, plants are also an essential part of urban life. Few, plants reappear in people's lives in the form of greening, parks, potted plants, etc.

With the continuous development of modern urban life, people living in cities are getting farther and farther away from plants. Many people choose to grow some plants in the area where they live or work, such as placing some green radishes in the bedroom and placing them on the balcony. Plant some hanging baskets on the top, put cacti on the desk, etc. Especially during the new crown pandemic, people who are isolated at home prefer to bring nature to their homes. Why do people choose to grow these plants in these indoor spaces? For most people, indoor plants can decorate and beautify their living environment, which is an extension of urban greenery to the interior. At the same time, the color and taste of indoor plants can soothe people's mood and emotions. Indoor plants can also adjust indoor temperature, humidity, purify air quality, absorb harmful chemicals and so on.

Plants are also vital to our survival. They provide food, fiber, building materials, fuel and medicines. Plants can also bring intangible benefits to people, such as improving our health. These benefits occur with plants both outdoors and indoors. People have been bringing plants into their homes for thousands of years. We are increasingly working indoors, and we are also making the most of plants in those spaces. Indoor plants have many benefits. Physically, they help us breathe cleaner, healthier air, which improves our well-being and comfort. They make our environment more pleasant, they make us feel more peaceful. Houseplants have been linked to reducing stress, increasing pain tolerance, and increasing people's productivity. The question of plants having an intangible positive effect on us. Research shows that people have learned to respond naturally to plants. Some of these responses appear to have a genetic component. Maybe that's why everyone likes to have some plants at home or on their desk.

In modern life, most of the urban buildings are energy-saving closed buildings. Due to the obstruction of air circulation, the concentration of pollutants in the air may reach dangerous levels, posing a serious threat to human health.

Plants can effectively remove pollutants and improve indoor air quality, and plants represent a sustainable solution to improve indoor air quality. Plants have a strong ability to remove indoor air pollutants through stomatal absorption (absorption) and non-stomatal deposition (adsorption), and can effectively reduce the concentration of carbon dioxide and nitrogen dioxide in the air. In addition, indoor plants, related microorganisms in the soil also have an impact on the air in the space. Purifying indoor air by means of houseplants can reduce the energy consumption of modern buildings.

There are also many gardening enthusiasts living in the city, who create a growing space for plants in the limited private space in the city, and they obtain happiness and satisfaction from the maintenance of indoor greenery.

However, in the process of selection, purchase, maintenance and so on of indoor plants, both experienced gardeners and newbies who are just about to buy indoor plants will encounter various problems.

1   Lohr, V. I. (2009, June). What are the benefits of plants indoors and why do we respond positively to them?. In II International Conference on Landscape and Urban Horticulture 881 (pp. 675-682).

2   Brilli, F., Fares, S., Ghirardo, A., de Visser, P., Calatayud, V., Muñoz, A., ... & Menghini, F. (2018). Plants for sustainable improvement of indoor air quality. Trends in plant science, 23(6), 507-512.

2   Adachi, M., Rohde, C. L. E., & Kendle, A. D. (2000). Effects of floral and foliage displays on human emotions. HortTechnology, 10(1), 59-63.

01.2
PROBLEM

People always hope that the houseplants they grow will be in the best condition at all times, just like when they were bought in the first place, but the reality is that most houseplants will outlive the same type of plants grown in the natural environment. The plants are much shorter, and at the same time, there will always be various unexpected situations with human participation, resulting in the early withering and death of indoor plants.

The indoor environment where indoor plants grow is very different from the natural environment. For plants, lack of light and insufficient light in ordinary rooms will not lead to plant death. The plants placed here often show a weakened growth potential due to insufficient light. , The leaves are pale, the leaves become smaller, the internodes are long, and the flowers cannot be bloomed. However, the lack of light to a certain extent, the plant can not survive. This is the case in dark hallways, hallways, and corners of rooms.

Dry and hot air, the indoor air humidity is very low due to indoor central heating or other artificial heating. Such environmental conditions are not tolerated by many indoor plants. Some of the more delicate plants may die in such harsh winter conditions.

Excessive solar radiation, even if the temperature is not too high, there are many indoor plants will suffer from sunlight. Although some houseplants, such as geraniums, grow well on sunny windowsills, they are generally placed with other plants in the summer to provide shade for their pots, otherwise, in the sun , Pots and pot soil heating is very high, can damage the root system of plants.

Convective wind, when the outdoor temperature is lower than the indoor temperature, especially in the cold winter, the convective wind will be generated when the window is opened. This convective wind has a great impact on indoor plants, especially those that are relatively delicate and afraid of cold, and may cause plant death in severe cases. In addition, plants placed on windowsills near windows with large gaps are susceptible to damage in cold seasons.

Low temperature at night, the higher the daytime temperature of the environment where the plant is located, the greater the damage caused by low temperature at night. The damage from the dramatic temperature change is more serious than that of the low temperature alone.

The complex and difficult indoor environment not only makes plants vulnerable, but also makes people's maintenance more difficult, not to mention that many people do not understand the types and needs of plants, etc. Many plants die due to neglect in the maintenance process of people.

02
INDOORS PLANTS

This part introduces what indoor plants are, what are the main types of indoor plants and which areas are suitable for growth, as well as common problems and suggestions for indoor plant maintenance.

02.1
INDOORS PLANTS

Indoor plants usually refer to plants that are artificially planted in indoor spaces. Most of the indoor plants grow in pots with limited space. Indoor plants need artificial maintenance and cannot rely on self-growth to complete their life cycle.

Indoor plants inherit the taxonomy and aesthetic principles of garden plants. Garden plants refer to plant materials suitable for landscaping. Most of the classification methods of garden plants are conventional, and there are many overlaps between the classification methods, such as woody, herbaceous, vine, aquatic plants and other categories, or trees, shrubs, ground cover, vines and other categories. Due to different viewing distances and viewing points, the selection of garden plants is often based on the overall shape of the plant, while the selection of indoor plants is based on the shape of flowers and leaves, color changes, etc. Indoor plants should generally have beautiful posture, beautiful color, and beautiful fragrance. It can be divided into: foliage plants, flower plants, fruit plants, aromatic plants, succulents and ferns. Foliage plants, with leaf color, shape and texture as the main ornamental objects, are the most widely used type of indoor greening.

Flower viewing plants, the color, shape, size and texture of the flowers are the main viewing objects. Ornamental fruit plants refer to plants with high ornamental value in fruit shape, size or color. Aromatic A plant, which can emit fragrance on its own.

Succulents refer to a class of plants in which a certain part of a plant's vegetative organ (such as a stem, leaf or root) appears thick and succulent in appearance. Ferns, which reproduce by spores, have peculiar leaves and are green and green.

The size of the plants is also an important factor in shaping the indoor plant landscape. Large plants are more than 1.8 meters high; medium-sized plants are 0.8-1.8 meters high), small plants are 0.4-0.8 meters high; micro ornamental plants are less than 0.4 meters, and 15-20 cm small potted plants are especially popular.

The survival of indoor plants has certain adaptability to factors such as temperature, humidity, and light in the surrounding environment. According to temperature requirements, it can be divided into cold-resistant indoor plants, semi-cold-resistant indoor plants and non-cold-resistant indoor plants; according to water requirements, it can be divided into high-humidity plants, Medium-humidity plants and lower-humidity plants; can be divided into positive plants (sun-loving plants), shade-tolerant plants (neutral plants) and negative plants (shade-loving plants) according to light requirements.

02.2 INDOORS PLANTS MAINTENANCE

The maintenance of indoor plants often causes yellowing and wilting of leaves.

The first: root rot

When growing flowers indoors, most of the plants will hang up due to excessive watering. Poor soil drainage or poor ventilation will easily cause root rot, and the demand for water of indoor plants will be drastically reduced. , If you water frequently, it will definitely lead to a lack of oxygen in the roots of the plant, which will cause the roots of the plant to slowly turn brown-black or mushy.

The main symptom of plant infection with root rot is that the branches and leaves of the plant will continue to wither and turn yellow, the leaves will continue to turn yellow, and the leaves will fall off when they are touched, which is basically rotten roots. After the roots of indoor plants rot, the branches of the whole plant will gradually wrinkle, and the bottom of the rhizome will become soft, and the bottom of the stem can even squeeze out water.

If it is a plant that has just started to rot its roots, such as the common money tree, money tree and other plants, but only part of the root system is rotten, you can remove them from the soil, wash the root system, cut off all the rotten root system, and Cut a few centimeters off the healthy part. After that, soak these branches with polyamine solution or potassium permanganate solution. After 30 minutes to an hour, pick up the plants and re-cut them into new potting soil, keeping the potting soil slightly moist, moisturizing humidity and temperature. , generally two or three weeks after the re-rooted germination.

When growing flowers indoors, it is recommended to use some loose and well-drained soil, try not to use yellow soil, red soil, or some relatively heavy pot soil to grow plants. It is best to choose terracotta pots, tile pots, or gallon pots with more drainage holes, green hill pots or Alice flower pots. Grow flowers. Before watering the plants, wait until the soil is completely dry before adding water, which basically feeds the indoor plants.

The second: excessive lack of fertilizer

After some friends grow flowers at home, they will not give a little fertilizer to the plants for several years, which will definitely cause the leaves of the plants to keep turning yellow, but the leaves will not fall off. This is very different from the symptoms of rotten roots.

If the leaves of your indoor plants keep turning yellow, but the leaves are still strong on the branches, it is basically caused by an excessive lack of fertilizer. The soil in the pot is very limited, and the nutrients in the pot soil will change over time. It will gradually deplete over time. When maintaining plants indoors, it is also necessary to occasionally supplement the plants with thin fertilizer, but the fertilization concentration should not be too large (the concentration is less than half of the usual), and the frequency should not be too high.

For indoor potted plants, it is enough to give slow-release fertilizer once or twice a year (once in spring and autumn), or bury some decomposed sheep manure at the bottom of the pot. The fertility of sheep manure will be milder, and it will not easily burn the plants. root system. For slow-release fertilizers, you can choose a long-acting type. Each time, you only dig holes at the edge of the flowerpot and bury it. Sprinkle 1-2 grams (small spoons) into the flowerpot about 15 cm in size.

The third type: plant "stiff seedlings"

Some of the plants in my friend's house stopped growing after they were raised. After half a year or even a few years, the plants did not grow a little, and no new leaves grew. The leaves of the plants gradually turned yellow, the leaves became smaller, and the growth of the plants was weak. . This situation is what we usually call "stiff seedlings", that is, no new roots grow, but the nutrients of the old leaves are continuously consumed, and the leaves will appear yellow from the bottom of the branches.

If this happens, loosen the soil in time. In addition, pay attention to keeping the plants in a suitable environment to improve the maintenance environment. You can give the plants some sunlight, you can give soft light in the morning or evening, and gradually increase the light. Do not expose to the sun all at once. In addition, we must pay attention to enhancing the ventilation of the environment, pay attention to cleaning the dust on the leaves, so that the plants can better photosynthesize, and after the plants grow new leaves and buds, you can start to supplement fertilizer. Do not fertilize the plant during the dead seedling period, otherwise it will only lead to fat injury,

Fourth: fungal diseases

If there are some black or brown spots on the leaves and branches of the plant, which slowly become plaques, it is basically infected with fungal diseases, and the infected plants need to be isolated to avoid infecting other healthy plants.

Some branches and leaves that are more seriously infected with bacteria should be cut off and thrown into the trash can, and sprayed with bactericides in time. Usually plants can be sprayed with mancozeb solution, chlorothalonil solution or thiophanate-methyl solution every 1 to 2 months, which can well prevent the growth of fungal diseases. If the plant has been infected with fungal diseases, it is necessary to prescribe the right medicine. Common three powerful drugs such as Lunasen, Lufei, flusilazole (black spot) and triazolone can be used.

The fifth type: the root system is full of flower pots

If your potted plants have been cultivated for many years, the root system has grown over the flower pot, or even the root system has grown out of the soil surface, then you must change the pot in time. The best time to change pots is after the plants have finished blooming, usually after the warm spring. It is best to change pots. In areas with warm winters, repotting can also be done in the fall.

When repotting a plant, don't change it to a flowerpot that is too large at once. Every time you change the pot, it is one size larger than the original flowerpot. For example, a flower pot with a diameter of 12cm can be changed into a flower pot with a diameter of 15cm.

When changing the pot, you can remove the topsoil slightly, check for signs of rotten roots, and then add new soil. The new soil should not be too different from the original old soil, otherwise it will be difficult for the root system to grow from the old soil to the new soil. .

After changing pots, the plants should be kept in a ventilated and shaded place for 3 to 5 days, and then slowly see the light, and gradually increase the light, so that the plants can resume growth. When changing pots, you can add some slow-release fertilizer or decomposed sheep manure to the bottom of the pot to ensure that the plant transplants have more nutrients that are continuously released.

Sixth: Insufficient light

The leaves of indoor plants grow smaller and smaller, and the gaps between the branches and leaves continue to widen, the leaves grow particularly delicate, and the color of the leaves will become dull, which is usually caused by insufficient light. All plants need photosynthesis to provide energy for plant growth. Without proper light, it will definitely lead to a reduction in the energy of plant growth.

The growth of the plant will become slower, and the branches and leaves will appear leggy, just to find more light.

Of course, these plants that lack light can't be moved to a sunny place all at once, see the light slowly, gradually increase the light, and let the plants slowly adapt to the new environment, so that they can safely resume growth.

**03
CASE STUDY**

This section presents the collection and analysis of products, services and related cases about urban greening development.

03.1
PRODUCT DESIGN CASES

XXXX

Abstract

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XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
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XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Triangle Innovation Char

innovation

validation

sustainability

Criteria

social impact	O O O O O O O
uesr center	O O O O O O O
economic benefit	O O O O O O O
market effect	O O O O O O O
popularity	O O O O O O O
Acceptance	O O O O O O O
Profitability	O O O O O O O
reproducibility	O O O O O O O

Name :	XXXX
Year :	XXXX
Nation :	XXXX
Producer:	XXXX
Focus area:	XXXX
Cost:	XXXX
Supported by:	XXXX

Regarding the related product design of indoor plants, use blue to represent the product design, display the name of the product, design year, introduction, and compare it with criteria such as good social impact, economic benefits, popularity, public acceptance, and reproducibility

innovation

validation

sustainability

The innovation triangle measures the comprehensive ability of design through innovation, usability, and stability.

The colored circles indicate how much, the degree of fit with the theme.

social impact   O O O O O O O

SMART FLOWER POT

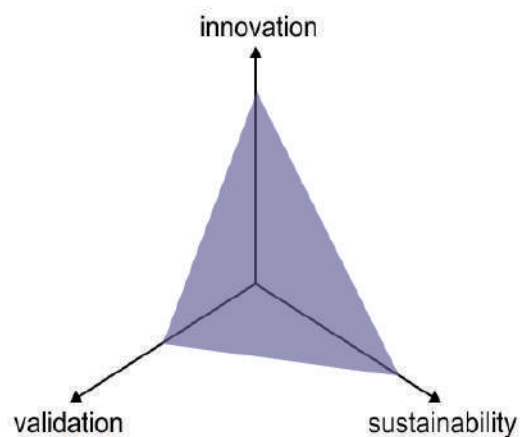Name : Parrot Pot smart flower pot

Year :   2020

Nation :   Amercian

Producer: Parrot Pot

Focus area: Smart Gardens

Cost: unknown

Supported by: for-profit

Abstract

The Parrot Pot smart flowerpot looks just like a normal flowerpot, but its connotation is inside. It has multiple built-in sensors that automatically acquire data every 15 minutes and transmit it to the movement. You only need to open the mobile app and connect to the Internet, you can clearly see the growth status of the plant and see if it is healthy.

Triangle Innovation Char

Criteria

social impact	●	●	●	●	●	○	○
uesr center	●	●	●	○	○	○	○
economic benefit	●	●	●	○	○	○	○
market effect	●	●	●	●	○	○	○
popularity	●	●	●	○	○	○	○
Acceptance	●	●	●	●	●	●	○
Profitability	●	●	●	○	○	○	○
reproducibility	●	●	○	○	○	○	○

DJI AGRICULTURE

Name :	Dji agriculture
Year :	2012
Nation :	China
Producer:	Dji
Focus area:	Agriculture
Cost:	unknown
Supported by:	for-profit

Abstract

DJI Agriculture equips operators with cutting-edge technology as well as innovative workflows, making farming more efficient than ever.DJI Agriculture not only empowers agriculture professionals with powerful equipment but also provides intelligent solutions that save time and increase workflow, benefiting a wide range of customers from farmers and growers to agricultural cooperation and service agencies.

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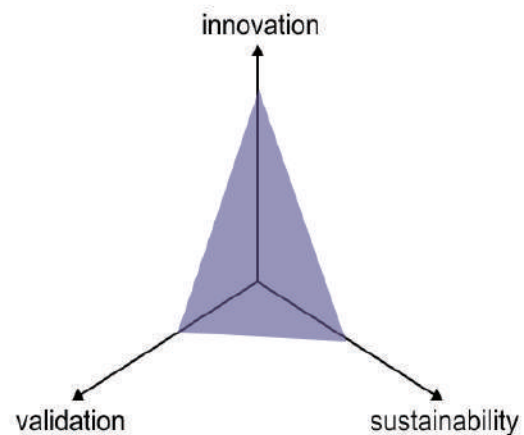
Criteria

social impact	●●●●●○○
uesr center	●●●○○○○
economic benefit	●●●○○○○
market effect	●●●○○○○
popularity	●●●●●○○
Acceptance	●●●●○○○
Profitability	●●●●○○○
reproducibility	●●●○○○○

QUANTIFIED

Abstract

Sensor systems provide gardeners with reliable support for managing crops, such as whether and how much water is needed. This support is designed to relieve labor in the short term, save resources such as water or agrochemicals in the medium term, and ensure more sustainable cultivation in the long term. The innovative factor of the EIP project "Sapling Growth Support System" lies in the new small pot measurement technology.

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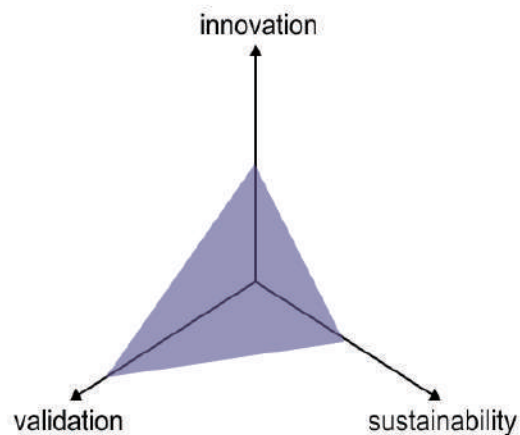
Criteria

social impact	●	●	●	○	○	○	○
uesr center	●	●	●	○	○	○	○
economic benefit	●	●	●	●	●	○	○
market effect	●	●	●	○	○	○	○
popularity	●	●	●	○	○	○	○
Acceptance	●	●	●	●	●	○	○
Profitability	●	●	●	●	●	○	○
reproducibility	●	●	●	●	●	○	○

Name :	Quantified
Year :	2021
Nation :	Netherlands
Producer:	Quantified
Focus area:	agriculture
Cost:	unknown
Supported by:	for-profit

HUAYI

Name: HuaYi intelligent device

Year:	2019
Nation:	China
Producer:	HuaYi
Focus area:	Potted plants
Cost:	unknown
Supported by:	for-profit

Abstract

With HuaYi remote intelligent plant maintenance flower device, it provides you with a full range of plant maintenance solutions and operation platforms. With the help of Internet technology covering the world, with its simple and user-friendly operation interface, technologically intelligent maintenance methods, and remote and direct-controlled multi-point interactive communication with the plant community, it can solve the problem of plant lovers who love flowers on business trips, long-distance travel, and long-term away from home. Timely replenishment and maintenance issues. And help flower gardeners to scientifically understand the difficulties in the maintenance process and increase the interest in plant maintenance

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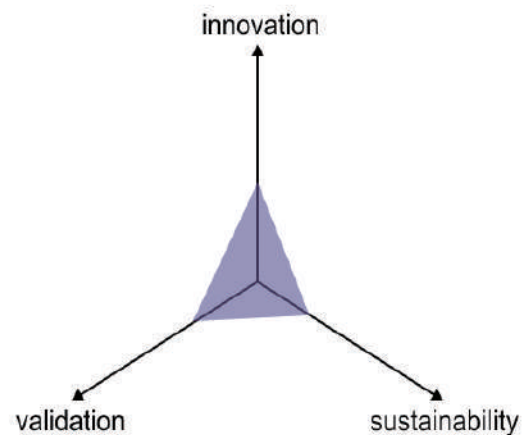
Criteria

social impact	⬤⬤⬤⬤⬤○○
uesr center	⬤⬤⬤○○○○
economic benefit	⬤⬤⬤○○○○
market effect	⬤⬤⬤○○○○
popularity	⬤⬤⬤○○○○
Acceptance	⬤⬤⬤⬤○○○
Profitability	⬤⬤⬤⬤○○○
reproducibility	⬤⬤○○○○○

WISGROW

Name :	Wisgrow
Year :	2018
Nation :	China
Producer:	Wisgrow
Focus area:	Potted plants
Cost:	unknown
Supported by:	for-profit

Abstract

This smart flower grower uses full-spectrum LED lights, patented matrix particles, soilless cultivation, and imported vegan plant nutrient solution to ensure the smooth growth of plants. At the same time, it also supports APP real-time monitoring, one-click sharing to social circles and other operations. There is also an eye protection table lamp above the flower machine, which can adapt to more use environments. A great product for the care of delicate flowers.

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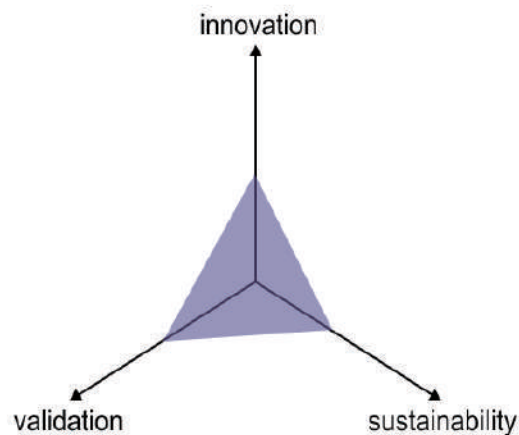
Criteria

social impact	● ● ○ ○ ○ ○ ○ ○
uesr center	● ● ● ○ ○ ○ ○ ○
economic benefit	● ● ● ● ○ ○ ○ ○
market effect	● ● ● ○ ○ ○ ○ ○
popularity	● ● ● ○ ○ ○ ○ ○
Acceptance	● ● ● ● ○ ○ ○ ○
Profitability	● ● ● ○ ○ ○ ○ ○
reproducibility	● ● ● ○ ○ ○ ○ ○

GROBO

Name :	Grobo
Year :	2022
Nation :	Canada
Producer:	Grobo
Focus area:	Smart Gardens
Cost:	unknown
Supported by:	for-profit

Abstract

An indoor home cultivation system launched by the Canadian start-up company Grobo simplifies the process of growing flowers, fruits, vegetables and herbs into three steps: sowing the seeds, entering the plant name in the app, and waiting for harvest. The appearance of the product is similar to a greenhouse container, with a height of about 1 meter and a length of 35 cm. With the Grobo APP, the color and brightness of the 53 LED bulbs in the Grobo can be precisely adjusted, and the watering schedule can also be set. It comes with an activated carbon filter to absorb plants. odor. Grobo has built-in hundreds of plant growth parameters, regularly supplies the right amount of water and nutrients, monitors soil pH changes, and focuses on cultivating small and high-quality plants. In addition to viewing, users hardly need to spend energy, especially suitable for "plant killers"
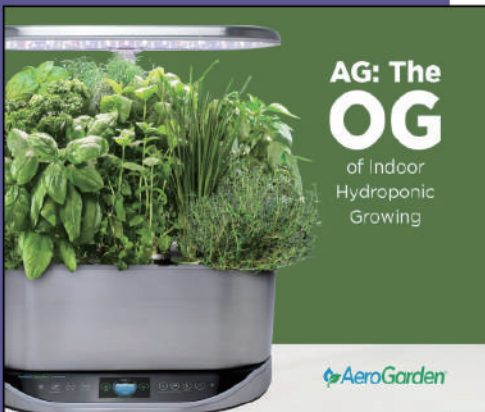
Triangle Innovation Char
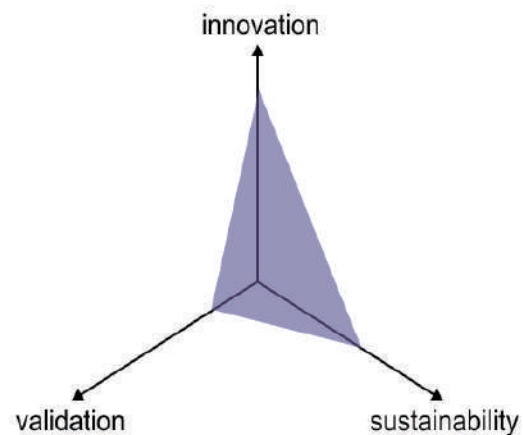
Criteria

social impact	⬤⬤⬤⬤⬤○○
uesr center	⬤⬤⬤⬤⬤○○
economic benefit	⬤⬤⬤⬤○○○
market effect	⬤⬤⬤○○○○
popularity	⬤⬤⬤○○○○
Acceptance	⬤⬤⬤○○○○
Profitability	⬤⬤⬤⬤○○○
reproducibility	⬤⬤⬤⬤○○○

AEROGARDEN BOUNTY ELITE

Name : AeroGarden Bounty Elite

Year :	2019
Nation :	Amercian
Producer:	Aerogardens
Focus area:	Smart Gardens
Cost:	unknown
Supported by:	for-profit

Abstract

This indoor nursery planter is grown on medium, not the usual seed, and is even certified by NASA for soilless cultivation. To plant Xiaobai, you only need to insert the built-in planter into the container, water it, and drip liquid fertilizer according to the indicator light. The planter will automatically control all growth functions, and the LED spectrum light provides a full range of photosynthesis. The screen will remind users to add water and nutrient solution, and a higher-end version supports APP control. The key is that this product comes with a variety of plant varieties such as basil, parsley, parsley, thyme and mint, and can enjoy the greenest eating experience after organic and dirt-free planting through a nursery planter. The product is more suitable to be placed in the kitchen to enjoy a chic growing experience.

Triangle Innovation Char

Criteria

social impact	●●●●●○○
uesr center	●●●●●●○
economic benefit	●●●●○○○
market effect	●●●○○○○
popularity	●●●●●●○
Acceptance	●●●●●●○
Profitability	●●●●●○○
reproducibility	●●●●●○○

THE CLICK&GROW WALL FARM

Name :   Wall Farm
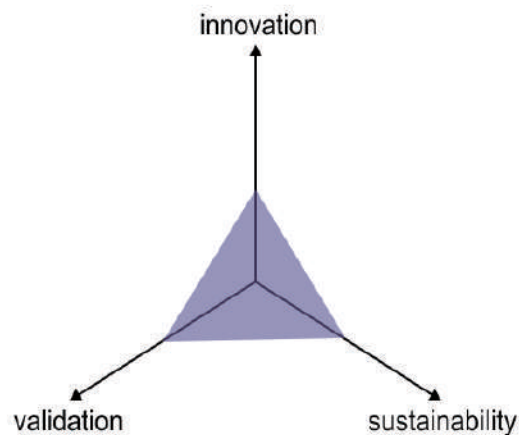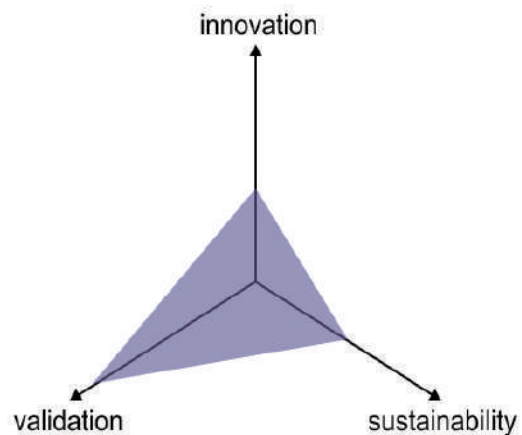Year :   2019
Nation :   Amercian
Producer: The Click & Grow
Focus area: Smart Gardens
Cost: unknown
Supported by: for-profit

Abstract

The Click & Grow Wall Farm is an indoor vertical garden that grows fresh herbs, fruits and leafy greens all year round and hyper-locally. Our innovative technology makes growing edibles and flowers at home year round super easy. Thanks to our unique Smart Soil technology our vertical gardens can easily be integrated into every home, restaurant, school, grocery store, or office. The Wall Farm has 3 shelves fully stacked with watering and lights. The Wall Farm has 51 growing holes in total

Triangle Innovation Char

Criteria

social impact	● ● ● ● ● ○ ○
uesr center	● ● ● ○ ○ ○ ○
economic benefit	● ● ● ○ ○ ○ ○
market effect	● ● ● ● ● ● ○
popularity	● ● ○ ○ ○ ○ ○
Acceptance	● ● ○ ○ ○ ○ ○
Profitability	● ● ● ● ● ○ ○
reproducibility	● ● ● ● ● ○ ○

25

SMART FLOWER POT

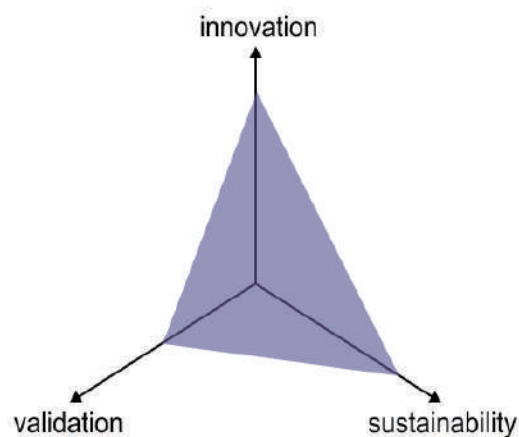

Name : Parrot Pot smart flower pot

Year :   2020

Nation :   Amercian

Producer: Parrot Pot

Focus area: Smart Gardens

Cost: unknown

Supported by: for-profit

Abstract

The Parrot Pot smart flowerpot looks just like a normal flowerpot, but its connotation is inside. It has multiple built-in sensors that automatically acquire data every 15 minutes and transmit it to the movement. You only need to open the mobile app and connect to the Internet, you can clearly see the growth status of the plant and see if it is healthy.

Triangle Innovation Char

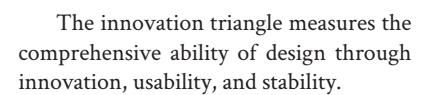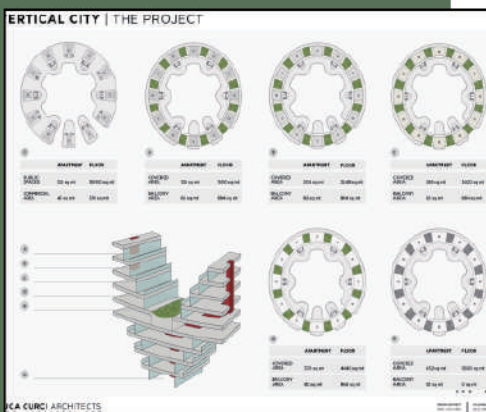## Criteria

social impact	●●●●●○○
uesr center	●●●○○○○
economic benefit	●●●○○○○
market effect	●●●●○○○
popularity	●●●○○○○
Acceptance	●●●●●●○
Profitability	●●●○○○○
reproducibility	●●○○○○○

03.2
FUTURE DESIGN CASES

XXXX

Abstract

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Triangle Innovation Char

Criteria

social impact	O O O O O O O
uesr center	O O O O O O O
economic benefit	O O O O O O O
market effect	O O O O O O O
popularity	O O O O O O O
Acceptance	O O O O O O O
Profitability	O O O O O O O
reproducibility	O O O O O O O

Name :	XXXX
Year :	XXXX
Nation :	XXXX
Producer:	XXXX
Focus area:	XXXX
Cost:	XXXX
Supported by:	XXXX

Regarding the related future design of indoor plants, use green to represent the possible future development direction of indoor plants, display the name of the product, design year, introduction, and have good social impact, economic benefits, popularity, public acceptance, can be Reproducibility and other criteria for comparison

The innovation triangle measures the comprehensive ability of design through innovation, usability, and stability.

The colored circles indicate how much, the degree of fit with the theme.

social impact   O O O O O O O

VERTICAL CITY

| Name :	Vertical city
Year :	2012
Nation :	Amercian,China
Producer:	Ken King
Focus area:	Focus area
Cost:	unknown
Supported by:	not-for-profit

Abstract

A vertical city is an arrangement of interconnected giant towers that are environmentally friendly, self-sufficient and capable of providing millions of people with a dignified life. By building vertical cities, we can save energy, support our growing population, and protect our land for food production, nature, and recreation.The vertical city will be composed of multiple buildings with the existing urban technology of contemporary civilization construction, dedicated to establishing, coordinating and sustainable connections, and creating an urban environment that is similar to life in different regions. , through the climatic conditions of future generations, and the purpose of our homes, will work in cities and regions, and the energy we can produce, and cities and residential communities that support population growth.

Triangle Innovation Char
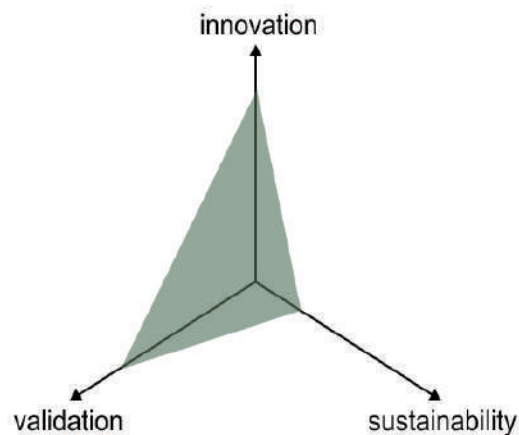
Criteria

social impact	○ ○ ○ ○ ○ ○ ○
uesr center	○ ○ ○ ○ ○ ○ ○
economic benefit	○ ○ ○ ○ ○ ○ ○
market effect	○ ○ ○ ○ ○ ○ ○
popularity	○ ○ ○ ○ ○ ○ ○
Acceptance	○ ○ ○ ○ ○ ○ ○
Profitability	○ ○ ○ ○ ○ ○ ○
reproducibility	○ ○ ○ ○ ○ ○ ○

GREEN ROOF

Name :	Semper green
Year :	1996
Nation :	Nertherlands
Producer:	Corné van Garderen
Focus area:	greenery
Cost:	unknown
Supported by:	for-profit

Abstract

Green roofs are buildings whose roofs are partially or fully covered with vegetation, growing medium, and buried with a waterproofing membrane. It can also include additional layers such as a root barrier and drainage and irrigation systems . Container gardens on rooftops, where plants are kept in pots, are generally not considered true green roofs, although this is debatable. Roof ponds are another type of green roof used to treat grey water . Vegetation, soil, drainage layers, roof barriers and irrigation systems constitute a green roof .

Green roofs are also a technical measure for low-impact development or sponge cities.

Triangle Innovation Char
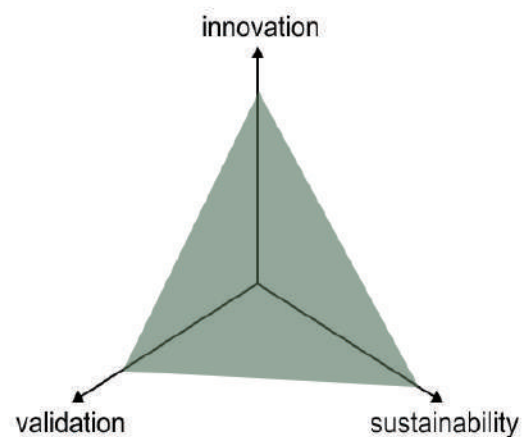
Criteria

social impact	⬤ ⬤ ⬤ ⬤ ○ ○ ○
uesr center	⬤ ⬤ ○ ○ ○ ○ ○
economic benefit	⬤ ⬤ ○ ○ ○ ○ ○
market effect	⬤ ⬤ ⬤ ○ ○ ○ ○
popularity	⬤ ⬤ ⬤ ⬤ ⬤ ○ ○
Acceptance	⬤ ⬤ ⬤ ⬤ ○ ○ ○
Profitability	⬤ ⬤ ⬤ ○ ○ ⬤ ⬤
reproducibility	⬤ ⬤ ⬤ ⬤ ○ ○ ○

LIVEING WALL

Abstract

SemperGreenwall Outdoor is a living wall system for exterior applications. Vertical gardens or green walls are highly suitable for greenifying urban areas and have a positive effect on the environment. The plants absorb CO_2 and fine particulate matter, provide a cooling effect while also enriching the environment with cleaner air. A green wall can remove an average of 2.3 kg of CO_2 from the air per square metre. A SemperGreenwall Outdoor can easily transform a grey surface into a green oasis, while hardly taking up any space. SemperGreenwall Outdoor is Cradle to Cradle certified, and your project can earn BREEAM and LEED points with our green facade system.

Triangle Innovation Char

innovation

validation   sustainability

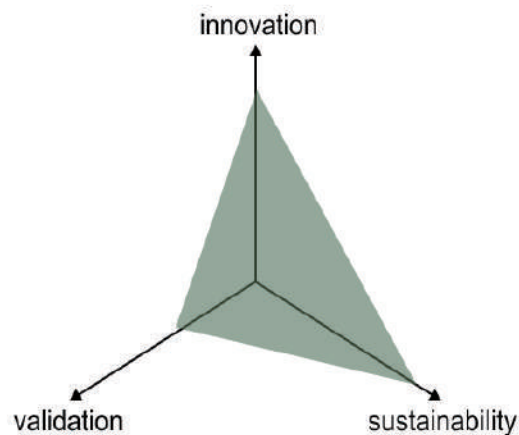| Name :	Semper green
Year :	1996
Nation :	Nertherlands
Producer:	Corné van Garderen
Focus area:	greenery
Cost:	unknown
Supported by:	for-profit

Criteria

social impact	● ● ● ● ○ ○ ○ ○
uesr center	● ● ● ● ● ● ○
economic benefit	● ● ○ ○ ○ ○ ○ ○
market effect	● ● ● ● ● ○ ○
popularity	● ● ● ● ● ○ ○
Acceptance	● ● ● ● ○ ○ ○ ○
Profitability	● ● ● ○ ○ ○ ○ ○
reproducibility	● ● ● ● ○ ○ ○ ○

BIOPHILIC CITY

Name :	Biophilic city
Year :	2013
Nation :	Singapore
Producer:	unknown
Focus area:	greenery
Cost:	unknown
Supported by:	not-for-profit

Abstract

he word 'biophilic' means a love of nature and the natural world, coming from bio- (life) and -philia (friendly towards). An organisation called Biophilic Cities exists to work with cities around the world to achieve accredited status and recognition for their work blending nature into urban planning.

We acknowledge the importance of daily contact with nature as an element of a meaningful urban life, as well as the ethical responsibility that cities have to conserve global nature as shared habitat for non-human life and people." Singapore has been a member of Biophilic Cities since 2013, no doubt thanks to the work done throughout the country to rewild the island.

Triangle Innovation Char
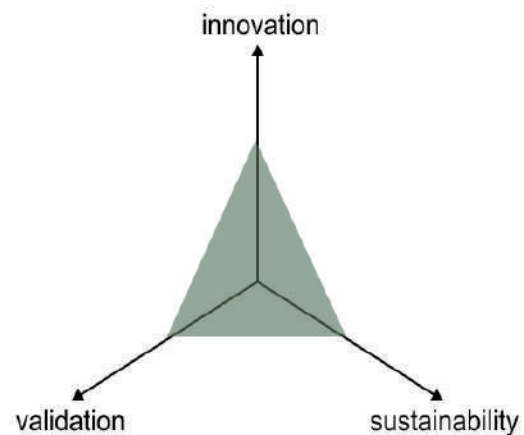
Criteria

social impact	⬤ ⬤ ⬤ ⬤ ○ ○ ○
uesr center	⬤ ⬤ ⬤ ⬤ ○ ○ ○
economic benefit	⬤ ⬤ ○ ○ ○ ○ ○
market effect	⬤ ⬤ ⬤ ○ ○ ○ ○
popularity	⬤ ⬤ ⬤ ⬤ ○ ○ ○
Acceptance	⬤ ⬤ ⬤ ⬤ ○ ○ ○
Profitability	⬤ ⬤ ○ ○ ○ ○ ○
reproducibility	⬤ ⬤ ⬤ ⬤ ○ ○ ○

ROOF TOP GARDEN

Name :	Roof top garden
Year :	unknown
Nation :	unknown
Producer:	unknown
Focus area:	greenery
Cost:	unknown
Supported by:	not-for-profit

Abstract

Roof gardens refer to planting plants on the roof to become gardens. Roof gardens and sky gardens are both types of roof gardens. Roof gardens not only bring a green and beautified environment visually, but also have functions such as slowing down the urban heat island effect, adjusting the microclimate, increasing water retention performance, building energy efficiency, and greening roofs, so they are highly valued by other advanced countries. Advanced countries have also formulated promotion and incentive policies for roof greening.
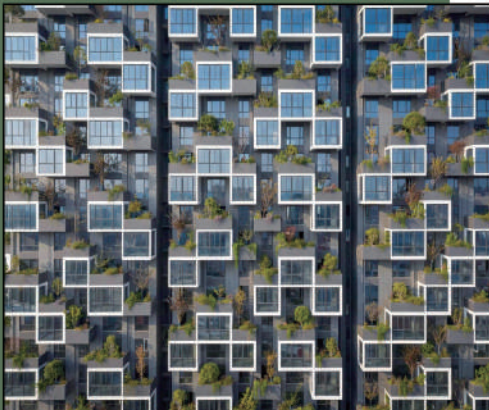
Triangle Innovation Char
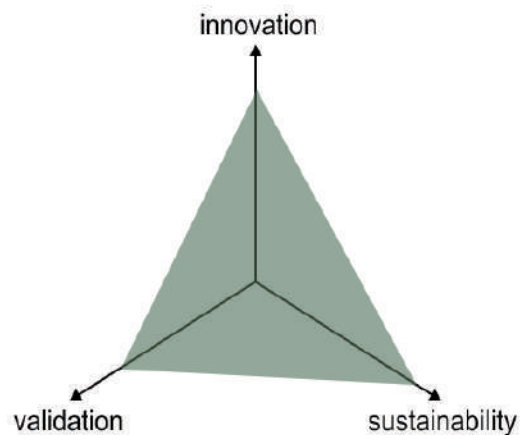
Criteria

social impact	⬤⬤⬤〇〇〇〇〇
uesr center	⬤⬤⬤⬤⬤⬤〇
economic benefit	⬤⬤〇〇〇〇⬤〇
market effect	⬤⬤〇〇〇〇⬤〇
popularity	⬤⬤⬤⬤⬤〇〇
Acceptance	⬤⬤⬤〇〇〇〇〇
Profitability	⬤⬤⬤〇〇〇〇〇
reproducibility	⬤⬤⬤⬤〇〇〇〇

VERTICAL FOREST

Name :	Easyhome Huanggang
Year :	2022
Nation :	china
Producer:	Stefano Boeri
Focus area:	greenery
Cost:	unknown
Supported by:	for-profit

Abstract

China's first 'Vertical Forest City' has been completed, providing a home to around 500 people - and over 5,000 shrubs and trees.
Though we may not think of tower blocks as green spaces, Italian architect Stefano Boeri has been disrupting this notion for decades.

Triangle Innovation Char

Criteria

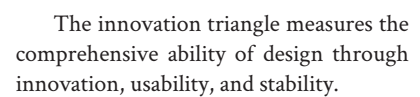|	
social impact	○ ○ ○ ○ ○ ○ ○
uesr center	○ ○ ○ ○ ○ ○ ○
economic benefit	○ ○ ○ ○ ○ ○ ○
market effect	○ ○ ○ ○ ○ ○ ○
popularity	○ ○ ○ ○ ○ ○ ○
Acceptance	○ ○ ○ ○ ○ ○ ○
Profitability	○ ○ ○ ○ ○ ○ ○
reproducibility	○ ○ ○ ○ ○ ○ ○

03.3
SERVICE DESIGN CASES

XXXX

Abstract

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Triangle Innovation Char

Criteria

social impact	○ ○ ○ ○ ○ ○
uesr center	○ ○ ○ ○ ○ ○
economic benefit	○ ○ ○ ○ ○ ○
market effect	○ ○ ○ ○ ○ ○
popularity	○ ○ ○ ○ ○ ○
Acceptance	○ ○ ○ ○ ○ ○
Profitability	○ ○ ○ ○ ○ ○
reproducibility	○ ○ ○ ○ ○ ○

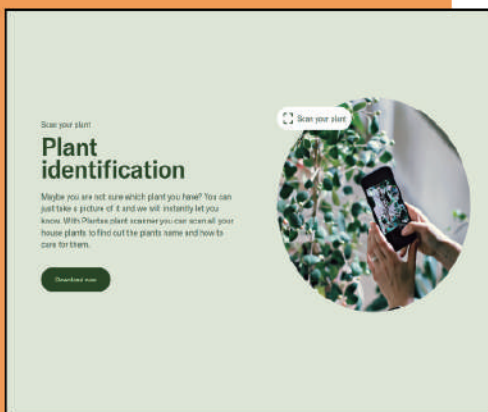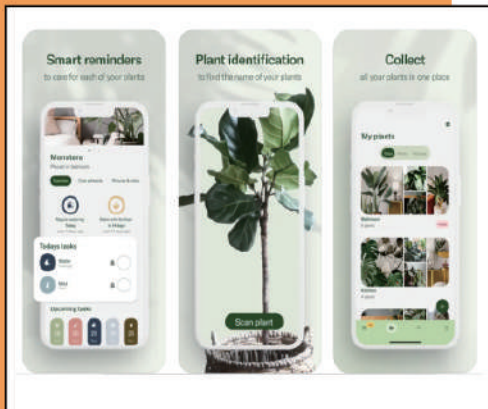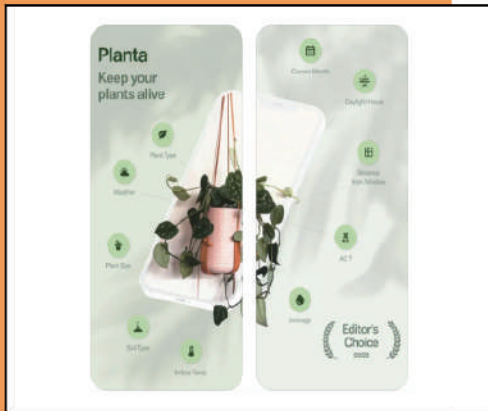|	
Name :	XXXX
Year :	XXXX
Nation :	XXXX
Producer:	XXXX
Focus area:	XXXX
Cost:	XXXX
Supported by:	XXXX

About service design of indoor plants, use yellow to represent related service design about indoor plant cultivation, display the name of the product, design year, introduction, and have good social impact, economic benefits, popularity, public acceptance, and can be reproduced sex and other criteria for comparison

The innovation triangle measures the comprehensive ability of design through innovation, usability, and stability.

The colored circles indicate how much, the degree of fit with the theme.

social impact ○ ○ ○ ○ ○ ○ ○
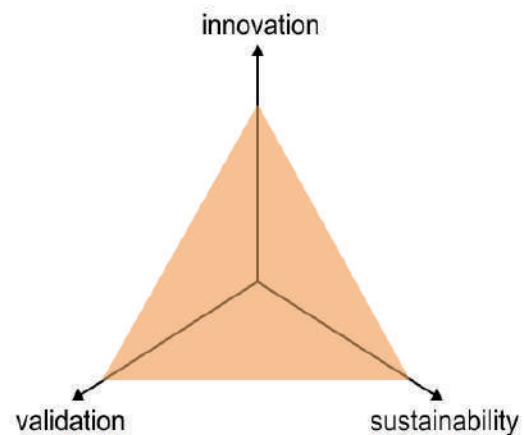
PLANTA

Name : Planta

Year : 2020

Nation : Sweden

Producer: Strömming AB

Focus area: Plant problems

Cost: unknown

Supported by: for-profit

Abstract

You can log the different species of plants you have at home, manually keep track of the light intensity of the room in which they're placed, and get push notifications about when you should water them based on the weather in your area. The app's best free feature? Detailed instructions about different watering methods — water over the soil, bottom watering, or water bath — based on your baby's needs.
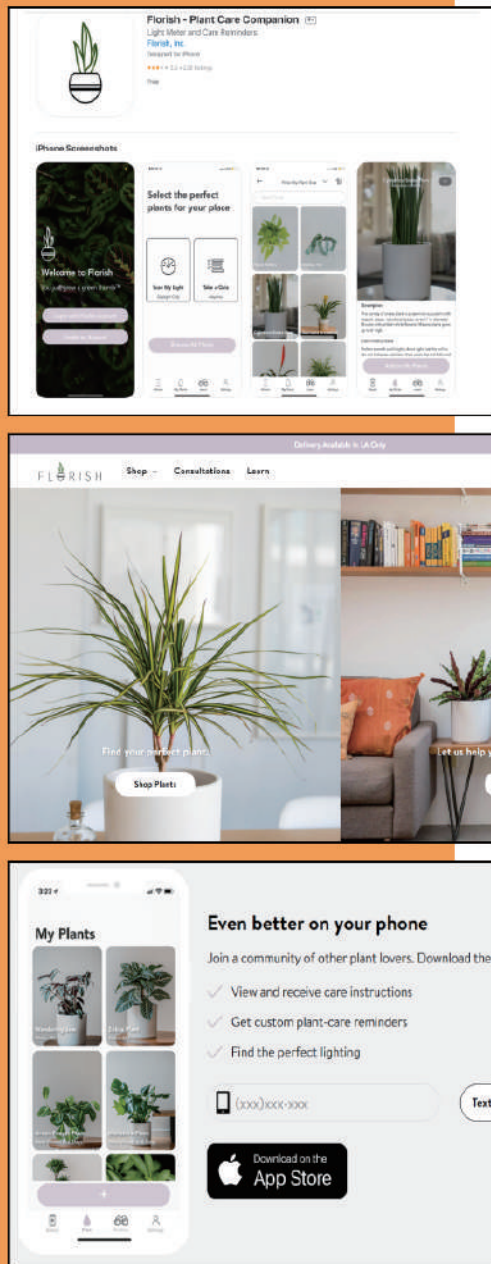
Triangle Innovation Char

Criteria

social impact	○	○	○	○	○	○	○
uesr center	○	○	○	○	○	○	○
economic benefit	○	○	○	○	○	○	○
market effect	○	○	○	○	○	○	○
popularity	○	○	○	○	○	○	○
Acceptance	○	○	○	○	○	○	○
Profitability	○	○	○	○	○	○	○
reproducibility	○	○	○	○	○	○	○

FLORISH

Abstract

Manually enter your plant babies' species into the app, and you'll get a brief description of what your plants should look like when they're healthy, care instructions with their water and light preferences, and a list of common issues that cause them to fall ill. But the app doesn't just tell you what your plants need; it also teaches you to fulfill those needs with watering reminders and plant care tips. The light meter is what makes this app stands out, though. Not quite sure if your room has bright, medium, or low light? This feature uses the phone camera to estimate light intensity in different areas in your home and to recommend plants based on those light settings. But really, it's just a useful tool for determining whether the plants you already have are getting the right amount of light. If you're not a fan of camera-enabled light meter, you can also determine light levels around your home with a three-question plant quiz.

Triangle Innovation Char

Criteria

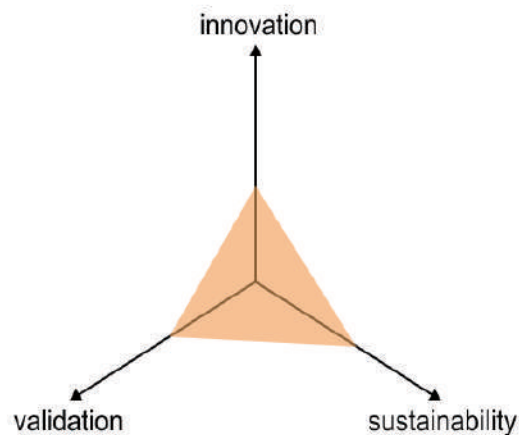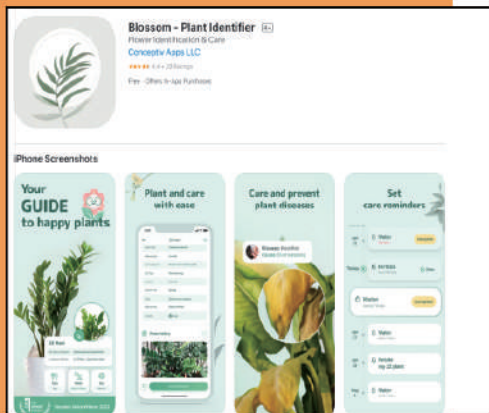|	
social impact	○ ○ ○ ○ ○ ○ ○
uesr center	○ ○ ○ ○ ○ ○ ○
economic benefit	○ ○ ○ ○ ○ ○ ○
market effect	○ ○ ○ ○ ○ ○ ○
popularity	○ ○ ○ ○ ○ ○ ○
Acceptance	○ ○ ○ ○ ○ ○ ○
Profitability	○ ○ ○ ○ ○ ○ ○
reproducibility	○ ○ ○ ○ ○ ○ ○

Name :	Florish
Year :	2018
Nation :	America
Producer:	Florish
Focus area:	Plant problems
Cost:	unknown
Supported by:	for-profit

BLOSSOM

Abstract

The app is split into four bottom tabs: a "search" tab that functions like a library for detailed plant descriptions and care tips, an "explore" tab for discovering new plants, a "reminders" tab for setting up push notifications for watering, fertilizing, and repotting, and a "my garden" tab designed for quick access to information about your plants.

Triangle Innovation Char
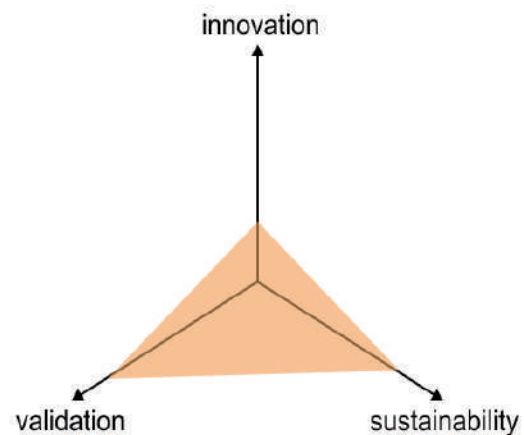
Name :	Blossom
Year :	2021
Nation :	America
Producer:	Conceptiv Apps
Focus area:	Plant problems
Cost:	unknown
Supported by:	for-profit

Criteria

social impact	●●● ○○○○
uesr center	●●●●●● ○
economic benefit	●●○○○○○
market effect	●●●●○○
popularity	●●●●●○○
Acceptance	●●●○○○○
Profitability	●●○○○○○
reproducibility	●●●●○○○

PICTURES THIS
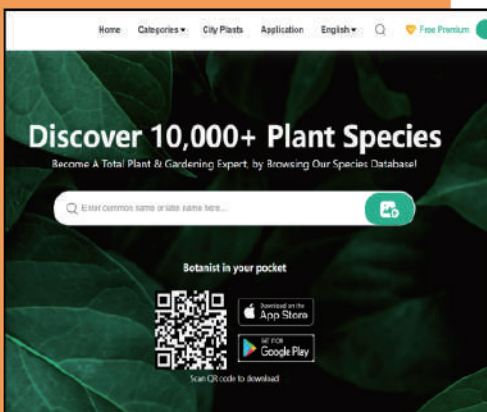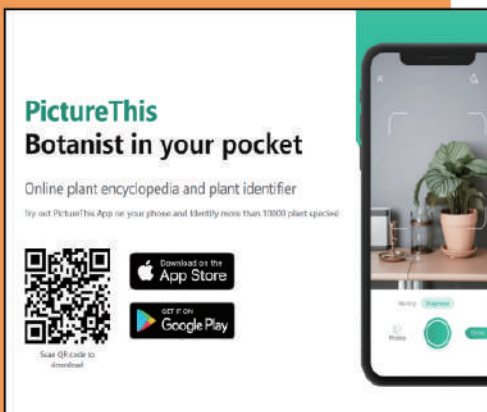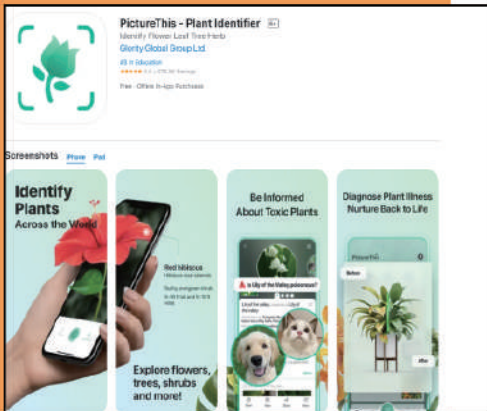
Name :	PictureThis
Year :	2020
Nation :	Hong Kong
Producer:	Glority
Focus area:	Plant problems
Cost:	unknown
Supported by:	for-profit

Abstract

PictureThis comes with a camera-enabled plant identifier and detailed plant care guides. But once you upgrade to either the gold or premium membership, the app will also let you access tools that no other app offers: an AI that diagnoses your sick plants, as well as a community forum for troubleshooting and sharing tips.

Triangle Innovation Char
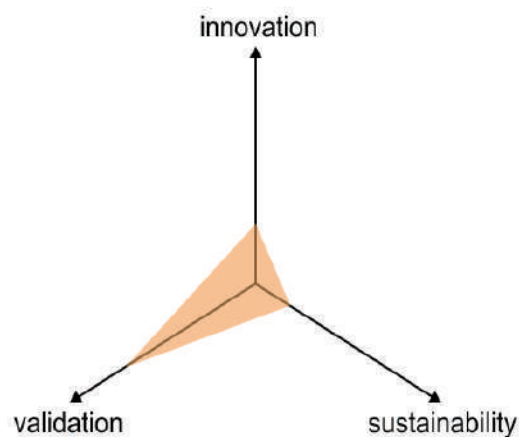
Criteria

social impact	⭕⭕⚪⚪⚪⚪⚪
uesr center	⭕⭕⭕⭕⭕⚪⚪
economic benefit	⭕⭕⚪⚪⚪⚪⚪
market effect	⭕⭕⭕⚪⚪⚪⚪
popularity	⭕⭕⭕⭕⚪⚪⚪
Acceptance	⭕⭕⭕⚪⚪⚪⚪
Profitability	⭕⭕⚪⚪⚪⚪⚪
reproducibility	⭕⭕⚪⚪⚪⚪⚪

THE PLANT ME
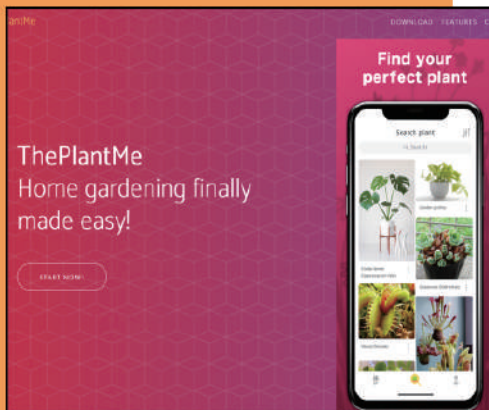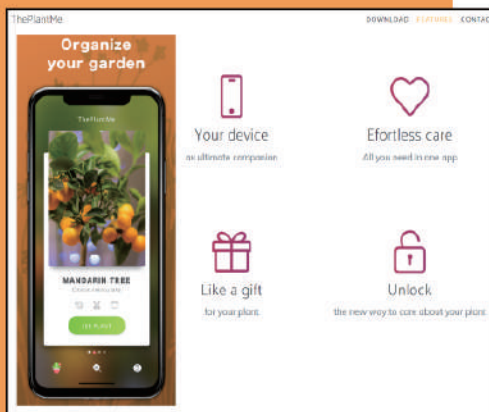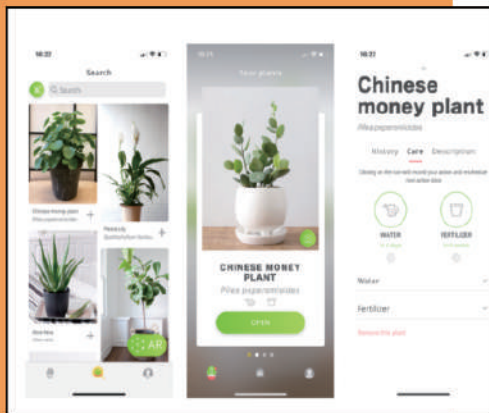
Name :	The Plant Me
Year :	2019
Nation :	Ukraine
Producer:	ThePlantMe
Focus area:	Plant problems
Cost:	unknown
Supported by:	for-profit

Abstract

To start, search for your babies in the app's database and add them to your list. Toggle one tab over to "your plants," and you'll see a lineup of plants you've added. Think of them as Pokémon cards for plants. Open up the card for a description of the plant's needs and to set up schedules and reminders for watering and fertilizing. But the star of the show is the "history" feature. Upload photos of your plant to the card once in a while, and you'll have a visual record of your plants' progress overtime. Maybe it's getting better, maybe it's getting worse — this feature will help you know for sure so you can adjust your gardening treatments to suit its needs.

Triangle Innovation Char

Criteria

|	
social impact	●●●●○○○○
uesr center	●●●○○○○○
economic benefit	●●●○○○○○
market effect	●●●○○○○○
popularity	●●●●○○○○
Acceptance	●●●○○○○○
Profitability	●●●○○○○○
reproducibility	●●●○○○○○

GARDENIA

Abstract

Add a plant from the app's database to your list, and immediately you'll see six icons that indicate the plant's ideal level of water, fertilization, sun exposure, its ideal soil type, its blooming seasons, and the minimum temperature it needs for survival. In a way, it reads like a pictograph report card for plants. Here's what makes Gardenia different. Unlike other apps, which generally offer reminders for only watering and fertilizing, Gardenia will let you set up notifications for a much wider range of tasks. You can schedule for not only watering and fertilizing, but also repotting, applying pesticides, sowing, harvesting, and pruning. You can even create a custom notification if you'd like.

Triangle Innovation Char
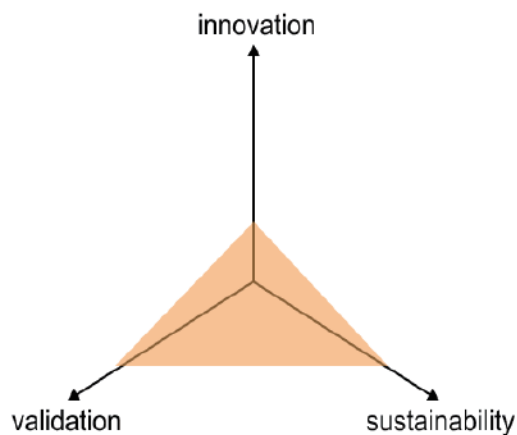
Criteria

social impact	●	●	●	○	○	○	○
uesr center	●	●	●	○	○	○	○
economic benefit	●	●	○	○	○	○	○
market effect	●	●	○	○	○	○	○
popularity	●	●	●	●	●	○	○
Acceptance	●	●	●	●	●	○	○
Profitability	●	○	○	○	○	○	○
reproducibility	●	●	●	●	●	○	○

Name :	Gardenia
Year :	2017
Nation :	Italia
Producer:	Gardenia
Focus area:	Plant problems
Cost:	unknown
Supported by:	for-profit
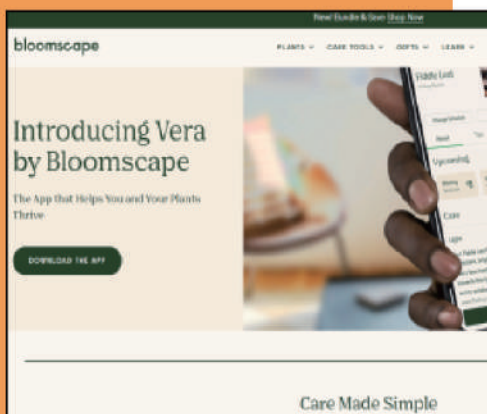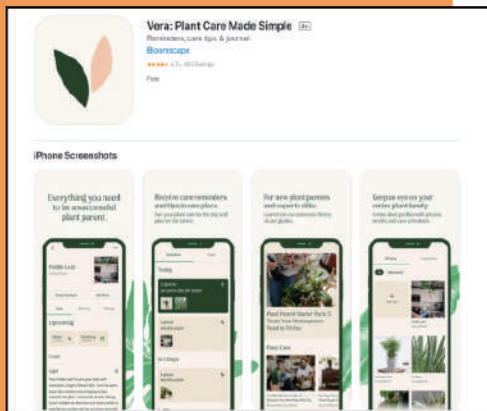
VERA

Name :	Vera
Year :	2020
Nation :	America
Producer:	Bloomscape
Focus area:	Plant problems
Cost:	unknown
Supported by:	for-profit

Abstract

Vera is a blank canvas. There are no guides, no tips, no nothing. In practice, it functions more like a journal for plant parents who already know what they're doing. To start, snap a photo of your plant, give it a name, identify its species, document its location, note its adoption date, and add any care instructions based on what you've learned. Once you create that journal entry, you're free to log any activity — watering, fertilizing, repotting, misting, and rotating — and add any extra notes about the plant on a day-to-day basis. If it helps, you can also enable push notification for watering and fertilization reminders.

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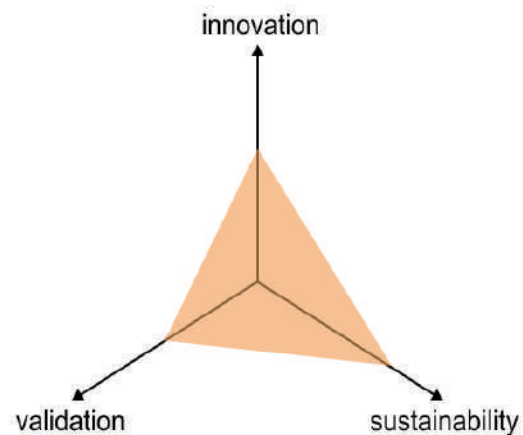
Criteria

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uesr center	● ● ● ● ○ ○ ○
economic benefit	● ● ○ ○ ○ ○ ○
market effect	● ● ● ○ ○ ○ ○
popularity	● ● ○ ○ ○ ○ ○
Acceptance	● ● ● ○ ○ ○ ○
Profitability	● ● ● ● ○ ○ ○
reproducibility	● ● ● ● ○ ○ ○

NATURE ID

iPhone Screenshots
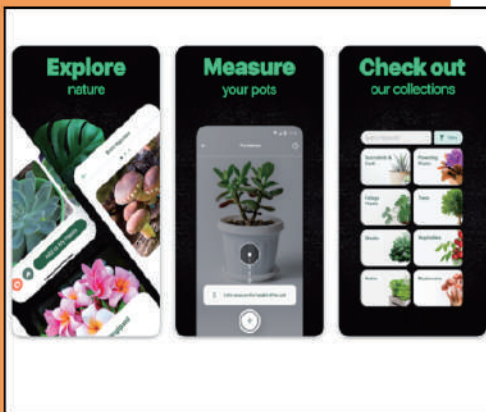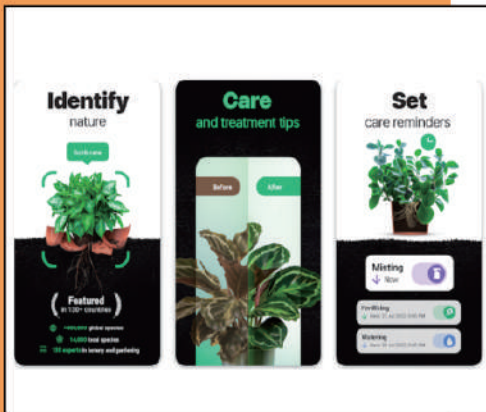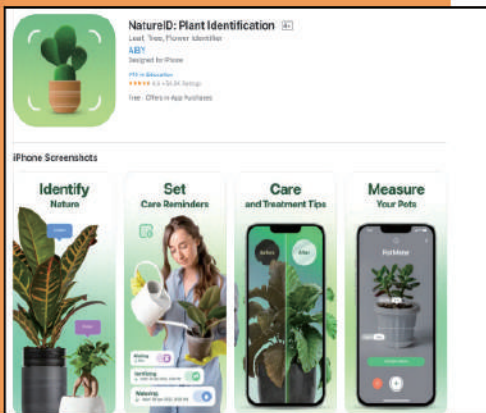
Name :	Nature ID
Year :	2018
Nation :	America
Producer:	AIBY
Focus area:	Plant problems
Cost:	unknown
Supported by:	for-profit

Abstract

Take care of plants with NatureID—keep a journal to see how they grow, use reminders to help them thrive. 10,000+ plants and mushrooms to identify. Choice of 6M+ users. Plant journal ,get timely reminders and don't let your plant wither. keeping all care recommendations in your head at once is quite a challenging task. set watering, misting, feeding, and rotating schedules right in the app – and see your plants thrive. plant encyclopedia ,read insightful articles every day and discover the diversity of the world's flora.

Triangle Innovation Char
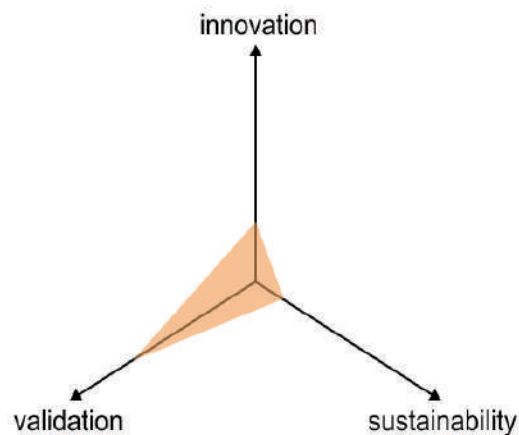
Criteria

social impact	●	●	●	○	○	○	○
uesr center	●	●	●	○	○	○	○
economic benefit	●	●	○	○	○	○	○
market effect	●	●	●	○	○	○	○
popularity	●	●	○	○	○	○	○
Acceptance	●	●	○	○	○	○	○
Profitability	●	●	○	○	○	○	○
reproducibility	●	●	●	●	●	○	○

03.4
CONCEPTUAL MAP

Concept map, which visualizes all cases. Design cases in three different directions for product design, service design, and future design are represented by circles with different colors. Visualize related standards, try to find the differences and similarities of cases in the same field, and connect all cases through three aspects of innovation, stability, and usability, and find the connection between cases.

03.5
CONCLUSION

From the concept map, we can see that the availability of product design cases, service design cases, and the future design of indoor plants are all very close. Most of the future design cases of indoor plants are concentrated in the innovation area, and the service design of indoor plants is mainly concentrated. In the area of sustainability, while product design is distributed in the area of ease of use and stability.

From the map we can easiy find:
(1) The product design of indoor plants mainly focuses on the monitoring function. Although the effectiveness is very good, it lacks innovation and the product homogeneity is serious.

(2) Regarding the future design of indoor plants, the innovation is very strong, but the ease of use and stability are very general. The future design direction of indoor plants focuses on biodiversity, which invisibly increases the maintenance difficulty of indoor plants. The design of anti-development in products and services is out of touch.

(3) Regarding the service design of indoor plants, most of them are mobile client apps, which mainly focus on ease of use and stability. The main directions of service design are social attributes and learning attributes.

For the next design direction, product design should be combined with service design, and the design that can meet the development direction of indoor plants.

INDOORS PLANTS

VALIDATION

SUSTAINABILITY

INNOVATION
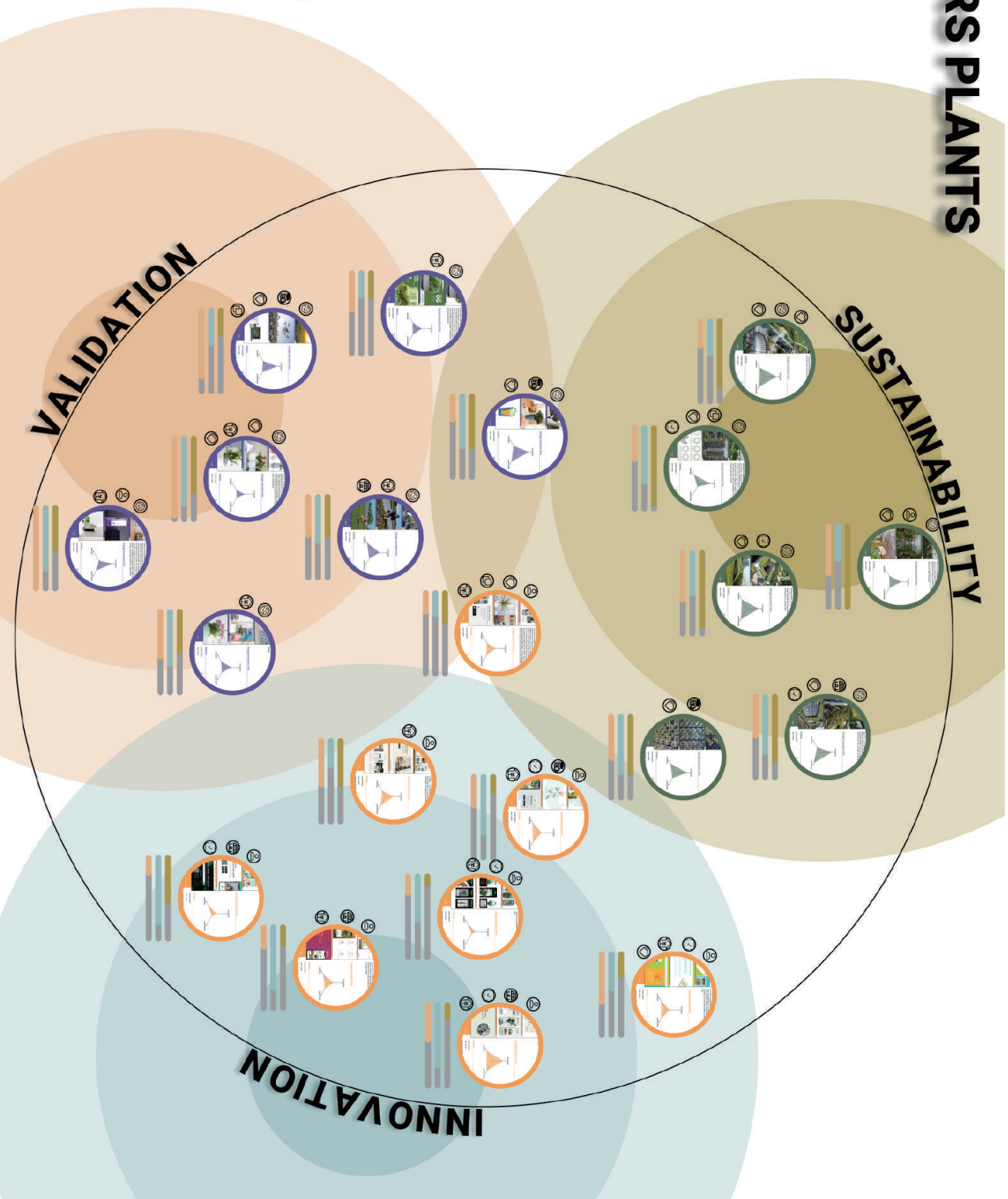
PART TWO

Design Research

04
USER RESEARCH

———

    User research is the initial user understanding center in the design process of user research. It's a way of aligning their goals, needs, and goals, being able to define the target group of a product, and study the pain points of users.

The interview method was chosen for the design research, and two interviewers of different genders were selected. Both of them were people who grow indoor plants. The interview questions mainly focused on why they chose to grow indoor plants, the growth environment of indoor plants, and the cultivation of indoor plants. , social networking, whether you have purchased related products, etc., to build the image of product users.

About choosing to grow houseplants
1. Why do you choose to buy or grow indoor plants?
2. What channels do you generally choose to buy these plants?
3. How did you start growing your own houseplants?
4. How did you choose these houseplants?
5. How many types of plants did you choose?
6. Do you think indoors are suitable for plant growth?

Growing environment for indoor plants
1. Where are your indoor plants placed?
2. On what basis did you choose these positions?
3. Is your balcony suitable for plants to grow?
4. Where are the plants in the bedroom generally placed?
5. Is there anything inappropriate or defective in these locations?
6. What changes do you think can be made, if possible?
7. Do you think the balcony, bedroom, kitchen, living room and other indoor spaces need plants?

About growing indoor plants
1. How did you choose to water the plants?
2. How do you manage the state of so many plants?
3. Have you ever forgotten to water?
4. In addition to watering the plants, what other activities do you usually do about plant growth?
5. Have you ever experienced excessive watering?
6. How are plants cared for when you are not at home?
7. What problems do you have with your plants?

Learning about planting knowledge
1. Where do you communicate and learn about indoor plants?
2. When plants wither, how do you usually choose to deal with them?
3. Have you communicated with other fans and on what platform?

Products or services about indoor plants
1. Have you ever purchased products or services related to indoor plants?
2. Are you satisfied with the products or services you purchased? Do you have any suggestions or recommendations?
3. Do you have any expectations for indoor plant products?

04.2
INTERVIEW RECORD

Name: Wang Zhi
Age: 31
Occupation: Accountant
Country: China
Background: Wang Zhi is a mother who has just had a child and has just returned to the workplace from her family.

Q: Hello, I am very glad that you have time to participate in our research on indoor plant cultivation. Can we start to ask some questions?

A: Hello, of course, I am also very happy to participate in your research. I am a person who loves gardening very much. I still have a lot of potted plants in the garden at home.

Q: Did you just take maternity leave this year? When did you fall in love with growing houseplants?

A: Yes, I just finished maternity leave last year, and now I have returned to work. I have liked to raise some small potted plants in the dormitory since I was in college, but at that time, the space was limited and I couldn't grow many. I only have a relatively simple pot of cactus on my desk. When I was pregnant last year, I learned some gardening knowledge when I had nothing to do at home, and then started gardening at home.

Q: Where did you grow these plants in your home? How many species are there, and how do you usually take care of these plants?

A: I set up a place on the balcony of my house, placed a shelf, and put all the flower pots on it. There may be more than 20 pots of plants of various sizes. I put some commonly used tools at the bottom. Yes, the balcony of my house is very sunny during the day, and basically it can meet the light required by the plants. Usually, it does not need any maintenance. Usually, it is watered regularly, and then fertilized and dewormed regularly. Of course, it is also possible that the plants I choose are relatively simple to take care of, because I choose monstera, orchids, which are more drought-tolerant.

Q: Are there any special requirements for watering of these plants? When to water and how much to water, how do you know this?

A: I usually water these plants at night, because the temperature on the balcony of my house is relatively high, so basically I water all the plants every night. I don't know how much water that plant needs. I poured it by feeling, I'm still a novice. Every time my plants wilt or have a problem, I ask my neighbors.

Q: Your neighbor, does he know a lot about plants?

A: Yes, he lives on the first floor, and his home has a small garden. I often go to him to ask some questions about plants to exchange experience, but I still check the Internet often, but I don't know I watered it several times a week, whether it was due to excessive light, I didn't record this information, so when I communicated with others, others couldn't know exactly how these problems happened.

Q: Which websites or platforms do you usually search for and exchange this information?

A: It is usually a direct Baidu search. For example, when I searched why there are black spots on the leaves of Clivia, I got a bunch of results. I looked around, but I was still confused. It is more convenient to ask my neighbors because he knows me better. watering frequency or something
.

Q: Have you ever purchased related products that can help you take care of these plants?
A: I don't have it, but I have used a lot of apps. It can help me identify the types of plants, and can actively identify the problems when the plants have problems. Although it is not accurate, there is a community function in the app. You can see To everyone's experience, suggestions, etc., but after using it for a while, I don't use it much.

Q: Do you think you need an app or product to help you better care for these plants?
A: I think I need something that can help me manage my plants, remind me of the needs of every pot of plants, so that I can manage these plants better, and it doesn't require too much energy, after all, there is not too much more time to take care of them.

Q: Hello, I am very glad that you have time to participate in our research on indoor plant cultivation. Can we start to ask some questions?
A: Hello, in fact, I am not a person about indoor plants, because I have not raised many indoor plants, and I am not a gardening enthusiast.

Q: Don't you have a few small pots on your desk and in your apartment? If you are not a gardener, why would you choose to buy a potted plant?
A: Your observation is really careful. Yes, I put green plants at home and on my desk, because the desk is the place where I spend the longest time. In a depressing atmosphere, green plants can bring soothing emotions. The effect is good, but the green plants on my table have never lived for a month, including the slightly larger pots at home. I don't know why, maybe I'm really not suitable for growing plants.

Q: Why do the plants you keep do not live for more than a month? Have you not taken good care of them? Have you never paid attention to them?
A: Possibly, all the green plants I bought back were grown-up plants. It stands to reason that they should be more tenacious. I would often water them when I was free, but I did ignore their existence when I was busy with work. There is no sunlight in the office, and the temperature is relatively low, and when I rest on weekends, the company is empty, and naturally no watering.

Q: What about the green plants you put at home, where did you put them, and did they die because of poor care?
A: I guess it may be because the sun is too full, so I died, because I put it on the window, and then the sun can shine all day.

Q: Why didn't you move him down?
A: This is my rented apartment, only the room is my private area, so I can only put the flower pots in the room, and then the window is the only place in the room with sunlight, and then there is no time to move in and out every day Go, and I was fine because of the sun, but I didn't expect excessive sunlight, and on the third day, both pots of plants withered directly.

Q: If you don't have the time and energy to maintain it, why should you choose to buy a new potted plant?
A: Because every time I feel that I can take good care of it next time, and I really need a little green in the room, I also inquired about how to grow green plants when I was free, but I really don't have that much time. I go out during the day and only come back at night. The daily work occupies all of my life, and it is difficult to separate my energy.

Q: Have you ever purchased related products that can help you take care of these plants?
A: I have purchased a Xiaomi monitor. When the plant is short of water, it will remind me to water it, but even though I know the plant needs watering, I don't have time to go home to water it, so I can only know My plant was killed by my lack of water, but I still can't save its life.

Q: Why not choose some simpler, drought-tolerant plants?
A: I have also raised a cactus in the bedroom, but although it does not need to be watered, in summer, due to the air conditioner, the temperature difference between day and night is too large, which also causes its roots to rot.

Q: Do you think you need an app or product to help you better care for these plants?
A: I think I need a product that can not only remind me what to do, but also help me to complete most of the work, so that I can only enjoy the soothing and beauty brought by green, without worrying about what is not taken care of,This kind of thing.

04.3
EMPATHY MAP

An empathy map is a drop-in exercise on user assumptions so you can connect with users to understand their wants/needs. When based on real data and combined with other research tools such as personas, user experience maps, etc., it can:

- Eliminate bias and align teams on user persona understanding
- Find flaws in research
- Discover user needs that users don't know about themselves
- Understand what drives user behavior
- Guide us towards innovation

An empathy map will help you get into the minds of your users – whether they are potential customers, target users, or product users, and map what they think, feel, see, say, do, and hear into a big picture.

SAYING - What the user says about the experience. Use real quotes from users

THINKING - What is the user thinking about when interacting? What occupies their thoughts? What matters?

FEELING - How does the user feel about the experience? What worries or excites them? What is painful / frustrating?

DOING - What actions does the user take to reach their goal? What behaviors have you noticed or are aware of?

THINKING

- because the temperature in the balcony of my house is relatively high
- I guess it may be because the sun is too hot, so I put them, but I can't leave it on the windowsill, and then the sun can shine all day
- the temperature difference between day and night is too large, which also causes it to rot
- I have used a lot of water, I can help me identify the types of plants
- and I was time because of the sun, but I didn't expect excessive sunlight.
- I think I need something that can help me manage my plants, one of the needs of plants, every part of plants.
- I rent something that can help me manage my plants
- I am not a person about indoor plants, because I have not raised many indoor plants
- easily recall a little green in the room
- I think I need a product that can not only remind me what to do, but also help me to complete most of the work

SAYING

- have a lot of potted plants in the garden
- there is not too much time to take care of them.
- only the room is my private area
- watered regularly, and then fertilized and dewormed regularly
- so when I communicated with others, others exactly how these problems happened.
- the green plants on my table have never lived for a month
- ou can see to everyone's experience, suggestions.
- you can see it Skills wash
- the plants I choose are relatively simple to take care of.
- that can manage these plants better
- because the desk is the place where I spend the longest time, a depressing atmosphere, green plants can bring soothing emotions
- all the green plants grown-up plants.
- There is no sunlight in the office, and the temperature is relatively low.

DOING

- Every time my plants will wither a problem, I see my neighbors.
- I have also raised a cactus in the bedroom
- raise some small potted plants in the corridors
- I set up a place on the balcony of my house, placed a shelf and put all the flower pots on it
- put some currently used tools at the bottom
- I usually water these plants at night
- I put green plants at home and on my desk
- I still check the internet often
- have purchased a Xiaomi monitor
- put I did spray their coldness when I was busy
- simple pot of cactus on my desk
- when I go on weekends, the company is empty, and naturally no watering

FEELING

- it stands to reason that they should be more tenacious
- I got a bunch of results, I looked around, but I was still confused
- every time I feel that I can take good care of it next time
- I don't have time to go home to water it, so I can only know my plant was killed by my lack of water, but I still can't have its life.
- maybe I'm really not suitable for my energy
- the daily work occupies all of my life, and so it's difficult to separate growing plants.
- I can only enjoy the soothing and beauty brought by green, without worrying about what is not take care of this kind of thing

04.4
PERSONA-1

——————

By arranging the records of the interviewee 1, the corresponding characteristics were obtained, and on this basis, the portrait 1 was constructed. One is interested in gardening activities, and at the same time does not have a lot of time to study, and can spend a lot of time and energy to take care of it man with indoor plants.

feature:
- Interested in gardening activities
- Have your own gardening corner at home
- Willingness to spend time and effort caring for plants and enjoy the joy of growing houseplants
- Insufficient study, research time, complete learning gardening knowledge
- There are many kinds of indoor plants, and it is impossible to fully understand the status of each plant

Introduction

Wang is a working woman who has just returned to her family. She is very envious of her neighbor's small garden. Referring to her neighbor's suggestion, she also arranged a gardening corner on her balcony and raised some plants. She also learned some basic garden knowledge from her neighbors. Wang often shares her news about her garden balcony on social media, but facing so many kinds of plants, she still gets in a hurry and doesn't know which pot to water. Which pot to fertilize and which pot needs more light.

Name: Wang Zhi

Age: 31

Residence: Residence

Occupation: Accounting

Education: postgraduate

Keywords: learn, pot, share, envy

Introduction

positive ——————— negative

rational ——————— sensibility

sensitive ——————— stable

excited ——————— quiet

communication ——————— badcommunication

Detail:

Place to grow plants: balcony

Planting area: >3m²   Number of Plants: 8

Types of plants: 5   Purchase cost: 500

            Maintenance cost: 100

Activity

· I often go to the plant market to buy some plant seedlings or seeds.

· Buy different types of pots frequently.

· Regularly change the soil and fertilize various potted plants.

· In the face of various plants on the balcony, I often move around, so that every pot of plants can be exposed to the sun as much as possible, but I am afraid of excessive temperature.

· Use the mobile phone to record the watering, fertilization time and other information of each pot of flowers to prevent forgetting or repeating.

· Always look up some plant maintenance knowledge on the Internet.

question

· I have some understanding of my favorite plants, but I don't have a suitable platform to learn and exchange related information.

· In the face of a wide variety of fertilizers, insect repellents, flower pots, etc. on the market, it is impossible to make a suitable choice, and at the same time, there are many unfamiliar but interested plants that cannot be understood.

· They do not know the characteristics of the plants themselves, and they cannot accurately grasp the surrounding environment. They cannot find and deal with problems in time, and sometimes forget to take care of these plants in time.

need

· It is necessary to count and sort out the watering, fertilization and other information of each potted plant.

· The status of various plants can be obtained in time and processed in time.

· A platform where potted lovers can communicate with each other.

04.5
PERSONA-2

By arranging the records of interviewee 1, the corresponding characteristics were obtained, and on this basis, portrait 1 was constructed. One is not interested in gardening activities, but likes the benefits brought by indoor plants, and does not want to spend time learning or taking care of these plants, often Inadvertently growing houseplants die.

feature:
- No interest in gardening activities
- Unwilling to spend the cost of learning to learn
- Unwillingness to spend time and effort caring for plants
-Love the benefits of houseplants
- Often inadvertent plant death
- Busy life, no extra time and energy
- Frequently leaving the house, unable to respond to the state of the plant in time

Introduction

Name: Li Xiang

Age: 23

Residence: Apartment (rent)

Occupation: Designer

Education: Undergraduate

Keywords: busy, small room, damp.

Introduction

positive —————●———— negative

rational ————●—————— sensibility

sensitive —————●————— stable

excited ——————●———— quiet

communication ——————————● badcommunication

decorative
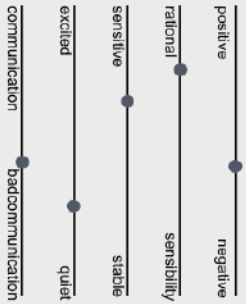
Introduction

Li is a college student who has just entered the workplace. As a workplace novice, his usual work is very busy. He has to go to work at 8 in the morning and can only get off work at 9 in the evening. He and his friends rented a 59-square-meter apartment in the city., In order to make the room less monotonous, at the suggestion of a friend, he bought a pot of green plants in the corner of the room and a few pots of succulent plants on the table. But because there is no time to take care of it, the succulents die because the room is too humid, and the growth state of green plants is not very ideal.

Question

- Not familiar with the types of flowers and plants, and do not know what type of plants to buy.
- Don't know, fertilizers and insect repellents corresponding to plants, flower pots, etc.
- Not choosing a suitable location according to the characteristics of the plant.
- Not understanding the characteristics of the plant itself, inappropriate watering, fertilizing, or forgetting to water, fertilize and so on due to busy work.

Detail:

Place to grow plants: balcony, desktop

Planting area: <2m²

Types of plants: 2-4

Number of Plants: 4

Purchase cost: 120

Maintenance cost: 30

Activity

- Buy your favorite potted plants online.
- I usually like to buy green plants that are not too large, similar to cacti, that can be placed on the table.
- After the green plants arrive at home, unpack them and place them directly on the desktop as decoration, or buy some to put on your desk.
- In the office, the remaining water in the water glass is often poured into the flower pot.
- The soil condition in the pots is not checked, and the potted plants often die.
- Because the sunlight in the office is not enough, I will put the potted plants in front of the window, but I will forget to take them back.
- Potted plants on the table at home, often forget to water.
- Since I leave the house in the morning and come back in the evening every day, the potted plants in the bedroom can hardly receive sunlight.

Need&Chance

- It is necessary to take into account the potted plants that are placed in both the home and the office.
- Need to know, if the plants need watering.
- You can get reminders about watering and other related matters.
- Need to know, if the plant is in a healthy state.
- When plants wilt, problems can be detected in time.

55

04.6
TARGET USER

_____

After the character portrait, according to the obtained data of the character portrait, sort out and select to obtain the final target user

Step 1: Targeting Users and Data Collection

Identify a main user group of the product, and collect the basic data of these users

Step 2: Brainstorm and analyze

(1) Establish several main dimensions of user portraits according to business goals

(2) Filter and classify data according to the image dimension

(3) At the same time, it is possible to summarize the concerns or priorities that the team should focus on

Target user 1: Use the scene family, like to grow indoor plants, enjoy the process of planting, but not rich in experience and have time to take care of plants.

Target user 2: Family using the scene, likes to use plants in indoor environment, but does not like the process of growing indoor plants, busy with work and has no extra time and energy to take care of plants.

05
USER NEEDS

Taking the user as the center, capture the user's touch points related to indoor plants in life, and capture the user's pain points and needs.

05.1
STORYBOARD-1

For target user 1: Describes his purchase of plants, maintenance, and various problems in the maintenance process.

1.Go to the plant market to buy seedlings or seeds

2.Plant seedlings or seeds in pots
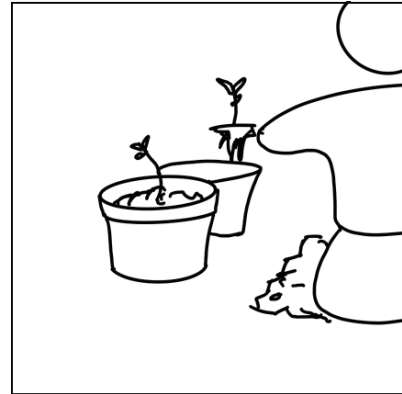
3.Arrange plants on a shelf on the balcony
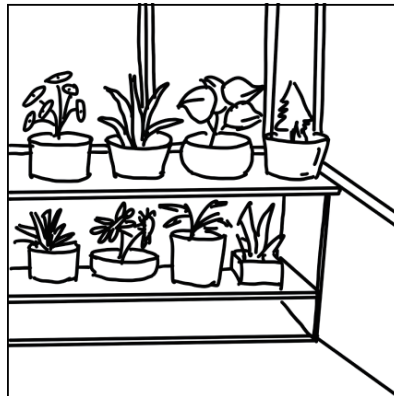
4.Move these plants as different plants need different light times

5.Use a notebook to record the watering time of different plants to prevent repeated watering
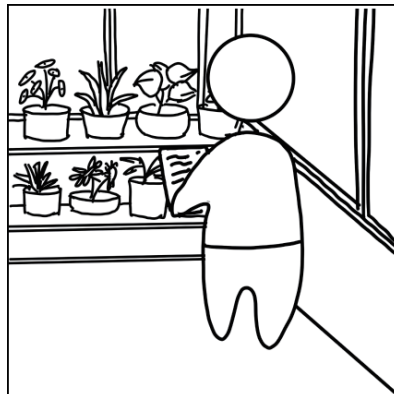
6.In the face of many plants, it will also be difficult

7.Search the Internet for maintenance routines for different plants

8.Share the growth status of plants
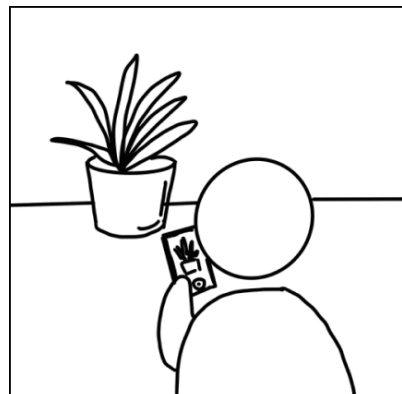
05.2
STORYBOARD-2

1.Buy adult plants online

2.Take it home and place it directly on the desktop in the bedroom, being ignored

3.Take it to the company and put it on the work table, water often

4.Leaving home in the morning without opening the curtains, coming home at night
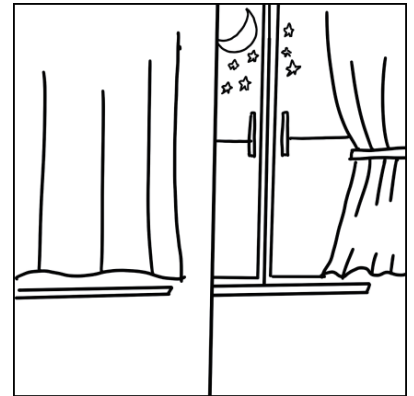
5.During the day the office temperature is cooler and there is no sun
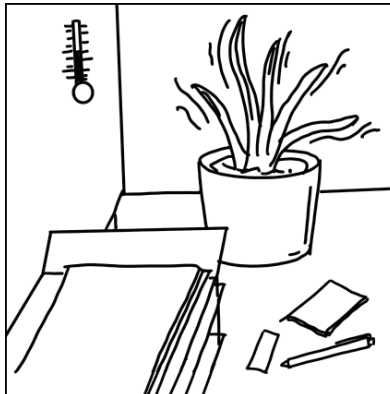
6.Unattended office on weekends

7.wilted home plants

8.Withered plants in the office
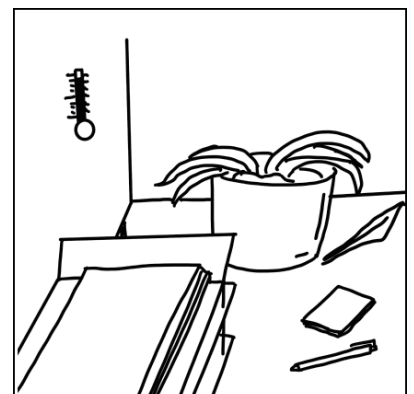
05.3
USER JOURNEY

According to the content of the storyboard, create a user journey map to describe the story of Wang and Li in a specific scenario, including their first contact with the product and the various points of the product. And help product design and optimization based on user emotions and ideas

User journey maps include

Basic information: from the portrait, including name, age, occupation and other basic information

Steps: According to the storyboard, each step of the process from generating the service to ending the service.

Touchpoint: Any tangible thing or service that comes into contact with a user.
Actions: All actions that the user takes during this step.
Feeling: The user's feeling at this step is divided into levels, very happy, happy, disappointed, angry.
Pain point: What is the reason that the user does not get a perfect experience in this step.

Opportunity: Is there a possible solution to the pain point in later designs..

| **Name:** Li Xiang | **Residence:** Apartment (rent) | **Education:** Undergraduate |
| **Age:** 23 | **Occupation:** Designer | **Keywords:** busy, small room, damp, decorative |

| stage | buy the plants on line | touch point | · online website
· express delivery
· harvest point |

| actions | · Buy
· pick up | opportunities | · Buying advice
· community exchange |

| pain point | · No buying advice
· Damaged in transit | feeling | 😃
🙂
😕
🙁 |

Name: Li Xiang
Age: 23
Residence: Apartment (rent)
Occupation: Designer
Education: Undergraduate
Keywords: busy, small room, damp, decorative

stage	buy the plants on line	place it in the bedroom	place on the workdesk	leave home	close the windows	come home	office temperature cooler	no one in office weekend	wilted home plants	wilted plants in office
touch point	• online website • express delivery • harvest point	• bedroom	• office • desk	• home	• windows	• home • bus subway	• air conditioner • remote control	• home • outdoors	• garbage can	• garbage can
actions	• Buy • pick up	• place	• carry • place	• leave	• close	• come			• throw	• throw
feeling										
pain point	• No buying advice • Damaged in transit	• Don't know where to put it	• The office environment is crowded	• No time to water plants, shift	• Don't know where to put it	• had to close the windows • Plants need sunshine	• The temperature of the office environment is variable • Plants can't stand excessive temperature changes	• No one takes care of plants on weekends • Just throw it away and leave the flowerpot		• Just throw it away and leave the flowerpot
opportunities	• Buying advice • community exchange	• placement guide	• automatic watering	• position identification	• Smart home, able to automatically open curtains, etc.	• Choose Plants That Are Right for Your Office Environment	• automatic watering • Data remote monitoring			

stage	touch point	actions	feeling	pain point	opportunities
go to market buy seeds	• market	• Buy		• No buying advice • There are no other items to choose from	• Buying advice community exchange • Planting advice
plant seeds in pot	• pot • tool	• plant • clean up		• No planting advice	• Planting advice
arrange plants on the shelf	• shelf • balcony	• arrange		• no plan • tired	• Reduce handling by arranging the best location for each plant
move for the light time	• balcony	• move pot		• don't know if it is necessary • unnecessary labor	• Reduce handling by arranging the best location for each plant
recoard the watering time etc	• notebook	• record		• takes a lot of time	• Automatically generate records
watering	• water kettle	• water		• don't know which ones need watering	• Smart home, able to automatically open curtains, etc.
searching for slove problem	• Website about houseplants • phone • social application	• searching		• don't know where the problem is, can't find a specific way	• Add markers to each pot to guide watering
take photo for sharing	• garbage can	• take photo			
wilted home plants	• Website about houseplants	• throw		• Just throw it away and leave the flowerpot	
try to found reason		• searching		• No related records, could not be found	• View all maintenance records

05.4
USER NEEDS
ANALYSIS

From the storyboard and user journey map, we can see that Wang and Li encountered various pain points when growing houseplants or buying them.

(1) People do not have enough energy and time to take care of plants growing in indoor spaces, busy work makes people always neglect to water plants, water, pest control, etc.,

Need a design that can remind or help them accomplish these tasks related to planting.

(2) Most indoor plants are planted in a limited space. The limited soil environment cannot continuously provide nutrients for the plants. Coupled with the complex climatic conditions of the indoor space, most indoor plants become larger than normal. Growing plants are much more fragile and require more attention and care.

There is a need for designs that help houseplants be as small as possible without being affected by the indoor environment.

(3) Many gardening enthusiasts have many kinds of indoor plants. Each kind of plant is different and has different characteristics. For example, some plants are drought tolerant and some plants are moisture tolerant, so the requirements for the surrounding environment are different. The maintenance requirements for planting are also different, and even experienced people will experience confusion.

A design is needed that can plan their maintenance behavior and can reduce the occurrence of accidents.

(4) Sometimes, people may leave plants for a short time. For example, the plants kept in the office are left unattended on weekends. When people go on vacation, all the indoor plants at home are left unattended. . Plants are left unattended, how to ensure that they can maintain a healthy state.

A design is needed that can automatically complete some relatively simple maintenance activities and reduce the dependence on people.

06
STAKEHOLDERS

In service design, stakeholder research can not only take into account the feelings of target users, but also systematically change the relationship between various stakeholders.

06.1
STAKEHOLDERS
ANALYSIS

In design, Stakeholders are the people, groups and organizations that will be affected by, or be affected by, a product. Stakeholder Map uses the methods of research, discussion and analysis to express the relationship between stakeholders in a visual way. It can also increase influence and value exchange according to special needs.

Study the stakeholders' ability, deeply understand the stakeholders' goals and interests, clarify the project's goal setting and expected returns, formulate more targeted communication plans, understand the value exchange chain of all parties, control potential risks, and prevent sudden changes Factors affect the final result and implementation of the project, master the key nodes of the process, and facilitate the changes of the later project.

Stakeholders are divided into three main parts, Partners, Primary Stakeholders, Secondary Stakeholders.
Partners
- Landscaper
- Potted plants for sale
-A learning platform about indoor plant maintenance
-Plant identification software

Primary Stakeholders
- Gardening Tools Supplier
- Flower pot supplier
-Nutrition solution supplier
- Insecticide suppliers

Secondary Stakeholders
-Government agencies
- Urban greening management

06.2
STAKEHOLDERS
MAP

Grading

According to the size of the stakeholder's influence in the project, their grades are marked, and they are roughly divided into Partners, Primary Stakeholders, and Secondary Stakeholders.

Secondary Stakeholders

Primary Stakeholders

Partners
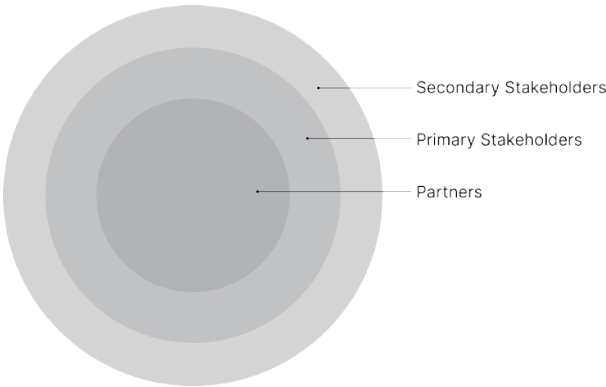
Appeal

In the Stakeholder Map, the demands of individuals, groups and enterprises can be marked under the corresponding icons, which is convenient for designers to understand the needs of stakeholders when solving problems.

Logistics companies want more profit and easier fixed routes

Connect

There will be some kind of connection between the stakeholders, so the specific relationship can be expressed by connecting lines on the diagram.

Warehouse

Logistics companies

Warehouse, receiving location hope not to over-warehousing

The courier company delivers the item to the warehouse

Logistics companies want more profit and easier fixed routes

EXPRESS DELIVERY

ONLINE SHOP

want more profit and easier
fixed routes

RECEIVING POINT

PLANTS MARKET

get more orders,more profit

want less inventory

buy   buy

WHO PLANTS INDOORS   APARTMENT MANAGEMENT

User buys more plants

buy   management

Regulate the cultivation of
green plants in the
apartment, etc.

FERTILIZER MARKET

GOVERMENT

Users buy more fertilizers
and get more profits

buy   learning

TOOL SHOP

LEARNING PLATFORM

Manage the greening of the
city and make it more
standardized

Users buy more tools and get
more profits

Users stay long enough and
have stronger user stickiness

PART THREE

Ideation & Proposal

07
IDEATION

Brainstorm for the user needs that have been learned, and evaluate the feasibility of each possible solution, etc.

07.1
USER NEEDS
REARRANGEMENT

User requirements rearrangement and details

Requirement 1: Users do not have enough time and energy to take care of indoor plants, they always forget to water and need to be reminded.

- Can remind users when to water
- Can remind users when to fertilize
- Can remind user which fertilizer to use
- The user can be reminded to spray which agent.

Requirement 2: Compared with plants that grow in nature, the environment that indoor plants face is more changeable and needs to be understood in time.

- Always monitor the environment around indoor plants.
- Ability to promptly alert users to changes in variables.

Requirement 3: The hobbyist has more indoor plants and needs to plan and manage all the plants.

-Plan a maintenance plan for each potted plant.
- Tag each plant type and needs, and for reminders.
- Record the user's maintenance behavior.

Requirement 4: Users need to take a short-term vacation, leave the plants for a short-term, and need to be able to host these plants for a short-term.

- According to changes in the environment, it can independently complete some maintenance behaviors.
- Allow users to travel for a short time without worrying about indoor plants at home.

07.2
BRAINSTORM

When the user leaves the house, the robot operates, watering and fertilizing the plants, and completing this series of activities.

It is possible to combine monitoring with automatic sprinklers

To plan the user's watering behavior, it is also possible to automatically monitor the changes in soil moisture and automatically monitor whether the activity is completed without checking the completed items.

For products located in the office, may not be combined with the faucet, bottled water can be used as a supplement

Automatic sprinkler system, installed on the balcony

Lights off can not only indicate user behavior, but also provide a sense of ambience for aesthetics.

Mark each plant with lights to remind users to pay attention

The maintenance behavior of plants is not only watering but also fertilizing and other activities. Fertilizing can also be included in the list of behaviors that can be maintained continuously.

Use sensors to monitor various environmental data, such as air humidity, temperature, etc.,

Close the curtains when the plants are found to be getting too much light.

The traditional method of watering through the soil can be replaced with air humidification.

It can be connected to the air humidifier at home. When the air humidity is reduced, the air humidifier can be turned on to increase the humidity for the plants

For special plants, it can be supplemented with special light sources

Smart flowerpot, can water potted plants and supplement the light source.

Plug-in sensors monitor soil data and environmental data to try to hide the presence of the product.

The home can be used as an eco-isolation cabin, which can build a suitable environment for plants by controlling air conditioners, air humidifiers, curtains, doors and windows, etc.

Hydroponics replaces traditional soil to provide nutrients to plants, which can control whether the plants grow healthily or not.

The monitor will record all the user's behavior and display the data completely and visually.

Users can share recorded data with others to exchange conservation experience with each other, etc.

The app can show the plants that are about to be watered, or other things that need to be done, which the user can decide by looking at them.

The modular design can be used to make the monitoring module have more functions and give users more choices.

The app can control the behavior of the monitor

The app can be used to display, visualize data, and let users understand important data about all products.

Integrate with smart home, such as when leaving the room in the morning, the curtains automatically open to provide sunlight for the plants in the room

Use the app to communicate all information visually to the user

07.3 IDEATION SELECTION

After brainstorming, evaluate all the ideas, suggestions, and conjectures, remove the parts that are not related to the theme, or do not want to be the design direction, carry out further evaluation of the remaining parts, and combine the selected parts into a preliminary plan .

Plug-in sensors monitor soil data and environmental data to try to hide the presence of the product.	To plan the user's watering behavior, it is also possible to automatically monitor the changes in soil moisture and automatically monitor whether the activity is completed without checking the completed items.	Mark each plant with lights to remind users to pay attention
The monitor will record all the user's behavior and display the data completely and visually.	Close the curtains when the plants are found to be getting too much light.	For products located in the office, may not be combined with the faucet, bottled water can be used as a supplement
It is possible to combine monitoring with automatic sprinklers	Use sensors to monitor various environmental data, such as air humidity, temperature, etc.,	Users can share recorded data with others to exchange conservation experience with each other, etc.

After sorting out the selected parts, we can get a preliminary design plan:

- Design a monitor that can monitor the growth environment of indoor plants, including soil data

- According to the data of the monitor, it can give suggestions and reminders to the user.

- User's maintenance behavior can be recorded, such as watering time and watering amount.

- Provide to do list, plan user's watering, fertilizing behavior.

- Can control fertilization.

- When the user can briefly leave the houseplant, it can be managed for a short period of time

-Using a modular approach to achieve more different functions.

- Can be linked with other smart devices in the home to achieve more functions, such as opening curtains and opening air humidifiers, etc.

07.4
EVALUATION

Whether the technical evaluation of the preliminary plan is feasible and whether the corresponding functions can be realized.

1. Monitoring function:
The data that need to be monitored are soil moisture, temperature, soil fertility, air humidity, temperature, time and light intensity of plants exposed to light.
Evaluate:
- Soil humidity and air humidity can be monitored by humidity sensor to obtain more accurate values.
- Soil temperature and air temperature can be obtained by temperature sensor.
- The fertility of the soil can be reflected by the soil pH value, and the pH value can be monitored by the pH value sensor.
- The light time and light time of plants can obtain specific data by combining weather information and light sensors.

humidity sensor

temperature sensor.

light sensor

pH value sensor

2. Record the maintenance behavior of users
Behaviors that need to be recorded, watering, fertilizing
- Watering, you can record the time of occurrence, the amount of watering and other information through the change of soil moisture.
- Fertilization, the corresponding time and frequency can be recorded through the change of soil ph value.

3. Reminder and plan user maintenance behavior
By obtaining relevant data from the monitor, you can know whether the soil and the environment are suitable for plant growth. Combined with information such as plant types, you can obtain the specific needs of various plants, thereby reminding users to water, fertilize, and so on.

4. Managed Features
For indoor plants, behaviors such as fertilization are not very frequent behaviors, so it is only necessary to achieve the ability to complete the watering and leave the plant for a short time. Hosting can be achieved through a water pump or a switch that directly controls the faucet.

5. Smart Home
Through iot technology, when the monitor finds that the plant lacks light, it can control the opening of the curtain to achieve light.

6. Modular design
Different functions can be realized through modular design, and the monitor and automatic watering function can be combined in one main body design.

**08
PROPOSAL**

Define the design ideas mentioned in the previous step through three aspects: functionality, usability, and morphology

08.1
FUNCTIONALITY

From a functional point of view, the purpose of this design proposal is to help users better grow indoor plants. The functionality of this design proposal.

-Monitoring and reminder functions: Monitor relevant data about plant growth, soil temperature, humidity, air temperature, humidity, PH value. Comprehensively consider these data and plant species, if it will affect the healthy growth of plants, remind users in time. Displaying these data to users in a visual way allows users to quickly obtain relevant information.

-Reminder, plan watering function: According to the value of the humidity sensor and the different characteristics of various plants, it can remind users to replenish water for indoor plants in time, recommend the amount of water to be replenished, and plan subsequent watering behaviors.

-Record user's watering and fertilizing behavior
According to the data changes of the humidity sensor and PH value sensor, the user's watering, fertilizing behavior and specific values are recorded, and these data are visualized.
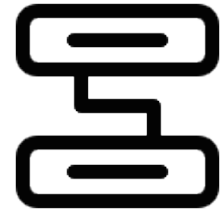
-Managed watering
When the managed mode is selected, use the managed watering module, connect it with the water source, and automatically complete the watering according to the soil moisture data obtained by the sensor.

-Spraying fertilizers and repairing liquids
Buy different fertilizer modules or modules such as pesticides to achieve even spraying.

-smart family
It can be connected with other smart devices in the home to complete the establishment of a smart home.

08.2
USABILITY
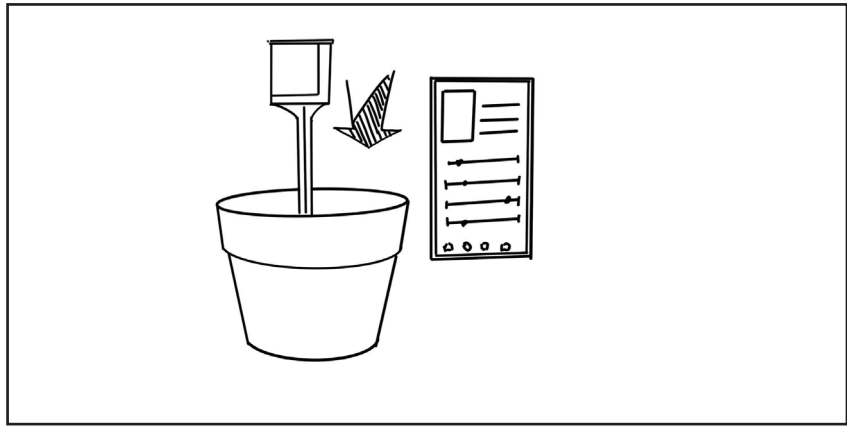
From the usability point of view, the user uses the preliminary design scheme, inserts the product into the flower pot, and then connects to the mobile phone to obtain relevant data, and can receive relevant reminders and planning information.
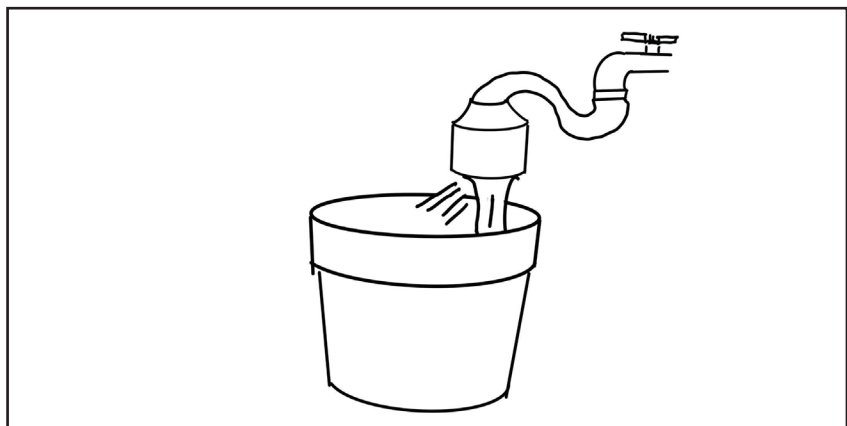
Replace the watering module, connect the water source, and realize the hosting mode. The device will complete the watering of the indoor plants according to the specific data.
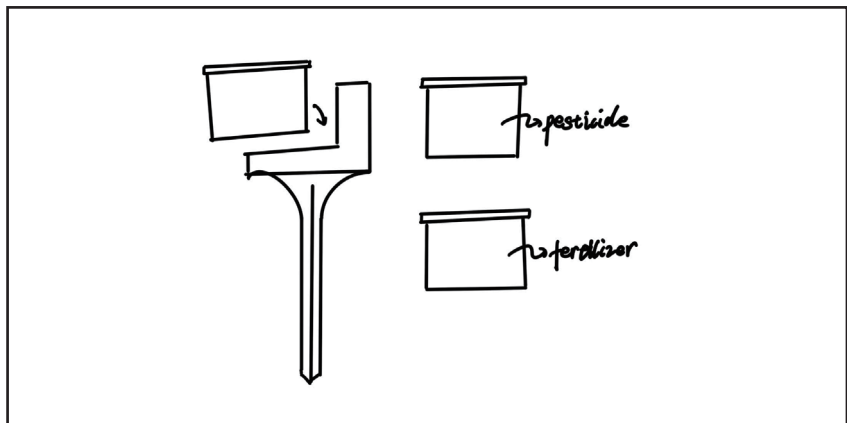
According to the data suggestion, change the liquid mode, choose different kinds of liquid, and realize the function of fertilization or insect removal.

08.3
MORPHOLOGY

For the product itself, the plug-in design is adopted, so the bottom will be wider than the top, and it has a modular design.
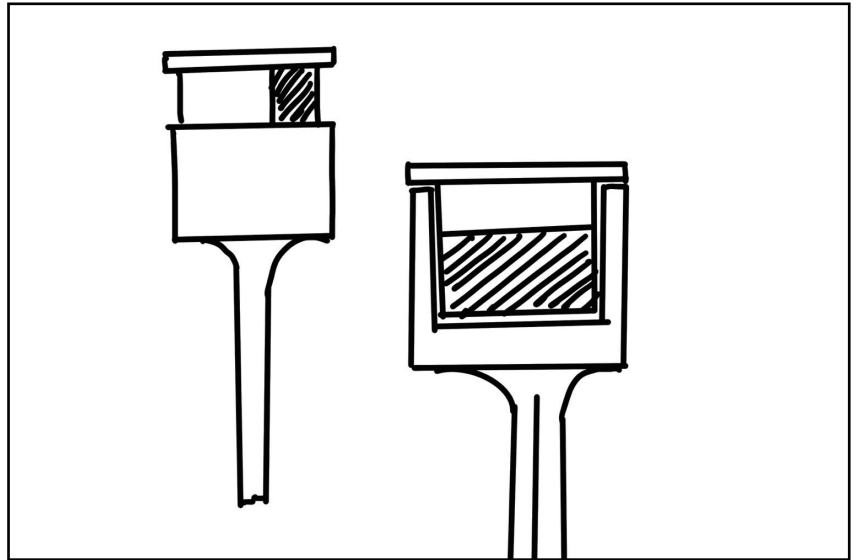
For the design of the app, the theme of indoor plants is used to display different functional divisions such as data visualization, reminders, planning, and recording.
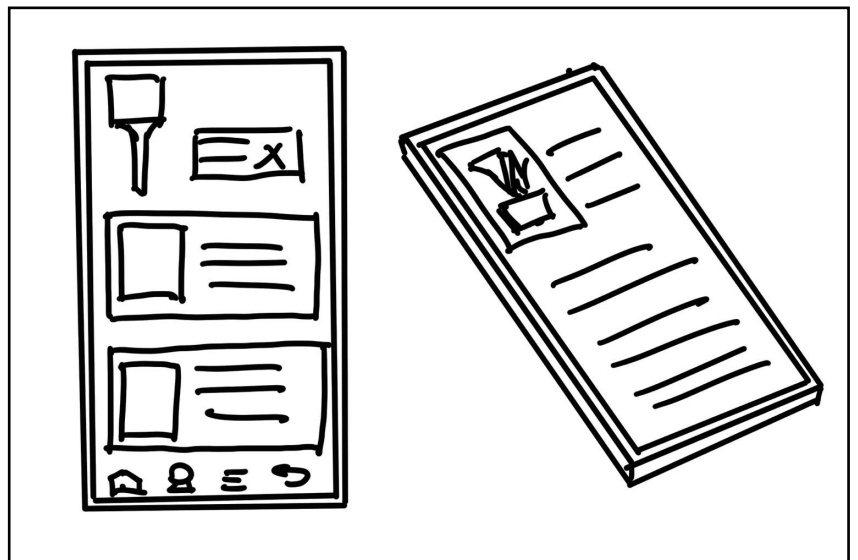
**09
SKETCH**

For the selected plan, use sketches to decipher the product form details, functions, interaction methods, etc. Complete low-fidelity app design at the same time

09.1
PRODUCT DESIGN
SKETCH

For the smart product itself, different segmentation methods are used for the cylinder, and the upper part adopts a modular design, which can replace different modules. In the middle position, there are light sources for lighting and nozzles for spraying liquid.
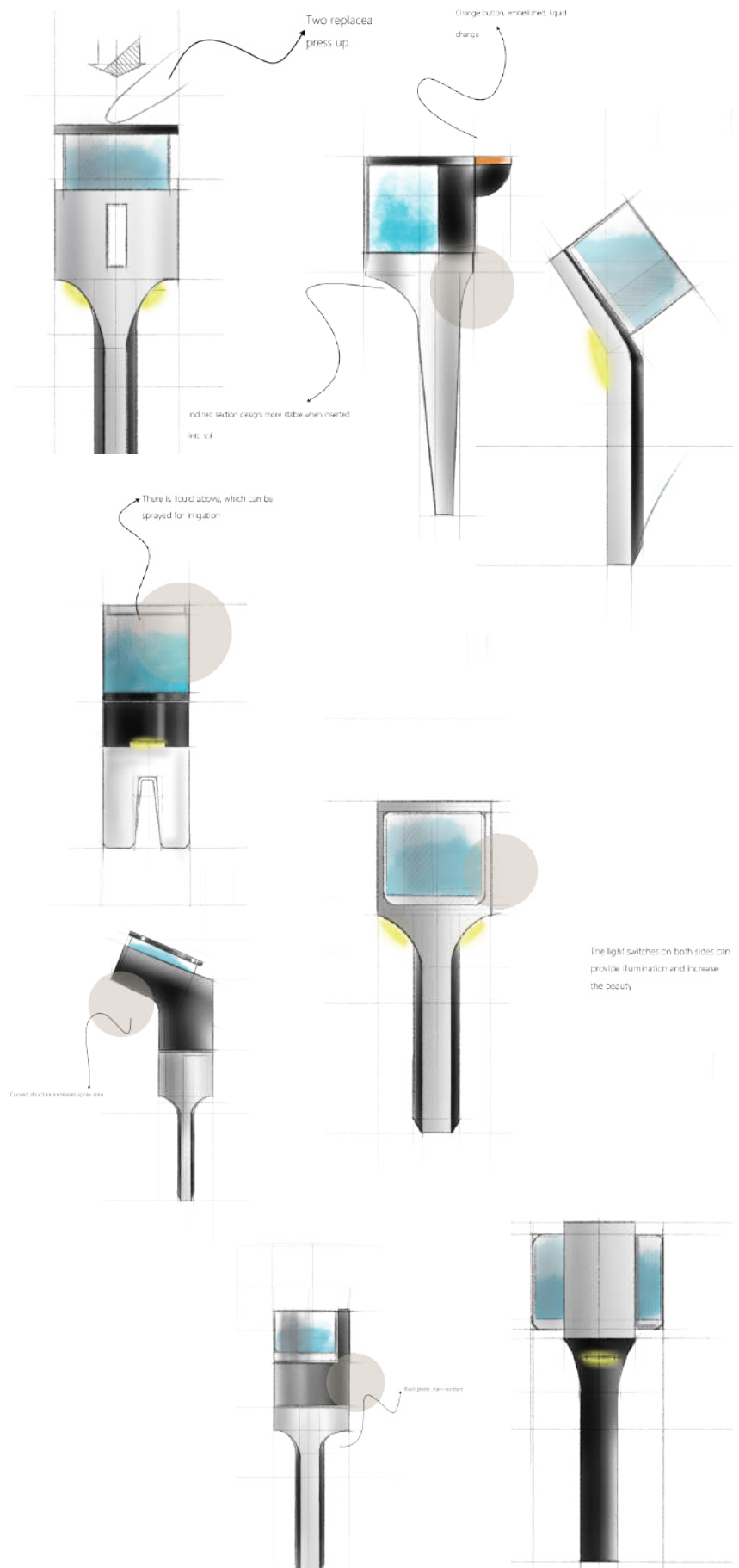
09.2
APP DESIGN
SKETCH

For the app design itself, plants are used as an important element of the interface, green is used as the main color of the app, and a simple and efficient design style is pursued, and the corresponding functions of the product are displayed in zones so that users can directly reach their goals.

09.3
DETAIL DESIGN
SKETCH

Design for many details of the product, such as the design of the charging port, the design of the spray port, the design of the button, and the design of the modular interface.
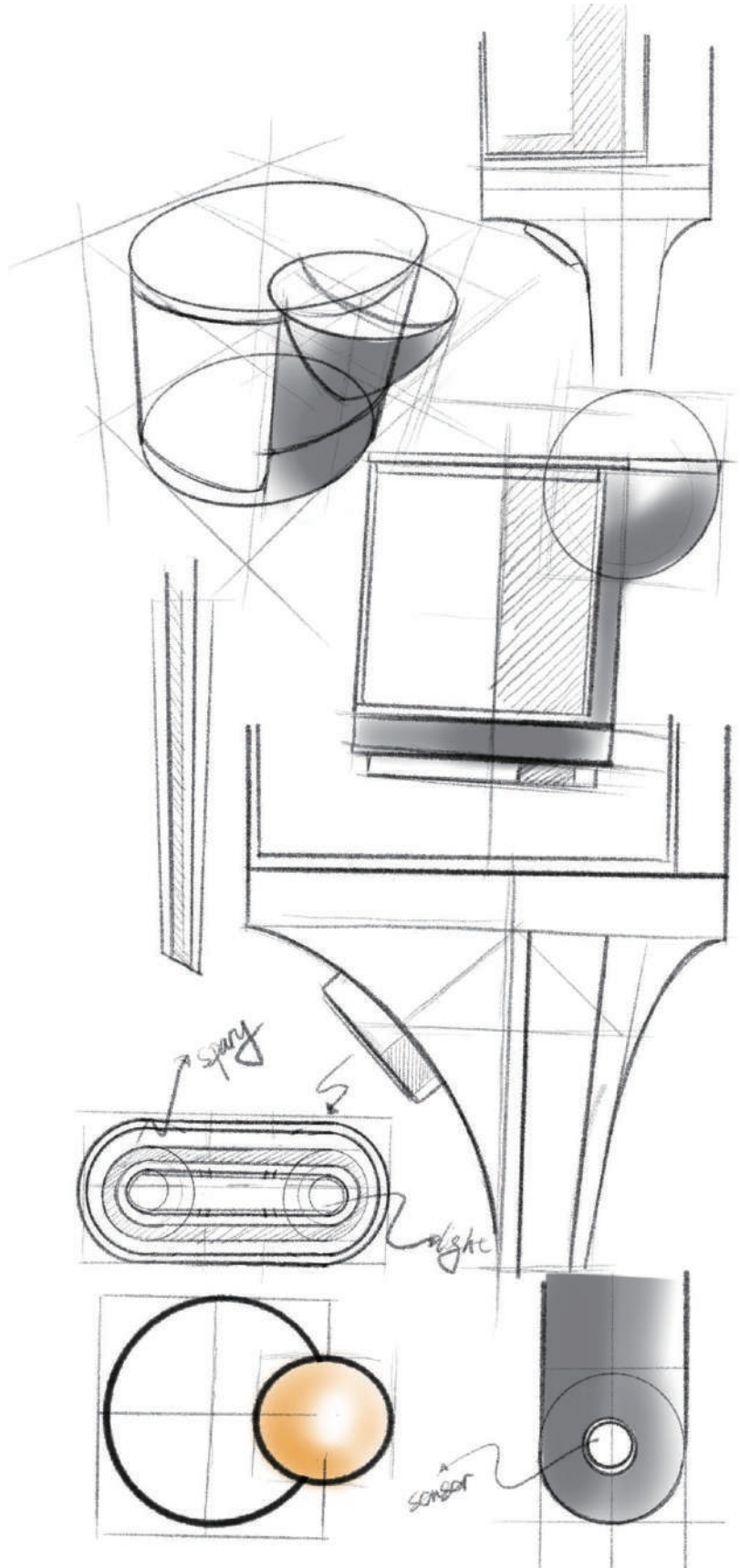
PART FOUR

Final Design

10
SMART PRODUCT DESIGN

The final design, the part about smart products, shows how the product looks, uses, charges, works, etc.

10.1
APPEARANCE

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10.2
DETAIL

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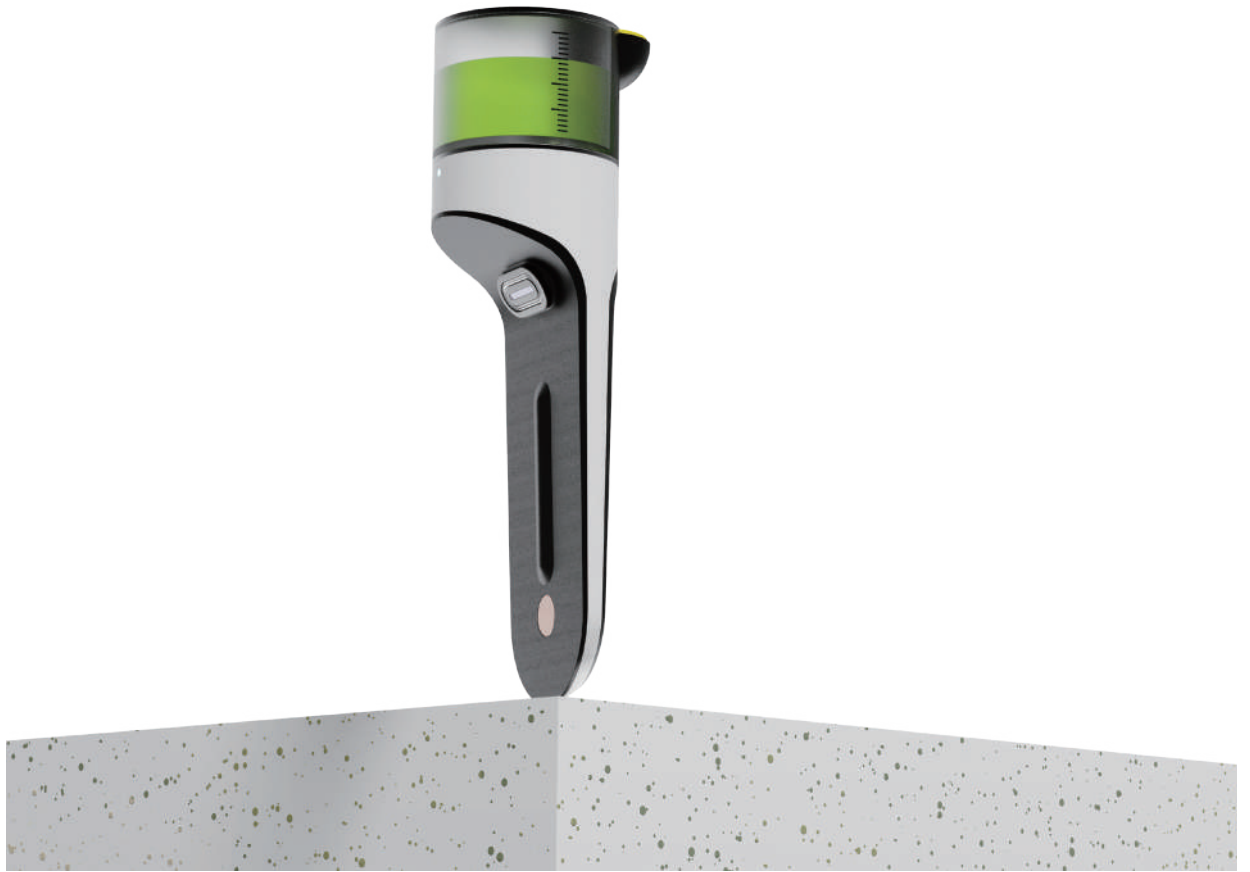
10.3
CHARGE

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10.4
MODULAR

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10.5
WORK MODE

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10.6
VACATION MODE

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10.7
IOT

11
APP DESIGN

The final design, the part about app products, Shows the partition of different functions, and the way of interaction.

11.1 FUNCTIONAL DIVISION

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11.2
MONITOR

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11.3
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11.4
PLAN LIST

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11.5
CONTROL

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11.6
SOCIAL

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11.7
EXPERIENCE

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12
USER NEEDS
SOLVED

The final design, the part about app products, Shows the partition of different functions, and the way of interaction.

12.1
STORYBOARD
AFTER-1

12.3
TOUCHPOINT MAP

13
BUSINESS MODEL
CANVAS

INDOORS PLANTS

SUSTAINABILITY

INNOVATION

VALIDATION

Topics of cases

- product design
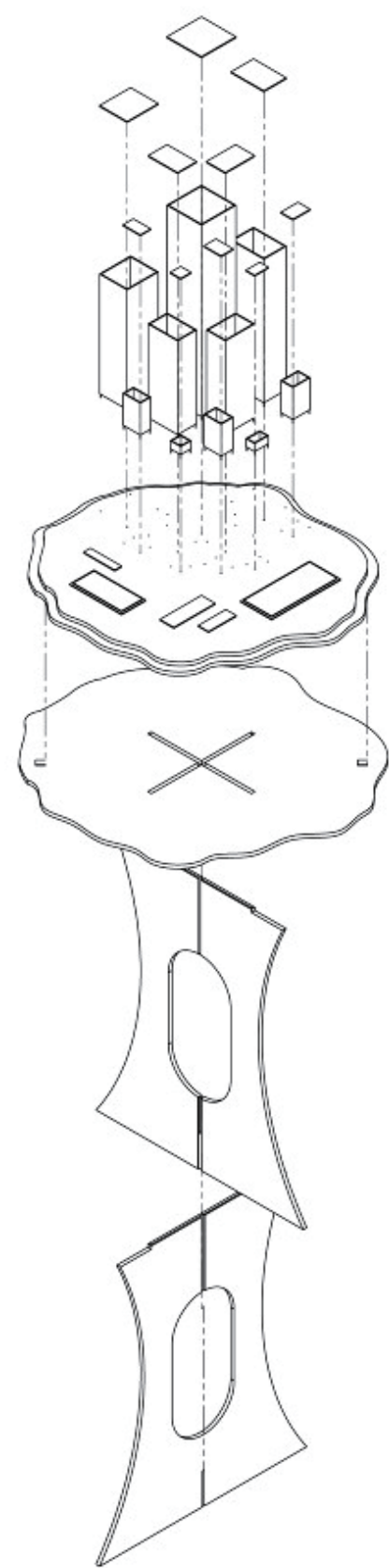- service design
- future design

Common Criteria

- Innovation
- validation
- sustainability

Specific Criteria

- social impact
- user center
- economic benefit
- market effect
- popularity
- acceptance
- profitability
- reproducibility

TITOLO DEL DISEGNO TECNICO
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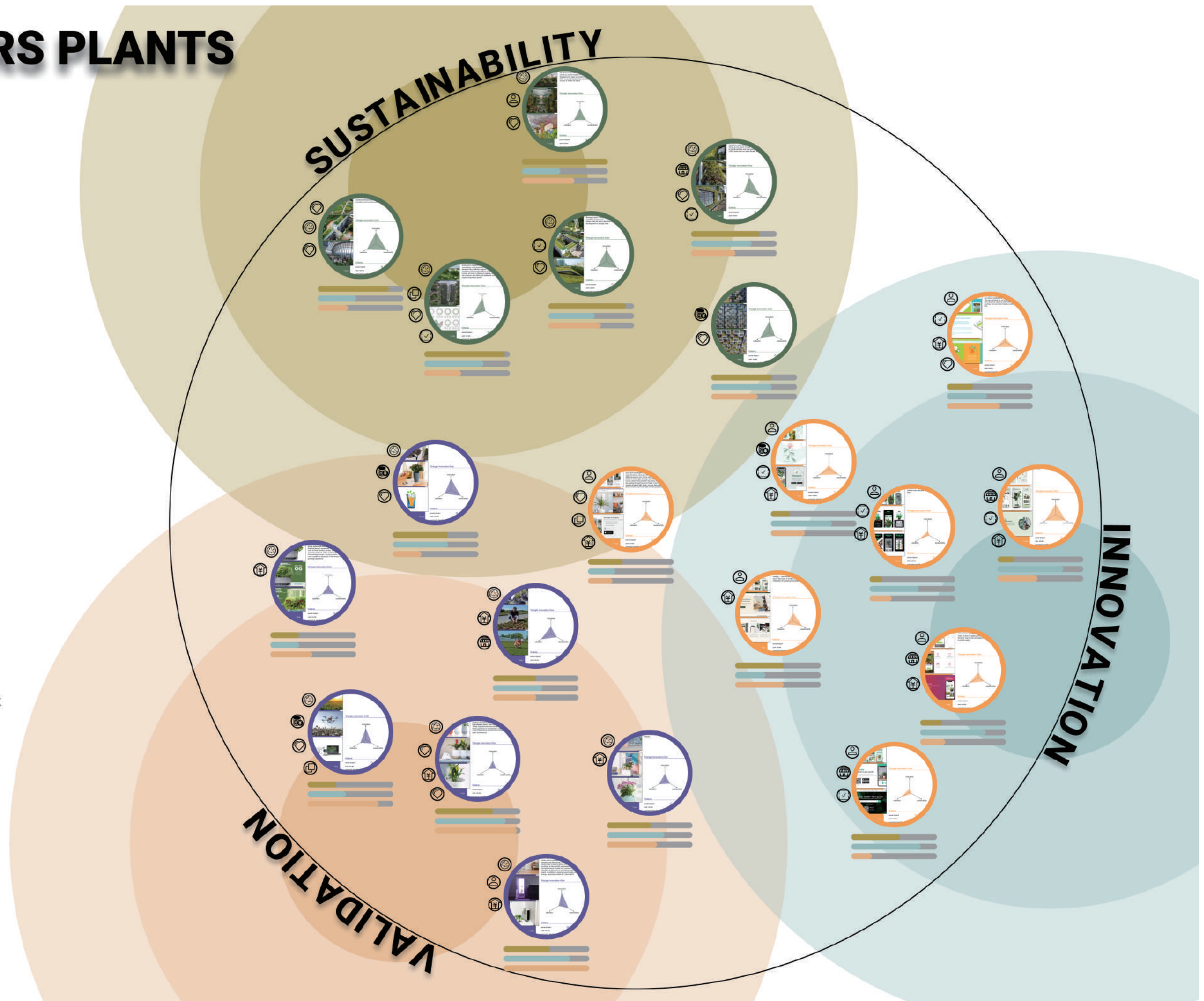
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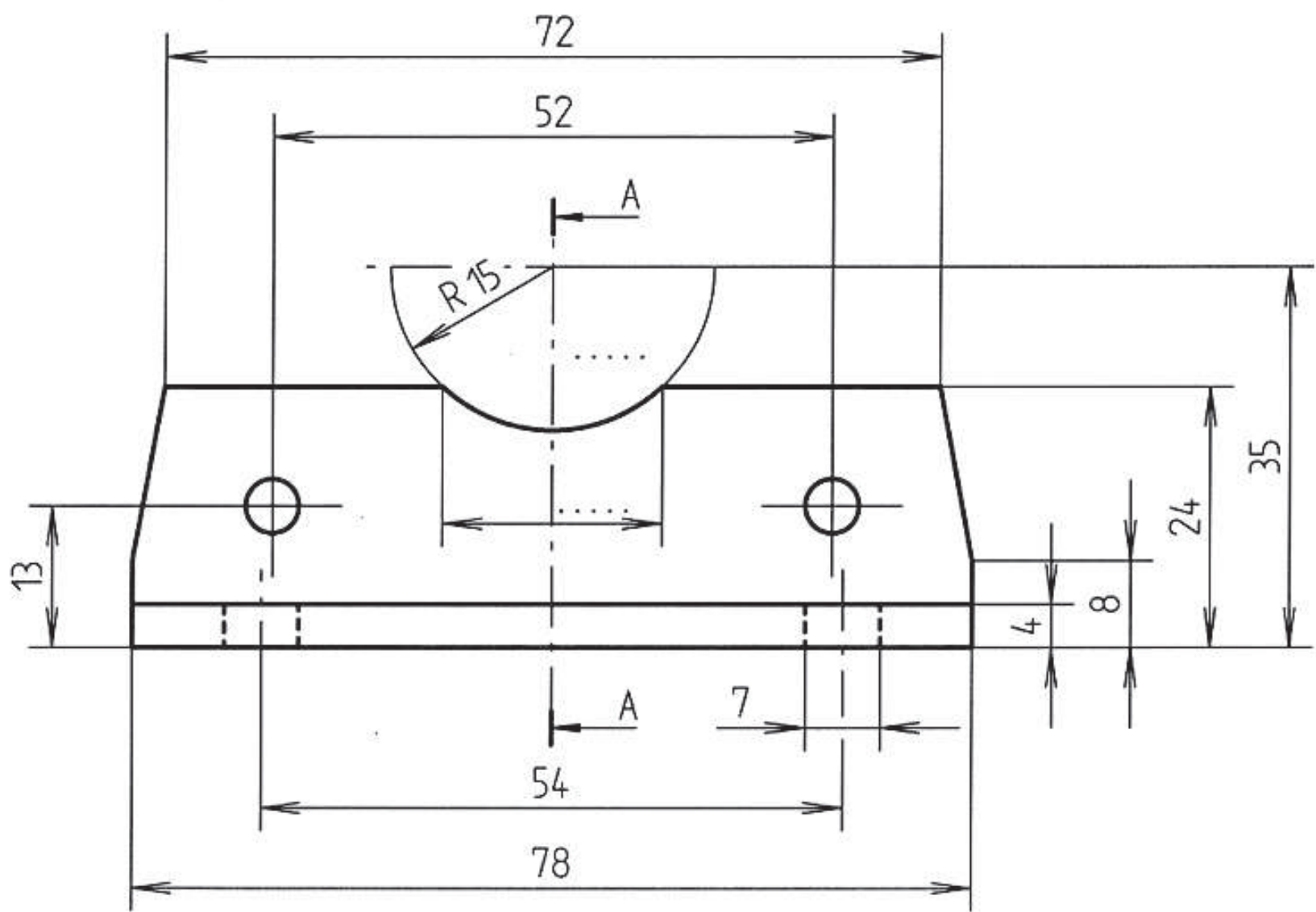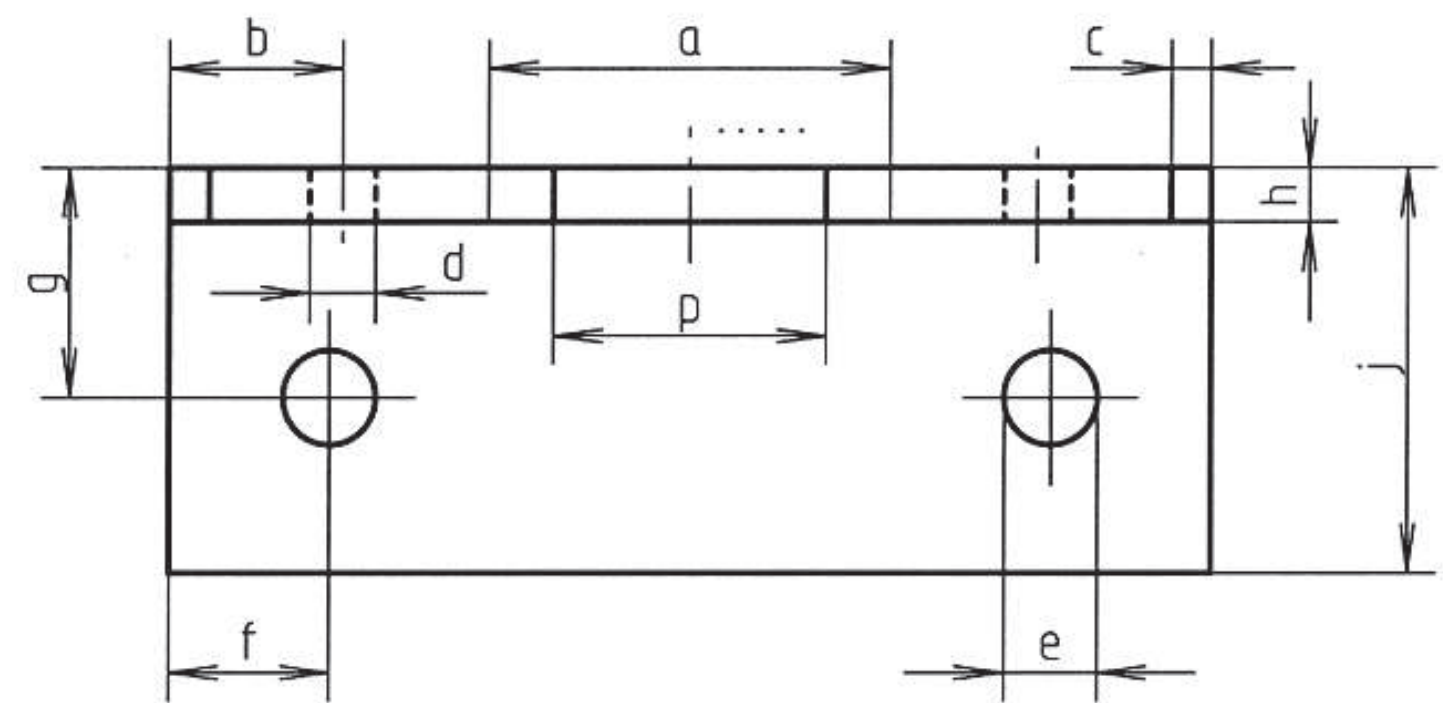
DIDASCALIE

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