SESSION n°3: CASE STUDIES HEALTHCARE DESIGN

Design & Health
International Academy for Design and Health

POLITECNICO MILANO 1863
DIPARTIMENTO DI ARCHITETTURA, INGEGNERIA DELLE COSTRUZIONI E AMBIENTE COSTRUITO

Milano, Italy 11-14 April 2024

Design & Health

13TH WORLD CONGRESS & EXHIBITION

REVITALIZING HEALTH BY SALUTOGENIC DESIGN

Healthy environment | Healthy people

BLUE HOSPITAL DESIGN

Eduard Boonstra

Deerns Group

Deerns

Blue Hospital Integrated design

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Sector Director Healthcare
Deerns Group

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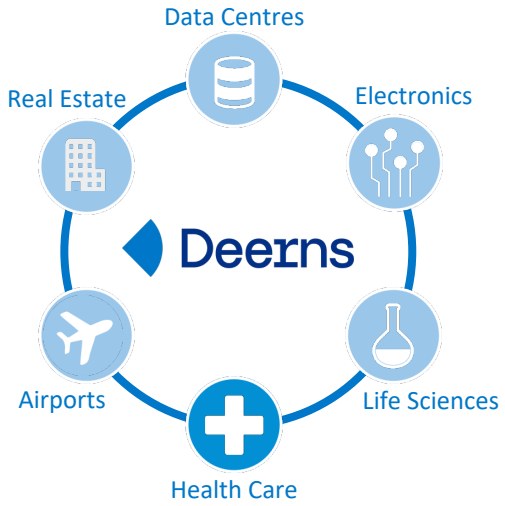
Introduction

A global engineering partner



Presence	Offices in 10 countries, 600 staff
Health Care	Leading position in the market
100 +	Major hospital projects globally
Smart	Digitally enabled future-ready designs
Sustainable	Net zero-energy and green hospitals
Services	Independent, full-service MEP consultant

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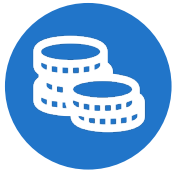
Why a Blue Hospital design

Hospital of the future

Challenging circumstances Healthcare:

Energy cost

Sustainability / ESG / EU regulations



High medical costs

Employee shortage

More focus on health & wellbeing is needed

Innovation and disruptions

Current Situation

Challenging circumstances Healthcare:

- Energy cost
- Sustainability / ESG / EU regulations
- High medical costs
- Employee shortage
- More focus on health & wellbeing is needed
- Innovation and disruptions

Urgent need to build hospitals that are more user friendly, flexible, more sustainable, and more cost-effective.

Requires an integrated design and decision - making approach in the program and design phase

that is why we change from a traditional design approach to a Blue Hospital integrated Design process

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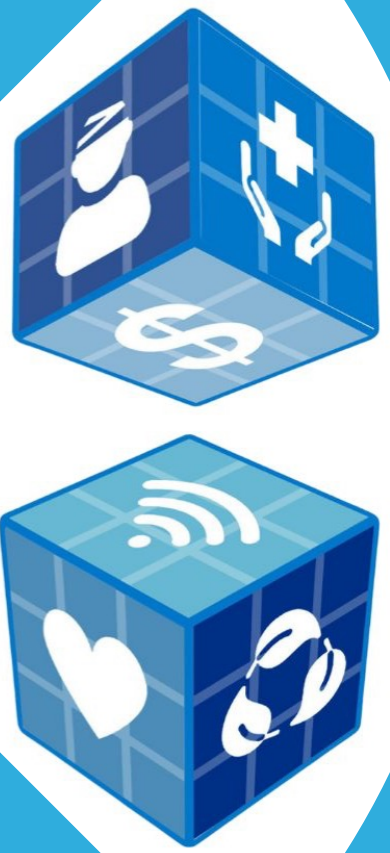

How to design a Blue Hospital

Creating a Model:
Tripple aim & Quadruple Aim

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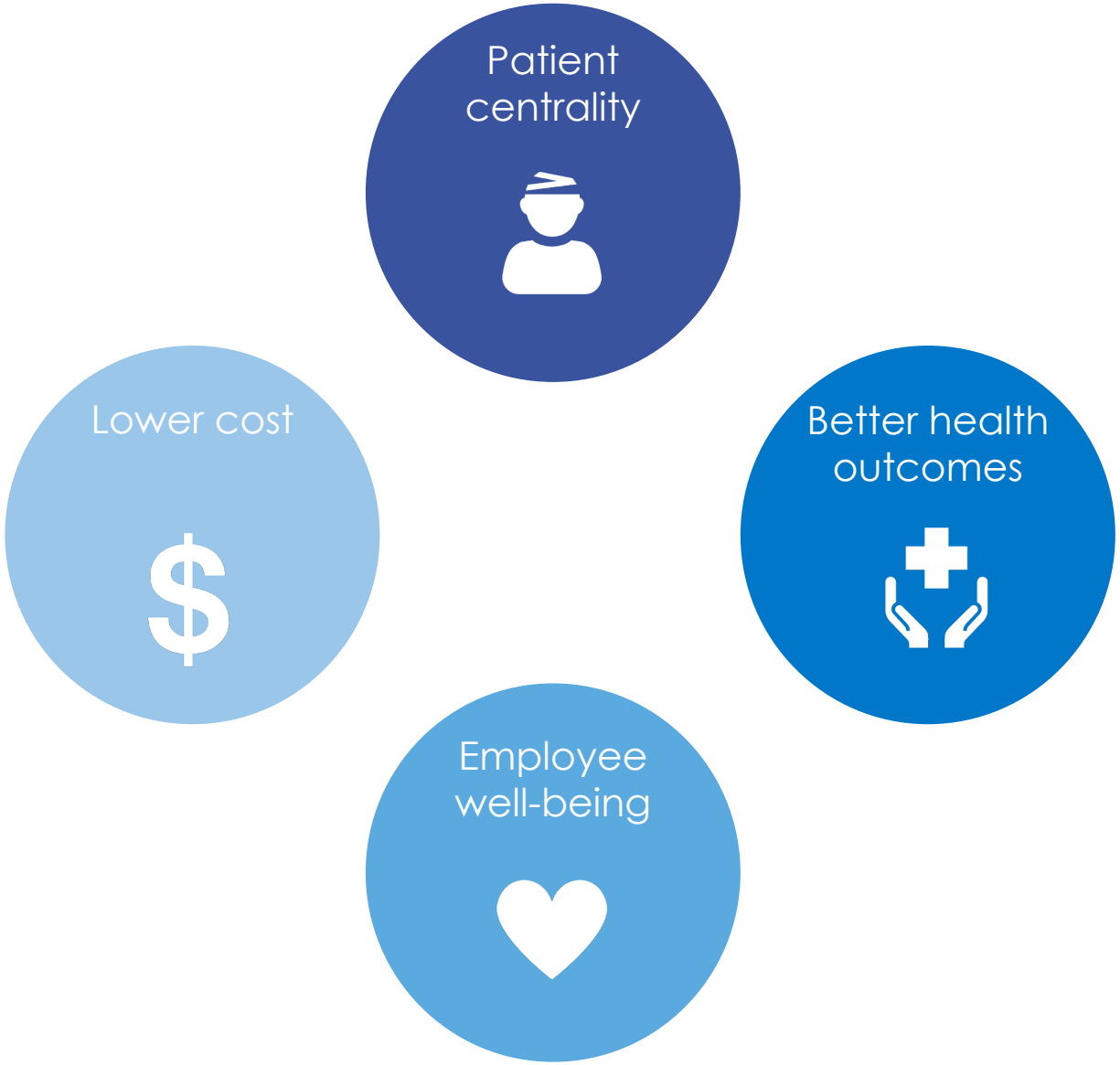
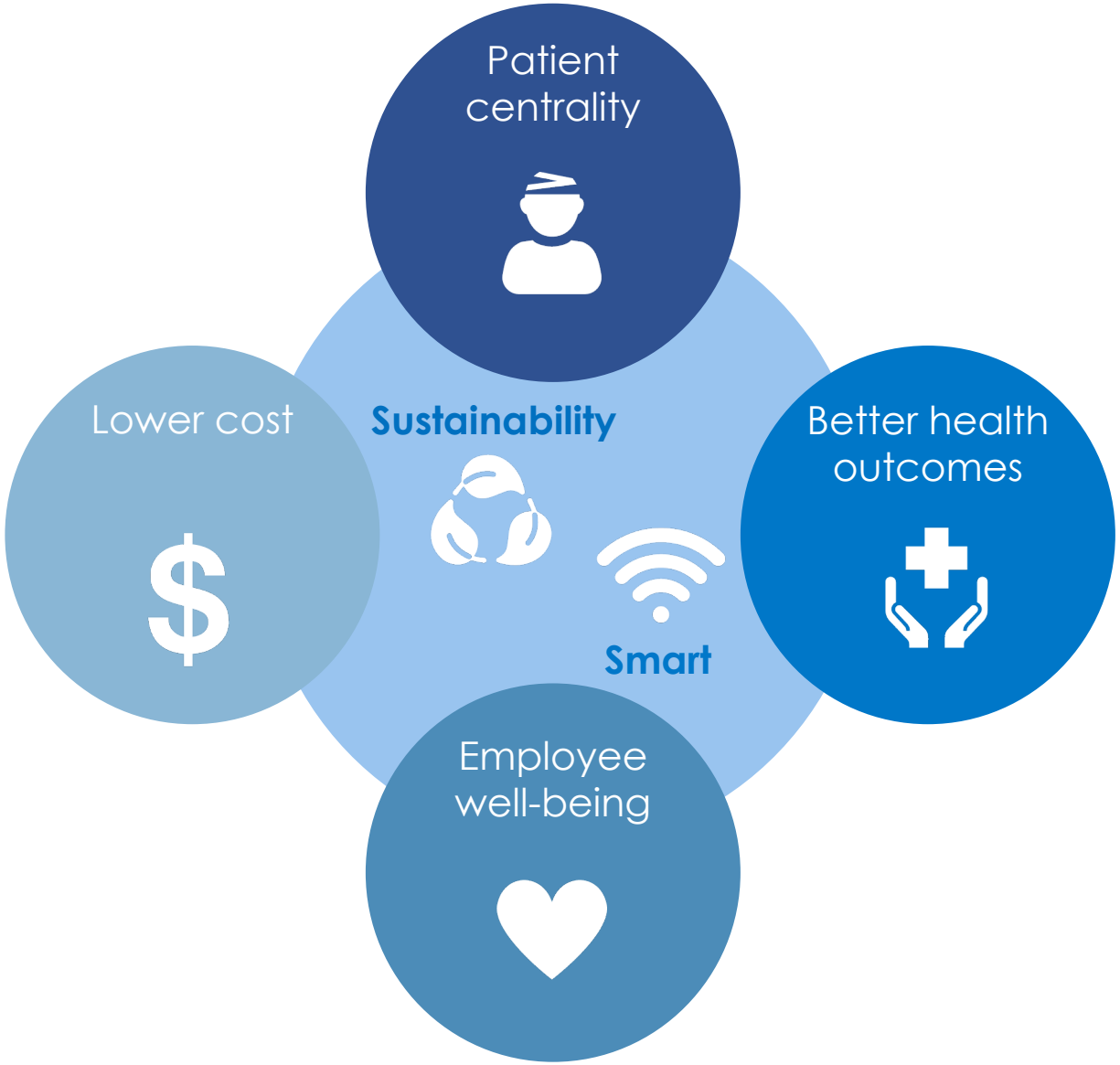


Quadruple Aim & Technical enablers / goals



Blue Hospital performance indicators for hospital design

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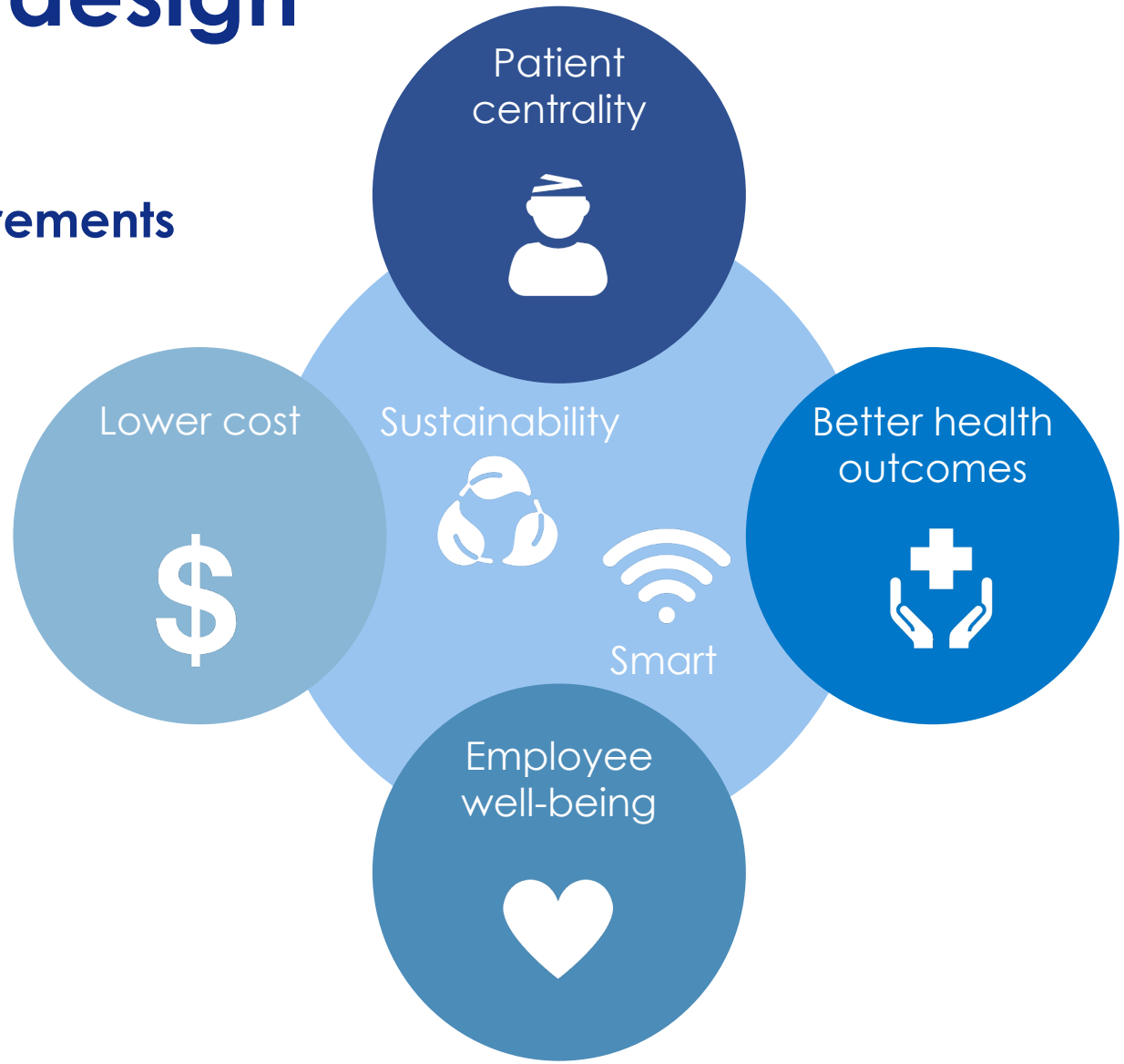
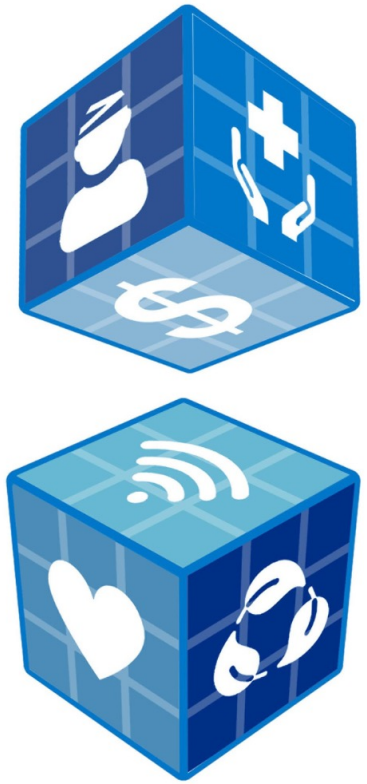
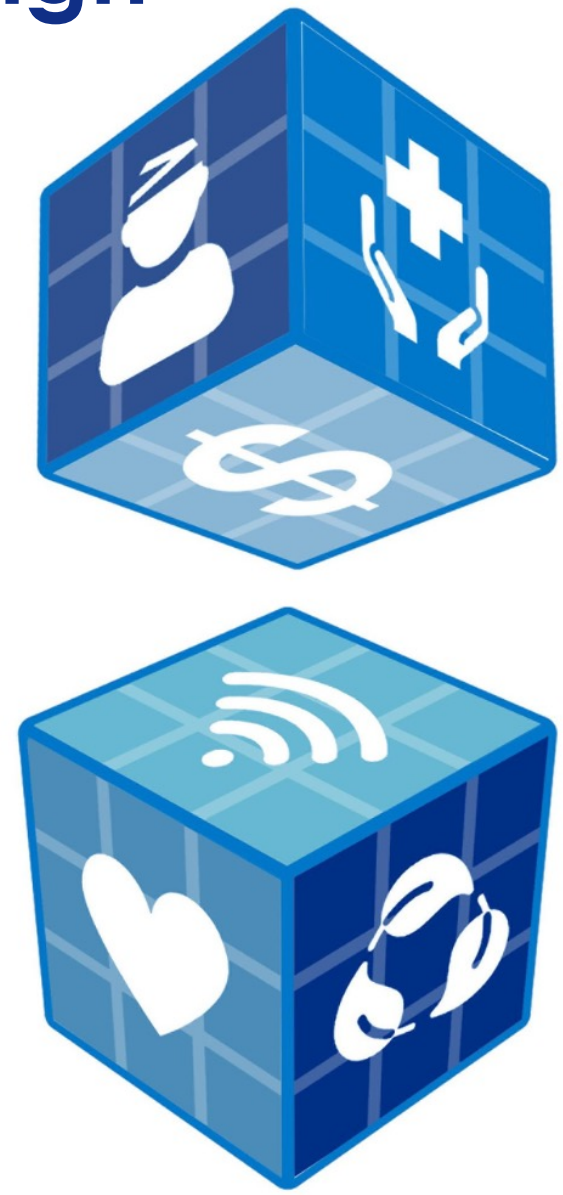
Project specific requirements





Blue hospital design



Setting priorities
&
Interconnectivity
&
Create synergy

The 6 Performance Indicators

Patient centrality

- Positive recovering space
- Improved patient experience
- Patient comfort
- Self-control of indoor conditions

Health outcome

- Positive impact on comfort and recovery
- Reduce infections
- Avoid transmission of diseases
- Improve communication
- Efficient and immediate reaction to emergencies

Costs

- Hospital budget
- Hospital ambitions
- Financial impact
- Return on Investment
- Total cost of ownership

Employee well-being

- Healthy and safe workspaces for healthcare staff
- Biophilic design
- Restorative spaces
- Optimization of indoor climate

Sustainability

- Material optimization
- Energy efficiency
- CO2 emissions
- Durability & climate resilience
- Maintenance & operations
- Total cost of ownership

Building smartness

- Collect, connect & use data
- Data-driven decision making
- Smart systems and technologies
- Control and manage indoor environment

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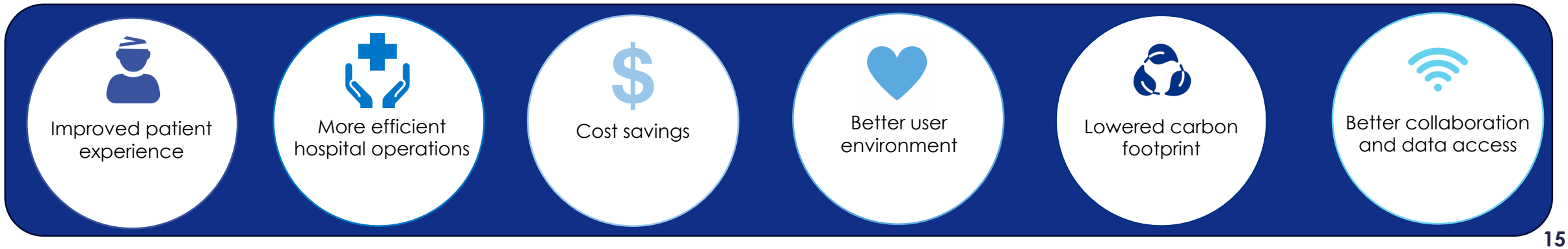

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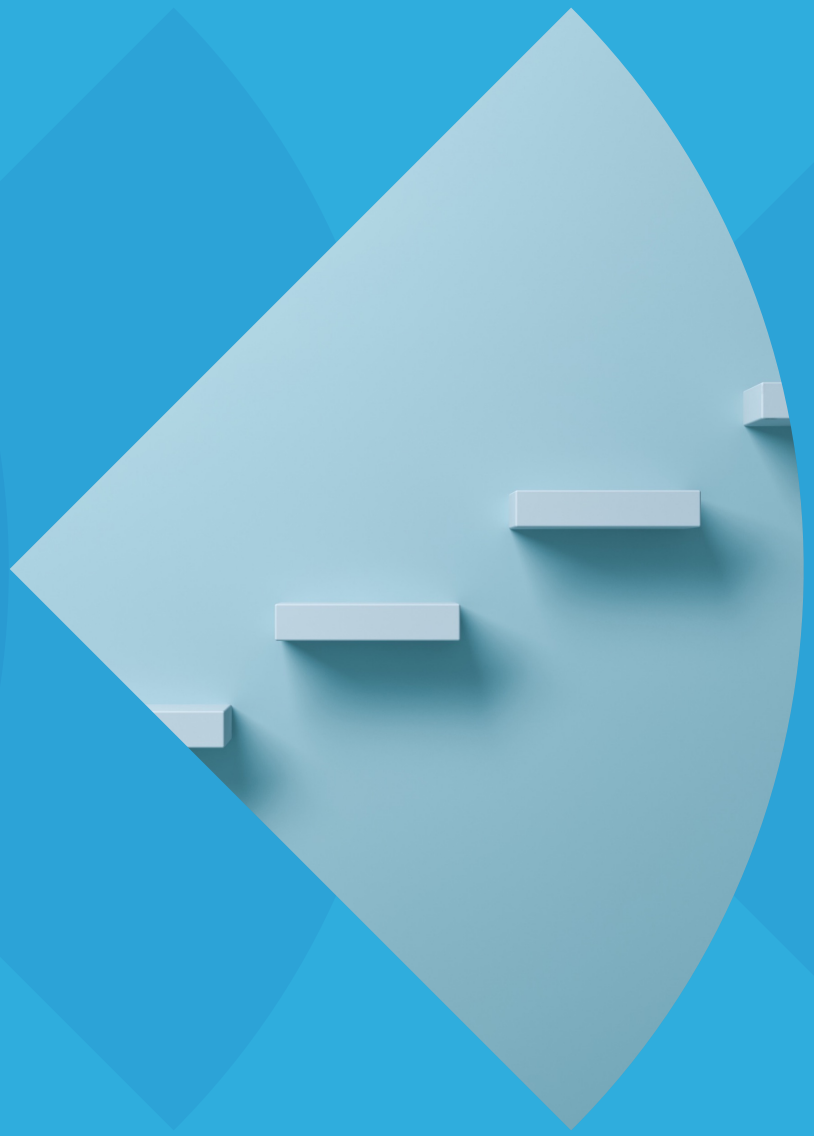

What are the results of a Blue Hospital design approach

Our experience

Lessons learned and observations:

- Difficulty to implement functionalities in later stages
- Budget challenges when introducing requirements in later stages
- Not sufficient focus on TCO, synergy and business cases
- Program of requirements incomplete
- Sustainability and smart are becoming major needs
- Increased need to address all performance indicators
- Hospital start requiring a holistic design approach

New UPMC Ismett 2 Hospital in Carini - Palermo

Isala Hospital Meppel, Zwolle, The Netherlands

Aspen Medical Hospital, Jakarta, Indonesia

Martini hospital, Groningen, The Netherlands

Reinier de Graaf, Voorburg, The Netherlands

San Raffaele Hospital, Milan Italy

Our vision in time

Holistic design approach with all items interdependent thoughout the design process.

Addressing all performance indicators but without connection among them and not from the early design phase.

MEP design of hospitals taking into account the Quadraple aim.

BLUE HOSPITALS

We have made a start…

Radboud UMC, The Netherlands

Goal: Efficient hospital, patient centrality, better use of energy, innovative (both for technology as for care processes).

Project details: Academical hospital, New built, 42.000m^2

Scope of Work: Feasibility study masterplan, Advice installation , Advice medical devices, BREEAM Excellent certification, Smart Building consultancy

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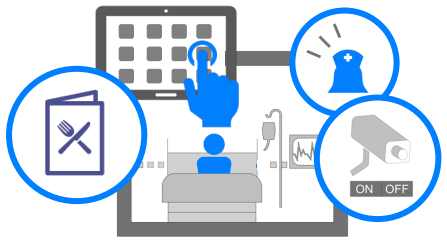
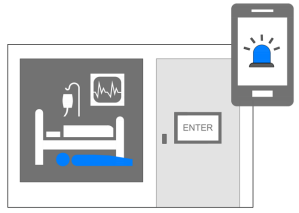
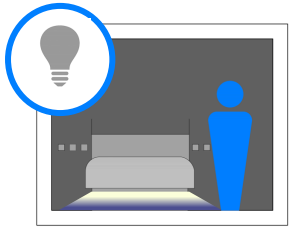


Remote functionalities for patients

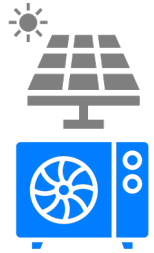
Indoor climate control



Incidence detection/ Alarms



Smart lighting/ LED lighting



Solar panels/ Heat pumps

Digital door signs

Nurse device

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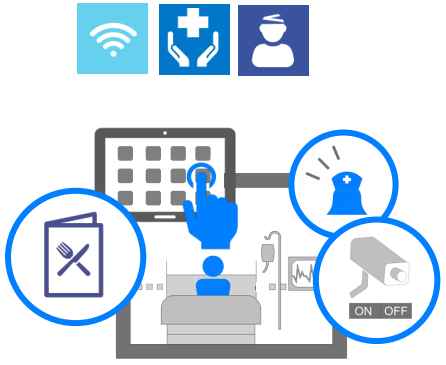

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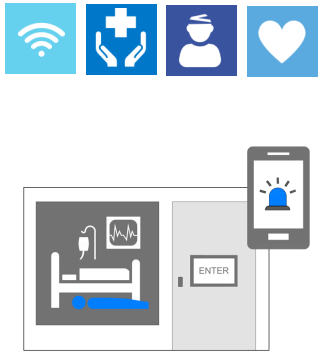

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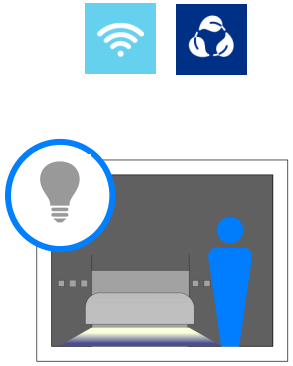

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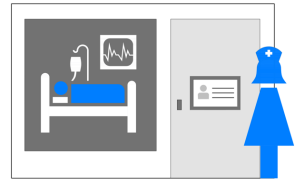
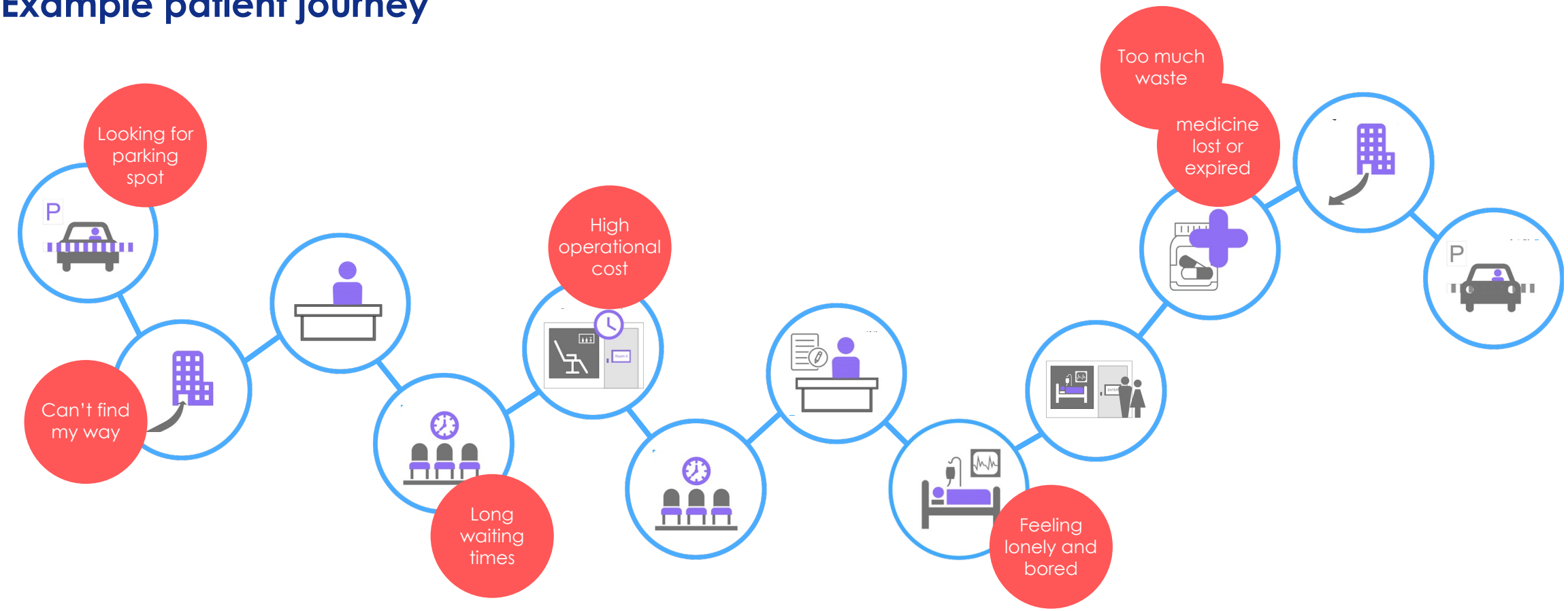


Digital door signs

Nurse device

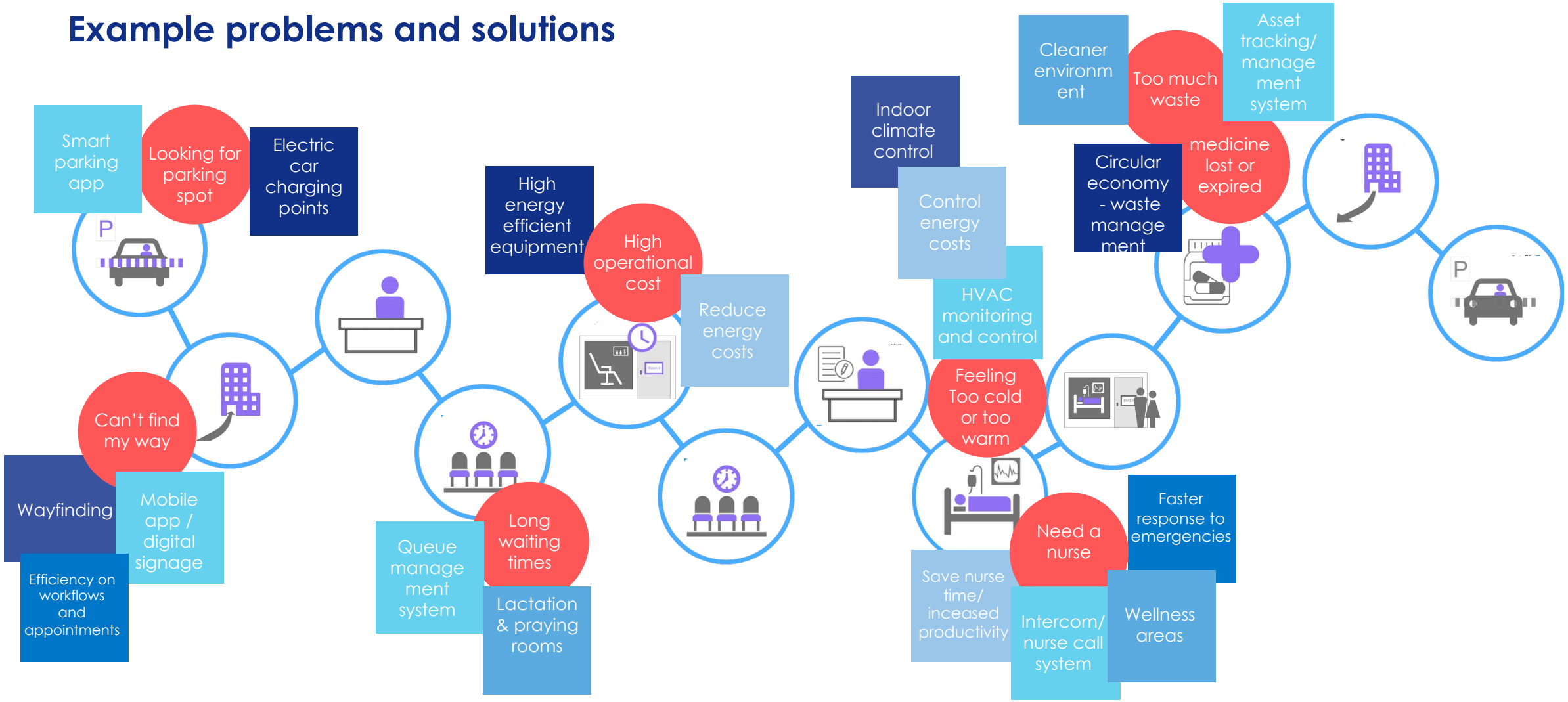
Blue Hospital approach

Example patient journey



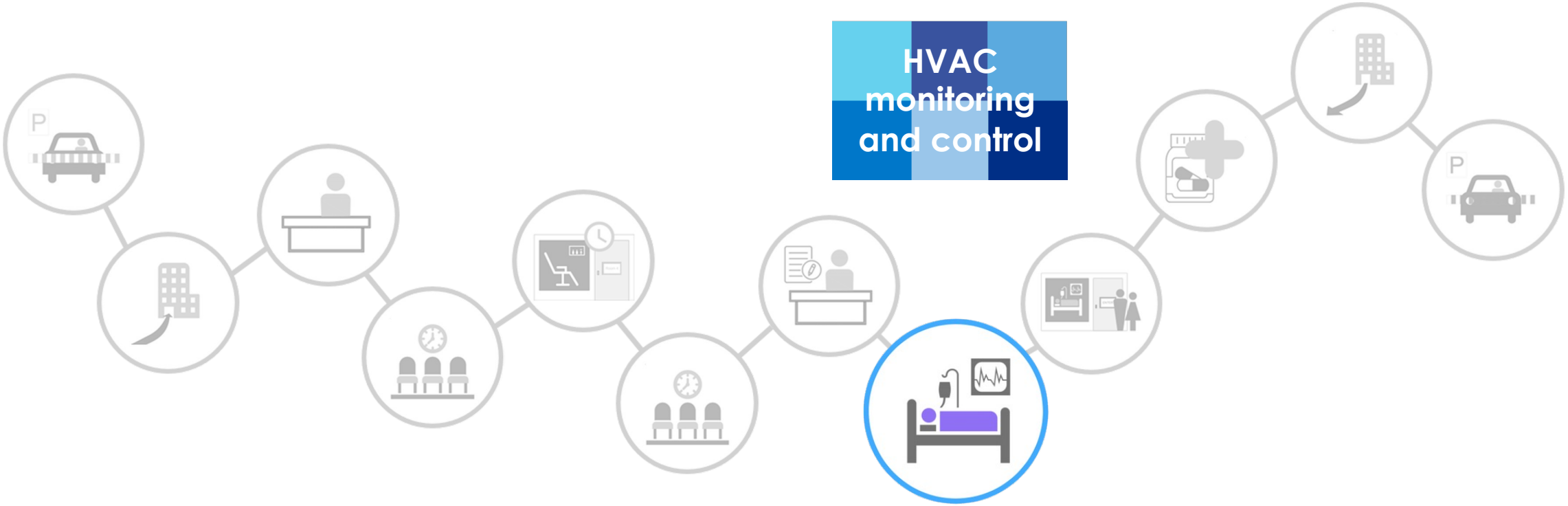
Blue Hospital approach

Example problems and solutions



Blue Hospital approach

Zooming in one example solution



HVAC control in patient room

HVAC control in patient room

1 Indoor air quality sensors

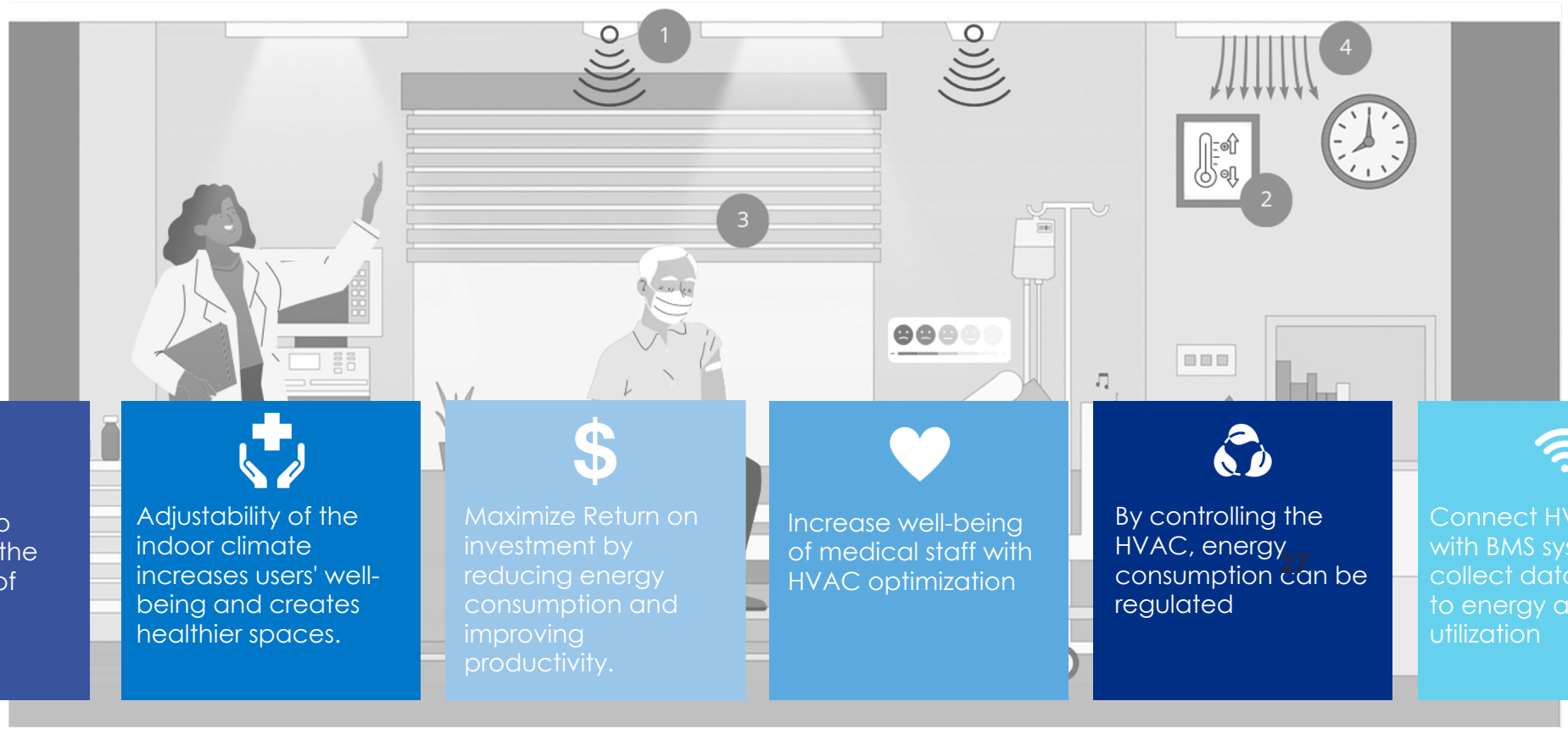
2 Temperature controller

3 Blinds controller

4 Air-conditioning

HVAC control in patient rooms

1 Indoor air quality sensors
2 Temperature controller
3 Blinds controller
4 Air-conditioning



Allow patients to control / adjust the indoor climate of their room.

Adjustability of the indoor climate increases users' well-being and creates healthier spaces.

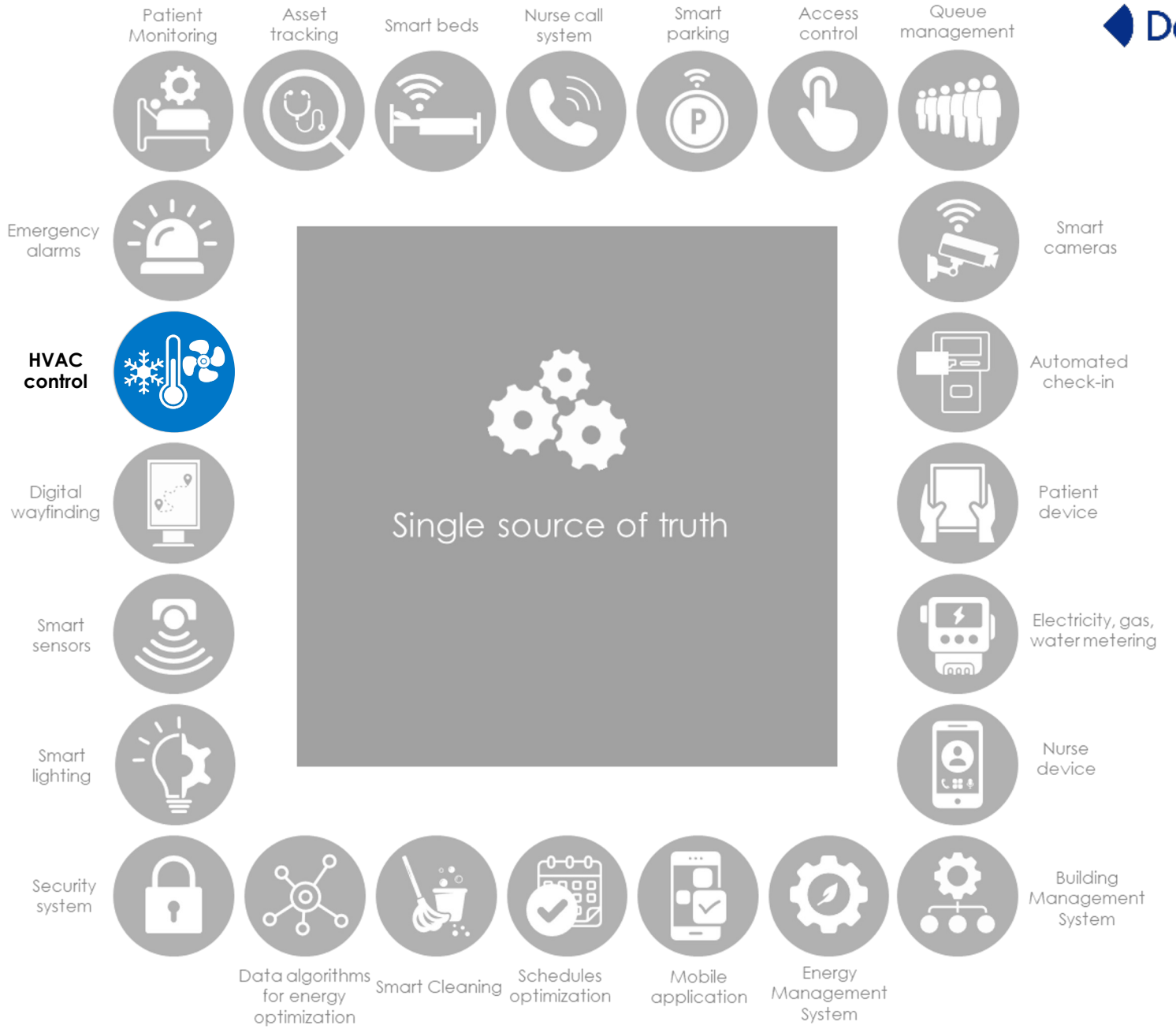
Maximize Return on investment by reducing energy consumption and improving productivity.

Increase well-being of medical staff with HVAC optimization

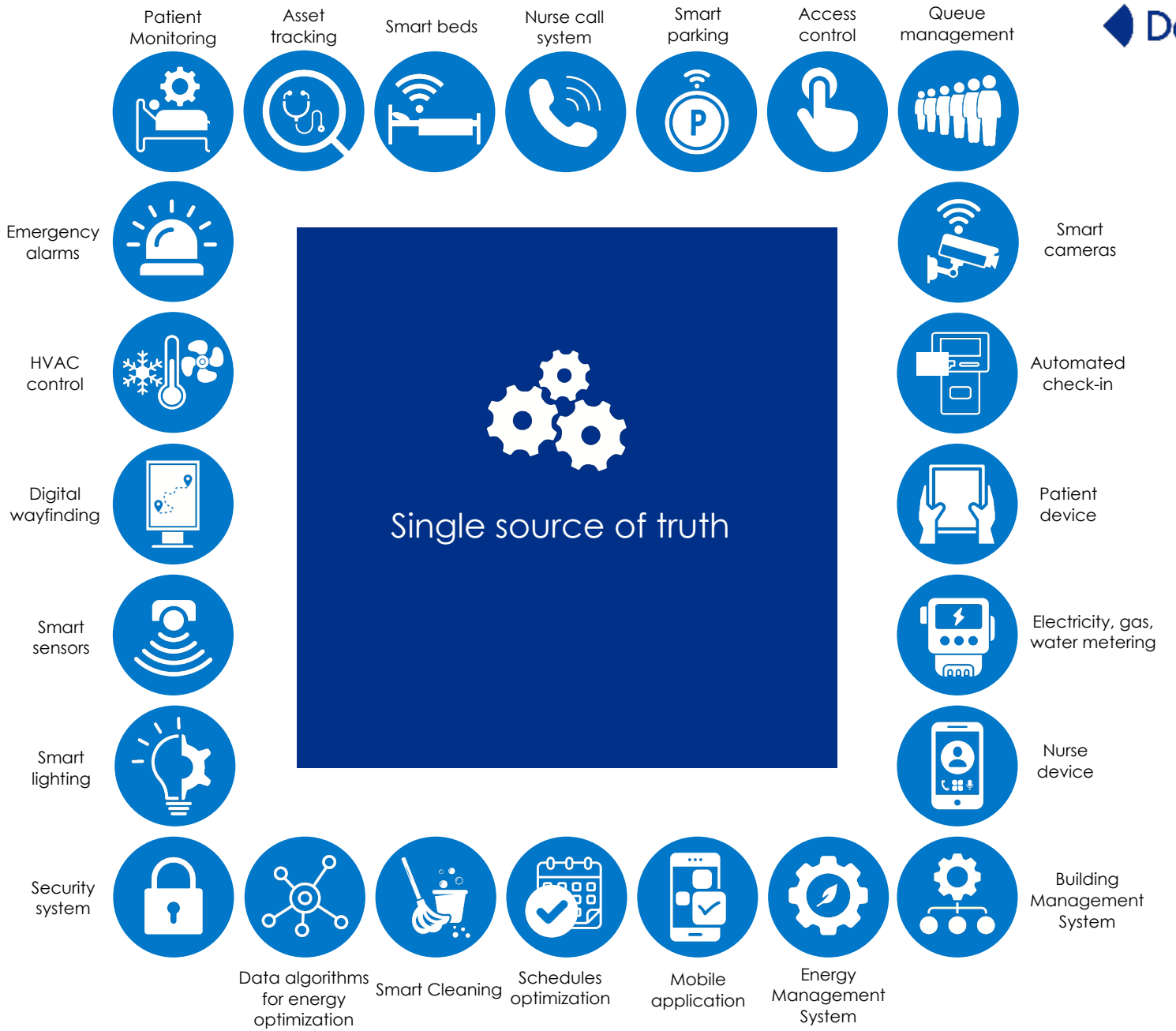
By controlling the HVAC, energy consumption can be regulated

Connect HVAC system with BMS system and collect data relevant to energy and space utilization

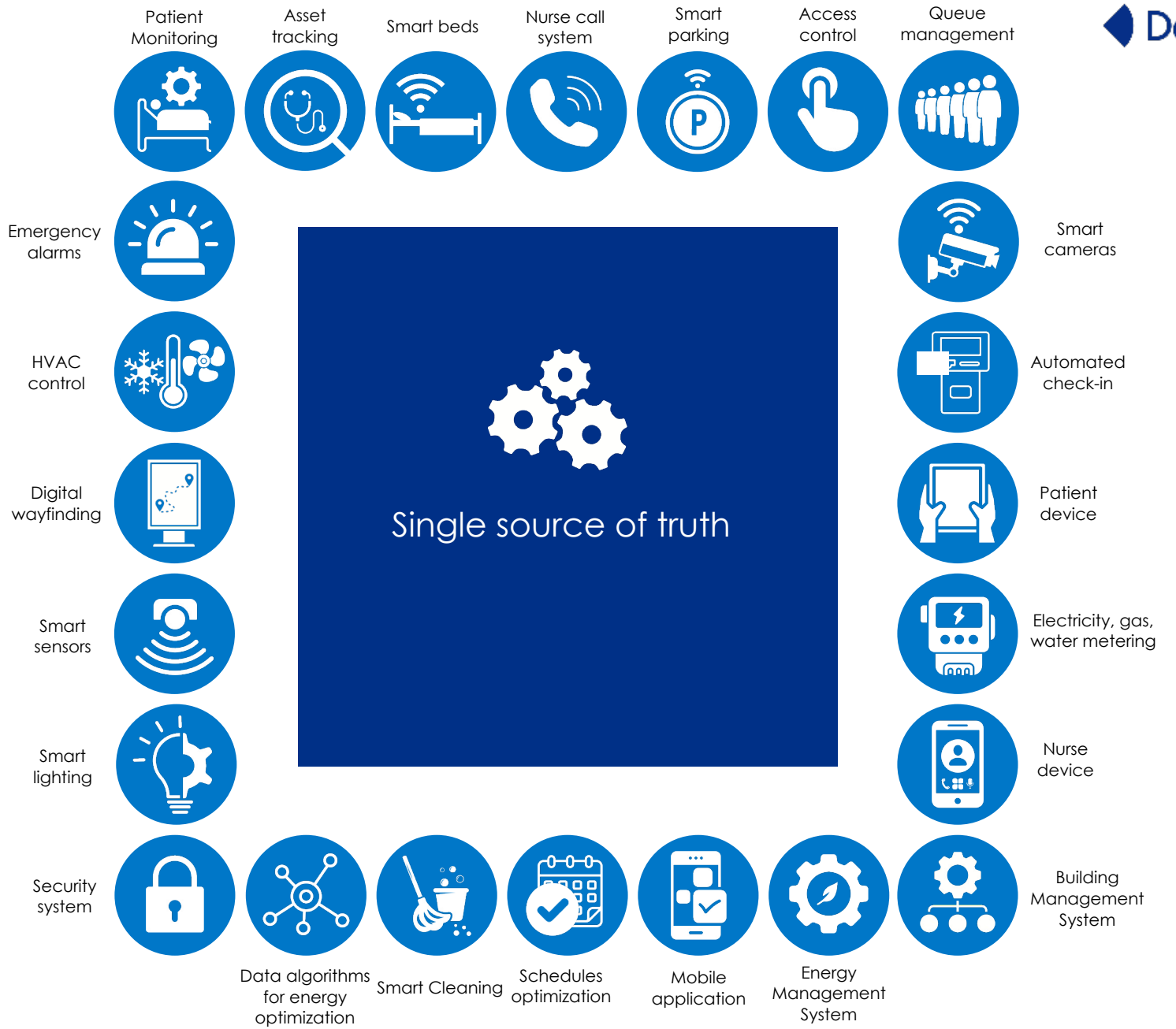
Just one out of many



Integrate and connect all systems



- Collect historical and real-time data/ Data analytics and insights
- Improved quality of care by monitoring and controlling the hospital performance
- Improved medical workflows and procedures securing the wellbeing of employees
- Cost savings from energy management, tracking equipment, increased productivity, predictive maintenance
- Energy efficiency / compliance with Building Automation and Control Systems (BACS) requirement (part of EU legislations of 2026).
- Improved patient experience/ Data insights for patients to decide on their comfort.



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Conclusions

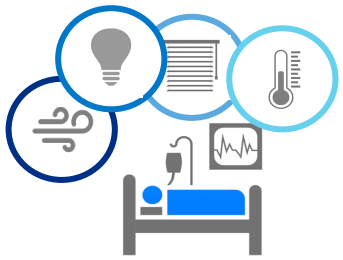
Conclusions

The blue hospital holistic design approach as a starting point to realise the next generation hospitals.

Take into account all 6 performance indicators in the program and design stage

Interdependencies and synergies are real opportunities

Reserve time for a real integrated design process, including TCO and business case thinking



Keep it simple, make it practical and push your limits…

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Q&A