OMAINTEC
CONFERENCE
EXHIBITION
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▶▶ 17th Edition

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& Conference Centre
United Arab Emirates

Under the Theme:
Enhancing Maintenance
Through Big Data Management

▶▶ **Hospital of the Future**

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Agenda

- Healthcare Challenges today
- Digital Transformation in Healthcare
- Patient and Consumer Perspectives
- Evolution in hospitals
- Improving Health systems
- Sustainable Health

Hospitals & Care Systems face many common challenges

- Shifting demographics of patients and the workforce.
- Drive towards cost efficiency; access to capital for investment needed.
- Continuous advances in technology and increasing adoption speed.
- Transition to value-based reimbursement focused on outcomes.
- Increasing demand for cost and quality data transparency.
- Need for clinical integration and care coordination.
- Growing demand for patient and family engagement.
- Challenging variations in care.

Tomorrow today

Promoting wellbeing

1. Greater patient engagement through patient involvement and self-managed devices and applications.

3. More productive and targeted care using real-time patient monitoring, analytics and genomics.

2. Healthier and safer communities by harnessing information about people and their communities to inform planning, improved emergency response, wellness campaigns, population health policy and population health considerations such as water, nutrition and food safety.

Delivering healthcare

4. More systematic, high quality and safer care through optimised workflows, information decision support and knowledge management.

5. Improved resource management through streamlined workflows and the ability to match demand with capacity.

Connecting healthcare

6. Better coordinated care through increased collaboration, digitally enabled care pathways across care settings and the secure sharing of information.

7. Improved access to expert knowledge more easily, anywhere and in real-time, enabled by technology.
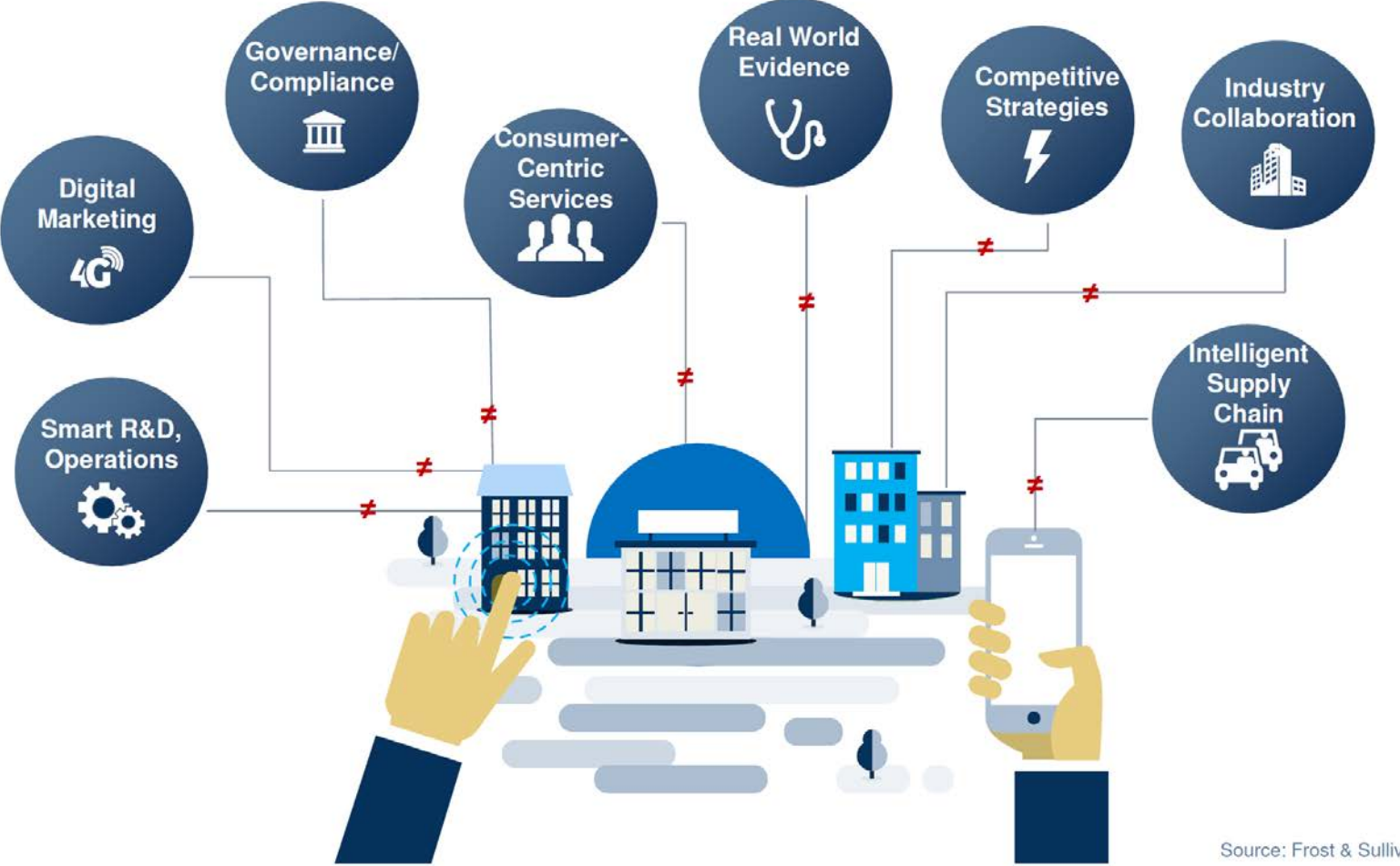
Pursuing innovation

8. Continuous system improvement and learning with a combination of analytics, science, digital innovation, organisational development and a learning

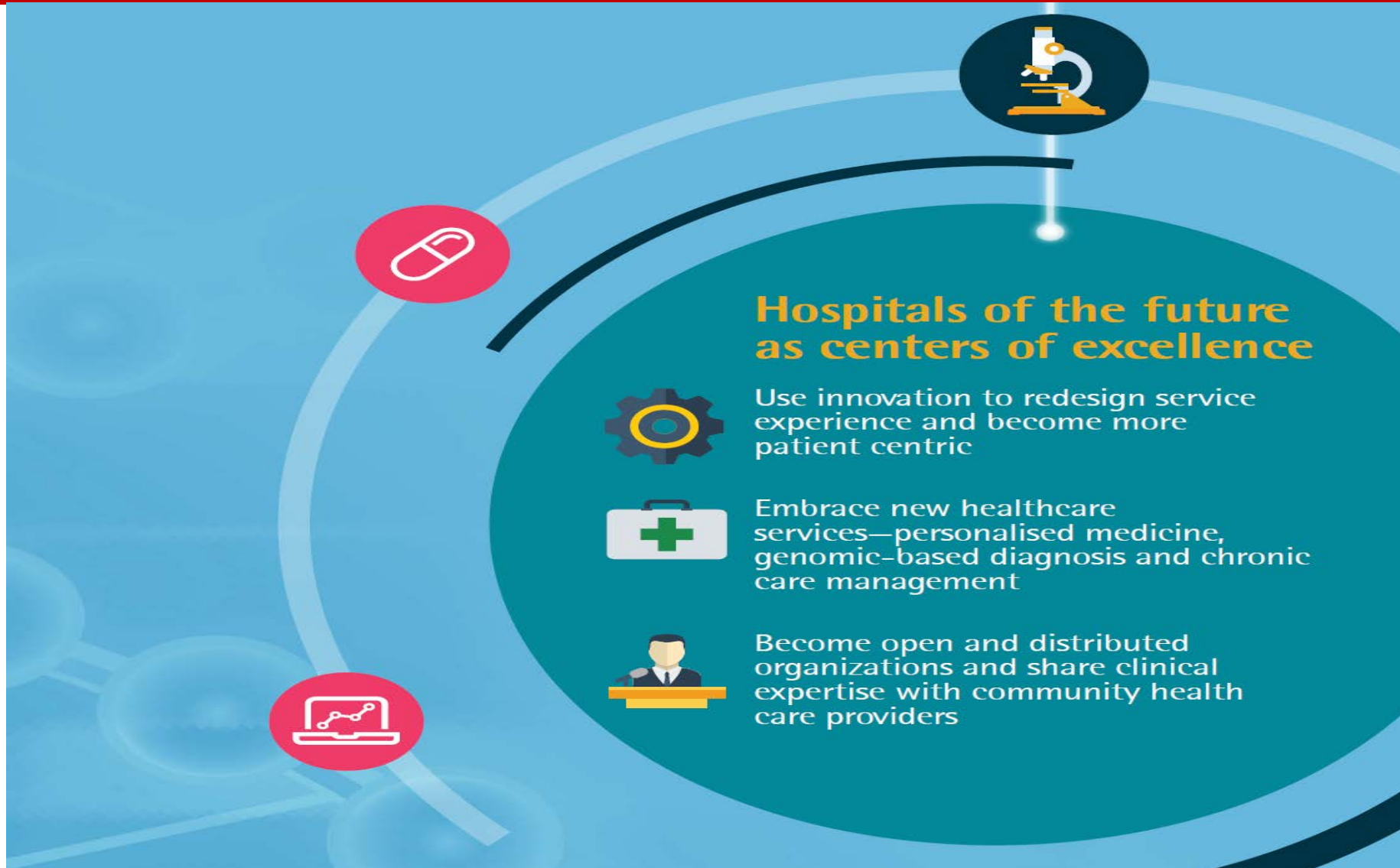# Technology Has Increased Cost of Healthcare in General

Hospitals Are Investing in Technology to Lead Digital Transformations

Source: Frost & Sullivan

Hospital of the Future as Center of Excellence

Hospitals of the future as centers of excellence

Use innovation to redesign service experience and become more patient centric

Embrace new healthcare services—personalised medicine, genomic-based diagnosis and chronic care management

Become open and distributed organizations and share clinical expertise with community health care providers

Hospital of the Future as Research and training hubs will

Strengthen partnerships with universities, businesses and other hospitals for research and training of new professionals

Develop information systems to manage and rapidly disseminate ever-increasing bodies of clinical knowledge
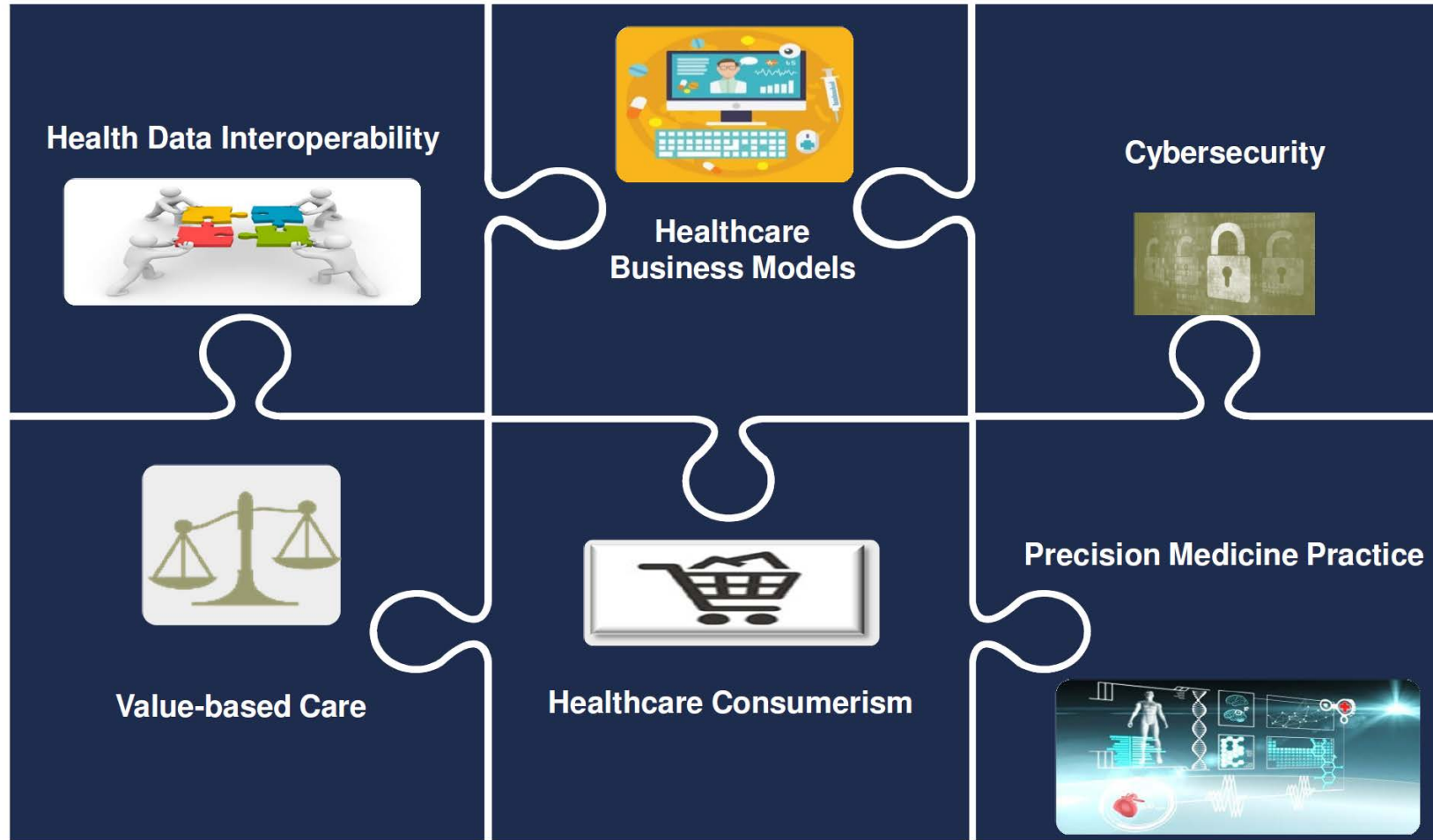
Organize into process-oriented teams and seek to create integrated care models

Involve clinicians and other health professionals in hospital management strategy, leadership and governance

# Blockchain will lead the transformation into Healthcare

Health Data Interoperability

Healthcare Business Models

Cybersecurity

Value-based Care

Healthcare Consumerism

Precision Medicine Practice

Source: Frost & Sullivan

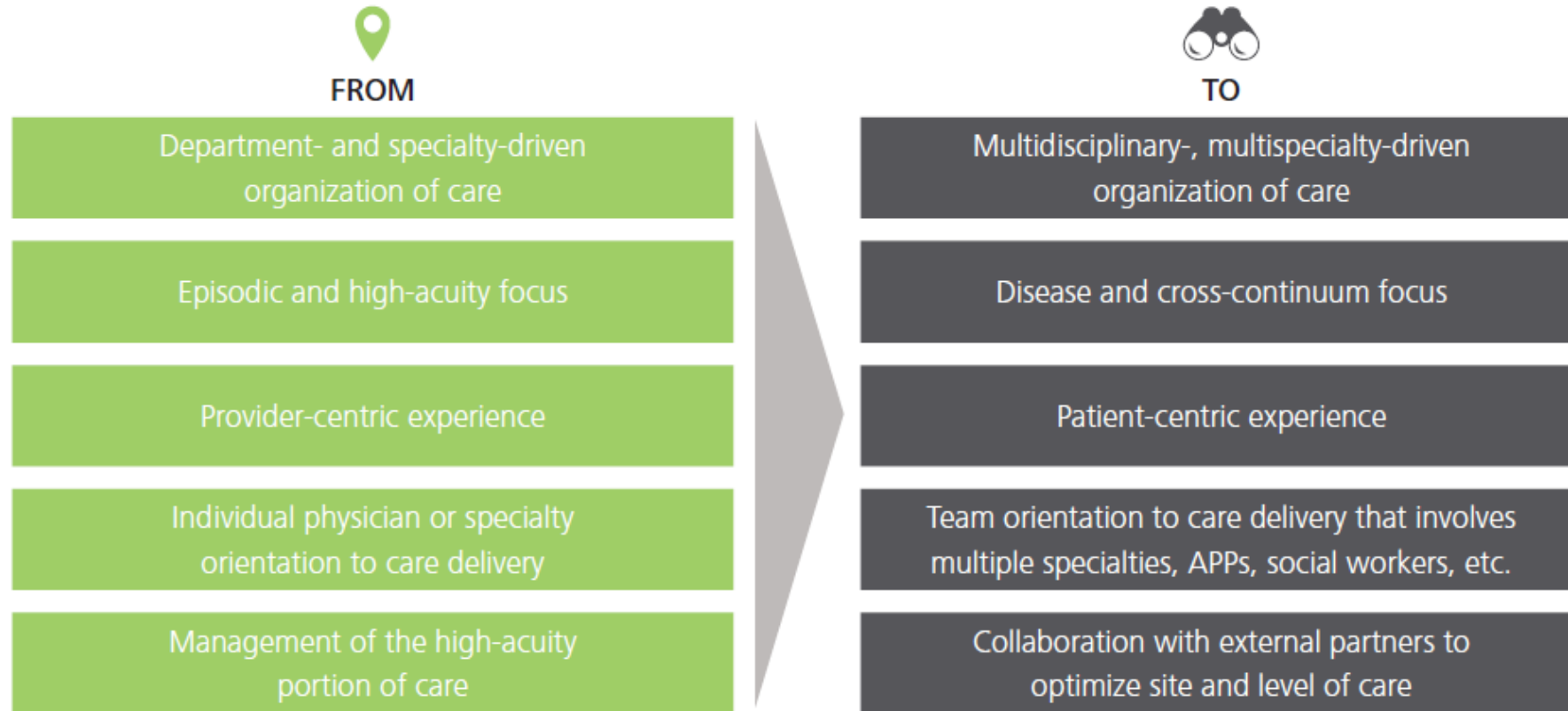# Breakthrough In the following Areas will Reshape Medicine

- **3D Printing**: Researchers hope to expand its use to develop increasingly complex organ and replace body parts
- **Stem Cells**: Advances will lead to more effective treatments for heart disease, cancer brain disorders, and other conditions
- **Machine learning and AI**: advances will enable clinicians to use algorithms to analyze patients' health, diagnose problems and more**.**
- **Wearables:** Soon will be common for consumers to wear technology that captures vital signs data and monitors their health 24 hours-a-day
- **Robotic Surgery**: A new generation of robots will perform procedures with enhanced accuracy and precision.

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Patient & Consumer Perspectives
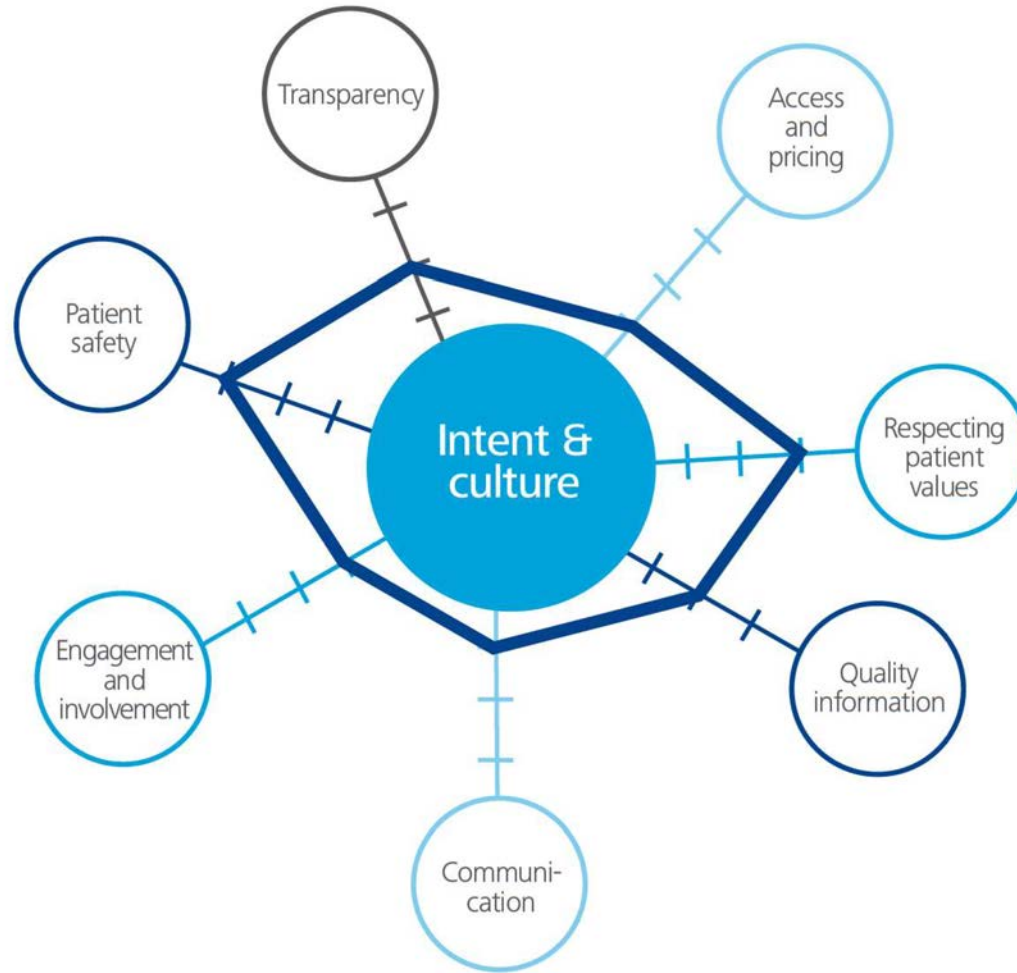
Source: Benchmarking Strategy for Corporate Patient Centricity, PatientView, 2013. see also: http://alexwyke. wordpress.com/2013/09/22/a-benchmarking-strategy-for-corporate-patient-centricity/

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Patient Centered Healthcare Provider Operating model

FROM	TO
Department- and specialty-driven organization of care	Multidisciplinary-, multispecialty-driven organization of care
Episodic and high-acuity focus	Disease and cross-continuum focus
Provider-centric experience	Patient-centric experience
Individual physician or specialty orientation to care delivery	Team orientation to care delivery that involves multiple specialties, APPs, social workers, etc.
Management of the high-acuity portion of care	Collaboration with external partners to optimize site and level of care

Source: HBR, "The Strategy that Will Fix Healthcare"

What has changed since 1950s

	Brand New Technology	More Capacity and Better Amenities	Faster Communication Tools
1950s Hospital	Upright X-rays	Baby Bassinet Drawers	Pneumatic Tubes
Today's Hospital	DaVinci Robots	Private Rooms	Electronic Medical Records

Source: Health Care Advisory Board interviews and analysis.

Spectrum of Service Offering in the Future

1 Level 1: Family Practice clinic

2 Level 2: Pediatrics, internal medicine, urgent care

3 Level 3: Outpatient surgery, advanced imaging

4 Level 4: General community hospital

5 Level 5: Broader community hospital

6 Level 6: Tertiary hospital, full-service portfolio, NICU

7 Level 7: Teaching, Transplant, Level 1 Trauma

Least Intensive Service Portfolio → **Most Intensive Service Portfolio**

Source: Health Care Advisory Board interviews and analysis.

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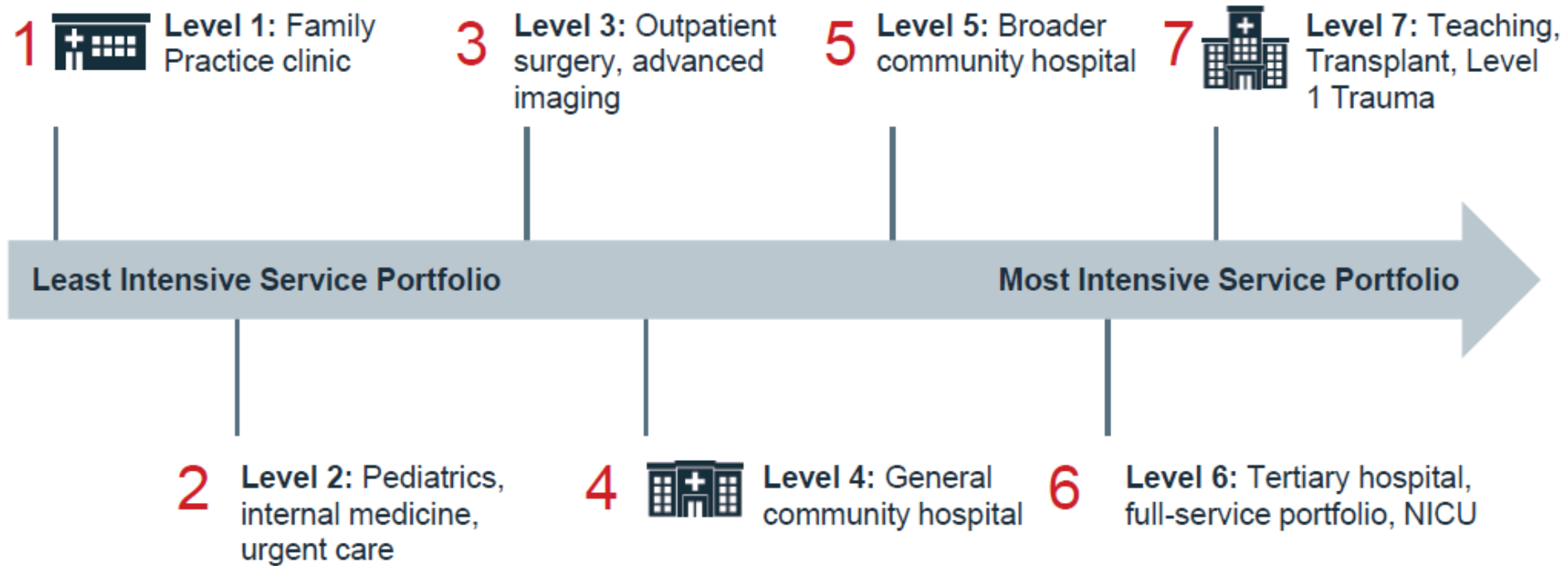
Hospital is Getting Smaller but More Specialized

Centralized Facility → Separate, Dispersed Facilities

Centralized Facility labels: Cardiac Unit, Orthopedics Unit, Lab, Imaging, Inpatient Surgery, Outpatient Surgery

Separate, Dispersed Facilities: Freestanding ED, Short-Stay Hospital, Cardiac Hospital, Orthopedic Hospital

Source: Innovations Center interviews and analysis.

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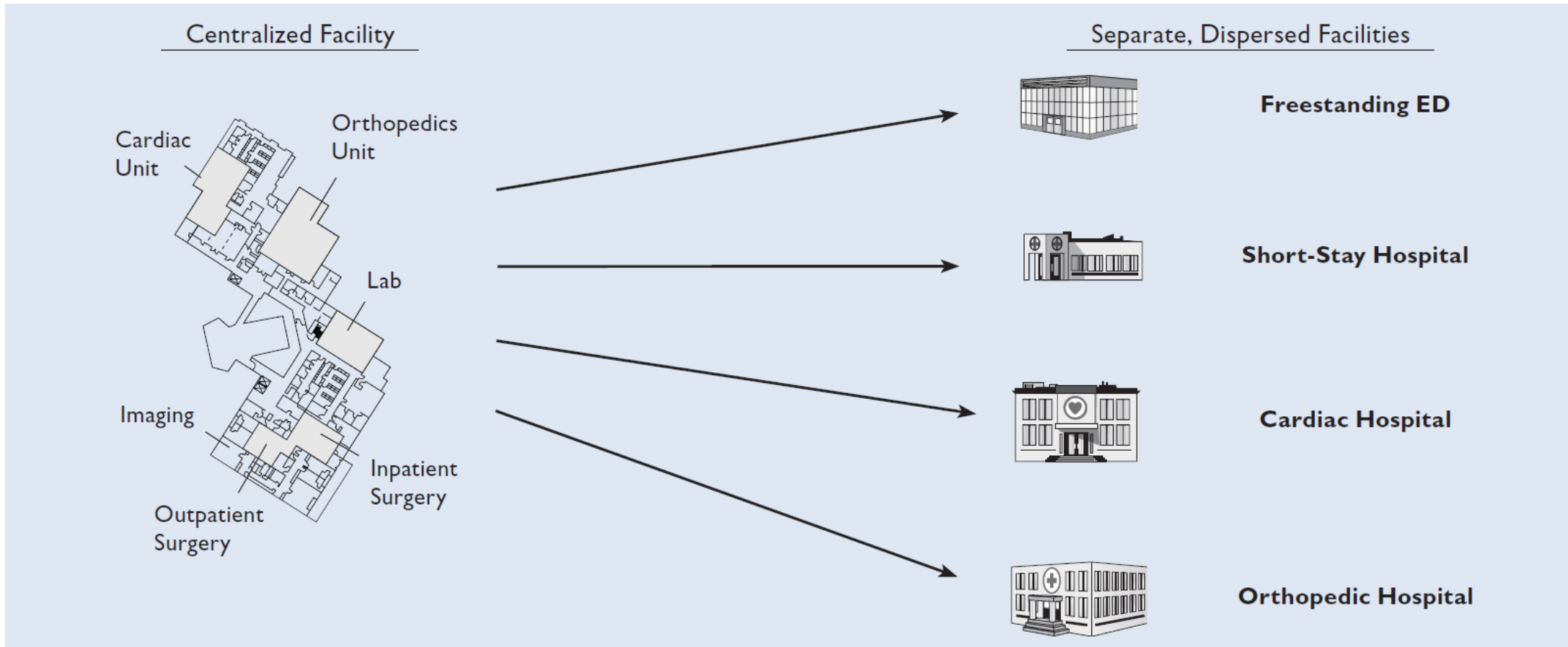
Departments Leaving the Hospitals

Support Functions

Patient Services

Lab

Imaging

Offsite Core Lab

Freestanding Imaging Center

Material Management

Outpatient Surgery

Centralized Materials Management

Ambulatory Surgery Center

Source: Innovations Center interviews and analysis.

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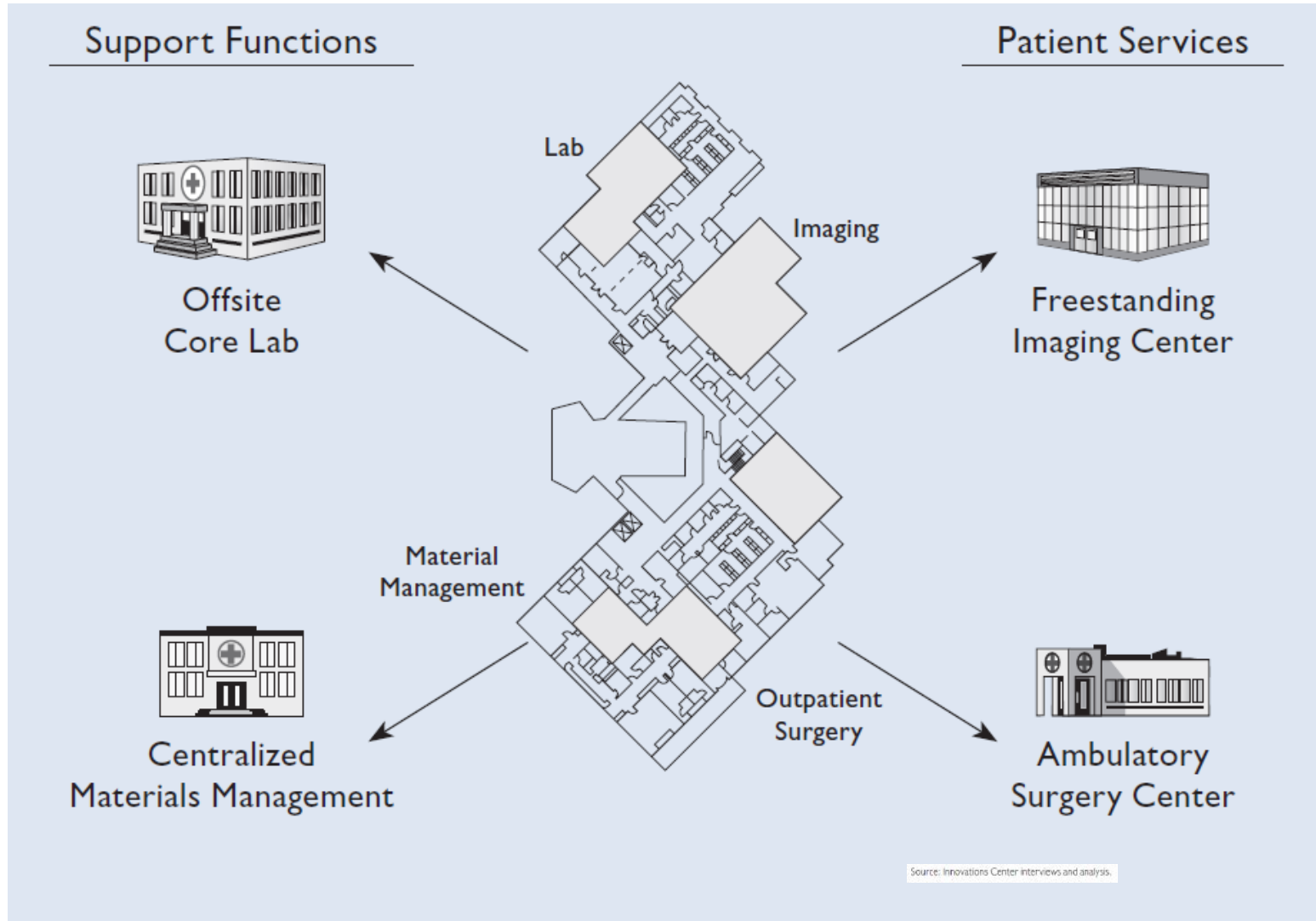
Hospital of the Future Physical Design

- Plan the growth from day one.

- Loose-fit design.

- Adaptable flexibility.

- Convertible flexibility.

- Robust Utilities.

- Plug and Play infrastructure.

- Seamless workflow

- Healing environment

Shanghai International Hospital Designed By HOK

Tomorrow Hospital will use new technologies to integrate the following trends

- We are all connected
- Collaborative care
- Point of care is everywhere
- Big data will drive decision making process
- Patient experiences will avail
- Simplification: less is more
- Home care is better care

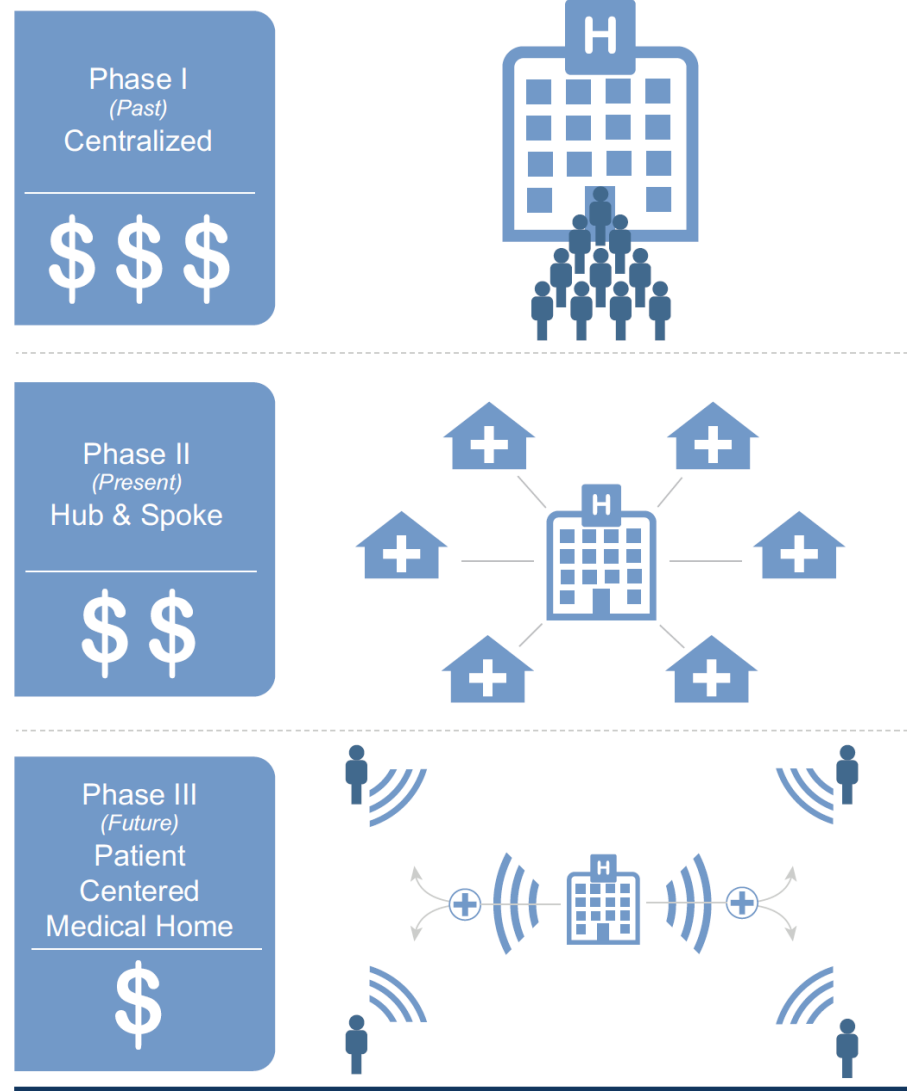# Hospital of the Future

Critical steps to improve clinical outcomes, integrate care, improve safety, and meet challenges of the future today.
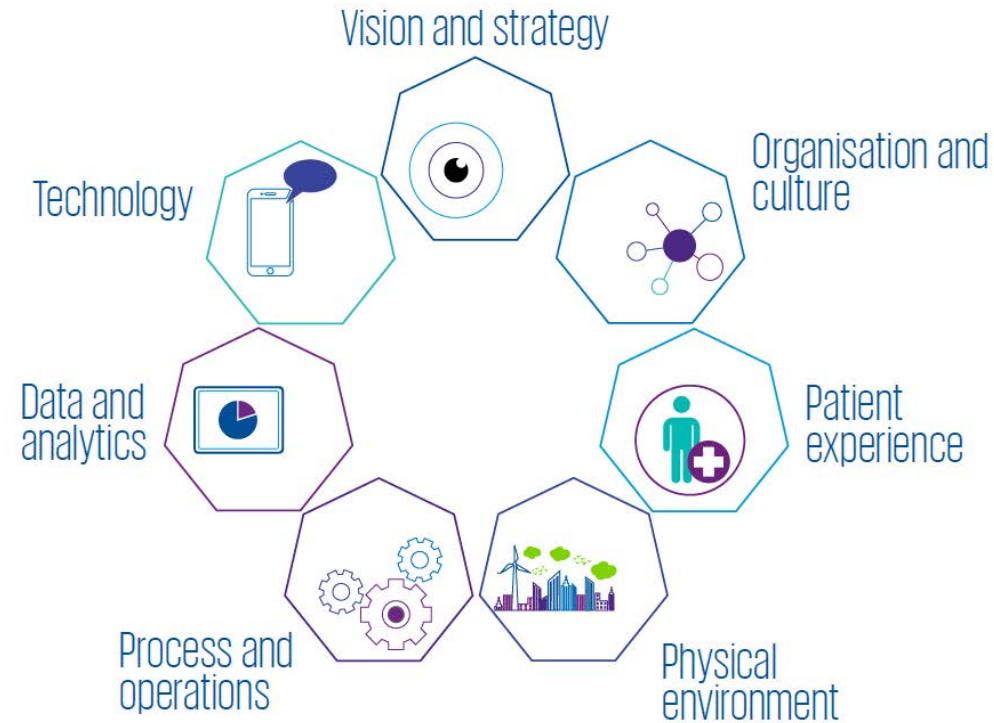
Hospital of the Future

Evolution of the Hospital

Source: Goldman Sachs Global Investment Research
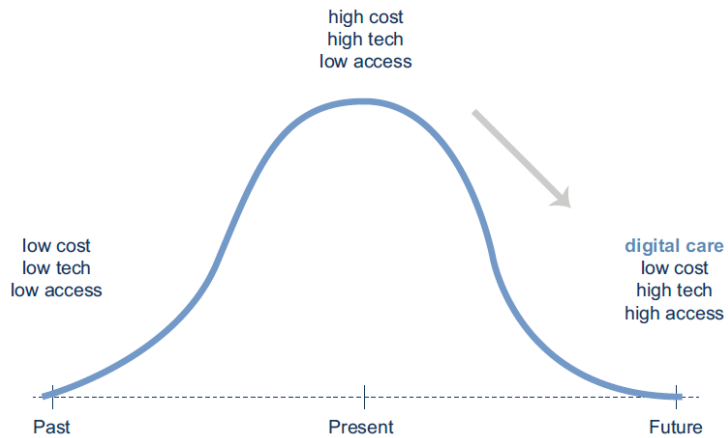
The Digital Transformation is leading to

- Dramatic Savings.
- Shared Knowledge.
- Patient Participation.
- Increased Coordination.
- Improved Outcomes.

The IBM Digital Hospital Frame Work

Category					
Health analytics	Master data management	Data warehouse	Performance and quality management	Compliance/ reporting	Enterprise content management
Staff management	Library and evidence base	Staff scheduling and credentialing	Clinical, allied and staff development		
Care orchestration	Resource scheduling	Patient referral and coordination	Care process optimization	Telehealth	
Electronic medical record	Care settings	Specialty services	Chart management and coding	Ancillary services	
Client/patient services	Enterprise master patient management	Eligibility management	CRM/patient billing	Patient engagement	
Business management	Human capital	Financial management	Enterprise resource planing	Bed management	
Clinical logistics	Real time location services	Tracking and alerts	Clinical messaging	Ancillary departments	BYO device
Integration	Medical device integration	System integration	Application integration	Data integration	Multi-channel integration / Vendor neutral archive
Operations	Data management	Data center management	IT operations	Application management	
Infrastructure	Medical grade network	Servers and storage	Device integration	Unified communications	Security and privacy
Intelligent buildings	Energy management	Water management	Waste management	Space management	Building operations

The Digital Innovation in Healthcare

high cost
high tech
low access

low cost
low tech
low access

digital care
low cost
high tech
high access

Past — Present — Future

Source: Goldman Sachs Global Investment Research

Potential Savings

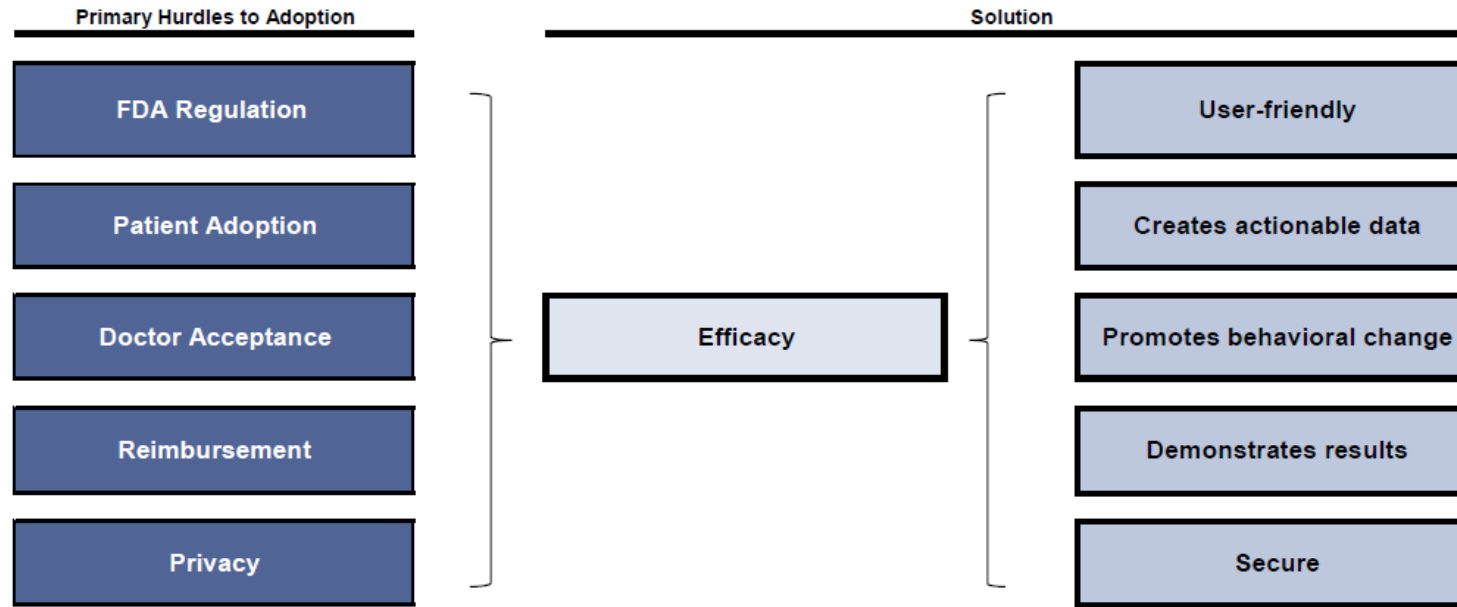| Vertical	Disease State	Total Savings Opportunity	Commercial Opportunity
Remote Patient Monitoring	Heart Disease, COPD/Asthma, Diabetes,	$200+ billion	~$15 billion
Telehealth	Routine & Psychological Care	$100+ billion	~$12 billion
Behavior Modification	Obesity, smoking cessation, overall lifestyle improvement	Indefinitely large	~$6 billion

Source: Goldman Sachs Global Investment Research

HCP are leading digital Health Solutions to meet Critical Objectives including:

- **Predicting** and tracking diseases before they become acute.
- **Preventing** recurring health episodes with a focus on positive behavior change.
- **Saving** unnecessary healthcare spending through better chronic condition management.
- **Increasing** patient-clinician data between visits.

Digital Health Development Challenges and Solutions

Primary Hurdles to Adoption		Solution
FDA Regulation		User-friendly
Patient Adoption		Creates actionable data
Doctor Acceptance	Efficacy	Promotes behavioral change
Reimbursement		Demonstrates results
Privacy		Secure

Source: Goldman Sachs Global Investment Research

Digital Health Case Studies Across Major Verticals

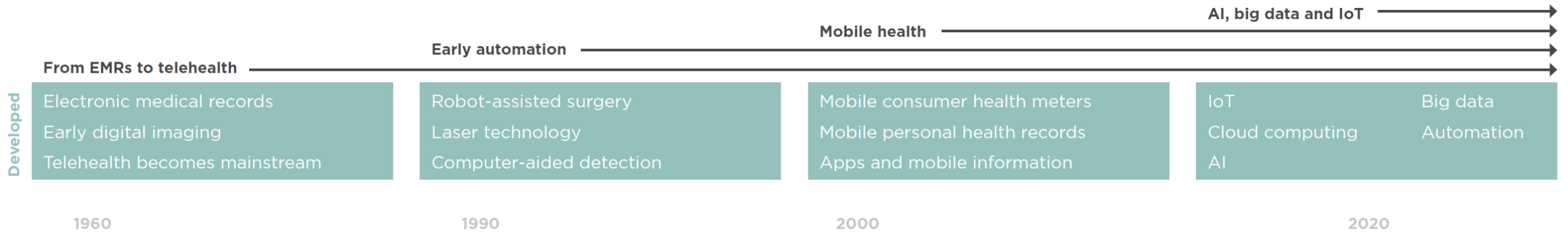$ in millions; trial size in number of patients where applicable

	Company	Description	Results Summary	Pilot Study/ Clinical Trial Size	Addressable Market	Savings Opportunity
Remote Patient Monitoring	CardioMEMS	Remote heart failure monitoring and management through an implantable device.	Substantial reduction of inpatient/ER admissions with better direction of outpatient resources.	550	$3,300	$17,400
	Vivify	Remote heart failure monitoring and management	Substantial reduction of inpatient/ER admissions with better direction of outpatient resources. Significant cost savings.	13	$495	$17,400
	DexCom	Continuous glucose monitoring connected to a smartphone application and social network.	Easily and discretely check glucose from a smartphone. Social networking component has already saved lives.	n/a	$6,468	$11,701
	Propeller Health	Medication adherence and air-quality tracking for Asthma/COPD patients.	50% improvement in total patients with symptoms 'controlled' (ie no acute events driving hospitalizations.	n/a	$2,726	$19,261
	iRhythm	14- day continuous heart monitoring for arrhythmia diagnosis.	Device delivers 99.1% performance detection accuracy (PDA), demonstrating efficacy and gaining FDA approval.	412	$2,275	$5,852
	AliveCor	ECG on an smartphone for arrhythmia diagnosis and monitoring	Accurate diagnosis of 3 variants of electrophysiological disruption in the heart (primarily Atrial Fibrillation)	381	$650	$5,852
	Biovotion	Arm-band based ICU grade vital signs measurement. Aims at monitoring glucose non-invasively	Accurate diagnosis of 3 variants of electrophysiological disruption in the heart (primarily Atrial Fibrillation)	381	~	~
Telehealth	Doctor on Demand	Virtual doctors visits (medical, psychiatric, lactation counseling) via a video conferencing platform	Healthcare delivered at ~25% of current costs over teleconference with increased patient satisfaction	n/a	$12,018	$103,625
Behavior Modification	Omada	Weight-loss coaching for diabetes prevention	Sustained weight-loss at a level that is significantly correlated to diabetes reduction	187	$5,655	$44,528

Scale

More Tangible

Less Tangible

Source: Goldman Sachs Global Investment Research, 2012 MEPS Survey, CMS, Industry Data

Exciting Time in Healthcare

	Old World	**New World**
Payment	Fee-for-service	Outcome-based
Incentive	Volume	Value
Focus	Acute episodes	Population health
Role of Provider	Single episodes	Care continuum
Information	Retrospective	Predictive

Digitization of The Healthcare Industry

AI, big data and IoT →

Mobile health →

Early automation →

From EMRs to telehealth →

Developed

Electronic medical records	Robot-assisted surgery	Mobile consumer health meters	IoT	Big data
Early digital imaging	Laser technology	Mobile personal health records	Cloud computing	Automation
Telehealth becomes mainstream	Computer-aided detection	Apps and mobile information	AI	

1960

1990

2000

2020

Key Digital Health Benefits

ACCESS ↑

Greater reach of healthcare delivery as some doctor services can be delivered to patients (and managed) via technology-based solutions (telehealth for remote monitoring and diagnostics).

Greater and faster patient access to health and wellness information delivered via mobile phones. This is key in developing countries where 51% of the population live in rural areas.

QUALITY ↑

Better coordination of care as digital health enables faster and secure communication and data sharing between healthcare centres, professionals and patients.

Enhanced quality of professionals as they are more equipped and can analyse greater data sets to take decisions. Digital health also includes tools for e-learning and training.

COST ↓

Earlier risk detection and action: digital health allows patients to take greater responsibility for active management of some of their own health issues and allows professionals to detect risks earlier. This can help reduce the burden of diseases.

Resource optimisation: digital health can ensure that available health resources are used most effectively and where/when needed.

Benefits of Digital Health

Minimises avoidable service use

Improves outcomes

Promotes patient independence

Focusses on prevention

Drivers of Digital Health Revolution

ECONOMIC

Unsustainable cost of care; shift to value-based reimbursement

DEMOGRAPHIC

Aging populations in developed countries; digital-first millennials

TECHNOLOGICAL

Growth of precision medicine; rise of smartphones and wireless technologies

SOURCE: General Electric

Using **big data** to drive value-based care could **reduce health care spending** in the U.S. between

$300-450 BILLION A YEAR,
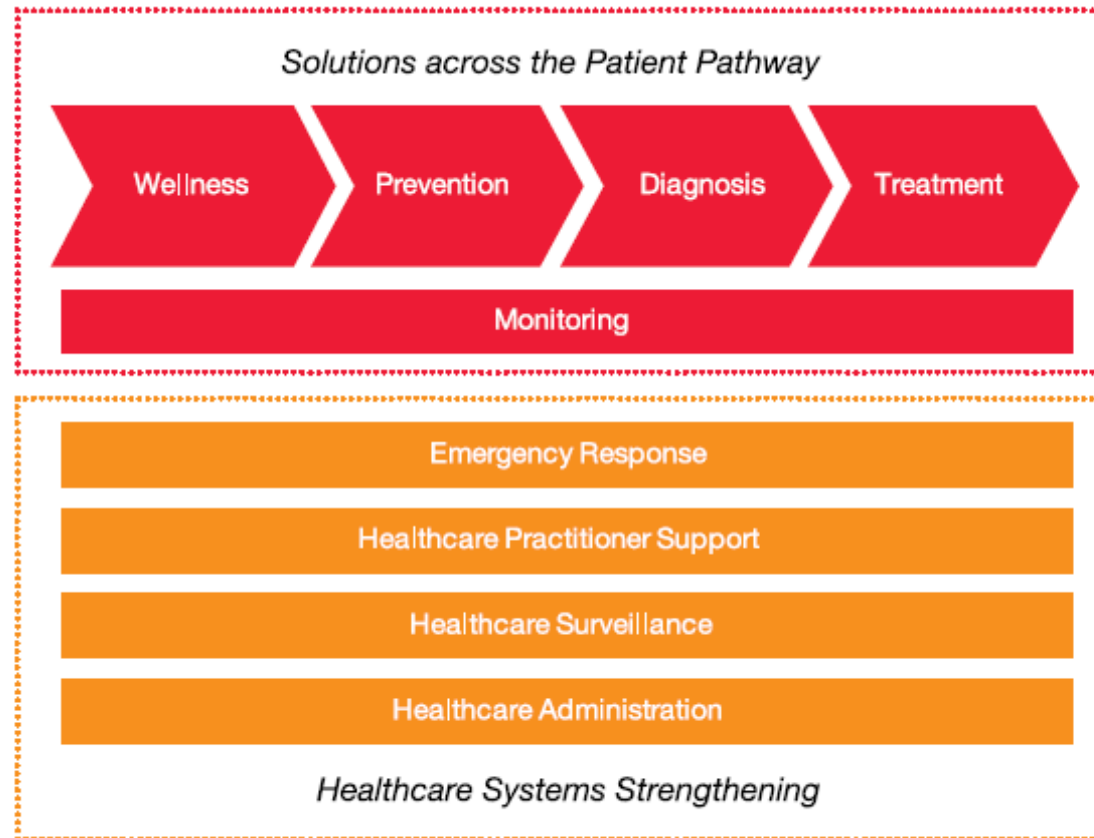
or 12-17% of the $2.9 trillion spent that year

SOURCE: McKinsey and Company

Digital Health Will Push Care Back Home

$ — Home
$$ — Assisted Living
$$$$ — Skilled Nursing Facility
$$$$$$$$$$ — Hospitalization

Step Ups in Care and Cost

Digital Health Services Across the Continuum of Care

Solutions across the Patient Pathway

Wellness → Prevention → Diagnosis → Treatment

Monitoring

Emergency Response

Healthcare Practitioner Support

Healthcare Surveillance

Healthcare Administration

Healthcare Systems Strengthening

Source: GSMA and PwC analysis

> " Sustainable health is about promoting wellbeing delivering connected and better healthcare and pursuing innovation. We are deemed to change. "

Malek El Husseini

Thanks