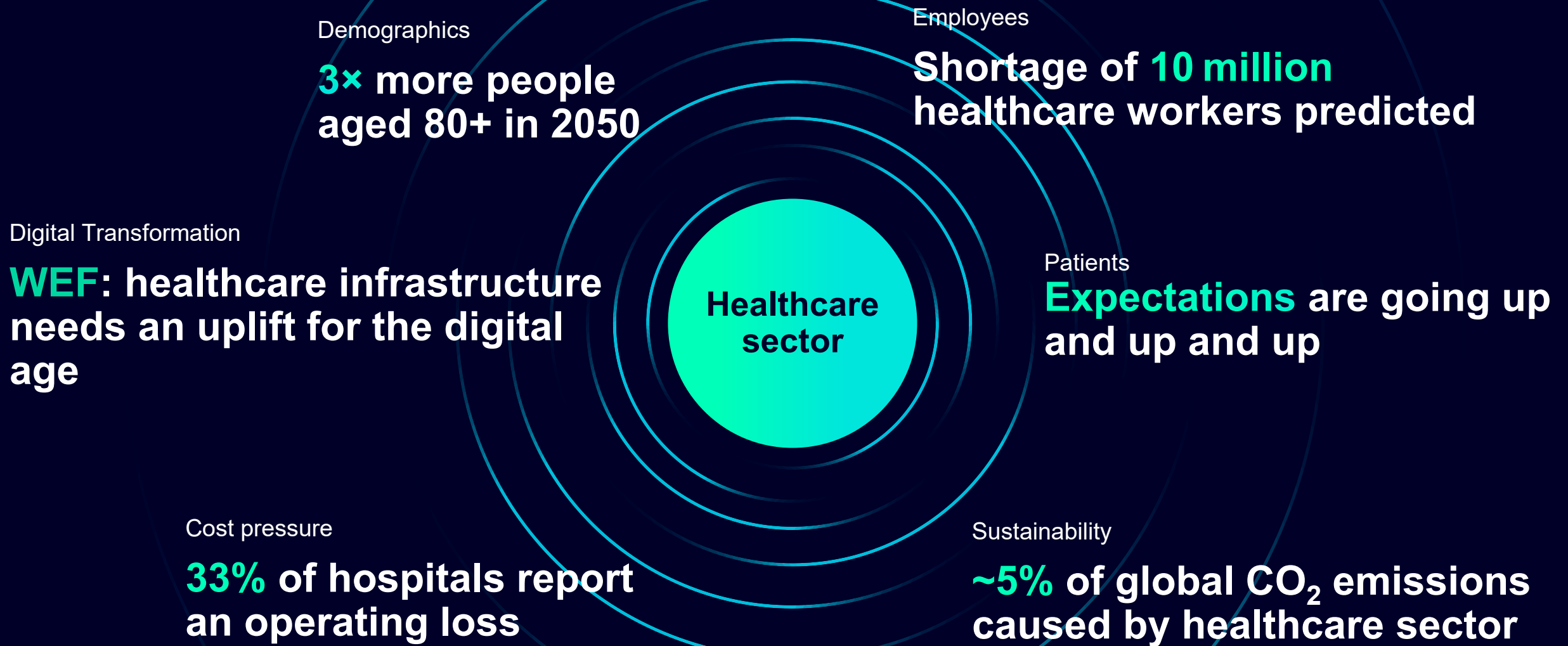# Siemens Smart Hospital
The role of AI in design and operations of healthcare buildings
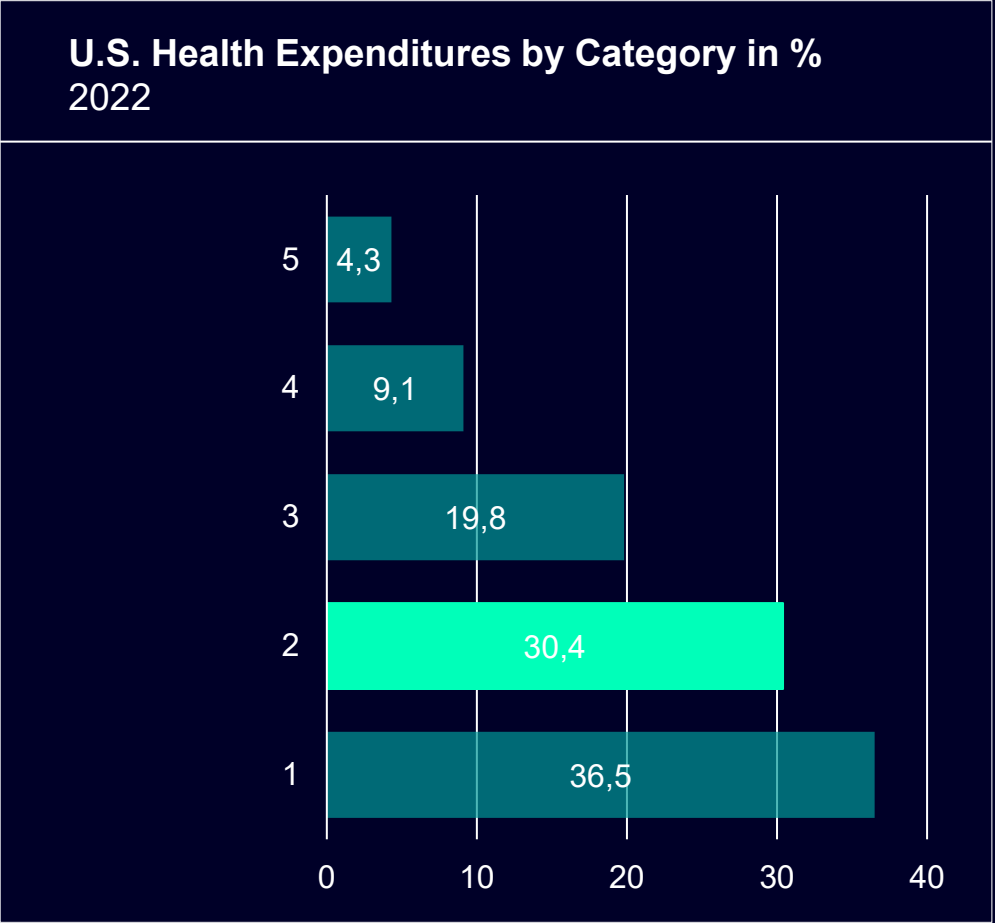
Ramboll Healthcare

Sept 09, 2025
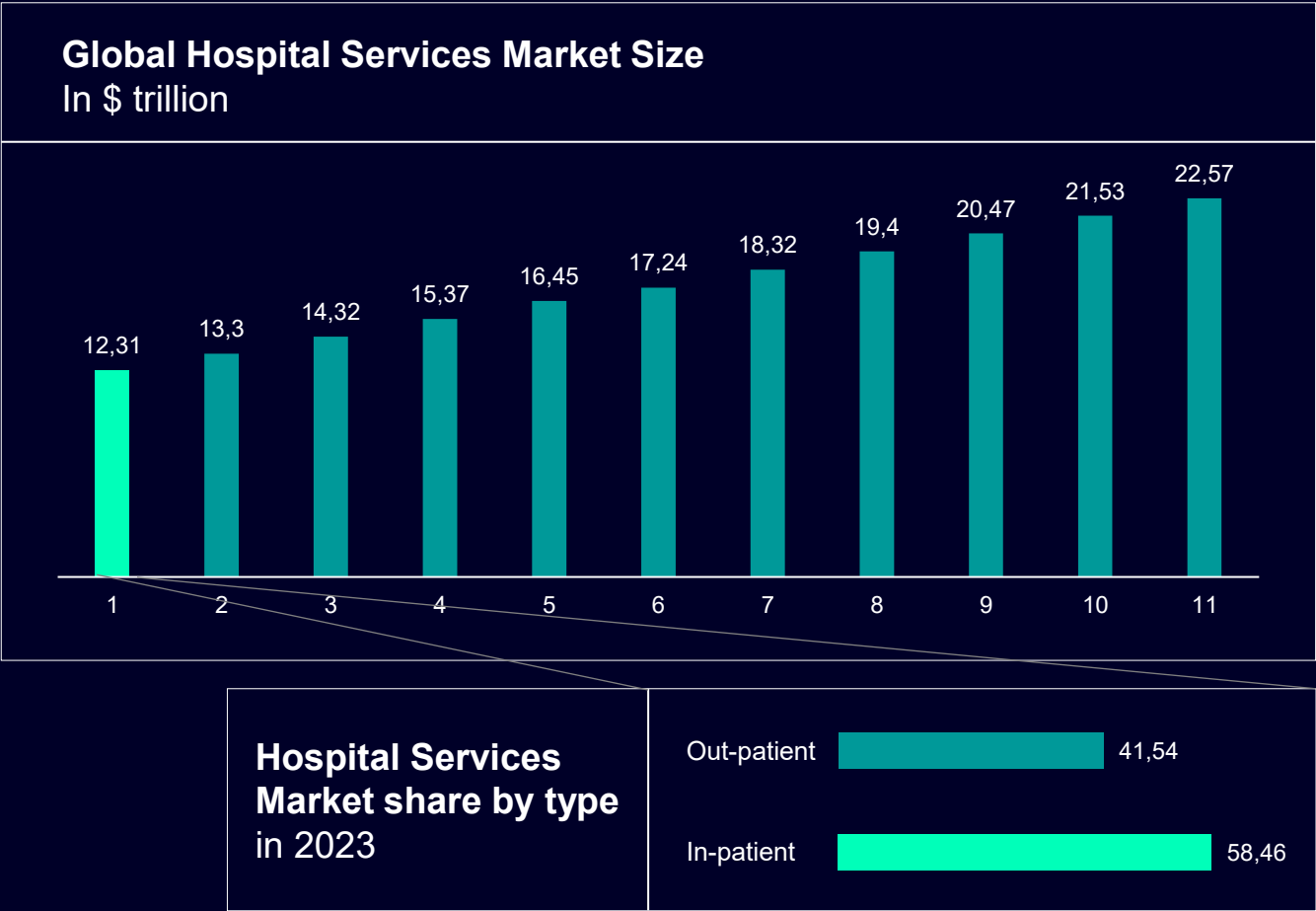
SIEMENS

Healthcare facing a perfect storm

Demographics

3× more people aged 80+ in 2050

Employees

Shortage of 10 million healthcare workers predicted

Digital Transformation

WEF: healthcare infrastructure needs an uplift for the digital age

Healthcare sector

Patients

Expectations are going up and up and up

Cost pressure

33% of hospitals report an operating loss

Sustainability

~5% of global CO_2 emissions caused by healthcare sector

SIEMENS

Hospital Care is a key contributor to total healthcare services provision – predicted to continuously grow with a strong growth tendency in outpatient services

U.S. Health Expenditures by Category in %
2022

- 5: 4,3
- 4: 9,1
- 3: 19,8
- 2: 30,4
- 1: 36,5

(x-axis: 0, 10, 20, 30, 40)

Source: Centers for Medicare & Medicaid Services, Office of Actuary, Data download 09/24

Global Hospital Services Market Size
In $ trillion

1	2	3	4	5	6	7	8	9	10	11
12,31	13,3	14,32	15,37	16,45	17,24	18,32	19,4	20,47	21,53	22,57

Hospital Services Market share by type
in 2023

- Out-patient: 41,54
- In-patient: 58,46

Source: https://www.precendenceresearch.com/hospital-services-market

SIEMENS

Operating hospitals sustainably - Let's put some numbers to selected challenges

Energy Consumption[3] per square foot in the U.S:
- 25.8 kWh average
- 31 kWh inpatient - 18.7 kWh outpatient
- hospitals need x2.75 more energy than all commercial buildings[4]

Carbon footprint of hospitals
- 1/3 of NHS hospitals CO_2 footprint caused by building energy, travel and medical equipment (10% each)[5]
- in the U.S. hospital care causes 36%, physician and clinical services 12% of CO_2 emissions in overall healthcare[6]

Fresh water[1] needs per bed/year:
- 180.000 - 370.000 liter in Europe
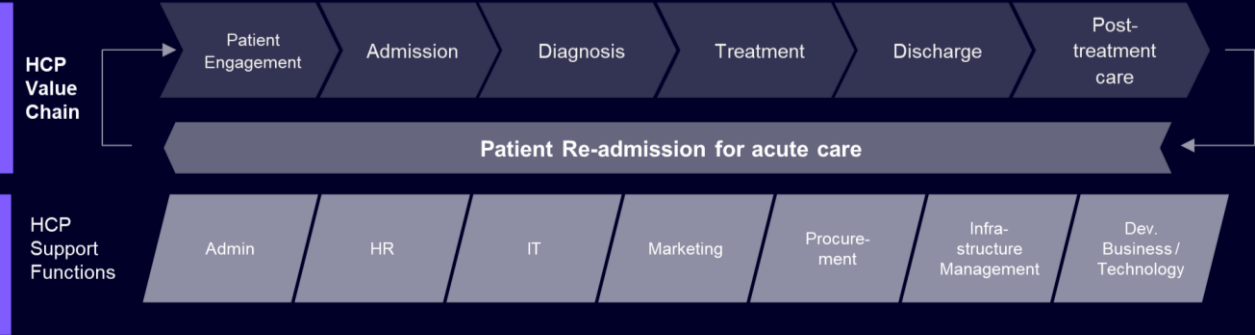- up to 550.000 liter in the U.S.

Staff shortage & safety:
- one open physician position generates a revenue loss of about $200,000 per month
- average turnover cost for a staff registered nurse is $56,3007
- temporarily closing of hospital beds to navigate the system's nursing shortage[8] leaving patients untreated, infrastructure investment unperforming, and hospitals at losses
- 85% of non-fatal workplace violence related incidents occur in healthcare[9]

Healthcare waste[2]:
- constitute approx. 1–2% of total produced urban waste
- therein 15% hazardous waste, which is infectious, radioactive or toxic
- hazardous waste (kg/bed/day) in low-income countries up to 6 kg, in high-income countries up to 11 kg

SIEMENS

On each step of the lifecycle of a hospital building, AI and Digital Twin Technology can create more sustainable hospital operations

| Plan | Design | Construct & Comission | Operate | Retro-fit |

HCP Value Chain

| Patient Engagement | Admission | Diagnosis | Treatment | Discharge | Post-treatment care |

Patient Re-admission for acute care

HCP Support Functions

| Admin | HR | IT | Marketing | Procure-ment | Infra-structure Management | Dev. Business / Technology |

HCP: Healthcare Provider

SIEMENS

AI capabilities to drive planning and design for hospitals

AI powered capacity planning

Adding bed, staffing, diagnostic or treatment capacity, with or without physical expansion

AI powered planning of expansions and new builds

Modulating clinical and patient volume to required infrastructure capacity

Clinical capacity

Infrastructure capacity

Infrastructure layout

Ai

AI powered departmental and unit redesign

Changing infrastructure layout to better support workflows and pathways

AI powered planning of resources

equipment, special rooms, etc. necessary to offer and operate clinical service lines

SIEMENS

AI capabilities to drive <u>operational efficiency</u> in clinical and non-clinical decision support & process automation for hospitals
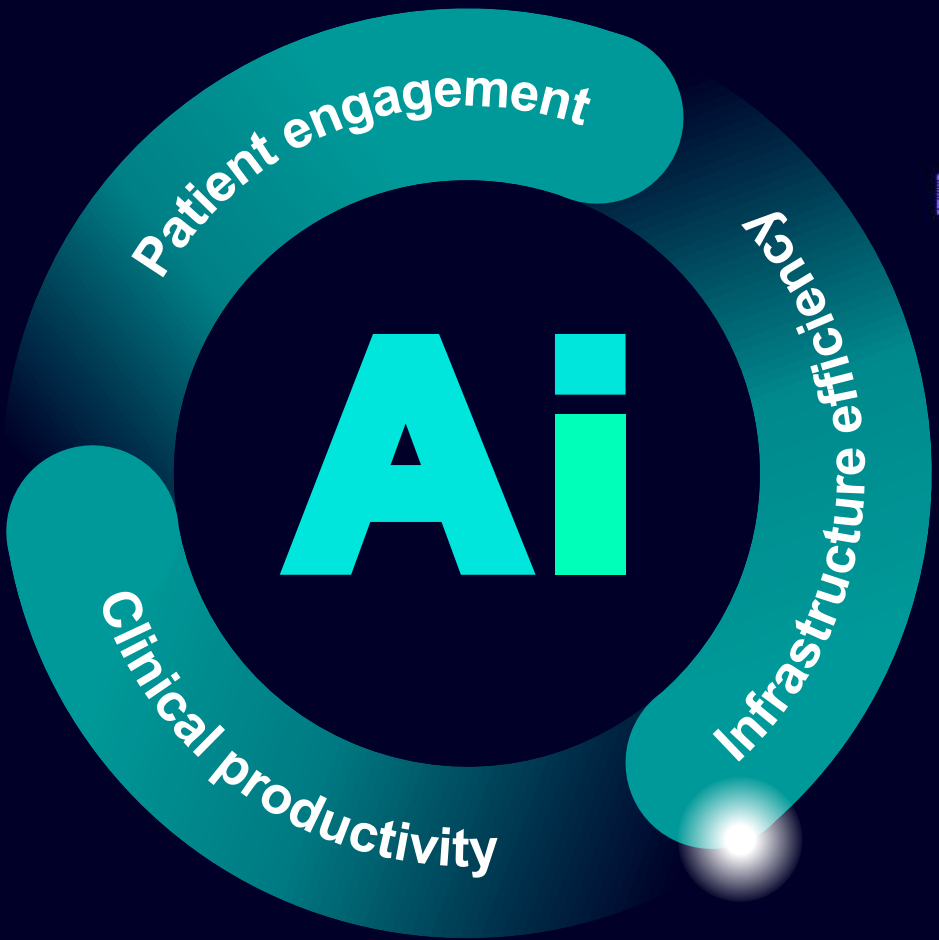
AI powered support for clinical staff

Relieves clinical staff from repetitive, automatable tasks to free-up time for patient care

AI powered scheduling

Staff, patient, room & asset scheduling support for increased staff and patient satisfaction

Patient engagement

Clinical productivity

Infrastructure efficiency

Ai

AI powered energy optimization

Analyzes consumption needs and recommends energy sourcing options based on cost and CO_2 footprint parameters

AI powered facility management

detect faults and performs real-time monitoring, extending the lifespan of equipment, reducing operational alarms

SIEMENS

Approaching hospitals sustainability challenges with data from 3 layers

Leverage
Building technology
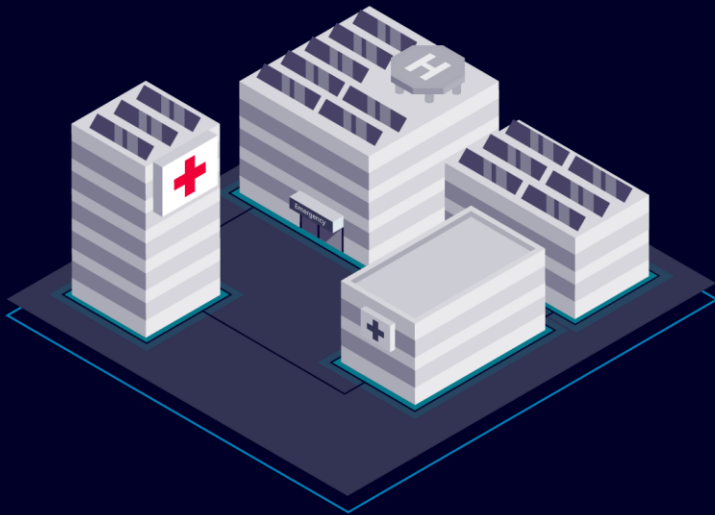
Address
Hospital operations

Understand
Clinical operations

SIEMENS

San Juan de Dios hospital, Sevilla

> ## "My team cannot imagine their daily routines without Siemens Data Analytics Service anymore."

Head of Engineering in the Technical Office of the UTII of the Spanish Province of O.H. San Juan de Dios

Challenge

- The new Hospital de San Juan de Dios in Seville (in operation since 2022) is created to offer the highest care and patient experience with the maximum standards on sustainability and functionality.

Solution

- Desigo CC is the integrated Building Management System for all technologies
- Energy Efficient Building Automation: Desigo PX controllers
- Remote digital services on fault detection and diagnostic to increase equipment life cycle, decrease operational alarms and generate further energy savings.
- Lightning management and control systems
- Enhanced Physical Security: Intrusion detection systems managed by Siveillance Suite, and Fire Safety products.

Impact

€75,000
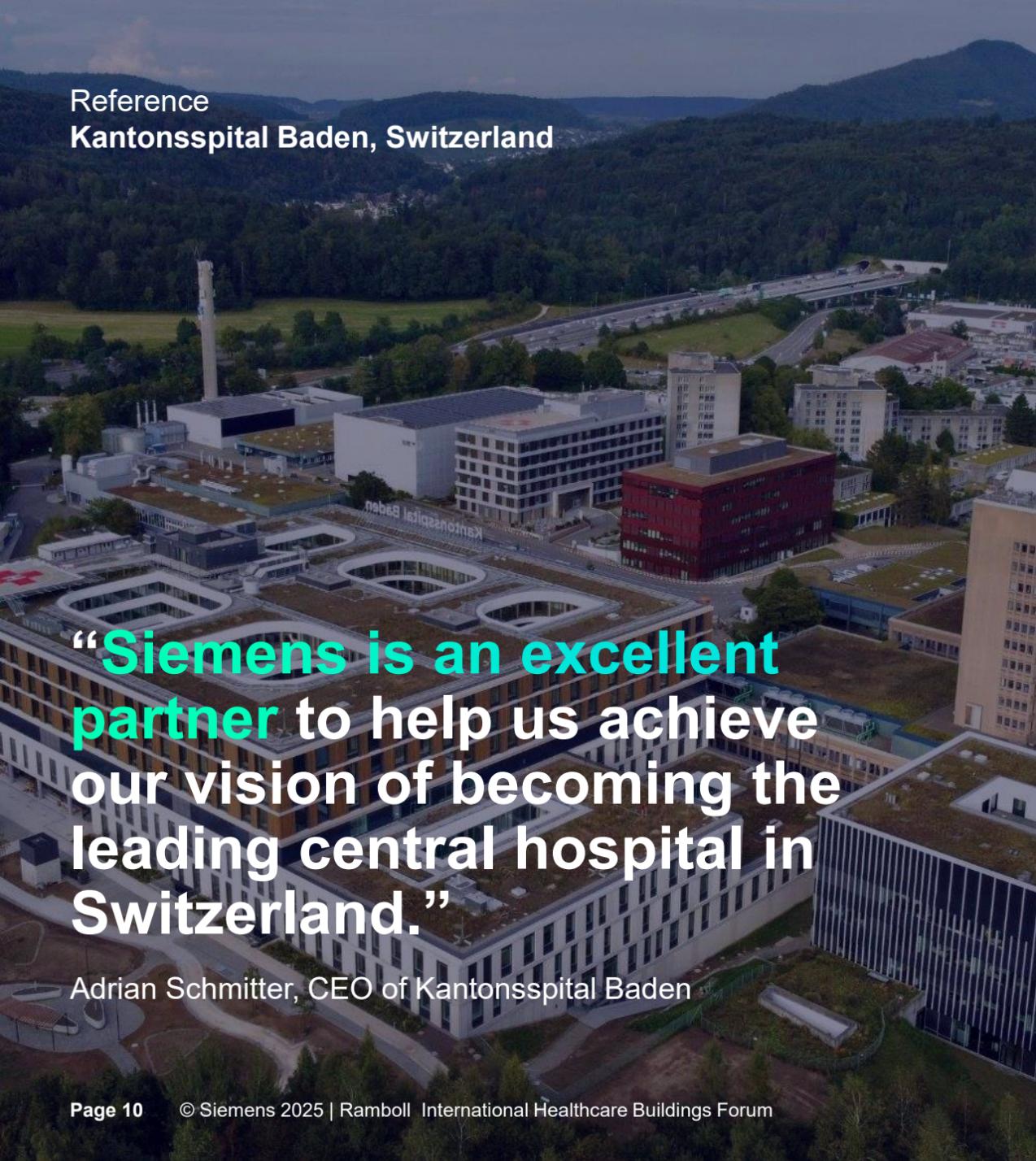
Annual savings through performance analysis

Open and flexible hospital management with safe and reliable operations

~ 35%

Energy cost savings annually

Learn more: siemens.com/hospital-san-juan-de-dios

SIEMENS

> "**Siemens is an excellent partner** to help us achieve our vision of becoming the leading central hospital in Switzerland."

Adrian Schmitter, CEO of Kantonsspital Baden

Challenge

Supporting the customer's vision of making Kantonsspital Baden (KSB) one of the smartest hospitals in Switzerland, offering the best possible patient experience and optimized processes for hospital operations and building management.

Solution

- Technology partnership between KSB and Siemens
- Customized, open IoT platform from the Siemens Xcelerator portfolio with 2,000 asset tags and 7,000 IoT sensors
- App-based navigation system for staff and patients
- Real-time location services (RTLS) – Asset Tracking
- Building management system Desigo CC

Impact

↑

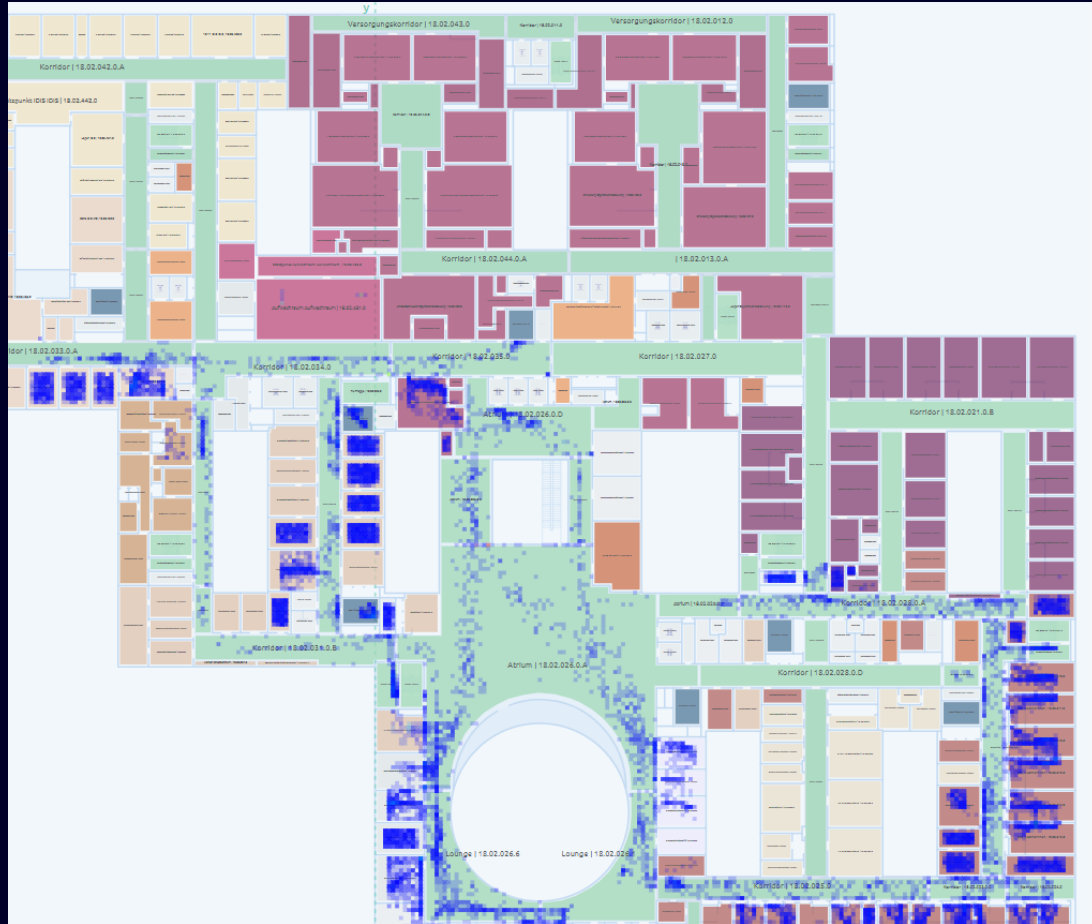User-centric patient experience and improved patient care

1

One customized, open IoT platform

↑

Increased efficiency and optimized operations

Learn more: Kantonsspital Baden

KS_B Kantonsspital Baden Ort der Gesundheit

SIEMENS

KSB reporting: data evaluation for hospital process optimization
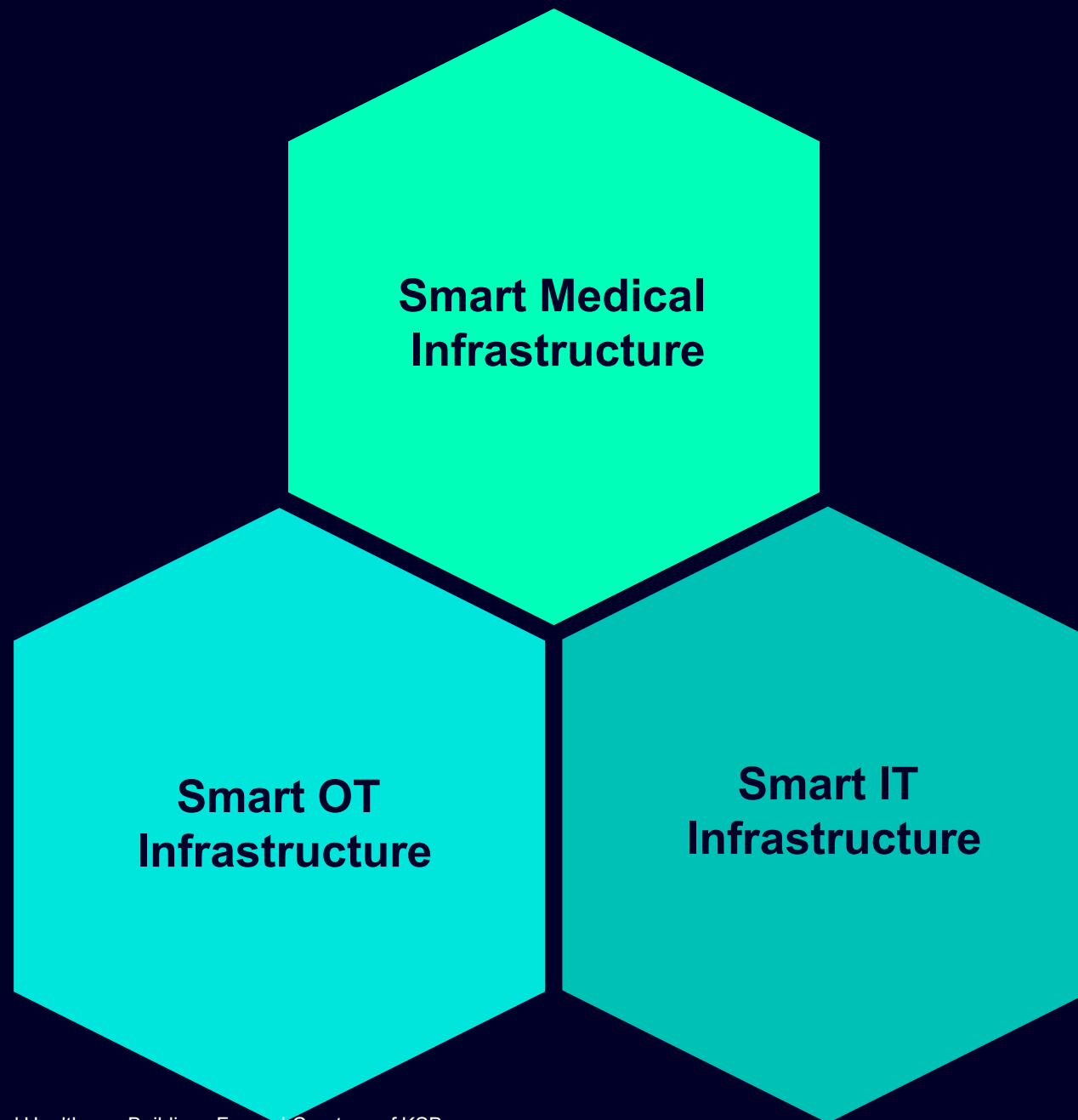

Heatmaps

Routes of the assets

- **Analysis of historical location data** to show possible **optimization potential**
- **Positions** of assets over a **period of time**
- **Dwell time** of one or more assets in selected areas
- **Graphical evaluations** such as **heat maps** and **spaghetti diagrams**

SIEMENS

Leveraging AI capabilities significantly depends on data availability, and processability

Building Data (exemplary)

BIM
Building Management Model

BMS
Building Management System

EMS
Energy Management System

WMS
Water Management System

RTLS
Real Time Location Services

Clinical & non-clinical data (exemplary)		
Value Chain	**Support function**	**Connected health systems**
EMR Electronic Medical Record	**RMS** Revenue Cylce Management	**HPMS** Health Plan Management System
RIS Radiology Information System	**NMS** Nursing Management System	**MIMM** Major Incident Medical Management System
CDMS Clinical Data Management System	**PMS** Pharmacy Management System	**Census** Demographic / population data
PACS Picture Archiving and Communication System	Inventory Management Systems	**Meteostat** Weather data
LIMS Laboratory Information and Management System		

Clinical data pools with high compliance demand on data access and use rights

SIEMENS

Xcelerator manages complexity to create and operate a **holistic smart hospital solution**

Smart Medical Infrastructure

Smart OT Infrastructure

Smart IT Infrastructure

SIEMENS

Combining all these layers
A game-changer for hospitals

Smart hospital

SIEMENS

YOUR CONTACTS

Tina Johne

Head of Strategy Healthcare Vertical

Siemens Smart Infrastructure

tina.johne@siemens.com

Dr. med. Leander Fortmann

Principal Expert Healthcare

Siemens Advanta

leander.fortmann@siemens.com

SIEMENS

Disclaimer

© Siemens 2025

Subject to changes and errors. The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.

All product designations may be trademarks or other rights of Siemens AG, its affiliated companies or other companies whose use by third parties for their own purposes could violate the rights of the respective owner.

SIEMENS