3 October 2025
Delft

DesHealth Autumn School
Service & Product Design for Circular Healthcare

Module 5
Systemic Design for Circular Healthcare

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Co-director – Sys - Systemic Design Lab

Politecnico di Torino

sys Systemic Design Lab

Let’s start from 3 keywords

Growth


THE WALL STREET JOURNAL.

DOW JONES | TUESDAY, JANUARY 17, 2023 - VOL. CCLXXXI NO. 12 | WSJ.com | ★★★★ $5.00

DJIA NASDAQ STOXX 600 10-YR. TREAS. OIL GOLD EURO YEN

What's News

Business & Finance

China's economy expanded 3% in 2022, one of its slowest rates in decades as repeated lockdowns hammered households and businesses, and down sharply from its 8.1% pace in 2021. A1

◆ Two years into negotiations with U.S. regulators about whether TikTok will be able to remain in the country, the popular Chinese-owned video-sharing app is trying a new tack: increased transparency. A1

◆ Electric-vehicle sales crossed a key global milestone last year, achieving

Nation Honors Civil-Rights Great Dr. Martin Luther King Jr.

China's GDP Growth Weakens To 3%

Covid-19 lockdowns block spending, knocking down rate from 8.1% in 2021

By Jason Douglas

SINGAPORE—China's economy grew at one of its slo rates in decades last ye repeated lockdowns mered households and

The Guardian Wednesday 3 April 2019

FTSE 100 -73.74 7391.12

All share -35.69 4035.52

Dow Indl -106.31 26152.11

Nikkel 225 -3.72 21505.31

£/€ 1.1644

£/$ 1.3031

Financial

IMF head warns of unsettled outlook for global economy as growth slows

Richard Partington
Economics correspondent

The head of the International Monetary Fund has warned that most countries around the world can expect slower growth in 2019 as the global economy loses momentum.

Christine Lagarde said rising trade tensions, concerns over Brexit and tougher financial conditions as central banks raise interest rates had "increasingly unsettled" the world economy

Yesterday, Lagarde said: "It has since lost further momentum, as you will see from our updated forecast next week."

The warning from the Washington-based fund comes as fears grow over the strength of the world economy a decade on from the 2008 financial crisis, amid growing risks from the US-China trade dispute and higher interest rates.

Lagarde said the IMF expected growth to slow in 70% of countries this year, two years after a synchronised upswing for three-quarters of countries in 2017.

Christine Lagarde highlighted trade tensions and rising interest rates

some pickup in growth in the second half of 2019 and into 2020," she said.

Financial markets around the

in by the IMF for the second half of 2019 does, however, come against a backdrop of increasingly precarious conditions, Lagarde said, with potential risks including Brexit, high debt in some sectors and countries, tensions over trade policy and a sense of unease in financial markets.

"Many economies are not resilient enough. High public debt and low interest rates have left limited room to act when the next downturn comes, which inevitably it will," she said.

Fears over the health of the global economy have increased in recent weeks. Turkey lurched back into a period of financial markets turmoil last week, while figures from the eurozone


Economic growth falls to lowest in over 6 yrs

SLOWDOWN GDP expands just 5%, manufacturing sector slumps alarmingly

Consumption slowdown hits hard

PFCE, which accounts for more than 56% of GDP, grew at just 3.1%

PM'S TOP AIDE MISRA TO STEP DOWN, SINHA NAMED OSD

HT Correspondent

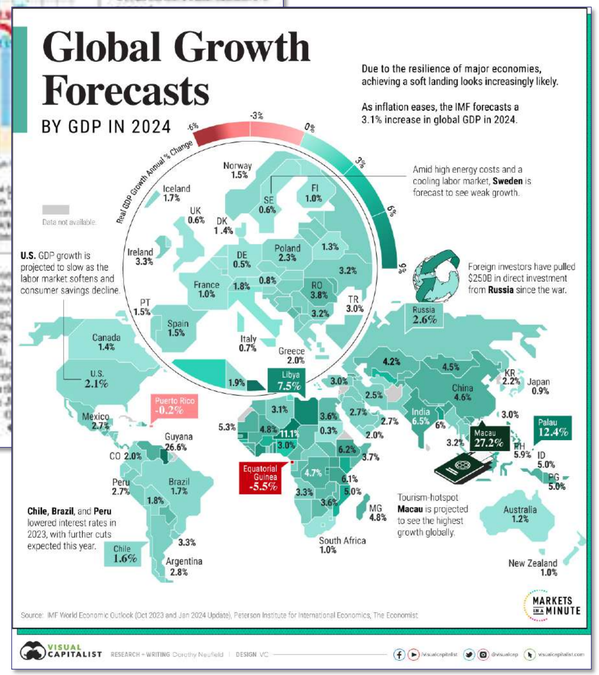

U.S. GDP Falls 3.5% in Biggest Drop Since 1946

Annual real GDP growth in the United States

10%
5%
0%
-5%
-10%
-15%
1950 1960 1970 1980 1990 2000 2010 2020
2020 -3.5%

Source: U.S. Bureau of Economic Analysis

statista


Global Growth Forecasts

BY GDP IN 2024

Due to the resilience of major economies, achieving a soft landing looks increasingly likely.

As inflation eases, the IMF forecasts a 3.1% increase in global GDP in 2024.

Real GDP Growth Annual % Change

Amid high energy costs and a cooling labor market, **Sweden** is forecast to see weak growth.

Data not available

U.S. GDP growth is projected to slow as the labor market softens and consumer savings decline.

Foreign investors have pulled $250B in direct investment from **Russia** since the war.

Chile, **Brazil**, and **Peru** lowered interest rates in 2023, with further cuts expected this year.

Tourism-hotspot **Macau** is projected to see the highest growth globally.

Source: IMF World Economic Outlook (Oct 2023 and Jan 2024 Updates), Peterson Institute for International Economics, The Economist

MARKETS IN MINUTE

VISUAL CAPITALIST RESEARCH + WRITING Dorothy Neufeld | DESIGN VC

Growth

Growth focuses on the quantitative increase in the scale of the physical dimensions of the economy.

Herman Daly* exemplifies Growth as a **snowball**.

*the father of ecological economics

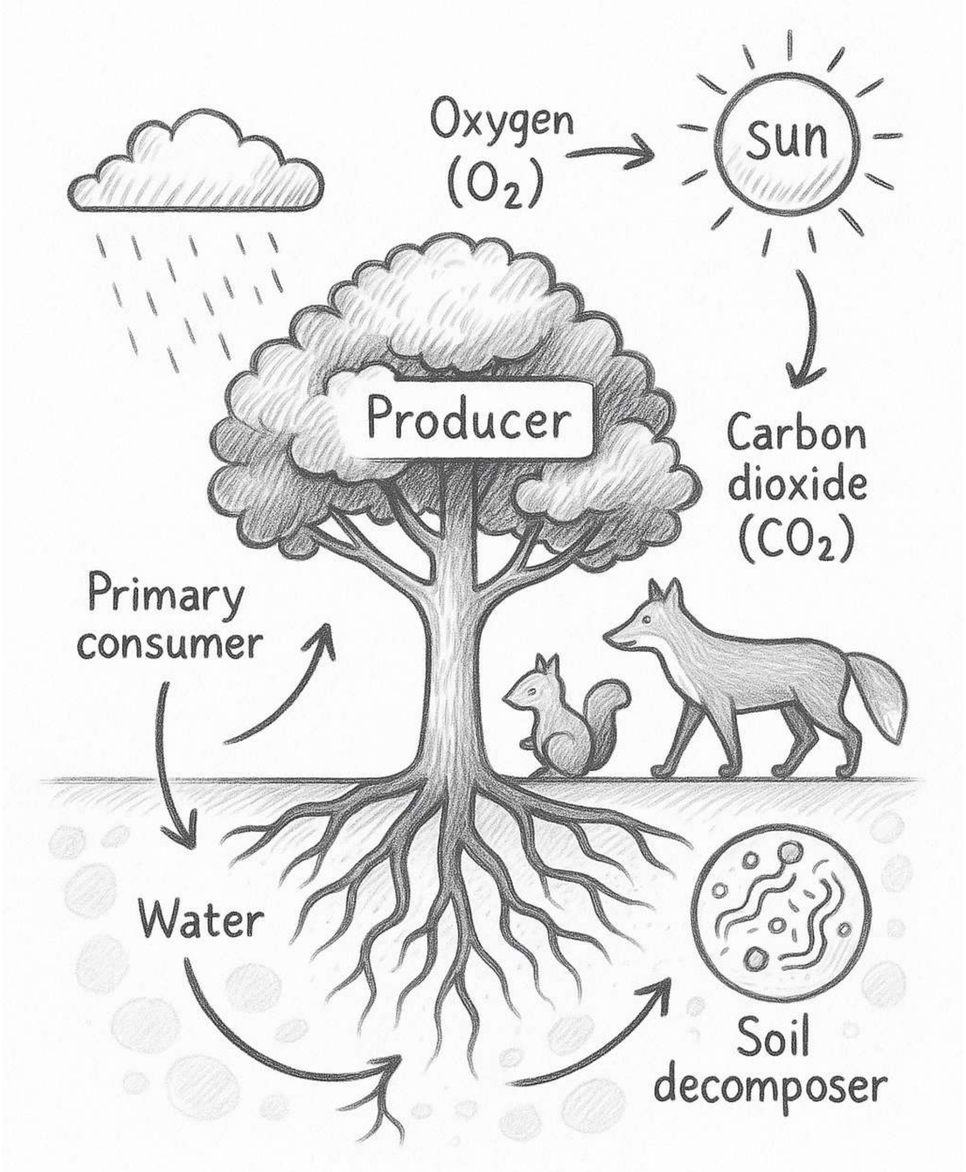
Linear production model

TAKE
MAKE
WASTE

Development

Development focuses on qualitative improvements in economy, well-being, and social-environmental progress.

Herman Daly exemplifies Development as a **natural ecosystem**.



Circular production model

System

According to Donella Meadows*

A system is **an interconnected set of elements**, organized in a coherent way to achieve a certain outcome.

Looking closely at this definition, it becomes clear that a system must consist of three key factors: **elements, interconnections, and a function or purpose.**

Meadows, D. H. (2008). Thinking in Systems: A Primer. Earthscan

* pioneering American environmental scientist

System

- ✓ System components **work together to achieve a common goal** or perform a specific function.
- ✓ They can be **physical**, such as parts of a machine or natural ecosystem, or **conceptual**, such as organisational or social processes.
- ✓ **The behaviour of the entire system is more than what can be predicted by examining each part separately**.

What is Systemic Design?

Systemic Design

In simple words:

👉 It’s like zooming out to see the **big picture** before zooming in to design solutions.

👉 It combines **systems thinking** (understanding connections and complexity) with **design thinking** (creating human-centered, creative solutions).

Systemic Design

Systemic Design identifies the **relationships between the parts of a system** as the very elements that generate the system itself.

It focuses on material and immaterial **flows** to develop open systems inspired by the dynamics of natural systems.

Systemic Design **provides practical tools to approach complex scenarios** with a holistic perspective, while supporting active cooperation among involved stakeholders.

Systemic Design

Pillars

Complex and interconnected problems are addressed **through the perspective of society and the human being**, understood as active parts of a broader ecosystem.

Humanity-centred design

Systemic Design

Pillars

The outputs of one process become the inputs of another, creating continuous flows of matter, energy, and information.

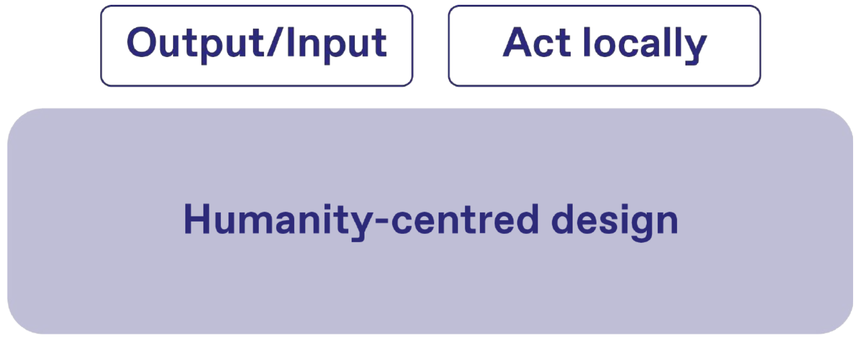
Output/Input

Humanity-centred design

Systemic Design

Pillars

Priority is given to the **local context**, enhancing its specific material, social, cultural, and economic resources.

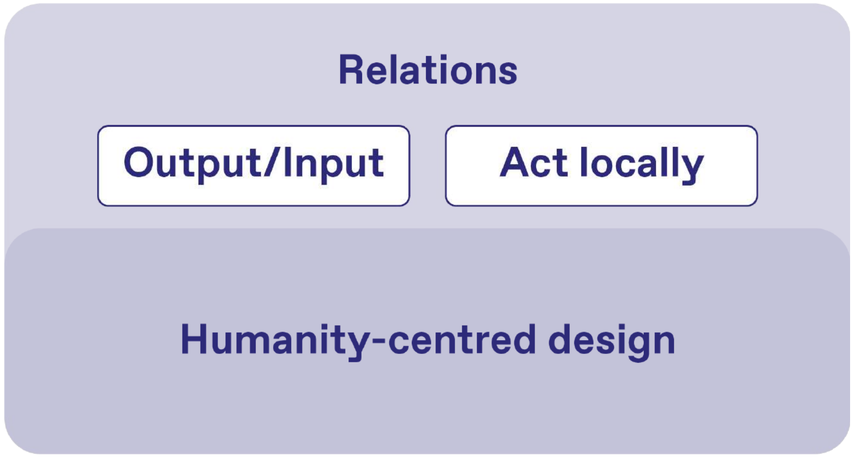


Systemic Design

Pillars

The relationships between a system's elements generate the system itself.

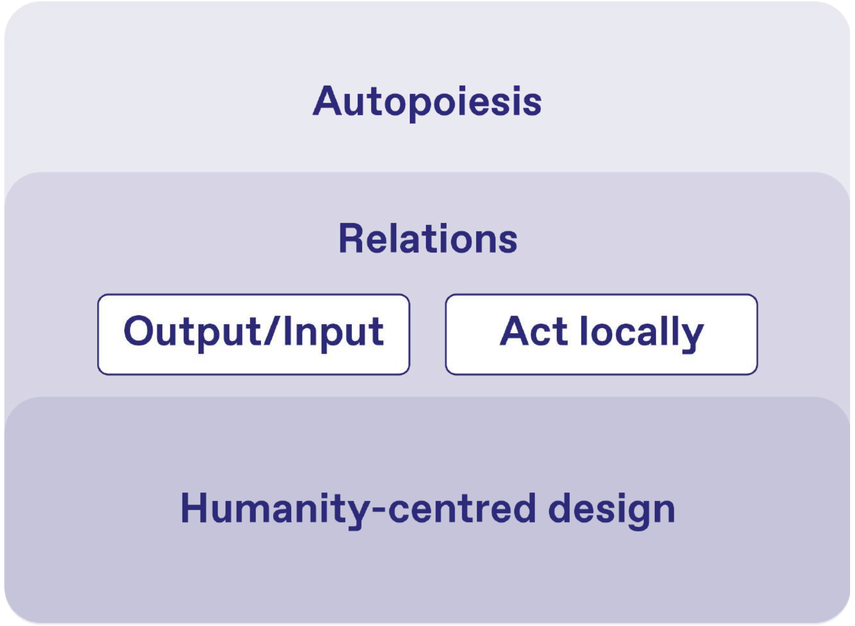
"The whole is greater than the sum of its parts".



Systemic Design

Pillars

Autopoietic systems sustain and reproduce themselves **by creating their own parts**, **while co-evolving alongside other systems**.



Maturana, H. R., Varela, F. J. (1972). Autopoiesis and cognition: the realization of the living. Boston studies in the philosophy and history of science (1° ed.). Dordrecht: Reidel.

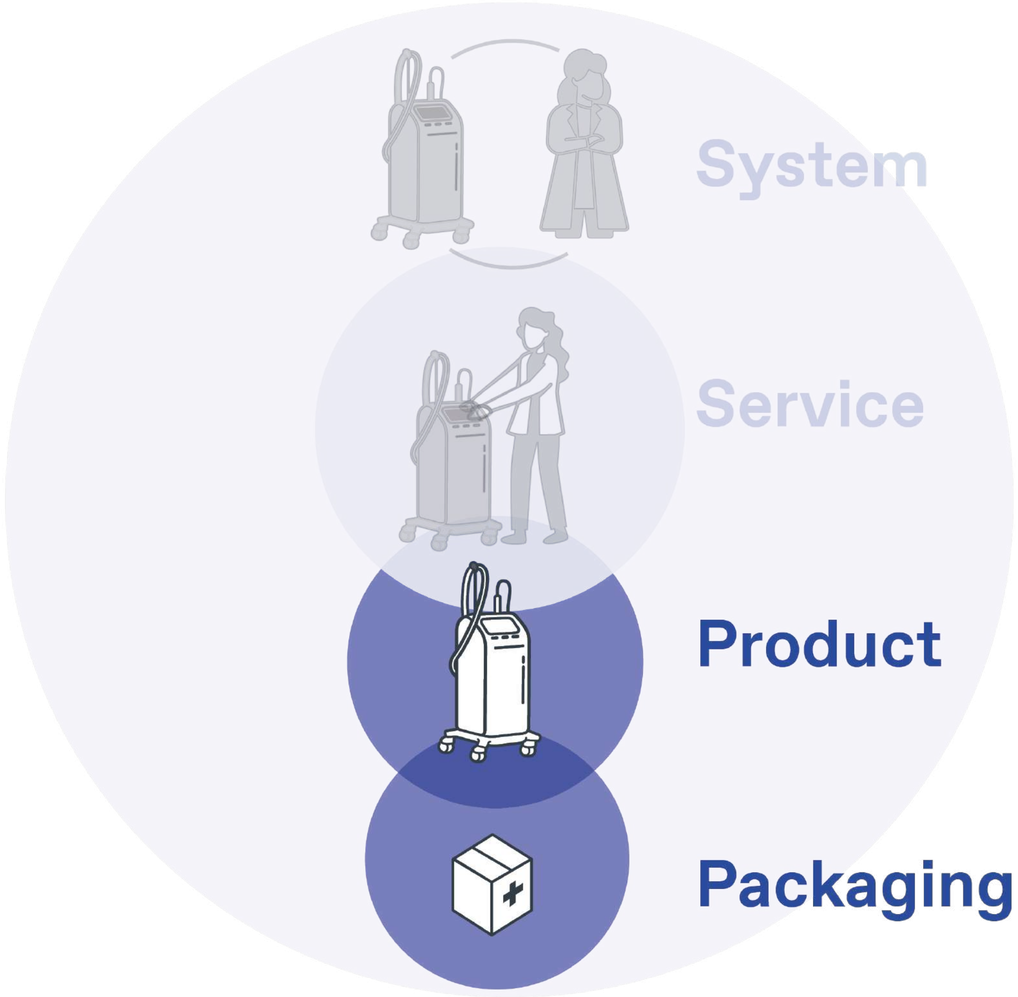
Systemic Design + Sustainable Healthcare
(in practice)

Hemodialysis

How can we design a sustainable dialysis?

Hemodialysis

Hemodialysis



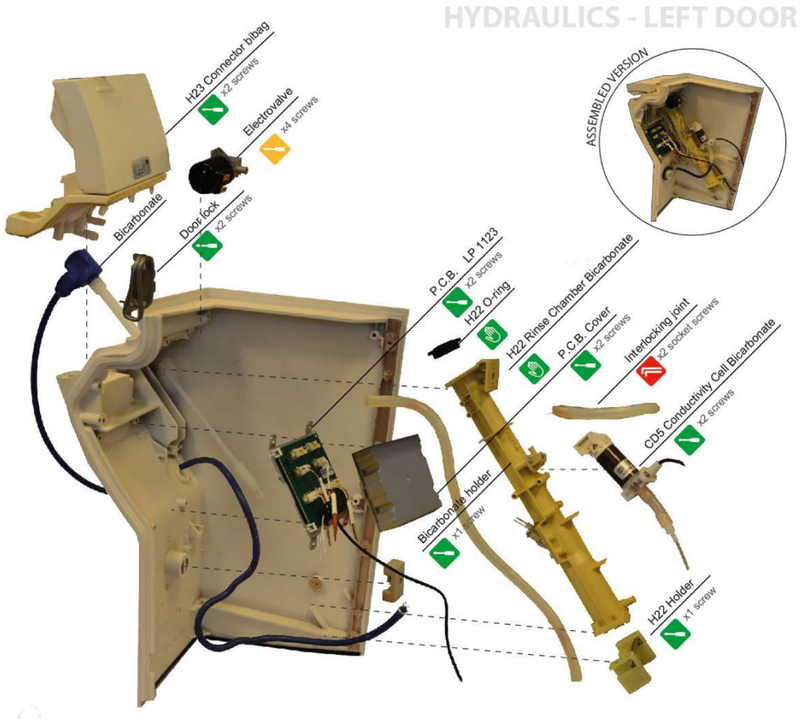
ANALYSIS CRITERIA

EASE OF ASSEMBLY
- easy
- medium
- hard

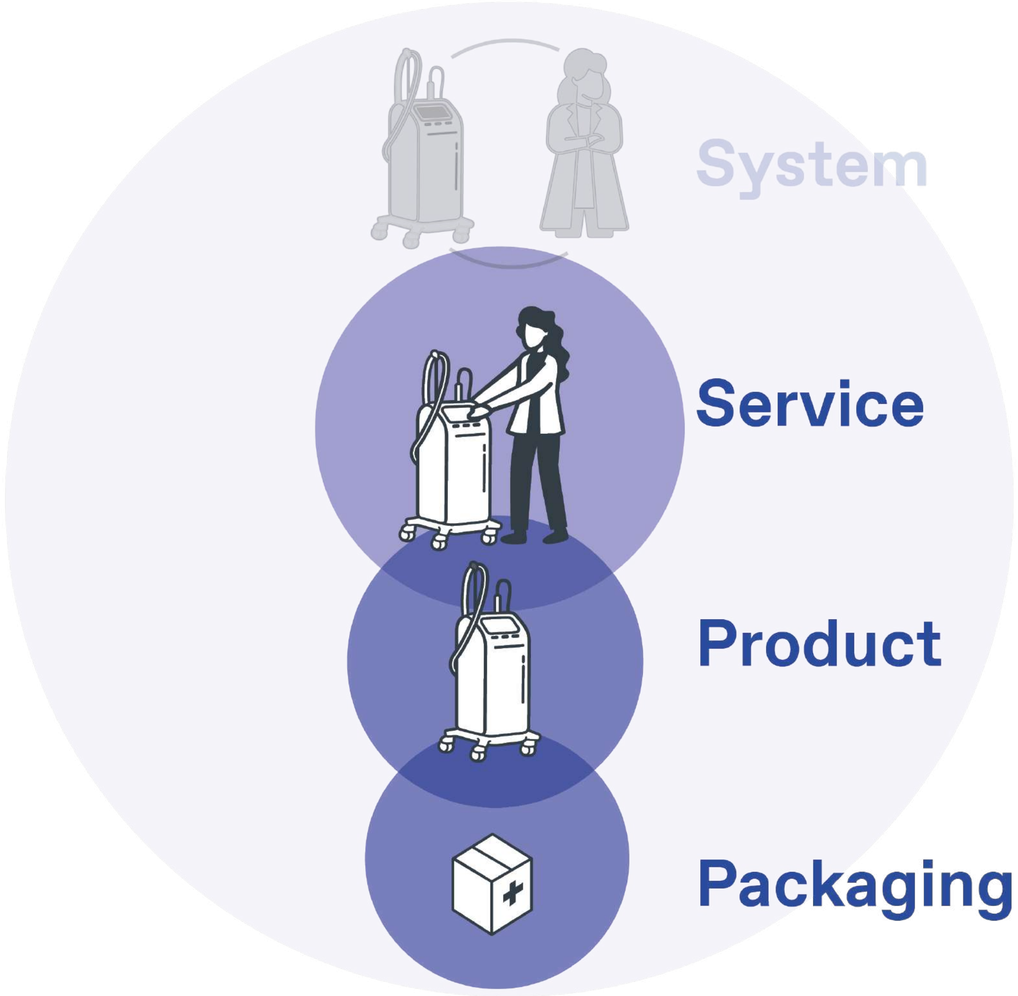
DISASSEMBLY TOOLS
- by hand
- screwdriver (11)
- hex key (2)
- wrench
- hammer
- tongs (2)

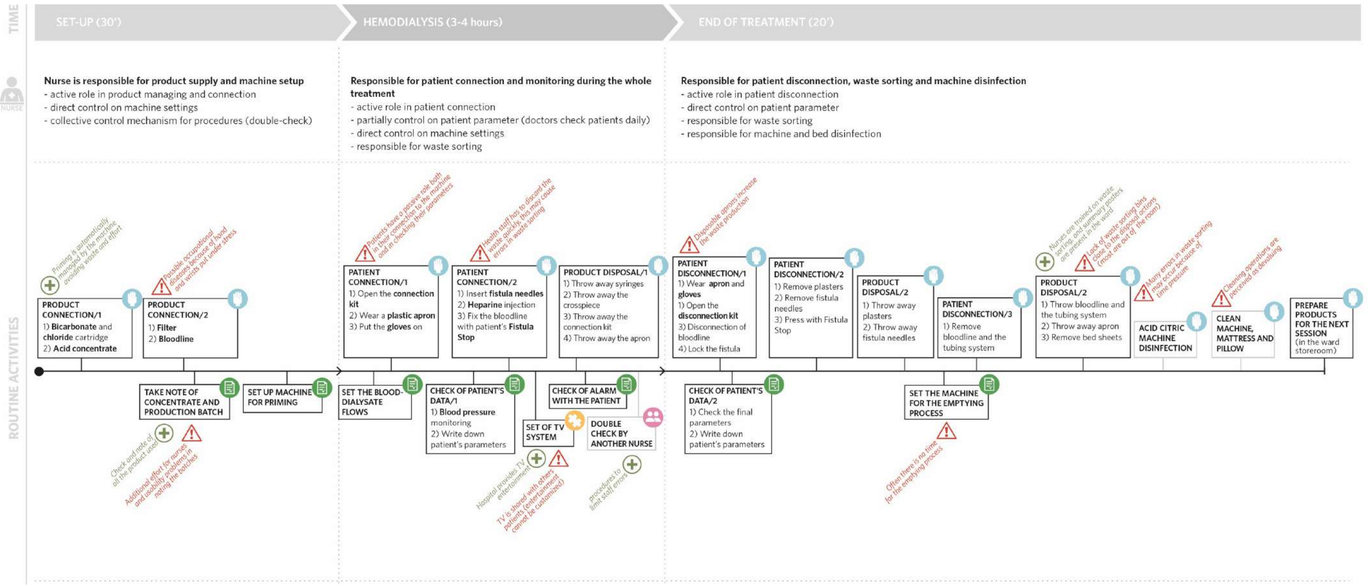
WEIGHT AND MATERIALS

COMPONENT	gr	material
Door	1366	PUR
Door locker	60	metal
H23	608	plastic mix + metal
LP1123	108	WEEE
LP1123 cover	43	PP
Electrovalve	170	WEEE
H22	198	plastic + metal
H22 Holder	45	PA66 + metal
O-ring	4	rubber (EPDM)
CD5	90	WEEE
Bicarbonate inlet	135	plastic mix + rubber
Bic. inlet holder	11	plastic
TOTAL	2838	

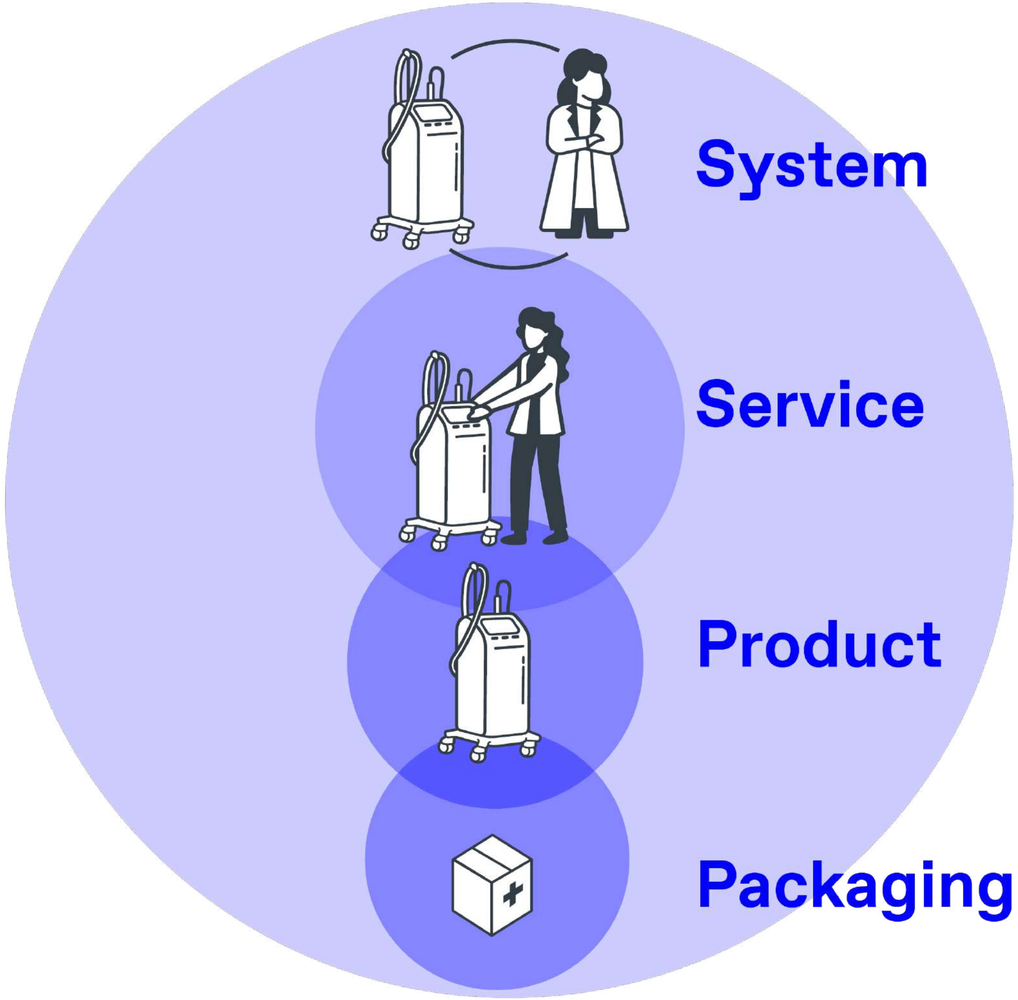


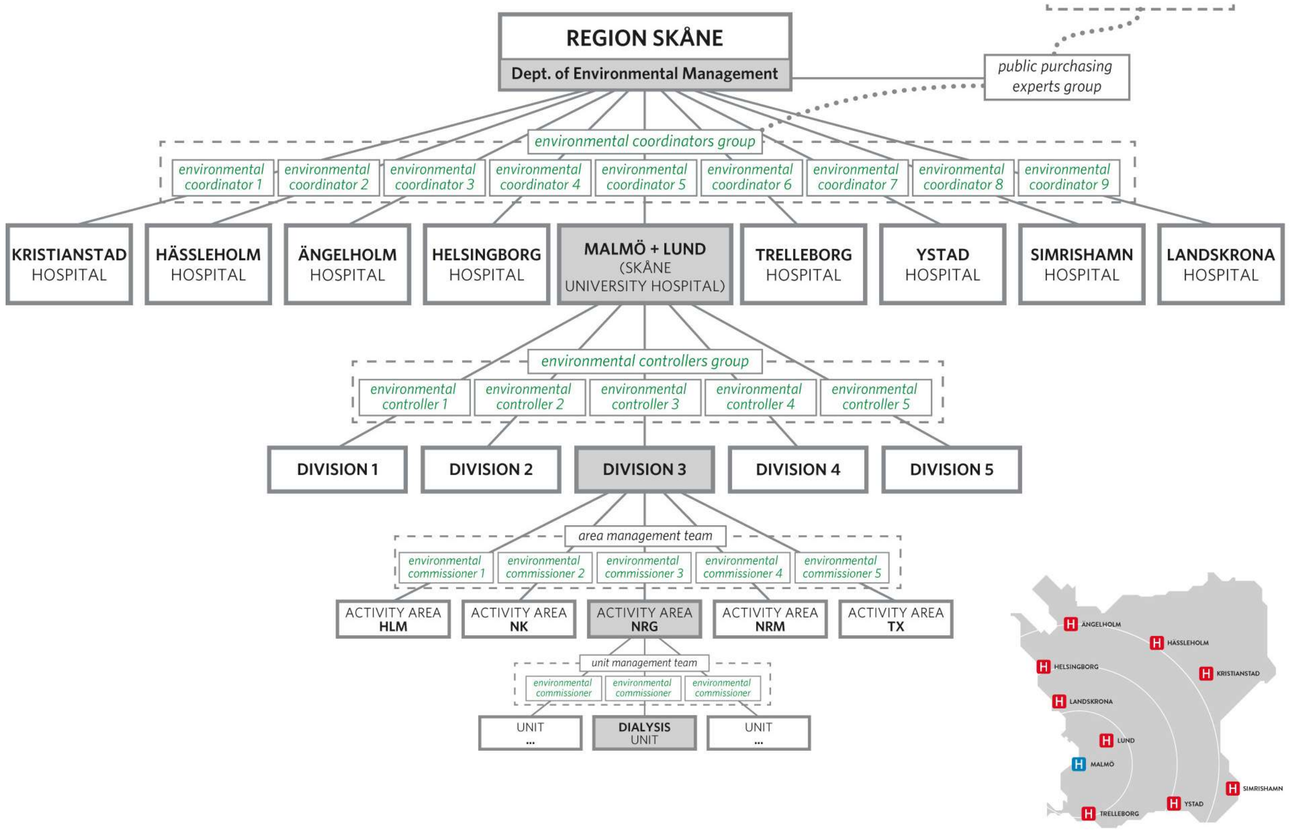
Hemodialysis





Hemodialysis





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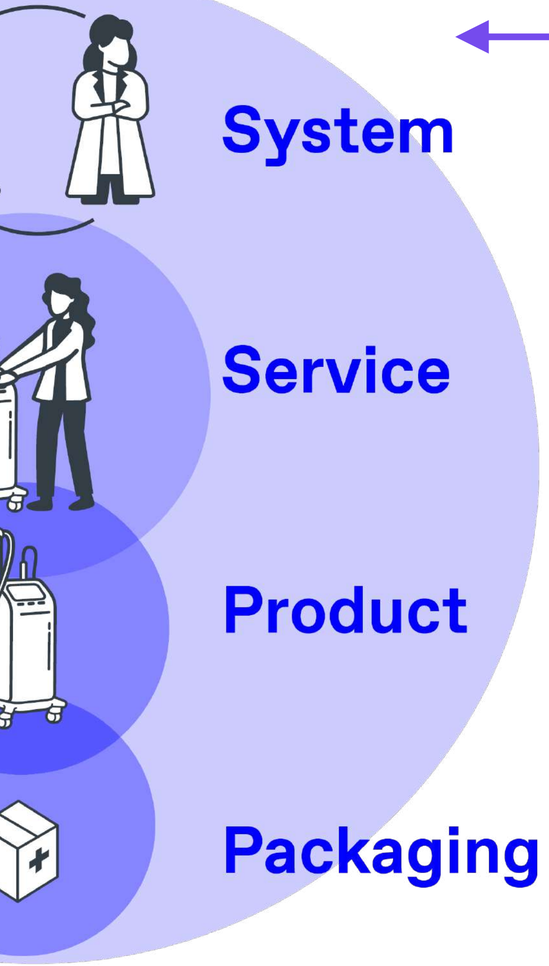
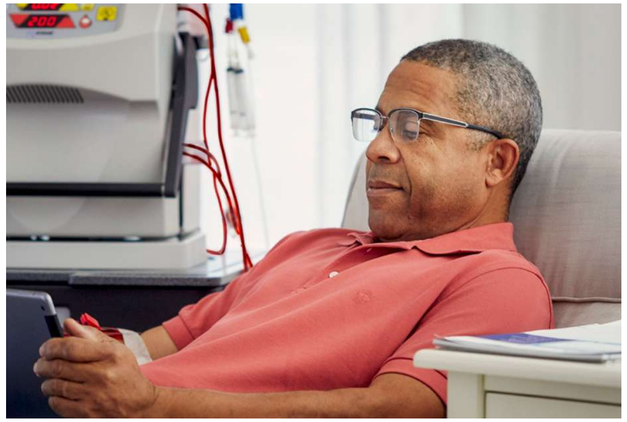
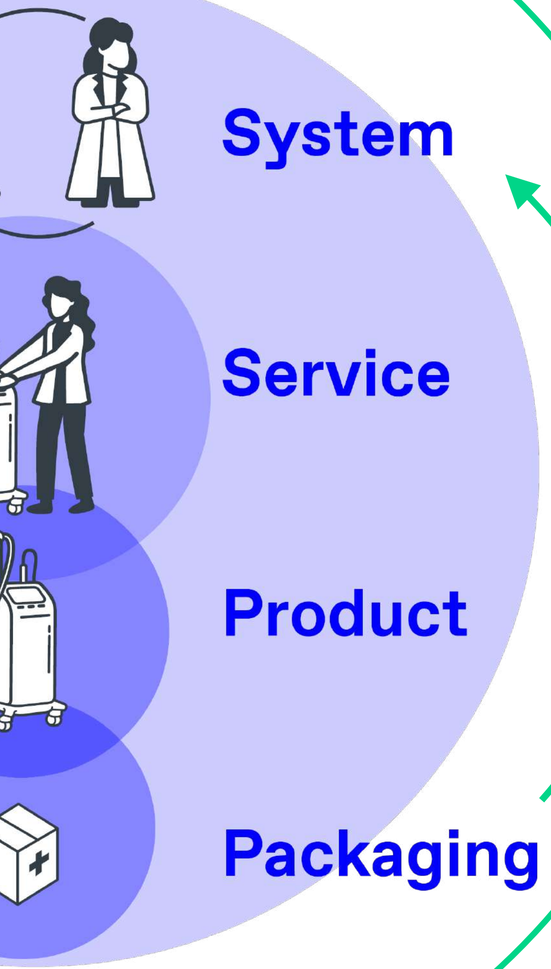




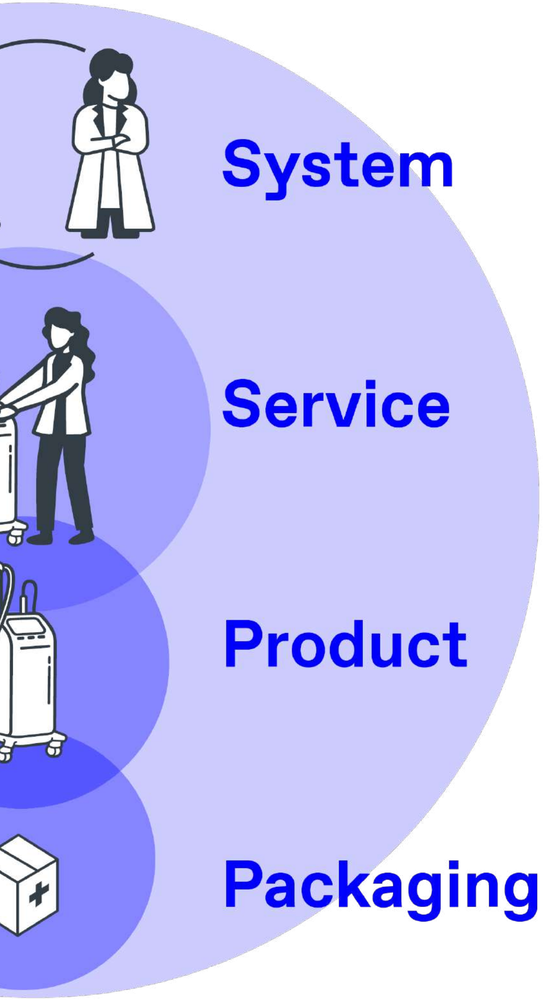
Hemodialysis



Design the system (from medium to long term)

Design how your product fits into the system
(from short to medium term)

Hemodialysis



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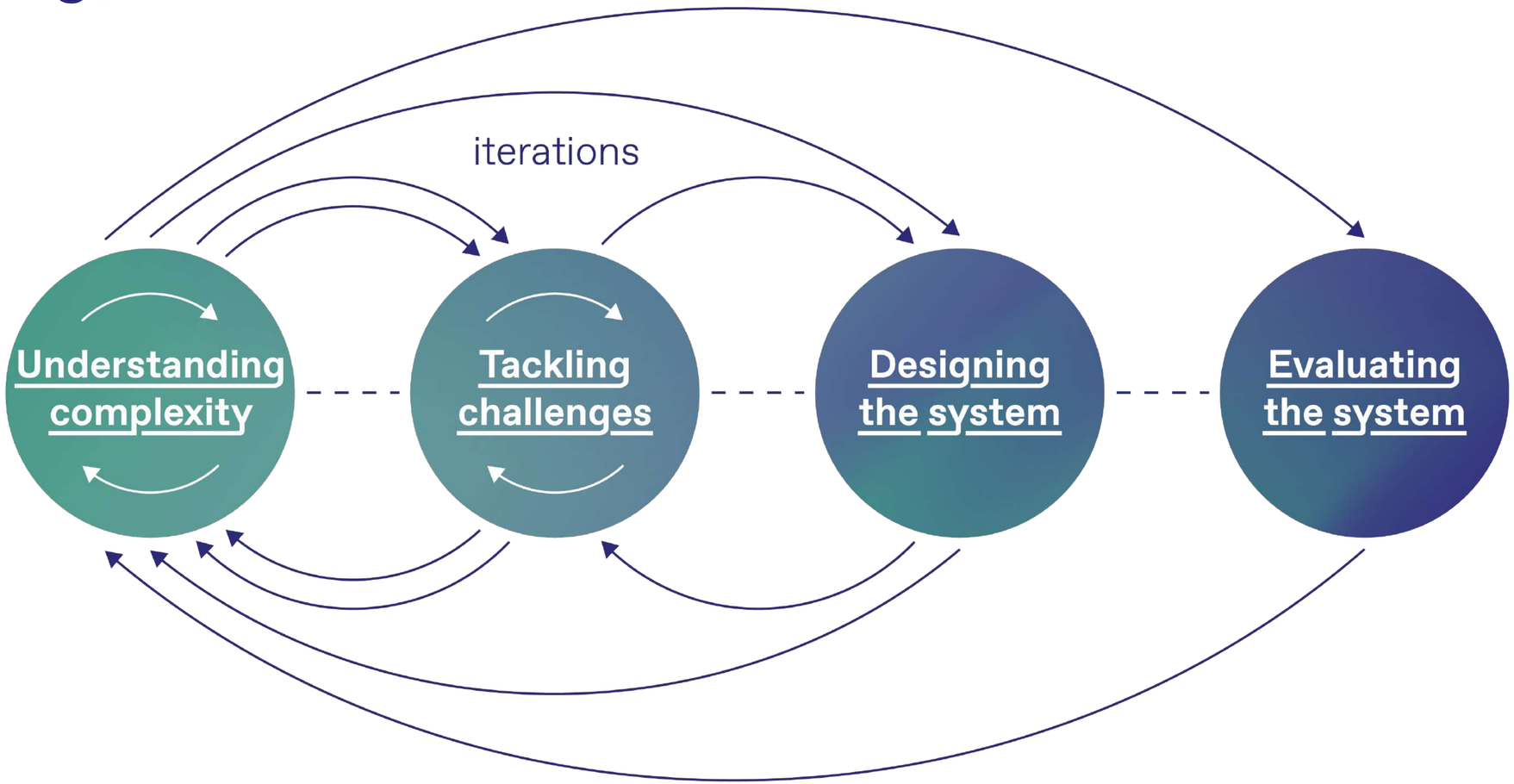
Portfolios of interventions

Systemic Design

Methodology



Understanding the system

COMPLEXITY MAP
2025

Territory

Europe

Italy

302 073 km²
58 990 000

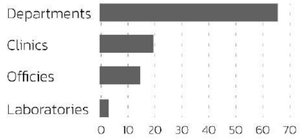
Piedmont

25 387 km²
4 251 344

Facilities

Physical spaces

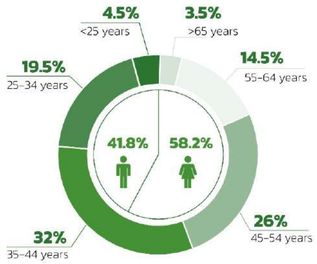
Number of **450beds**



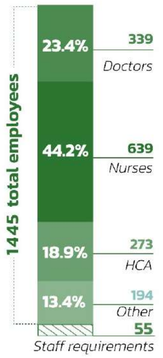
250 Car parking
30 Bike parking

Staff

Age & gender distribution

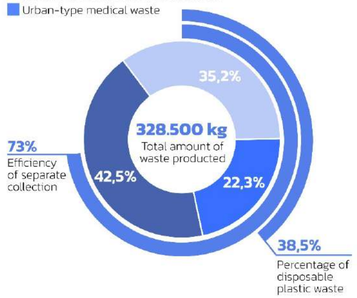


Employees distribution

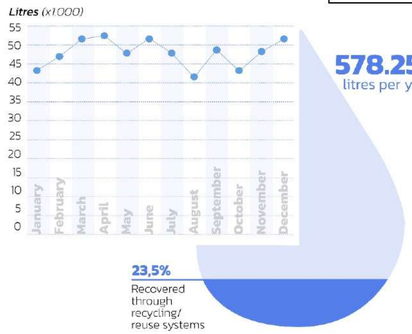


Enviroment

Waste



Water



Geographic Scope of Data
Hospital
Local (city)
National
International

Economy

Cost for patients

Media per treatment or service or day

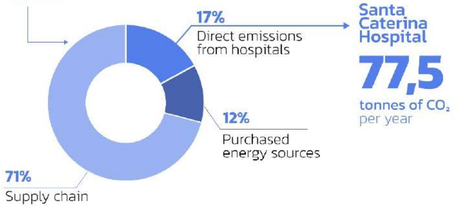
Outpatient 50 €/
Consultations, tests, X-rays

Day hospital 95 €/
Minor surgeries, chemotherapy

Inpatient 570 €/
Major surgeries, intensive care

Energy

The healthcare sector is responsible for **4,4%** of global emissions



Municipality of Turin

The city of Turin is divided into 8 districts

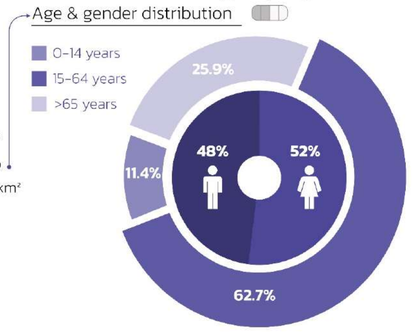
130,1 km²
851.199 p
6.542 p/km²

Comparison with the most populated cities in Italy

Roma	Milan	Naples
2.139 p/km²	7.551 p/km²	7.828 p/km²

General Demography

Age & gender distribution



Specific Demography

Prevalence of chronic diseases

62% Suffer from at least one chronic condition, such as diabetes, hypertension, heart disease, etc.

38% Population without the presence of chronic diseases

Rate of disability

5%

Rate of hospital admission

Per year **105,2‰**

Services

Transportations

The hospital is accessible by:

3 railway stations
Tram line no. 4
Private vehicle
3 suburban lines

How do people get to the hospital?

Private transports | Public transports | Bicycles

Staff: 33% | 62% | 5%

Patients: 39% | 51% | 10%

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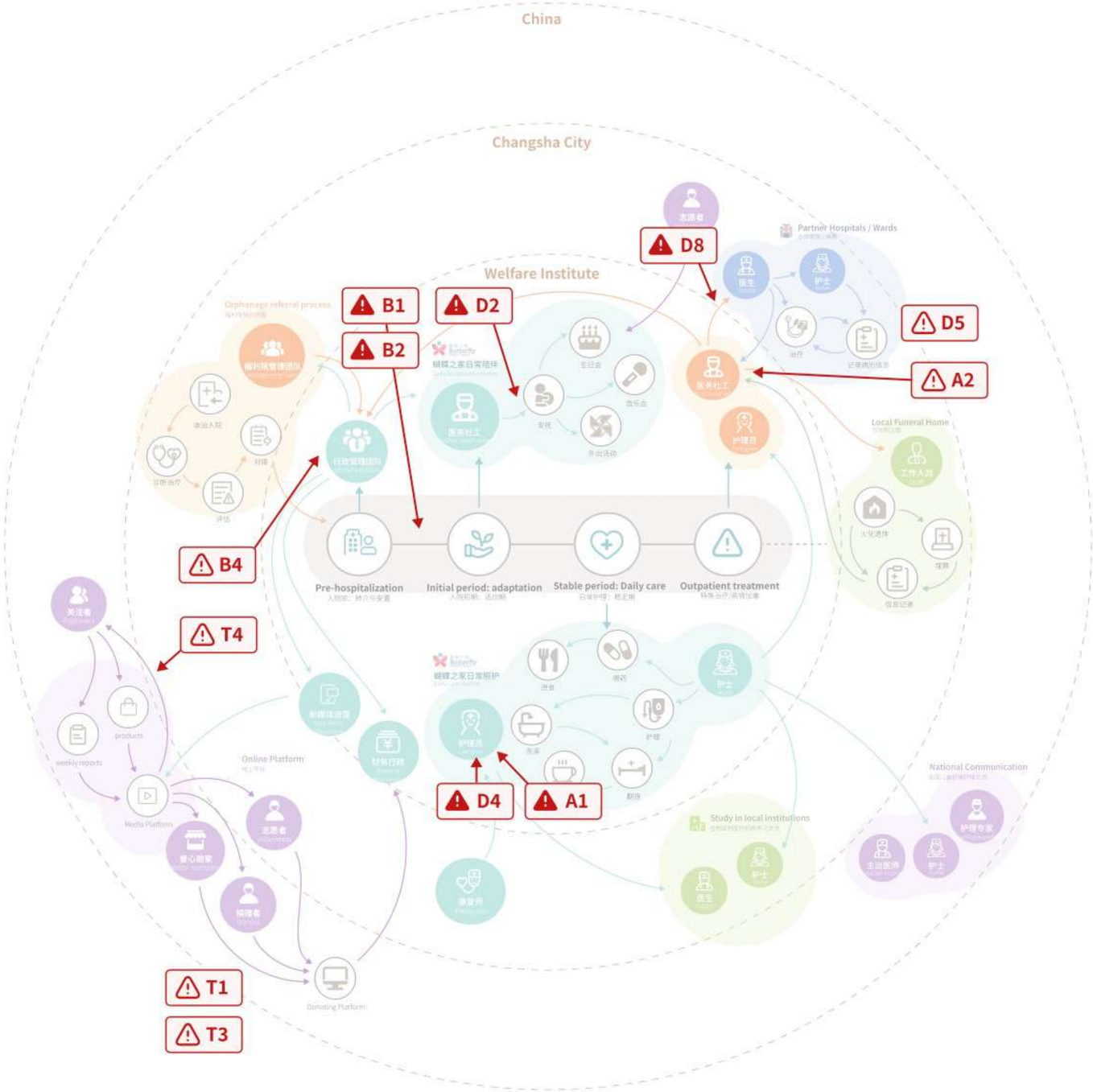
Understanding the system



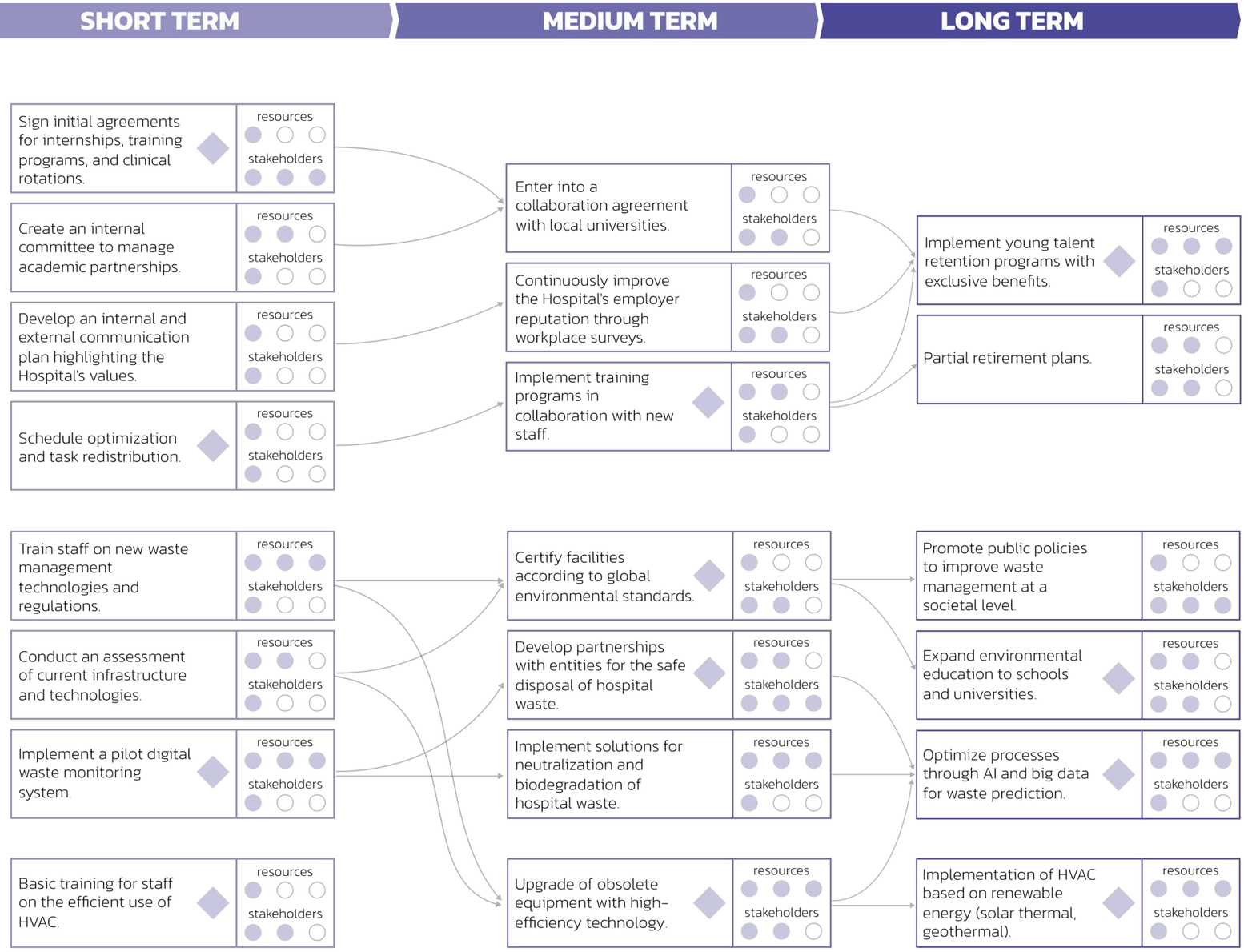
Emotional Expression & Psychosocial Support

Systemic Fragmentation & Information Flow Gaps

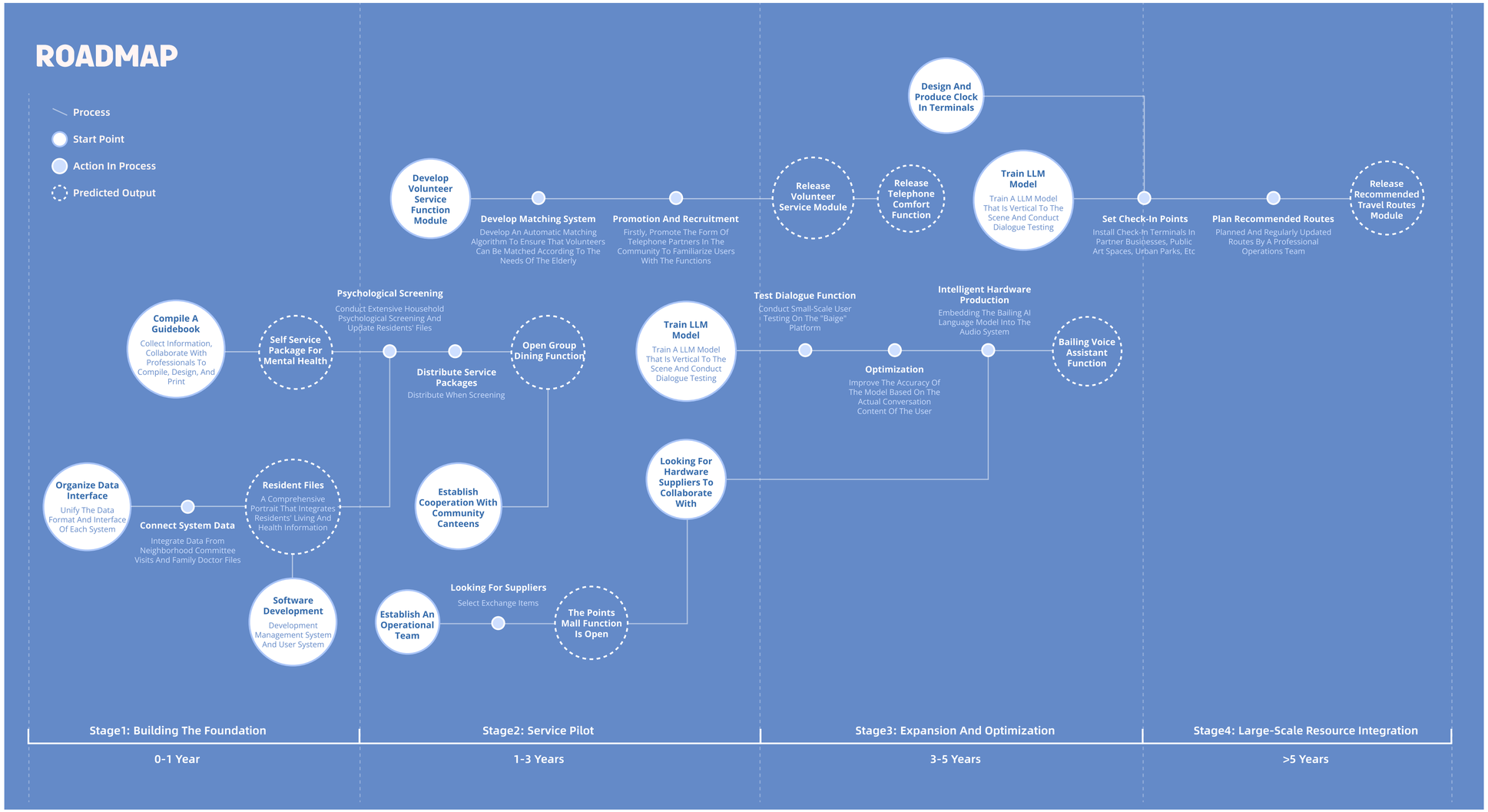
Shuxiao Zhong (2025)
Systemic Design for Palliative Care

Identifying painpoints

Designing interventions



Designing strategies



Leyun Cai (2025)
A Systemic Study on the Design of Mental Health Care Services for Elderly People

Grazie!

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www.systemicdesignlab.it

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