DESIGN BRIEF
FROM HOSPITAL TO HOUSE
Elderly Healing Centre in the Information Society
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FROM HOSPITAL TO HOUSE

Would you feel relaxed in hospital? Would you choose to meet a friend there? Would you like to spend your free time there? The answer for most people is no. Hospitals have always been synonymous with fear and sadness. Although it relates to the fact that life and death is a heavy topic, the hospital's factory-like model and oppressive space exacerbate the negative emotions.

This situation is even worse for elderly people. According to a CNN Health survey, the older you are, the worse the hospital is for you. But on the other hand, Germany is even entering a super-ageing society. According to the United Nations Health Organisation, 27.6% of the population in Germany is over 60 years old, the second highest population in the world after Japan.[1] And in the German healthcare system, more than 60.5% of patients are older than 60. Geriatric medicine department's average length of stay of 15.2 days is twice the average, ranking first among all departments.

All the facts prove that hospitals, which have remained unchanged for decades, need a revolution. The best future hospital is NOT hospital, at least not the way it is now. This article studies the body perspective to provide an excellent healthcare experience for elderly patients. Filling the gap between society, hospital and home, enabling the revolution from hospital to house.

Figure 01: Medical care for the elderly in Germany (Drawn by the author)

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1 "World Report on Ageing and Health." 2015. https://apps.who.int/iris/bitstream/handle/10665/186463/978924069 4811_eng.pdf?sequence=1&isAllowed=y.
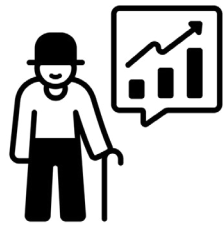
Rapid ageing and growth of elderly patients

Physical and mental health care barriers

Lack of social well-being

Figure 02: Medical care for the elderly in Germany (Drawn by the author)

Population ageing refers to the increasing median age of the population as a result of declining fertility and increasing life expectancy. Globally, the population aged 65 and over is growing faster than all other age groups. By 2050, one in six people in the world will be over 65 (16%) and in 2019, one in 11 (9%) will be over 65. Population ageing is set to become one of the most important social changes of the 21st century, with implications for almost all sectors of society. Germany, as a hyper-ageing society, is also suffering a huge impact on the healthcare system. Not only is there pressure on the number of older people as mentioned earlier, but also older people are experiencing various medical barriers.

The World Health Organisation defines health as "a state of complete physical, mental/cognitive and social well-being and not merely the absence of disease or infirmity". According to Thais Abud in his report 'Determinants of Healthy Ageing', older people have very distinct medical impairments at all three levels.

The physical aspect is mainly characterised by a decline in physical function. From the age of 60 onwards, mobility rapidly decreases to a third of what it was in younger years. This has a serious impact on the quality of daily life, as evidenced by the need for assistance from others to maintain an equivalent standard of living. In addition, the probability of developing chronic and multiple diseases, which are difficult to cure and have medical co-ordination problems, is greatly increased. A survey of older people in 11 high-income countries showed that 24% of individuals had five or more co-morbidities and 39% said they had seen four or more doctors in the past year (12).

On a mental and perceptual level, older people are more fearful of being treated in hospital and resent changes in their living environment. In addition, over 20% of adults over 60 years of age suffer from mental or neurological disorders (excluding headache disorders). All of these stresses can lead to isolation, loneliness or psychological distress in older people, for which they may require long-term care.

Social wellbeing includes the family, the community and wider society, and all the factors within it, such as the built environment, the people and their relationships, attitudes and values, health and social policies, the systems that support them and the services they implement. In contrast, the current hospital environment lacks a focus on older patients and older people lack hedonic possibilities and social support during long stays.

In summary: for older patients: 1. the rapid ageing and growth of elderly patients; 2. Barriers to physical and mental health care; 3. lack of social wellbeing.

Architecture is a continuation of the body. In contrast to agrarian and industrial societies where the body existed in physical form, in the current information society the body is represented more as a collection of data. A large number of body monitoring and information processing technologies are being used. In particular, the proliferation of personal wearable devices enables the continuous monitoring of human physical activities and behaviors, as well as physiological and biochemical parameters during daily life. The most commonly measured data include vital signs such as heart rate, blood pressure, and body temperature, as well as blood oxygen saturation, posture, and physical activities through the use of electrocardiogram (ECG), ballistocardiogram (BCG) and other devices. The data on psychological aspects such as stress, emotions, mental health, etc. are also being developed. All these can be innovative solutions for healthcare problems, including the prevention of diseases, maintenance of health, patient management and diseasemanagement. The data can directly impact clinical decision-making. Wearable technologies are improving the quality of patient care while The big data generated by wearable devices is both a challenge and opportunity for researchers who can apply more AI techniques on that data in the future.

The body of the elderly, as a collection of data, is related to the building in terms of both health care and social well-being. In terms of intrinsic capacity, the traditional general hospital uses medical technology as the core of the building, using large medical equipment to obtain data on the patient's body, such as X-ray, MRI, CT, etc., and then using the doctor as the processor to give treatment plans. In the information society, the separation of the body and data allows hospitals to improve the quality of health care and deliver comprehensive and person-centred services. In terms of functional ability, the input of personal characteristics places more individual demands on the building.

This article uses hospital and house to refer to the two building attributes required by older people, trying to fill the gap between hospital and house in the elderly living environment. The research question is:

How to design a healing space that provides both health care and social well-being for the elderly in the information society?

More specific:1. How to design the healing space of hospi-tals based on the healthy ageing of the elderly? 2. How to design the healthcare system based on the body as a collec-tion of data?
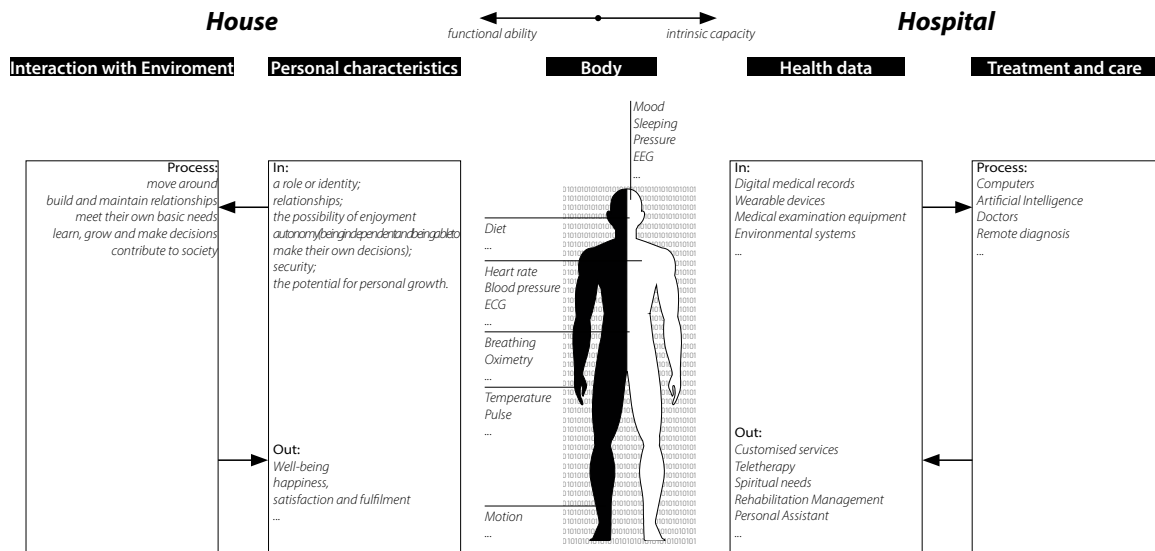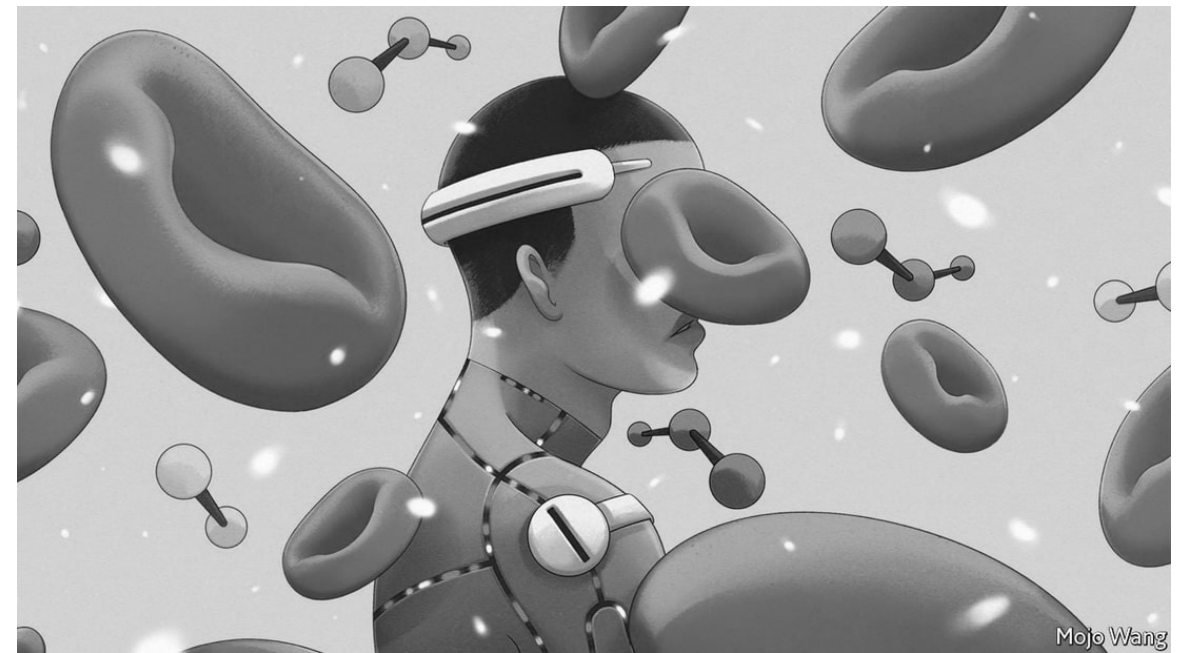

Figure 04: Data transforming healthcare

Figure 01: Medical care for the elderly in Germany (Drawn by the author)

Research Framework

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┌─────────────────────────────────────────┐
│ Problem: Rapid ageing & Unbalanced       │
│          healthcare system               │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│ Theory: Healthy aging requires intrinsic │
│         capacity and functional          │
│         ability - WHO                     │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│ Research Question: how can a new hospital│
│ use the technology of the information    │
│ society to provide older people with     │
│ intrinsic capacity and functional ability│
│ to help achieve healthy ageing?          │
└─────────────────────────────────────────┘
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| Wearable devices support health care | —Theory support→ | |
| Elderly needs: move around, build and maintain relationships, meet their own basic needs, learn, grow and make decisions, contribute to society | —Theory support→ | Comprehensive considered and managed health care is more effective |

—Theory support→

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┌─────────────────────────────────────────┐
│ Hypothesis: Elderly Healing Centre in    │
│ the Information Society providing         │
│ intrinsic capacity and functional        │
│ ability, and fill the gap between        │
│ hospital and house                        │
└─────────────────────────────────────────┘
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┌─────────────────────────────────────────┐
│ Design brief: Program, client, site      │
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Relevence

1. Healthy aging: The German Federal Ministry of Health introduced the goal of healthy ageing in 2012 as one of nine national health goals.

2. Lack of nursing staff: Germany's hospitals have been experiencing a shortage of nursing staff for several years, and this shortage worsened last year. In 2021, there were approximately 14,000 vacant positions for registered nurses in German clinics, with an additional 8,000 vacancies in intensive care units.

3. Digital health care: he German Federal Ministry of Health is driving the digital transformation of Germany's healthcare system for the good of patients.

Program

Literature study

Study of German and WHO literature on older people and analysis of needs in terms of both intrinsic capacity and functional ability. Determine the functional composition of the building.

Study of German and European guidelines for hospital buildings and current developments in information technology to analyse the medical processes and functional relationships in geriatric hospitals. Determine the programme of the building's intrinsic capacity.

Case study

Study case studies of buildings for the elderly, e.g. geriatric hospitals, care centres, housing for the elderly etc. Determine the programme and area of the functional capacity of the building and the area of the intrinsic capacity. Also identify key space.

Client

Internet search

Basically, there are three types of clients, public - government owned, non-profit - managed by trusts / societies, and private - corporate sector.

Searching the internet to analyse the trends of the three types of hospitals in Germany in terms of number of hospitals, financial investment, research development and patient satisfaction. And also comparing their respective strengths and weaknesses to chose the final client for the building.

Site

Internet search

A map study of the entire environment and public transport in Berlin. Analysis of the public attributes, accessibility and environmental quality. Selection of possible sites.

Through internet search and analysis other physical attributes of the site, such as air pollution levels, noise, etc.,

Site visit

Obtain first-hand site information through site visit and experience.

Analysis and comparison of all possible sites to finalise the site for the building.
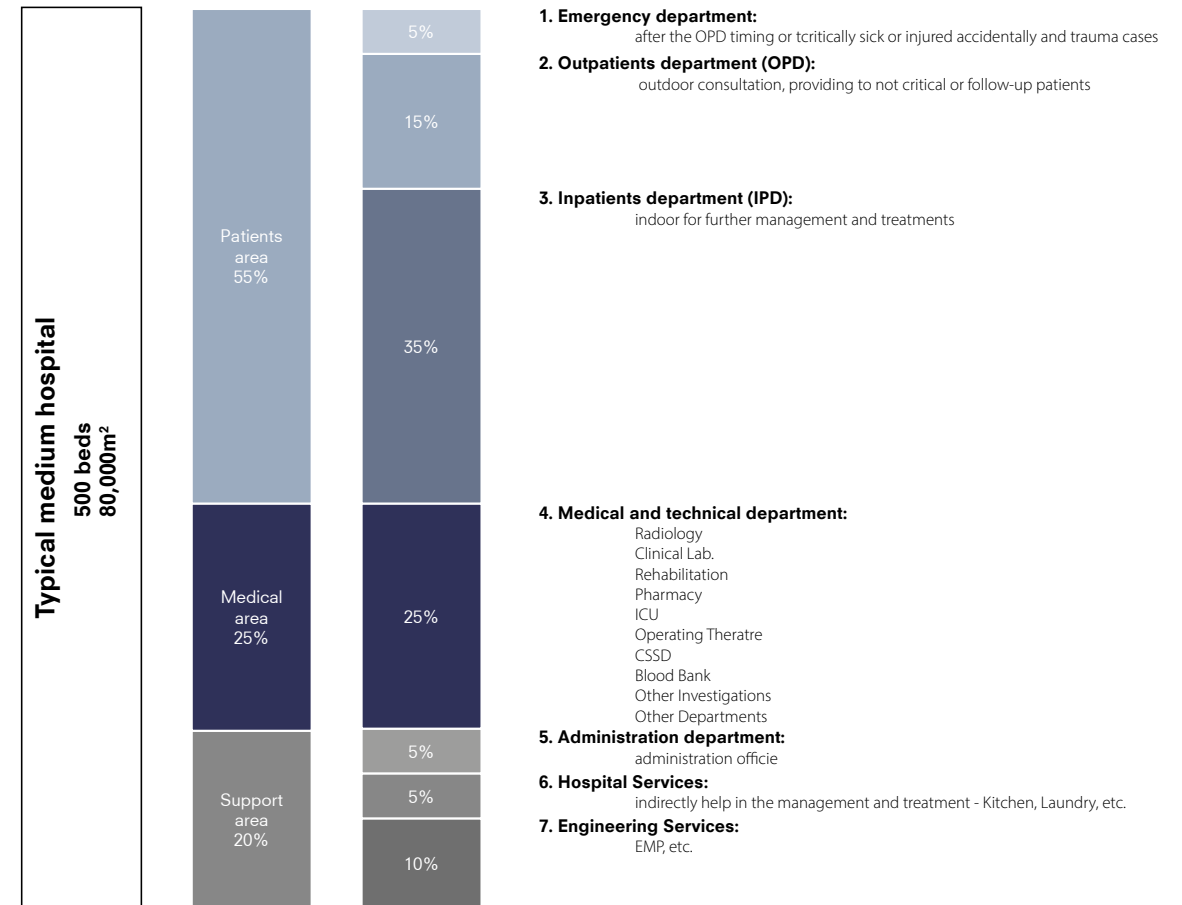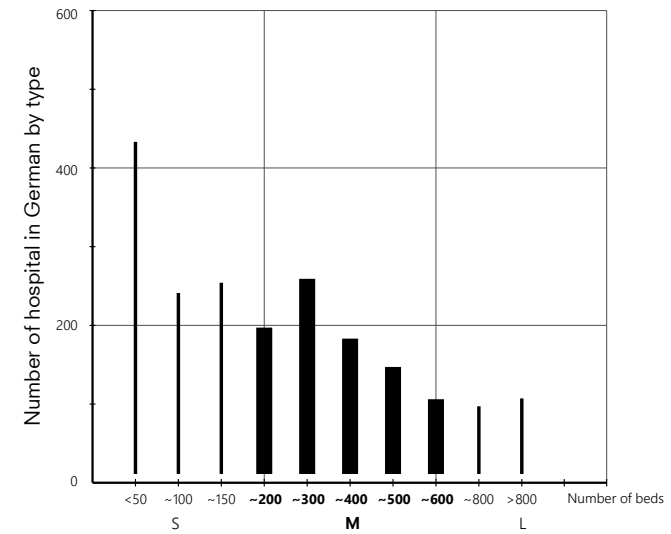
Program

Benchmark

We have analysed Capacity, Program, Flows and Comfort of existing hospitals and have come to the following conclusions.

1. Capacity

After studying the statistical reports of German hospitals, it was found that there are three main sizes of German hospitals. The largest international medical centres are larger than 1000 beds, followed by general and specialist hospitals with a majority of 200-600 beds and finally clinics with only a few beds. The distribution of hospitals in Berlin is similar. This paper counts 29 major hospitals in Berlin, of which 6 are medical centres larger than 1000 beds, 8 are general and specialist hospitals, with a majority of 300-500 beds, and the rest are small clinics. The study in this paper is a specialist geriatric hospital, so a 500-bed hospital is taken as the basic size.

2. Programme

According to the study of German and European hospital guidebooks and case studies of the main hospitals in Berlin, hospitals are divided into seven main areas, of which medical technology is the core part of the hospital, with three departments - emergency, outpatient and inpatient - handling the corresponding patients, and management, engineering and service departments as support. But this is only the most basic form of distribution of a hospital. As a healing centre for the elderly in the information society, which is the goal of this paper, the functions and programmes of functional ability need to be refined in the next step.

1. Emergency department:
 after the OPD timing or tcritically sick or injured accidentally and trauma cases
2. Outpatients department (OPD):
 outdoor consultation, providing to not critical or follow-up patients

3. Inpatients department (IPD):
 indoor for further management and treatments

4. Medical and technical department:
 Radiology
 Clinical Lab.
 Rehabilitation
 Pharmacy
 ICU
 Operating Theratre
 CSSD
 Blood Bank
 Other Investigations
 Other Departments
5. Administration department:
 administration officie
6. Hospital Services:
 indirectly help in the management and treatment - Kitchen, Laundry, etc.
7. Engineering Services:
 EMP, etc.

Benchmark

3. flows

The flow of the hospital is often a bad experience, as the departments are scattered, patients have to go to different departments to complete their procedures and spend a lot of time in queues, the space in the medical street is uncomfortable, people have to wait in specific enclosed spaces, and the departments are densely packed, resulting in a noisy flow of people.

4. Comfort

The comfort of the hospital is very poor, both in the ward areas and in the medical areas. The rooms have limited views and light and are very cramped and depressing. There is no transition from public to private areas, mostly direct connections between halls and corridors, so the ward areas are not private enough and are very monotonous, and the medical streets are mostly long halls with no space to stay, people often feel very tired and depressed

Summary

From the above analysis, we can draw some parts that can be referred to and some problems that need to be avoided
The optimum number of beds for a hospital is 200 -500 beds and 40,000 -80,000m2.
We need to avoid problems such as the lack of social welfare functions within the hospital, a medical focus rather than a patient focus, a monotonous and depressing medical street, dense departments, rooms with a lack of views, limited light, no transitional space and no dwell space.

Medical street

Consult & therapy

courtyard

wards
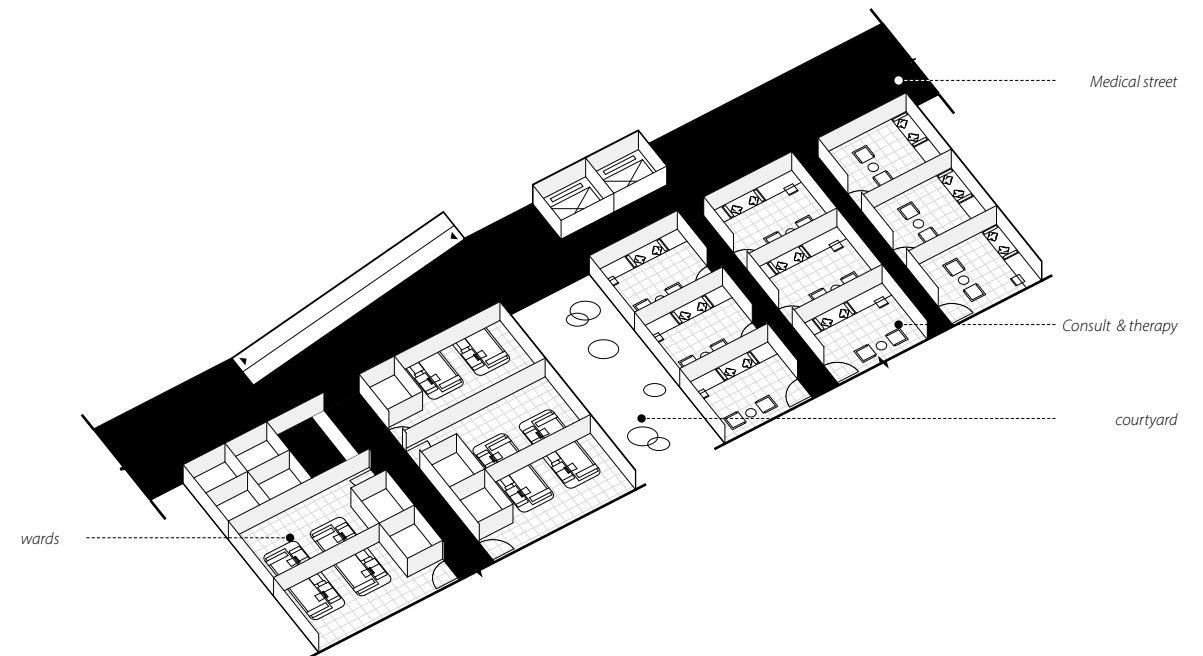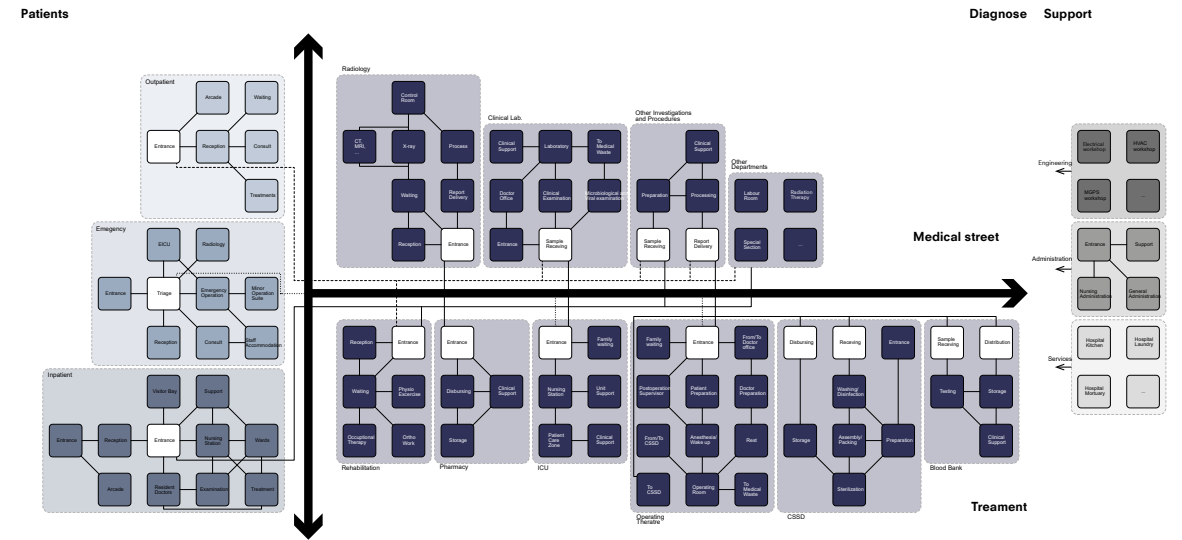
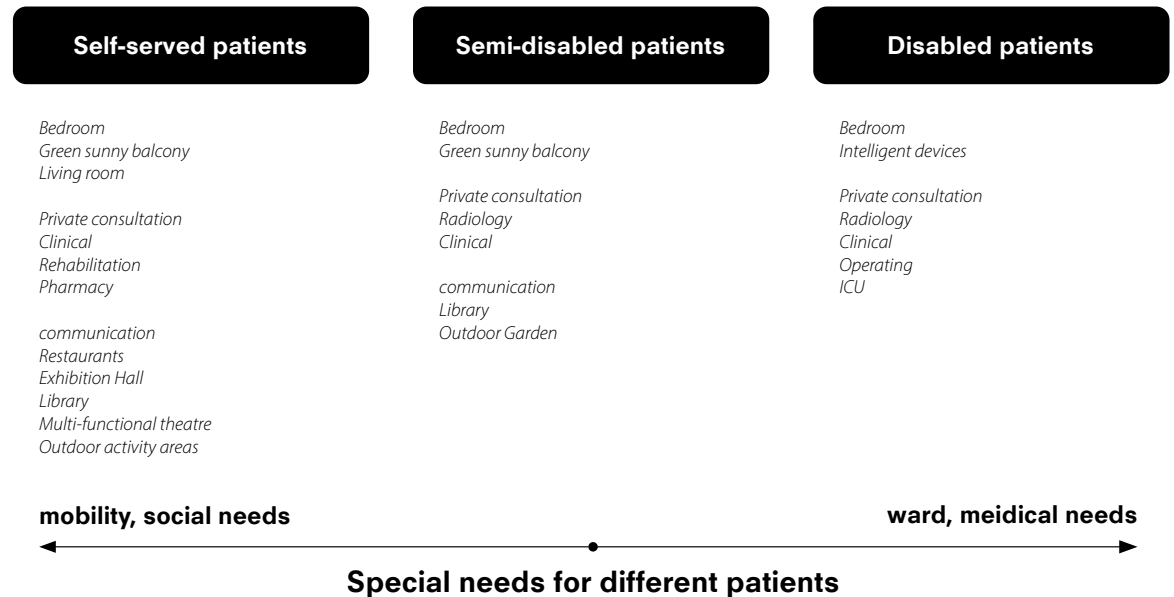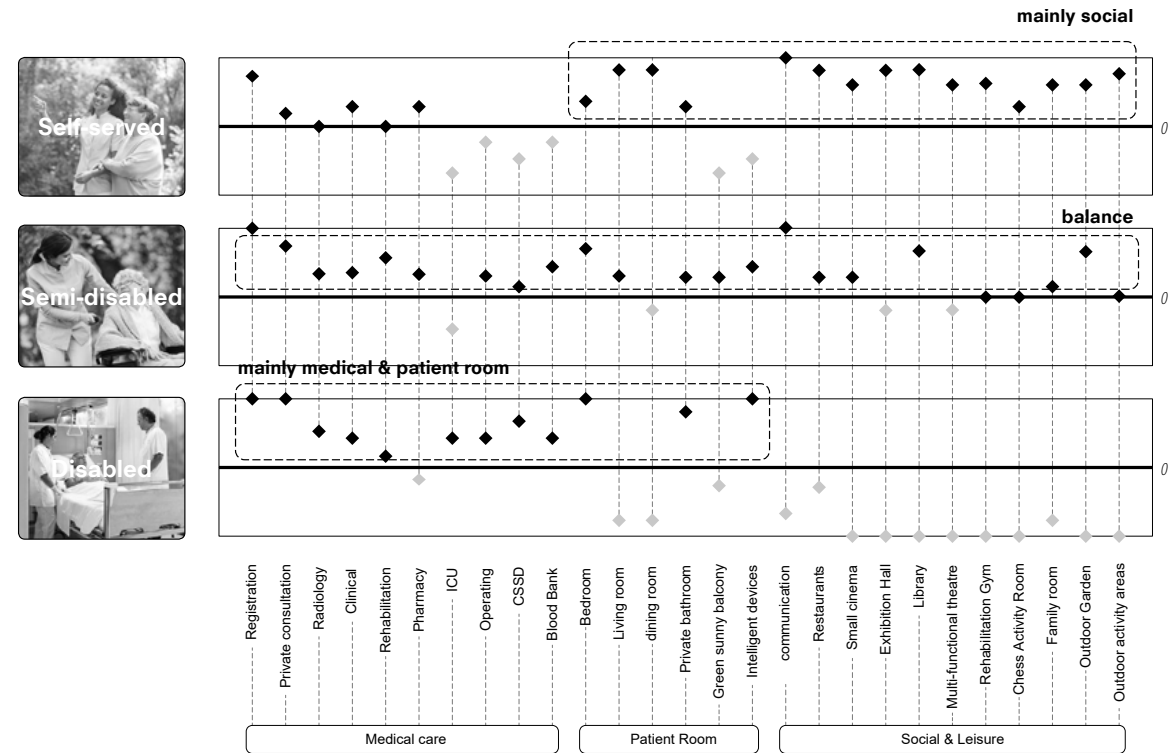## Activity Analysis

Patient Types

We tried to provide an excellent healthcare experience for elderly patients from the patient's point of view, thus subdividing the elderly patients according to their mobility, namely self-served patients, semi-disabled patients and disabled patients, and we divided the hospital into medical area, ward area and social activity area, by analysing the activity areas of these three types of patients, we can draw the following conclusions

The activities of the disabled patients are concentrated in the ward area and the medical area, the activities of the self-care patients are concentrated in the ward area and the social activities area, while the activities of the semi-disabled elderly are more evenly distributed in all areas.

Activities Conclusion

We tried to provide an excellent healthcare experience for elderly patients from the patient's point of view, thus subdividing the elderly patients according to their mobility, namely self-care elderly, semi-self-care elderly and dysfunctional patients, and we divided the hospital into medical area, ward area and social activity area, by analysing the activity areas of these three types of patients, we can draw the following conclusions

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Self-served patients	Semi-disabled patients	Disabled patients
Bedroom *Green sunny balcony* *Living room* *Private consultation* *Clinical* *Rehabilitation* *Pharmacy* *communication* *Restaurants* *Exhibition Hall* *Library* *Multi-functional theatre* *Outdoor activity areas*	*Bedroom* *Green sunny balcony* *Private consultation* *Radiology* *Clinical* *communication* *Library* *Outdoor Garden*	*Bedroom* *Intelligent devices* *Private consultation* *Radiology* *Clinical* *Operating* *ICU*

mobility, social needs　　　　　　　　　　　　　　　　　　　　**ward, meidical needs**

Special needs for different patients

Space Analysis

Patients Area Analysis

The self-care ward includes a living room, a dining room and other rooms to meet the needs of self-care patients and provide a good living environment, with sufficient space for self-care patients and green outdoor areas.

The semi-disabled ward includes a living room, which meets the daily needs of guests and a green outdoor area, where they can relax and spend most of their time in their beds, including meals, but they sometimes have social activities as well as outdoor activities

The main functional room in the disabled ward is the bedroom, equipped with intelligent equipment throughout the house, where patients can easily control the equipment in the ward, and a balcony with a view of greenery.

Social Area Analysis

The communication centre acts as the building's living room linking the various functional modules.It includes a number of social and relaxation areas, a ward area and a medical area, and also serves as a medical consultation hall for patients, allowing them to have medical consultations in a peaceful and comfortable atmosphere.

Medical Area Analysis

Consultation area with equipment wearing area and private consultation room with outdoor activity area
The general medical examination rooms have outdoor gardens to provide a good environment and the specialist testing rooms are equipped with operating rooms
The treatment rooms have an outdoor garden at the patient entrance and a doctor's entrance and equipment on the other side
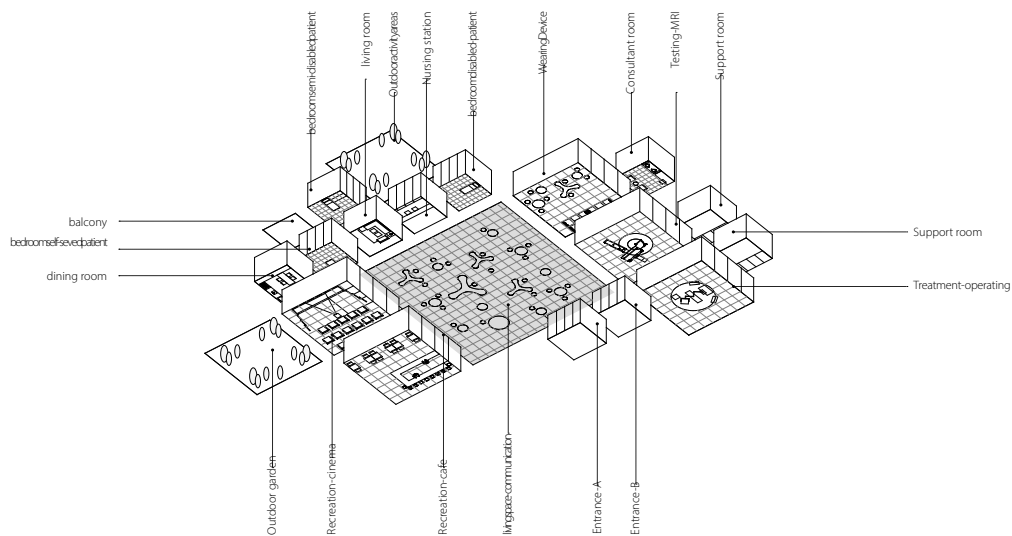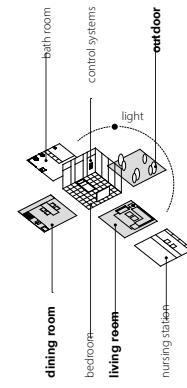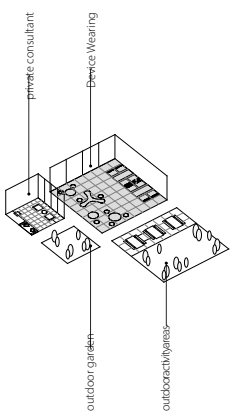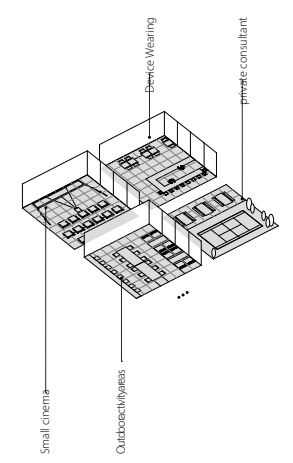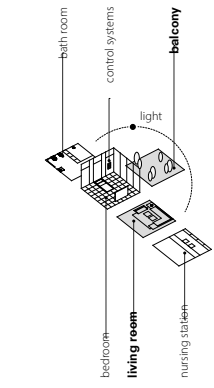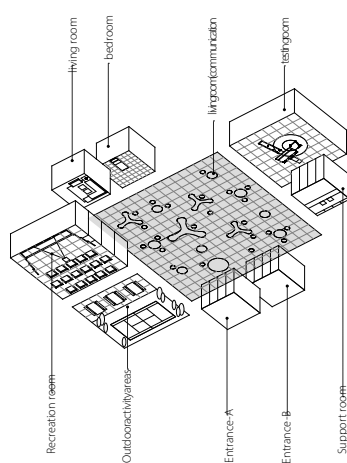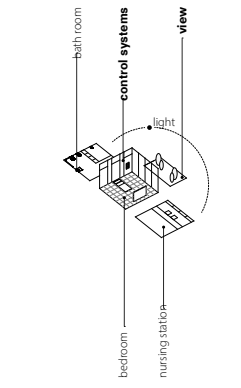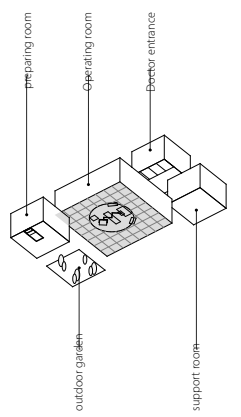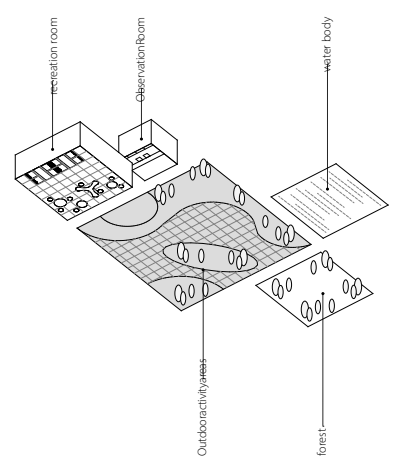
Program

From hospital to house
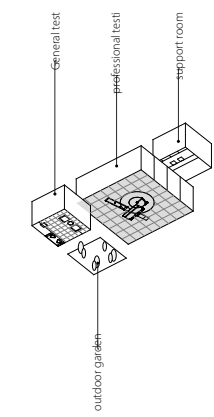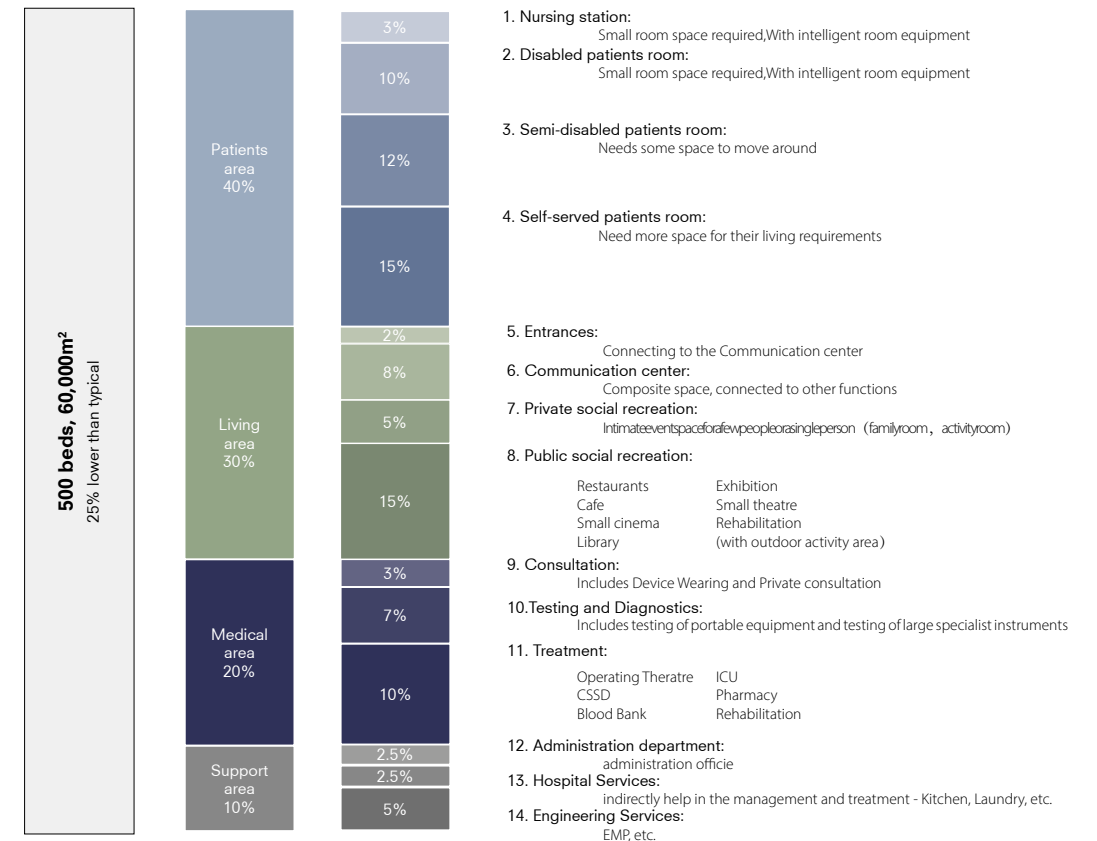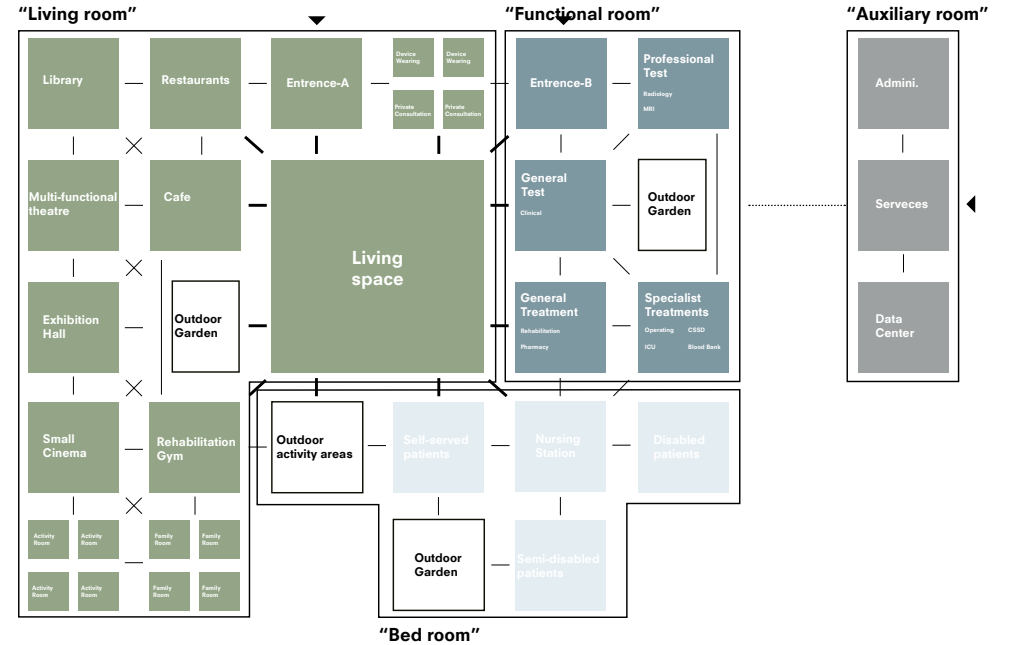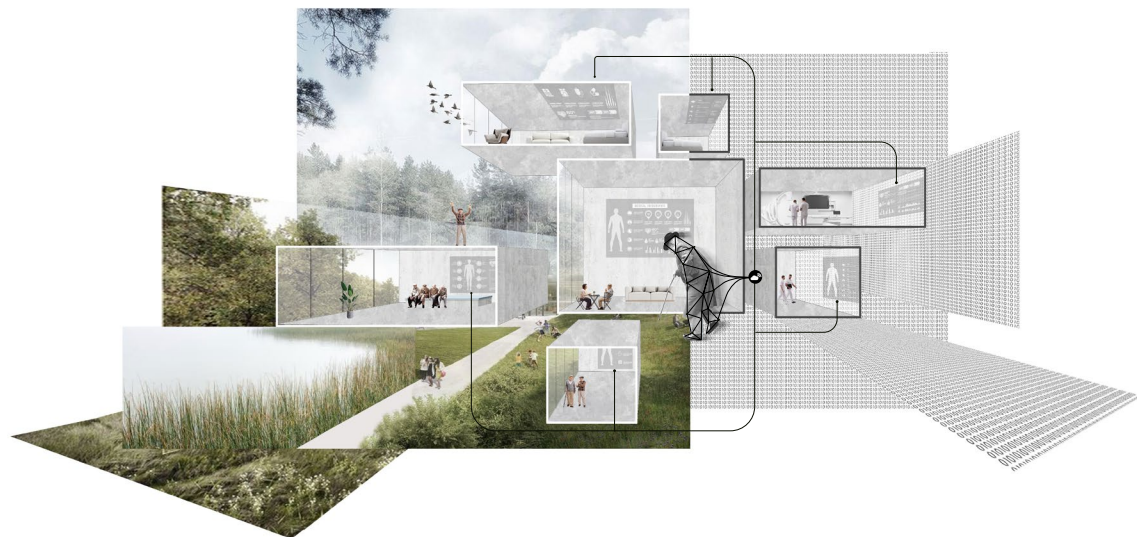
With the communication centre as the core of the chain of functions, its organisation is similar to that of a living room at home, connecting the bedrooms and other functional spaces, so that patients can have a more comfortable and richer life in the hospital as if they were at home, instead of being confined to the ward, truly freeing them from the ward.

Program Bar

The amount of beds remains the same, but the size of the ward area is reduced, due to the optimisation of functions and the accessibility of some data, which helps us to design the hospital from the patient's point of view, rather than from a functional point of view, with a top view.

Vision

Elderly healing centre in the information society

500 beds, 60,000m² 25% lower than typical

- Patients area 40%
  - 3%
  - 10%
  - 12%
  - 15%
- Living area 30%
  - 2%
  - 8%
  - 5%
  - 15%
- Medical area 20%
  - 3%
  - 7%
  - 10%
- Support area 10%
  - 2.5%
  - 2.5%
  - 5%

1. Nursing station:
   Small room space required,With intelligent room equipment
2. Disabled patients room:
   Small room space required,With intelligent room equipment

3. Semi-disabled patients room:
   Needs some space to move around

4. Self-served patients room:
   Need more space for their living requirements

5. Entrances:
   Connecting to the Communication center
6. Communication center:
   Composite space, connected to other functions
7. Private social recreation:
   Intimate events space for a few people or a single person (familyroom，activityroom)
8. Public social recreation:

Restaurants	Exhibition
Cafe	Small theatre
Small cinema	Rehabilitation
Library	(with outdoor activity area)

9. Consultation:
   Includes Device Wearing and Private consultation
10. Testing and Diagnostics:
    Includes testing of portable equipment and testing of large specialist instruments
11. Treatment:

    | Operating Theratre | ICU |
    | CSSD | Pharmacy |
    | Blood Bank | Rehabilitation |

12. Administration department:
    administration officie
13. Hospital Services:
    indirectly help in the management and treatment - Kitchen, Laundry, etc.
14. Engineering Services:
    EMP, etc.

Any hospital criteria

When it comes to hospitals, there are three basic criteria: accessibility, Healthy environment and Link to the nature.

First of all, accessibility, according to Traveling Towards Disease: Transportation Barriers to Health Care Access mentioned that Transportation barriers are an important barrier to healthcare access, particularly for those with lower incomes or the under/uninsured. Also in World Health Organization: World Report On Ageing and Health reported that even in high-income countries, 12.1% of people over 60 years of age still do not have access to health services because of transport barriers. So we set the site to have at least one station, one main road, At the same time, the time to the city center is less than 30 minutes, and the time to the airport is less than 60 minutes. There are subway lines and bus stops on the north side of the site, and it is close to highways. It takes 26 minutes to reach the Berlin railway station and 54 minutes to reach the airport, which meets the standard.

In Healthy environment we set two standards, noise control and air quality. The World Health Organization (WHO) recommends sound levels of 35 dB(A) during the day and 30 dB(A) during the night. But this counts in all the sound generated inside and outside the hospitals. As a general environmental requirements for the site, we set the requirements as follows: Total noise from the road, rail and air traffic < 65dB(A). On the other hand, for excellent air quality, the AQI needs to be less than 50. The site is close to the Tegel forest and has a good natural environment, with a noise level of 26 dB(A), The AQI is 45.

In Link to the nature, we hope to Minimizing the impact on the environment, while adding value to the location and its context. At the same time, according to The Business Case for Creating a Healing Environment, the physical setting has the potential to be therapeutic if it connects patients to nature with views to the outdoors, interior gardens, water elements, etc. The site is close to one of the largest forests in Berlin, Tegel Forest. At the same time, it is close to an artificial lake. It can provide a very good natural environment for patients.
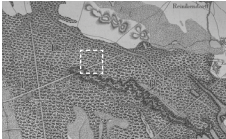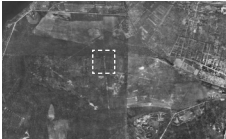
Environment group criteria

The environmental group's criteria are relatively simple, mainly divided into three points. First of all, Berlin has already achieved great results as a green city. The greening rate reaches 44%. We hope to minimize the impact of the building on the environment, so we set the site as in or next to environment. Use negative urban land or public green space that has less impact on the surrounding area. Second, we hope that the site can respond to the city more effectively, so we need to be close to the green corridor area of Berlin. Finally, we strictly forbid the site to be in a nature reserve.
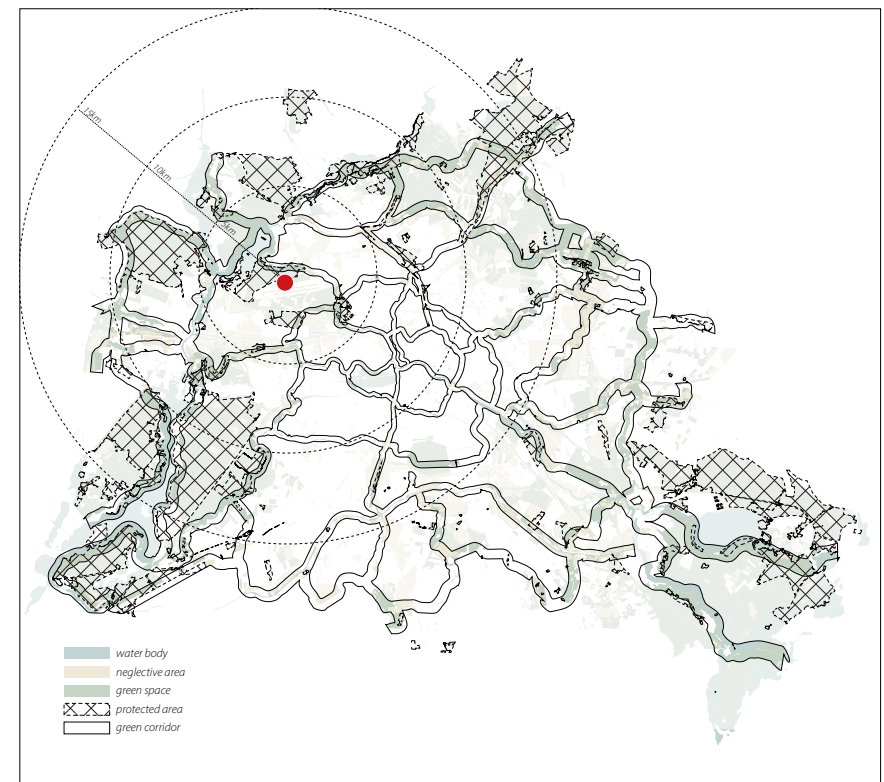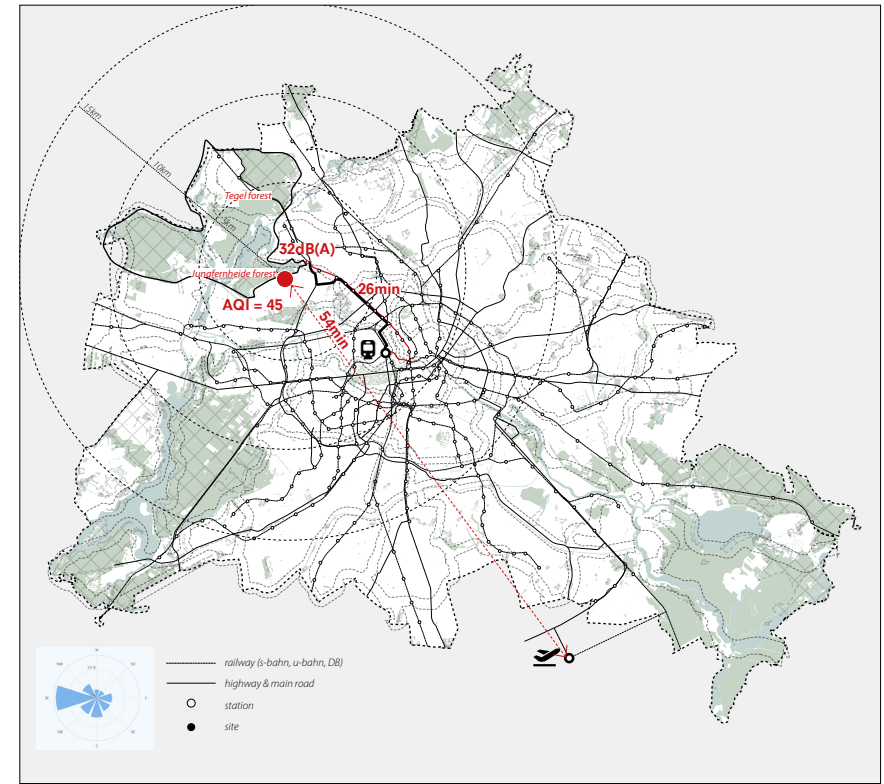
Timeline

The site is located north of Tegel Airport. The history of Tiger Airport and its surrounding Jungfernheide forest is mainly divided into five stages. It existed as a royal garden before 1824, and then as a military area in 1948. It became an air force base during World War II. After the war, the airport began commercial operation and For civilian use, it became Berlin's main airport. But as Berlin's demand for aviation increased, it was no longer able to meet the current demand and closed after the new Brandenburg Airport became operational. The airport will also be transformed into an urban community and Tegel city health park in the future. Including commercial, residential, office, public green space and other functions. This project is based on the future renewal plan, making the hospital a part of it.

Forest	Military area	Military airport	Commercial airport	**Community & Landscape**
Before 1824	**1824-1948**	**1948-1960**	**1960-2021**	**After 2021**
Part of Jungfernheide forest	Military training	Allotment gardens plan shelved by the Berlin Blockade	Berlin main airport	Urban Tech Republic
Hunting ground for the Prussian nobility	World War I: military training of aerial reconnaissance crews	Individual, non-commercial gardening or growing food plants, so forming a kitchen garden away from the residence of the user	1960s Built the terminal	800 companies with some 17,500 employees
	World War II: military training of Flak troops	Military airport	Flughafensee	Berlin University of Applied Sciences and Technology with 2,500 students
	Destroyed in Allied air raids	Berlin Airlift: Tempelhof was not big enough	1953-1978: An artificial lake for mining gravel	**Tegel city health**
		Base aérienne 165 Berlin Tegel	A recreational lake with beaches and an angling club	Tegeler Stadtheide landscape area as an area for nature and landscape protection
			Over 24 million passengers; Handled over 60% of all airline passenger traffic in Berlin	
			Fourth busiest airport in Germany	
			Decommissioned	
			2021: Decommissioned	
			2022: COVID-19 vaccination centre; Temporary shelters for refugees fleeing Ukraine	
			to 2029: The separate minor military area (Tegel Nord) will still be used for governmental helicopter flights until 2029	

- ❶ Education/Research/Technology
- ❷ Tegel city heath
- ❸ Jungfernheide forest
- ❹ Trade + Industry
- ❺ Living
- ❻ mixed building land

Access and surrounding

There are three main ways of entrance around the site, and the subway and bus station on the northeast side provide convenient public transportation. It can be reached quickly along the existing internal roads. Will serve as the main patient entrance to the hospital. The south side is connected with the distant Tegel community through internal roads, which is the main social connection direction of the hospital. Provides the basis for the social functional areas of the hospital. The forest on the north side is the main activity site for the surrounding residents to get close to nature, and it also provides the possibility for the hospital to connect with nature.

Vehicles
Walk
Trade + Industry
Education/Research/Technology
Living
mixed building land
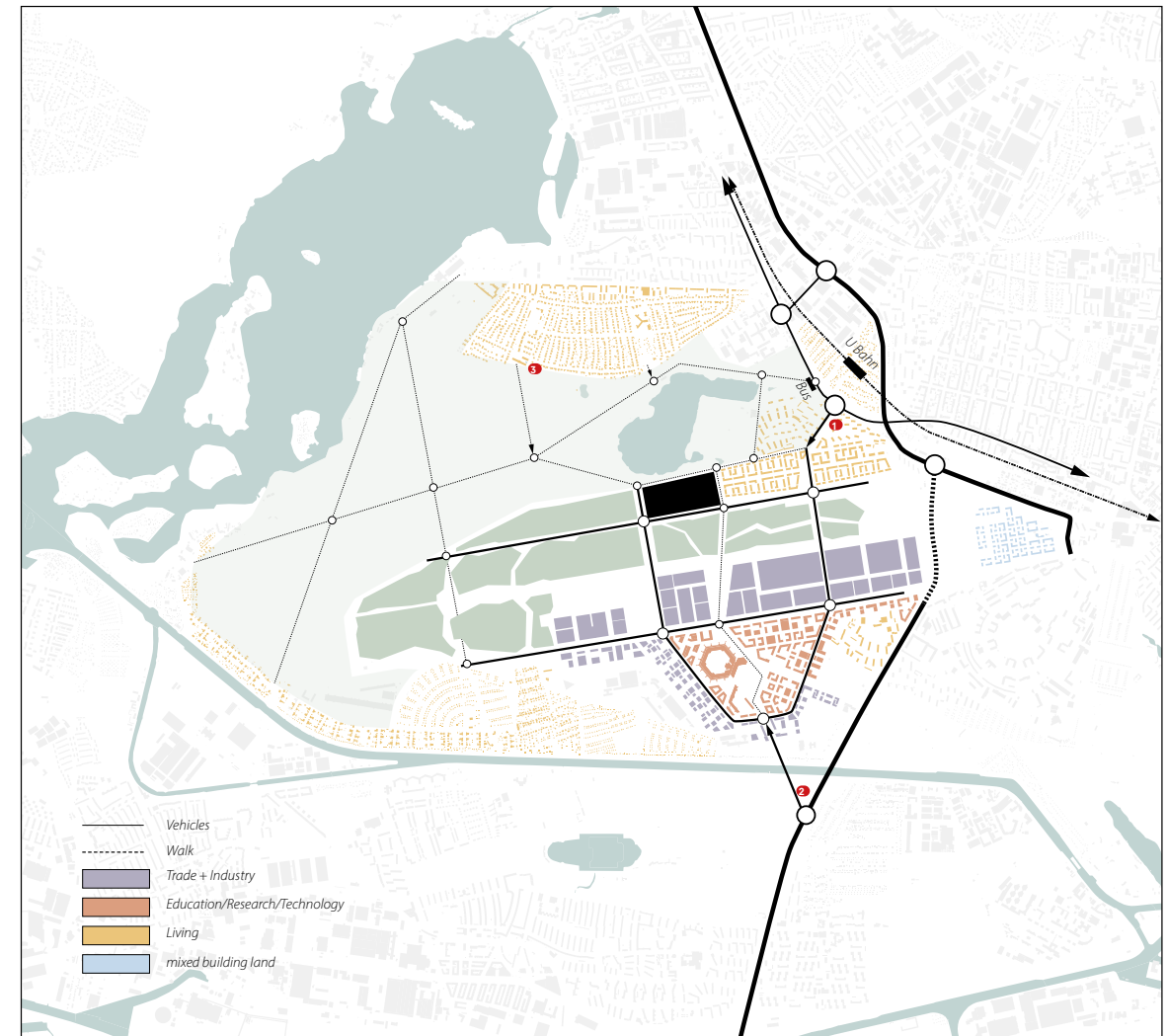
Site

Evironment

The site's more complex surroundings are also an opportunity for this project. It is mainly divided into forests, water, communities, parks and the distant community of Tegel.

Strategy

- North:
  orientation of the landscape view
  easy connection and access to nature

- East:
  community orientation
  community connection
  minimal disruption to residents

- South:
  sunlight
  views and interactive with the park
  appropriate distance
  main socially functional areas

- West:
  as the main medical entrance
  appropriate distance
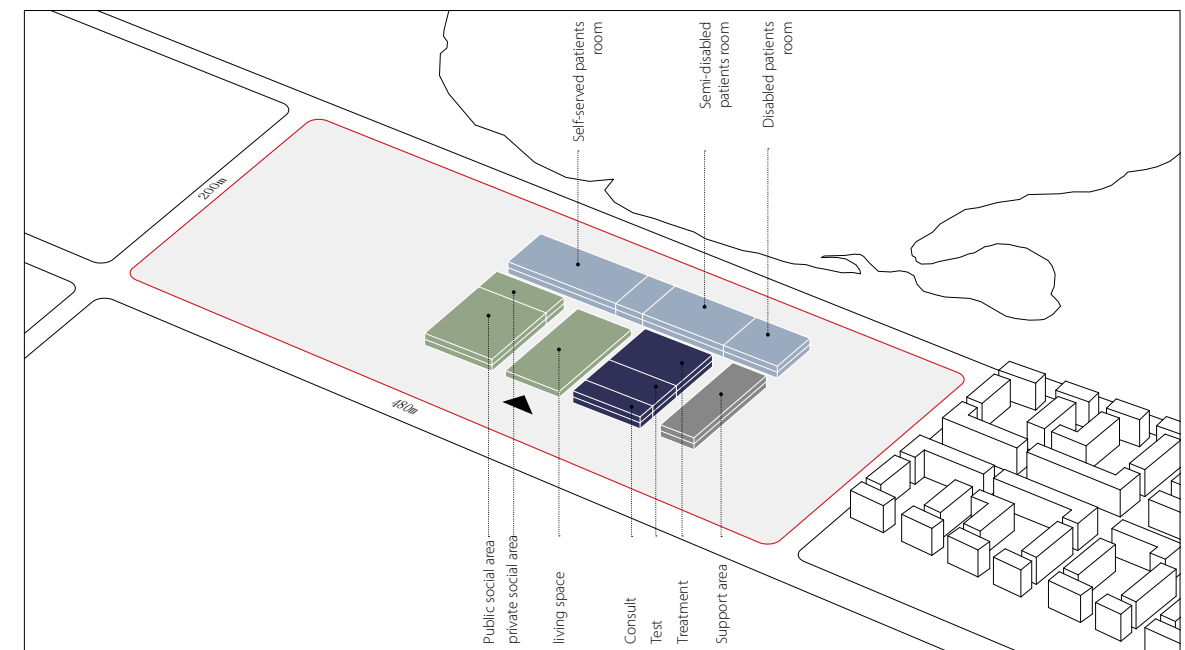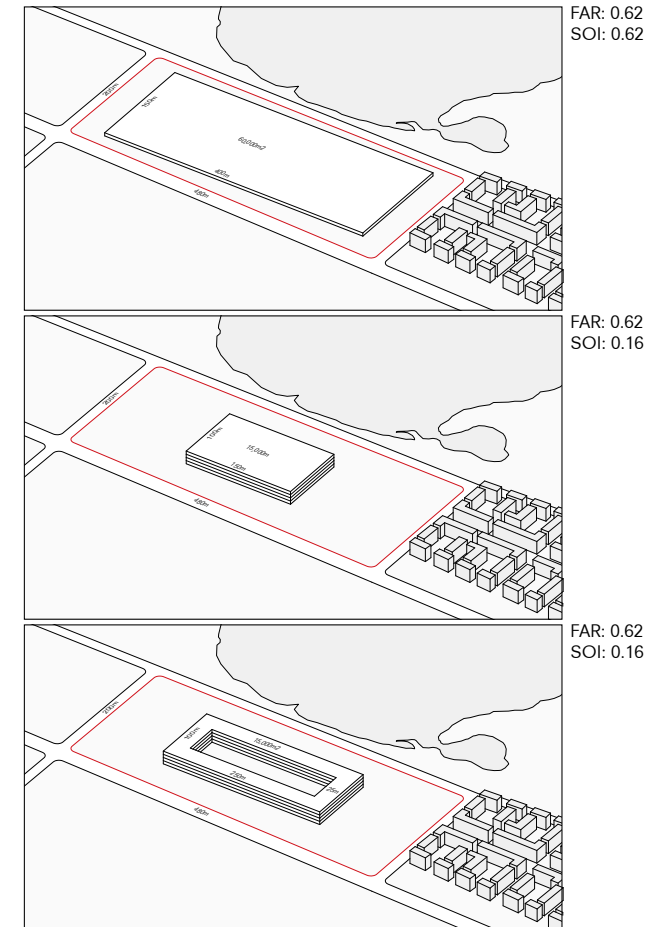 convenient access
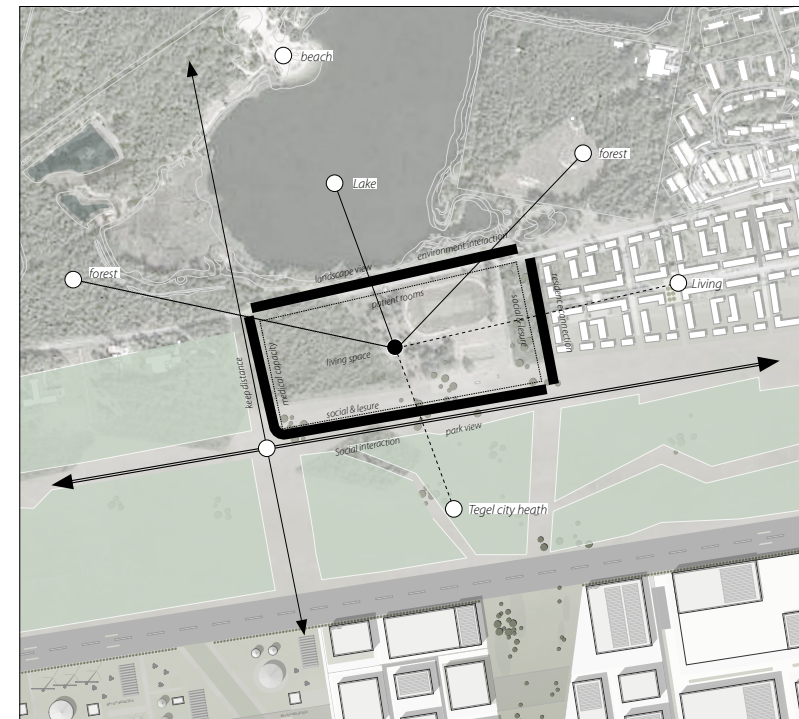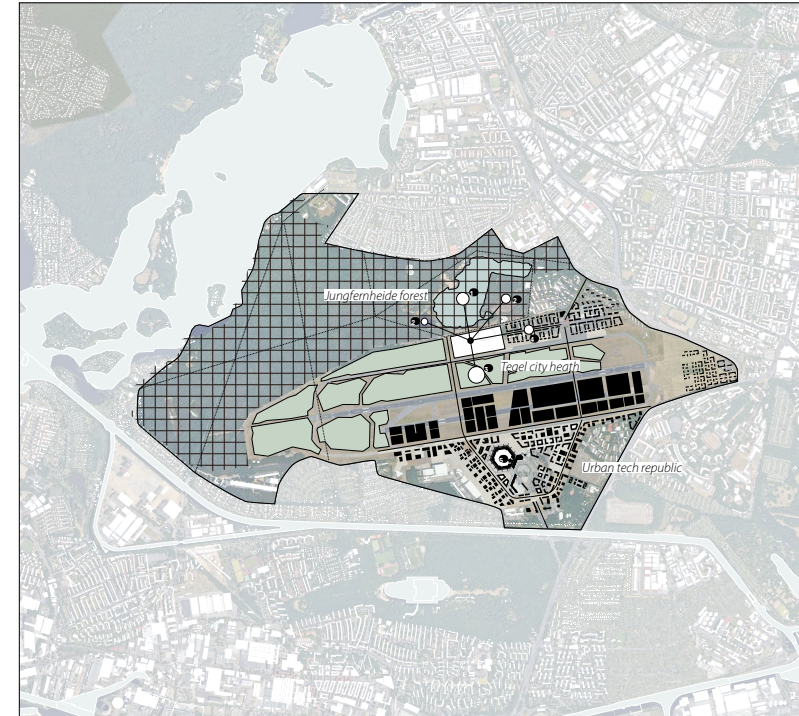
Site

Site senario

The site has been tested and fits well with the low density needs of a hospital for the elderly, with plenty of room for expansion. It can be used to create a better landscape and provide the basis for future expansion.

Vision

The project aims to create a medical space that connects nature and society at the same time, with a good medical experience.

FAR: 0.62
SOI: 0.62

FAR: 0.62
SOI: 0.16

FAR: 0.62
SOI: 0.16

Self-served patients room

Semi-disabled patients room

Disabled patients room

Public social area
private social area
living space
Consult
Test
Treatment
Support area
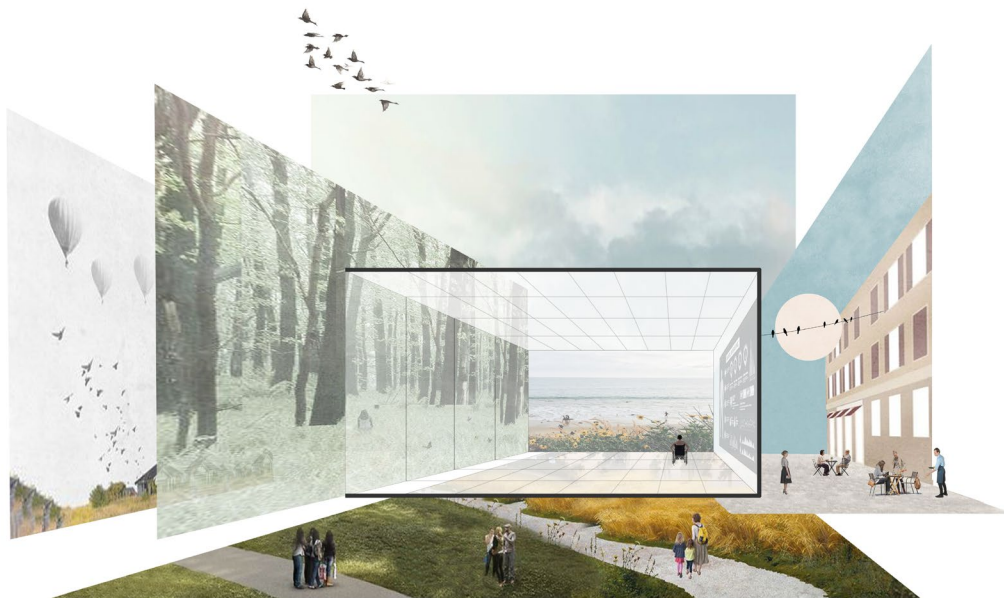
Client

Client overview: After study the three types of hospital, public, non-profit, and private. It shows that in Germany, the proportion of private hospitals is increasing, and other two types are decreasing (Figure 06). To more detail, the public hospitals have the advantage of having a policy of healthy ageing, but on the other hand, the excessive budget is a huge strain (Figure 07). And the non-profit hospitals are difficult to maintain and their numbers have fallen to the minimum. The private hospital is temporary chosen, whose numbers and accepted cases are rising rapidly (Figure 08), and also more hospitals researching and applying new technologies and building forms. Specific companies are the largest private hospital group - Helios (Fresenius) and the fastest growing group - Asklepios in Germany.
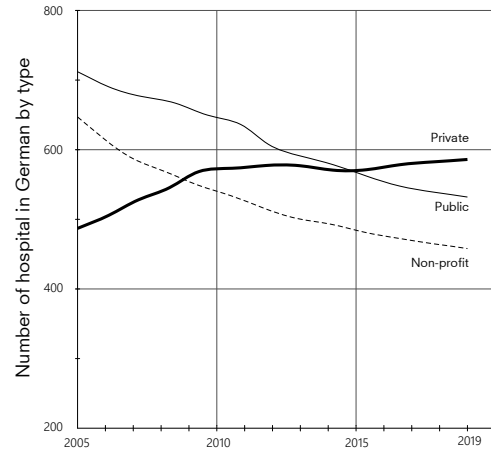
Fresenius is the largest private hospital company in Germany, with facilities throughout the country. It is made up of four main groups. The business covers hospitals, health centres, prevention centres etc. and has a great deal of experience in both medical and nursing care.

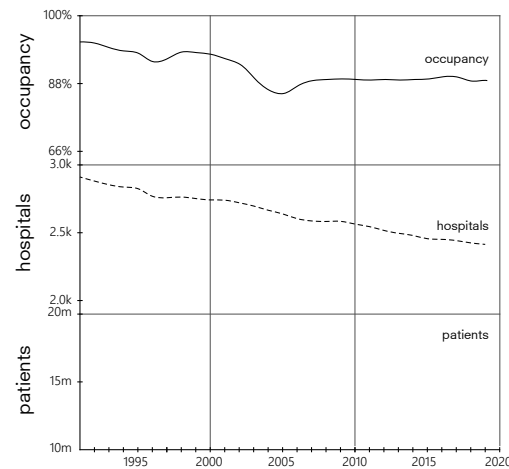*Figure 06: Number of hospital in German (Drawn by the author)*
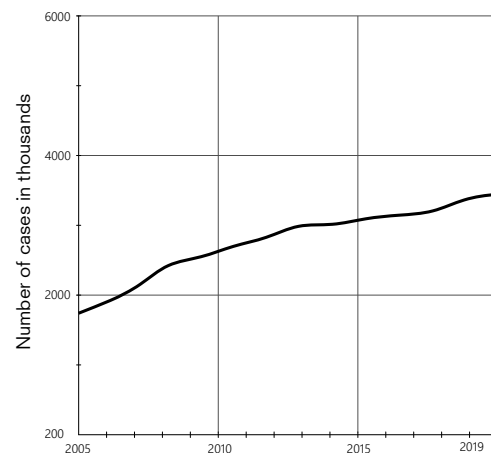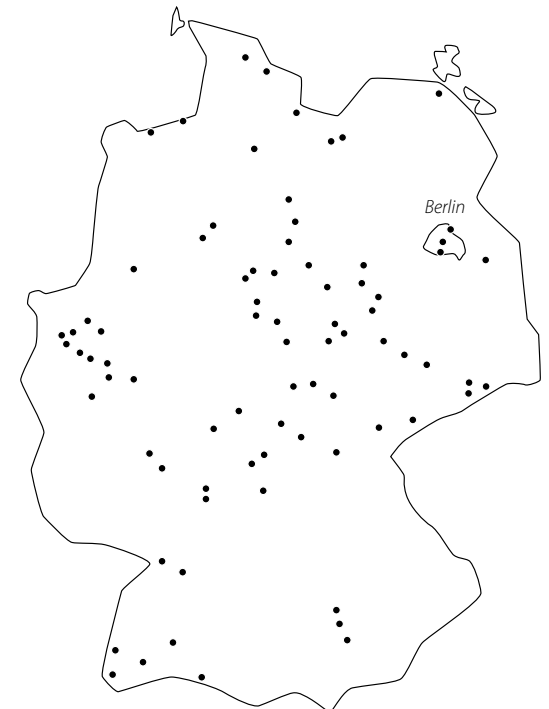

Figure 07: Healthcare in German (Drawn by the author)

Figure 08: Cases of private hospital in German (Drawn by the author)

FRESENIUS

FRESENIUS MEDICAL CARE

FRESENIUS KABI

FRESENIUS HELIOS

FRESENIUS VAMED


Berlin

Facts and figures:

- 86 hospitals

- 126 medical care centers

- 10 prevention centers

- 5.3 million patients

- more than 66,000 employees

- 6.1 million in sales

While having a good track record of growth, the company has deployed the same strategic planning in the direction of intelligent healthcare. It is trying to create an intelligent health group involving all its institutions. The creation of an integrated data platform to provide more valuable services to patients. These concepts are very much in line with the philosophy of this project.
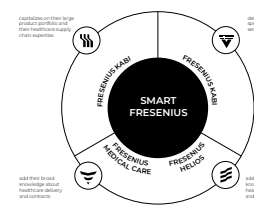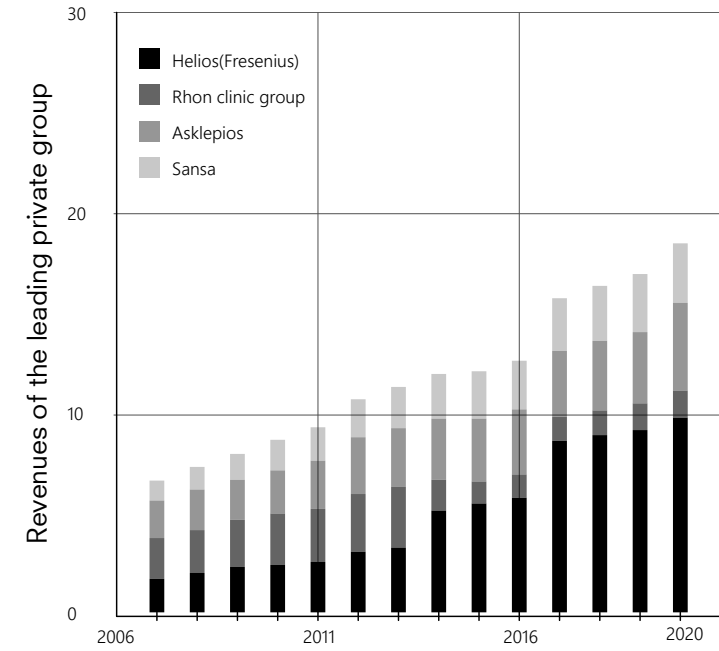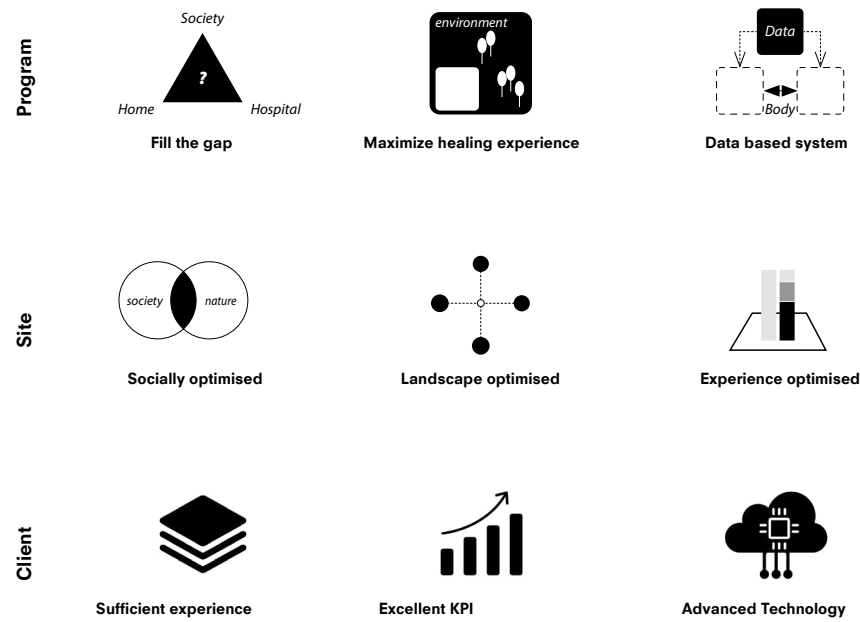

Smart health care group
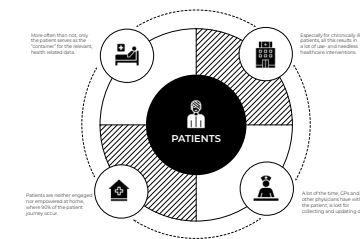
Integrated data platform
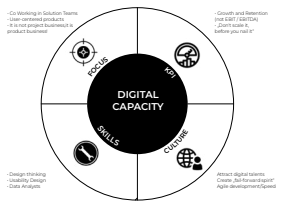
Digital capacity

Starting point

This paper has laid the foundations for the next semester's design at the program, site and client levels.

Program

Fill the gap

Maximize healing experience

Data based system

Site

Socially optimised

Landscape optimised

Experience optimised

Client

Sufficient experience

Excellent KPI

Advanced Technology

Next steps

- Configure living space (entrances, space, relationship, ...)
- Configure patient rooms (entrances, views, light, ...)
- Configure other functions (medical, social, support, ...)
- Sustainability design
- Structure design
- Landscape design
- ...

Reflection

For decades, everything has evolved because of the development of the information society. However, with hospitals we have always complained about the very poor experience, without ever thinking fundamentally about the relationship between the building and the body and changing it from a human perspective.

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