FROST & SULLIVAN

THE **H** IN HEALTHCARE OF 2025

THE FUTURE OF HEALTHCARE

The Times That Are Changing…

Economically Unsustainable
Current healthcare and human services industries

Treatment Decisions
Gap in accuracy

Evidence-Based Medicine
Less than 50% is actually evidence-based

Aging Populations
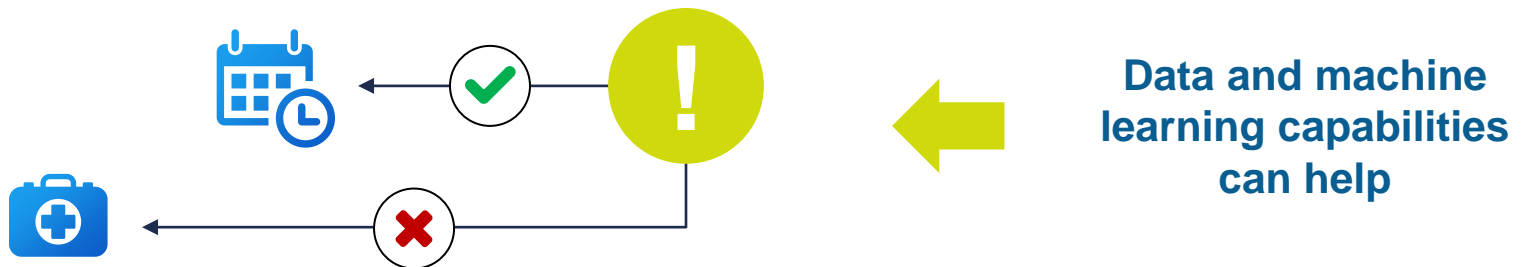Requires more care

Health Spending
Disconnect with outcomes

The problem is one of productivity, not of diseases, gadgets or healthcare.

Data and machine learning capabilities can help

Source: Frost & Sullivan

The Digital Revolution

Expected alternative payments from the CMS by 2018

50%

75%+

Percentage of patients expected to use digital health services in the future

Frequency at which healthcare data doubles

24 Months

39.7 million

Healthcare smartphone apps in use

Estimated global economic impact of chronic disease by 2030

$47 trillion

20-30 billion

Connected/Internet of Medical Things Devices by 2020

Amount of healthcare data today

150+ Exa-bytes

55%

Environmental and social factors account for approximately 55% of population
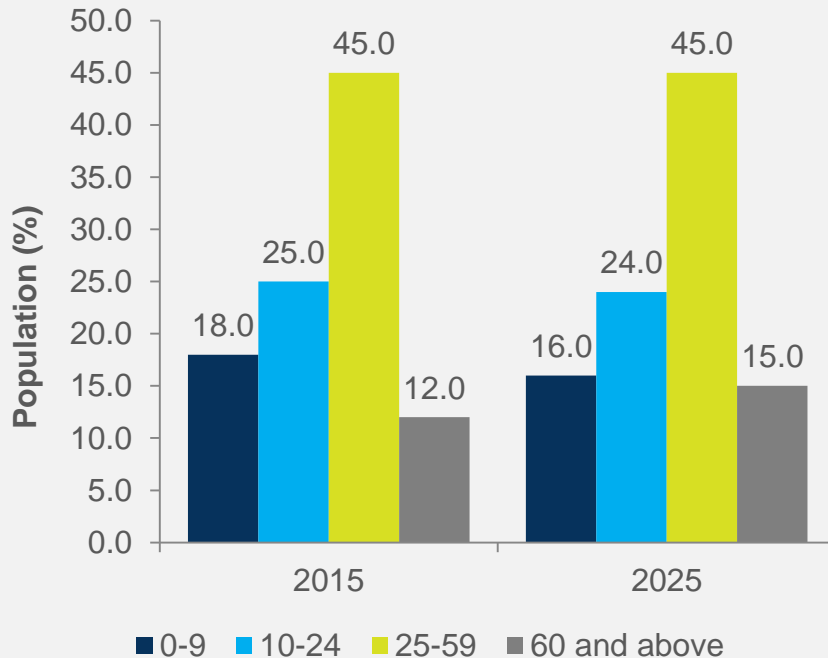
There's a Need for Efficient, High-Quality Healthcare

Population Distribution by Age Group, Global, 2015 & 2025

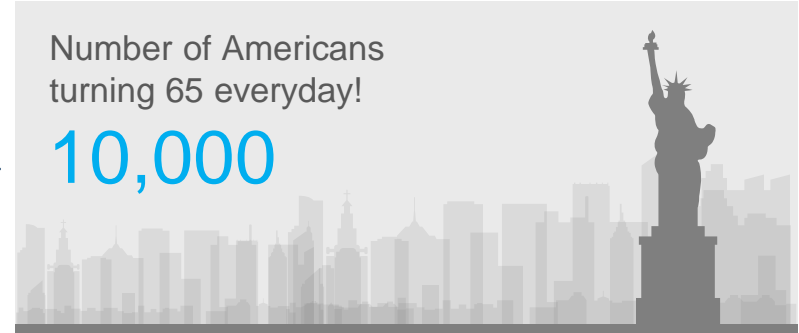### Senior Population Size Increasing

Population (%)

Year	0-9	10-24	25-59	60 and above
2015	18.0	25.0	45.0	12.0
2025	16.0	24.0	45.0	15.0

Legend: ■ 0-9 ■ 10-24 ■ 25-59 ■ 60 and above

Number of Americans turning 65 everyday!

10,000

Number of centenarians in Japan!

67,824

(34.85/100,000)

[Expected to rise to 272,000 by 2050]

People aged 60 and over in 2025

1.2 billion
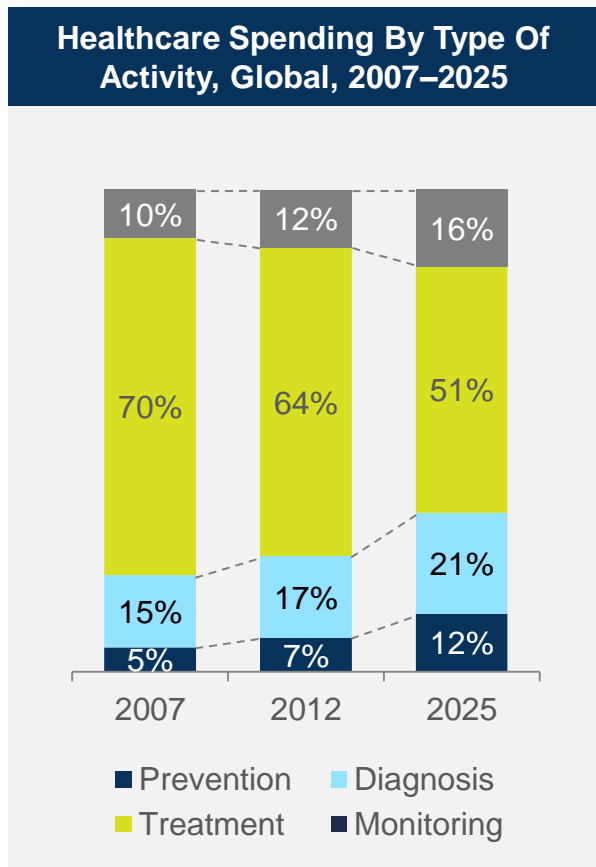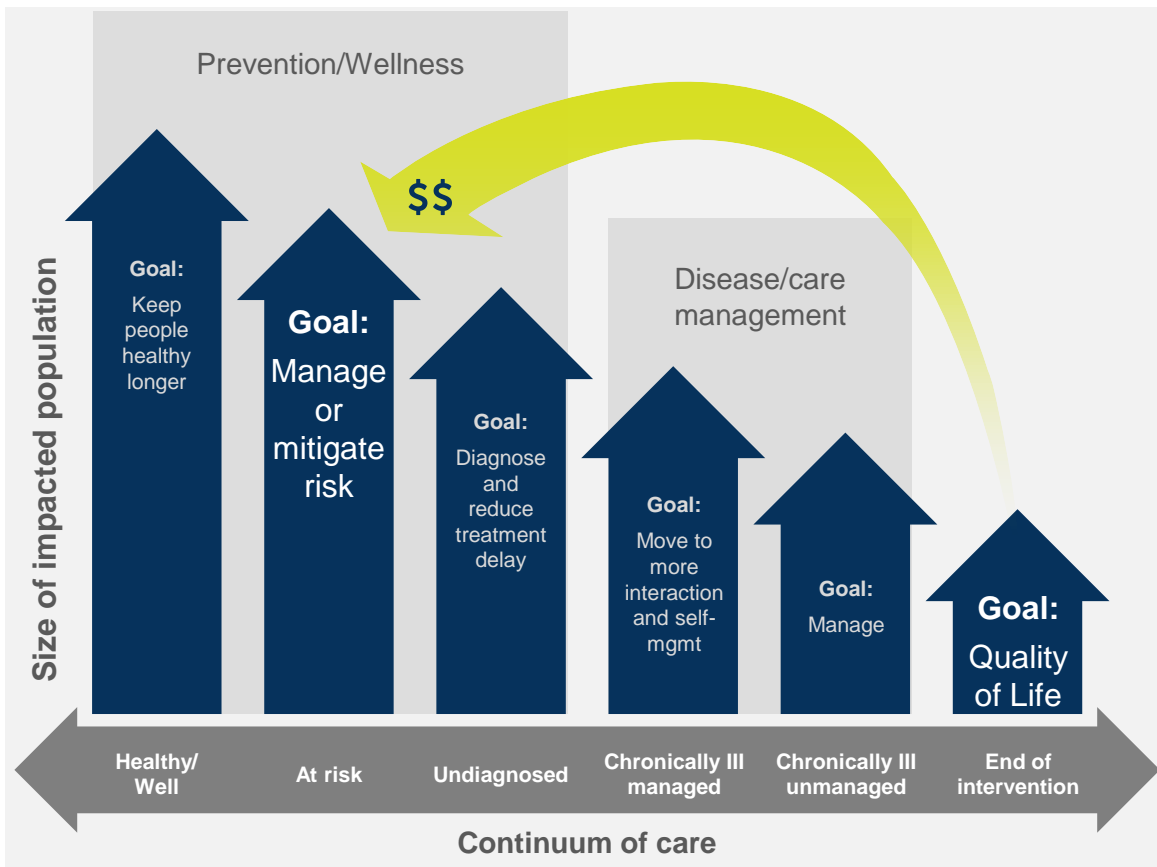
Current population size of India!

Source: Frost & Sullivan

Changing the Cost Curve: People want Health, not Healthcare

Shift our focus—and investments—from acute care to prevention

Prevention/Wellness

Disease/care management

$$

Goal: Keep people healthy longer

Goal: Manage or mitigate risk

Goal: Diagnose and reduce treatment delay

Goal: Move to more interaction and self-mgmt

Goal: Manage

Goal: Quality of Life

Size of impacted population

| Healthy/ Well | At risk | Undiagnosed | Chronically Ill managed | Chronically Ill unmanaged | End of intervention |

Continuum of care

Healthcare Spending By Type Of Activity, Global, 2007–2025

	2007	2012	2025
Monitoring	10%	12%	16%
Treatment	70%	64%	51%
Diagnosis	15%	17%	21%
Prevention	5%	7%	12%

■ Prevention   ■ Diagnosis
■ Treatment   ■ Monitoring

Source: Frost & Sullivan

Top 5 Wellness Shifts to Ensure a Healthier Population

01 Imperceptible wellness integrated in daily life

02 Wellness no longer limited to body, but extends to mind and soul

03 Diets and exercise designed around individual genomes, environment, and life goals

04 Workplace wellness programs give way to total wellness work cultures
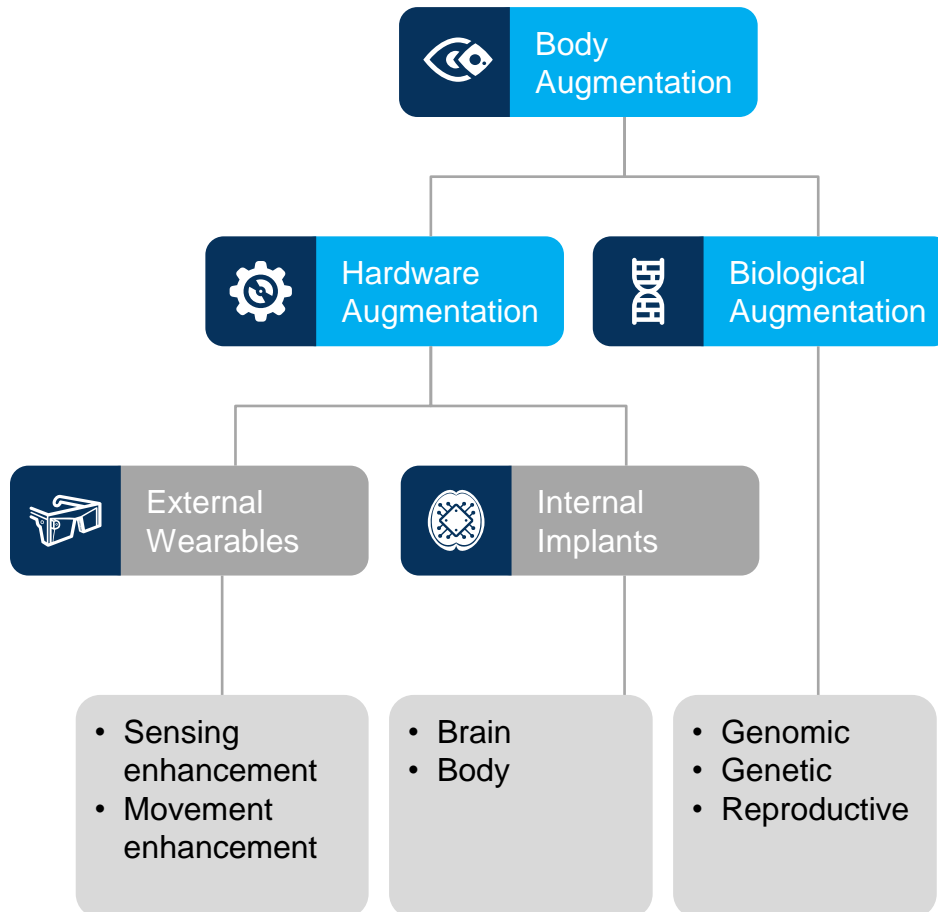
05 Growing medical wellness tourism to health resorts, cities, and regions
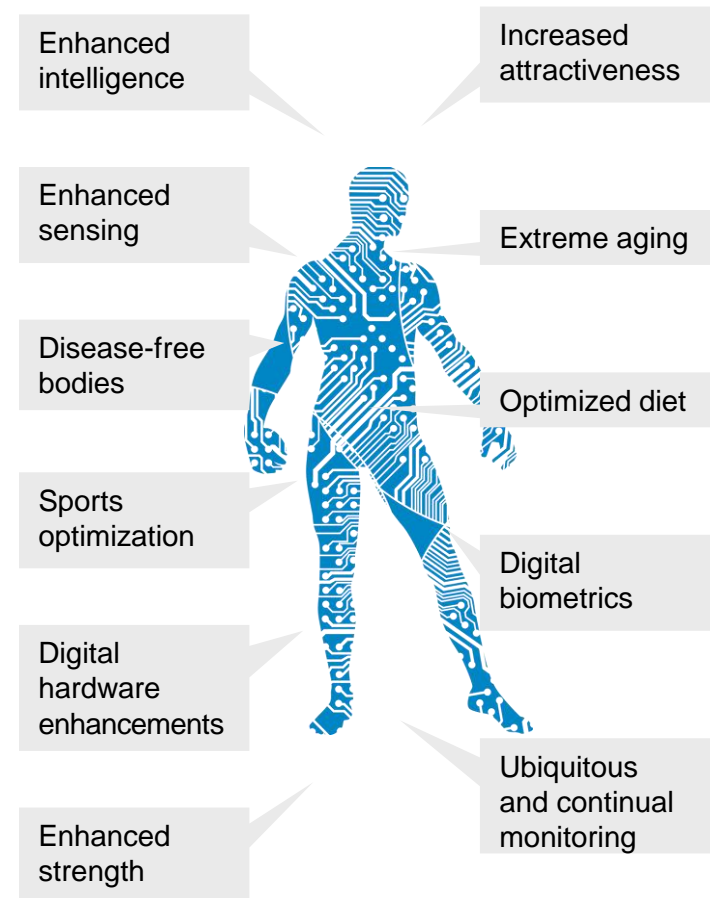
Source: Frost & Sullivan

The Evolving Human Body
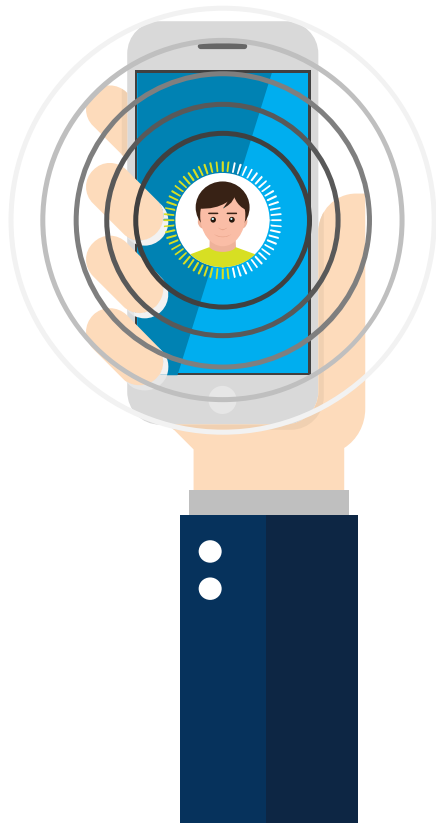
Evolving Human Body: Framework, Global, 2017–2030

Body Augmentation

Hardware Augmentation

Biological Augmentation

External Wearables

Internal Implants

- Sensing enhancement
- Movement enhancement

- Brain
- Body

- Genomic
- Genetic
- Reproductive

Evolving Human Body: Capabilities of the Future, Global, 2017–2030

- Enhanced intelligence
- Enhanced sensing
- Disease-free bodies
- Sports optimization
- Digital hardware enhancements
- Enhanced strength
- Increased attractiveness
- Extreme aging
- Optimized diet
- Digital biometrics
- Ubiquitous and continual monitoring

Source: Frost & Sullivan

The Big Debate: Who Owns Patient Medical Data?

National-level Biometrics Identification Programs Leveraged

EHR linked to Biometric ID

Accessible to any qualified professional after patient consent by providing biometric validation, and in case of emergencies to paramedics or volunteers
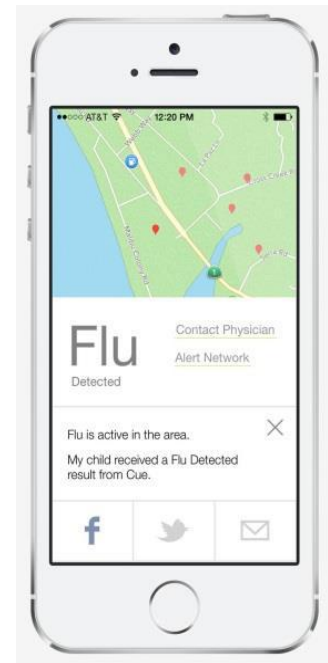
Visualization possible via the following:

- Computers, tablets and smartphones
- Mixed-reality devices, holographic projection devices

Source: Frost & Sullivan

Empowered Patients Can Perform At-Home Tests With Instant Diagnoses At Low Costs

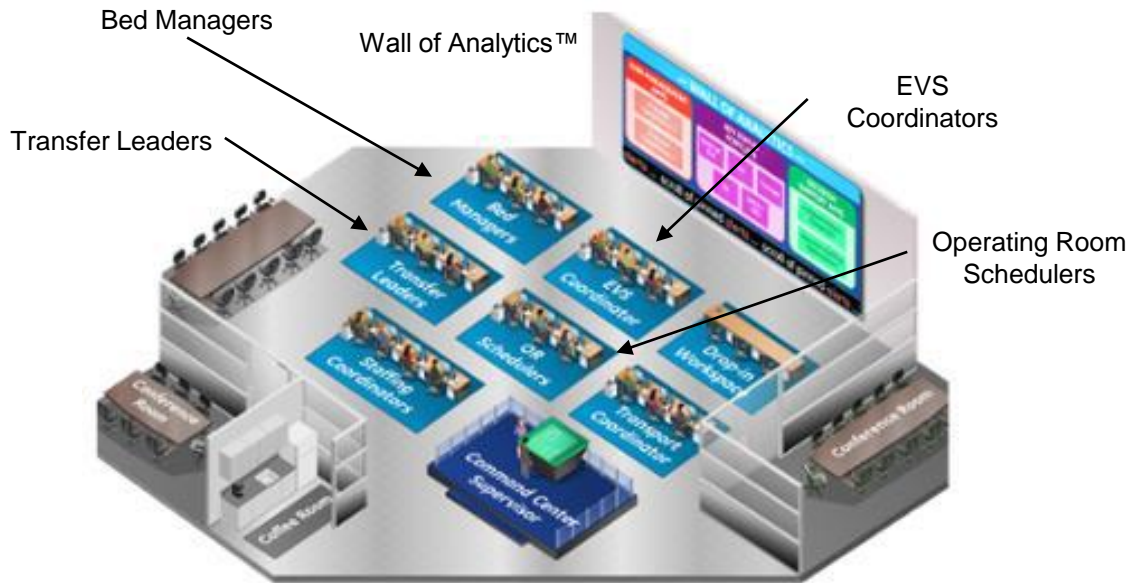| **$200 Analyzer**	**$4–$10 Cartridges**	**Test Results in 10 Minutes**	**Link to Clinicians**

Smart Hospitals Will Feature Air Traffic Control Like Command Centers

CAPACITY COMMAND CENTER LAYOUT AT JOHNS HOPKINS HOSPITAL

Bed Managers

Wall of Analytics™

Transfer Leaders

EVS Coordinators

Operating Room Schedulers

FEATURES

- 2,550 square feet
- Technology from aviation, aerospace, and power industries—predictive analytics and systems engineering principles
- 24 staff members
- 22 information screens— Wall of Analytics
- Data from 14 sources, approximately 500 messages/minute
- GE consultation services
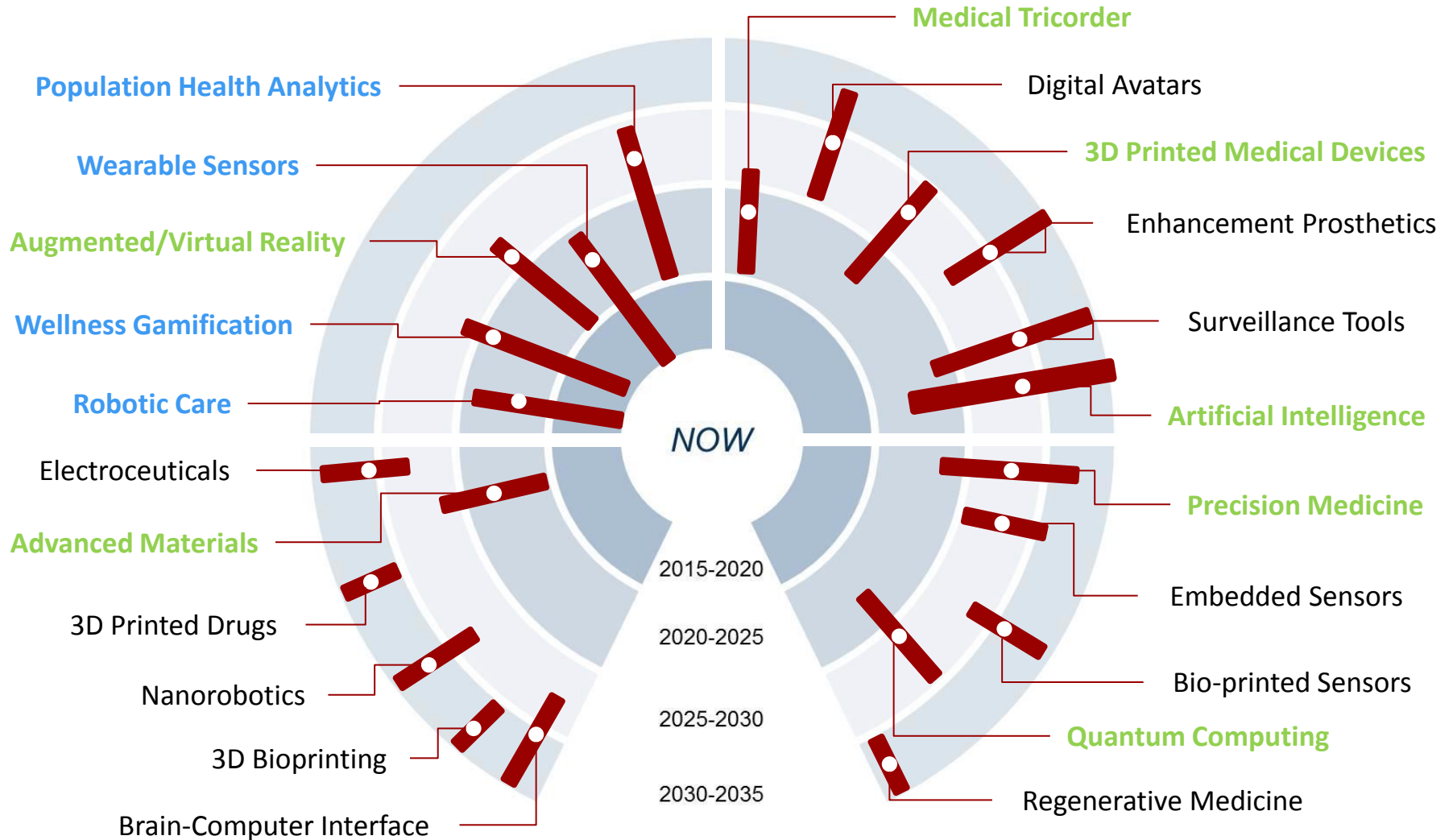
- 60% improvement in patient transfers from other hospitals (serious medical conditions)
- 63 minutes faster ambulance dispatch to patients.
- 30% faster in-bed assignment and 26% faster in-bed transfer processes at the ED
- 70% reduction in transfer delay from the operating room
- 21% increase in early discharge of patients

Source: Frost & Sullivan

HEALTHCARE ENABLING TECHNOLOGIES

Technology Commercialization and Maturation Timeframe

Medical Tricorder

Population Health Analytics

Digital Avatars

Wearable Sensors

3D Printed Medical Devices

Augmented/Virtual Reality

Enhancement Prosthetics

Wellness Gamification

Surveillance Tools

Robotic Care

Artificial Intelligence

Electroceuticals

NOW

Precision Medicine

Advanced Materials

2015-2020

3D Printed Drugs

Embedded Sensors

2020-2025

Nanorobotics

Bio-printed Sensors

2025-2030

3D Bioprinting

Quantum Computing

2030-2035

Brain-Computer Interface

Regenerative Medicine

*Bars represents the horizon for technology commercialization and maturation

Source: Frost & Sullivan

The New Connected Ecosystem

On Body	In Home	Community	In Clinic	In Hospital
Invisible Wearables/Connected Apparel	Virtual Assistants Answer Health Queries	Drone Emergency Support	Smart Diagnostic Devices	Digitally Connected Systems
Enhanced Strength	Contact-less Vitals Monitoring	Seamless Monitoring Beyond Home	Instant Pathology Test Results	Real-time Staff, Equipment, Patient Location
Augmented Hearing	Food Consumption, Activity Monitoring	Telehealth Kiosks in Public Places	Telemedicine/Telepresence Technology	Virtual Departments (ICU)/Hospitals
Smart Pills for Imaging, Drug Delivery	Telemedicine enabled TVs & Screens	Smart Supply Chain Logistics	AI-based Scribe Support	Analytics for Operations and Patient Outcomes

Analytics/ Informatics   **Storage**   **Machine Learning**   **Cybersecurity**   **Interoperability**   **Decision Support**

Source: Frost & Sullivan

AI Will Transform Healthcare As We Know It

AI Needed to Process and Manage Big Data

4.4 ZB

44 ZB
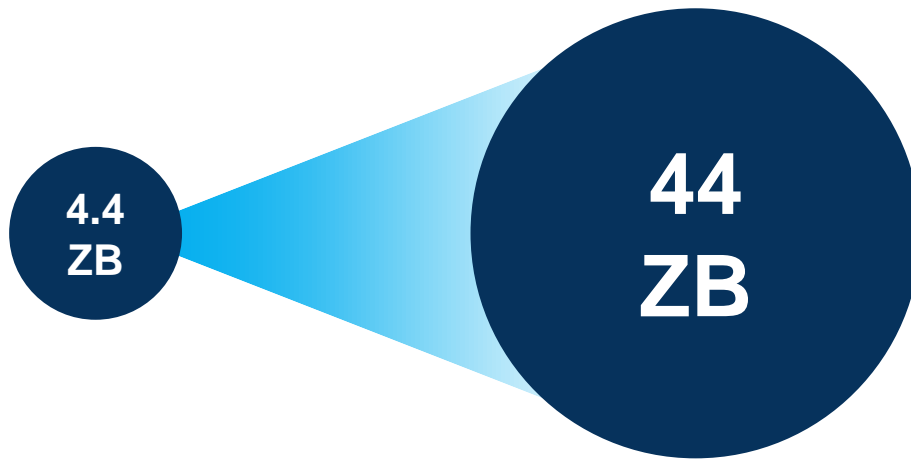
1 ZetaByte =
1 Trillion Gigabytes !!!

Data Created Annually

The Medicine of the Future

EHR Analysis

Population Health Management

Clinical Decision Support

Treatment Regime Designing

Predictive Care Guidance

Medical Image Processing

Virtual Personal Assistants

Cost Comparison

Precision Medicine

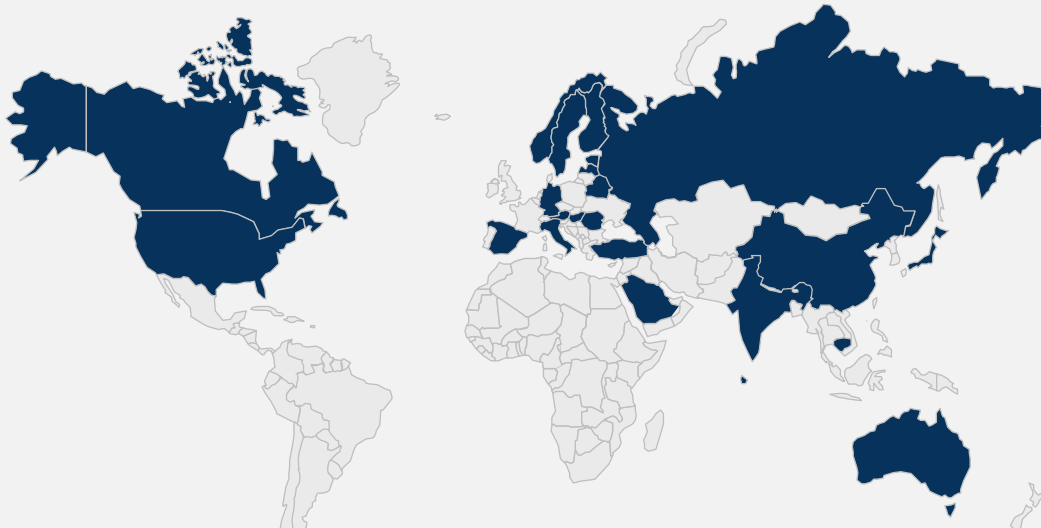Hospital Error Reduction

Predictive Modelling

Source: Frost & Sullivan

5G Technology to Enable IoT and Continuous Monitoring In Healthcare

TODAY

5G trials are underway using various spectrum bands

2035

$1.1 TRILLION

5G Enabled Output in Healthcare

Potential 5G bands
US
600 MHZ
2.6 GHZ (sprint)
3.55-3.7 GHZ
20, 37, 39 GHZ
57-71 GHZ (<_____>)

Potential 5G bands
EU
700 MHZ
2.6 GHZ (sprint)
3.4-3.8 GHZ
26 GHZ

Potential 5G bands
CJK
3.3-4.2 GHZ
4.4-4.9 GHZ
28-39 GHZ

Source: Global Mobile Suppliers Association; Qualcomm; Frost & Sullivan

Show Me the Money!

PHARMACEUTICALS & BIOTECHNOLOGY

$30+ B
Targeted Therapeutics

$30+ B
Immuno-Oncology
Checkpoint Therapeutics

MEDICAL TECHNOLOGIES

$500 M–$1 B
External
Neurostimulation Devices

$250–$500 M
Assistive Robotics

$1+ B
MRI Adaptive Radiation
Therapy

$1 B
AI Medical Image Analysis

$250–$500 M
AI Enabled Clinical
Decision Support

$1 B
Clinical Predictive Analytics

MEDICAL IMAGING

HEALTHCARE IT

Source: Frost & Sullivan

Where are the Jobs in the Future?

TECHNICIANS & INFORMATION TECHNOLOGY EXPERTS

- Companion Robot Technician
- Internet of Things Business Analyst
- Brain Computer Interface Designer
- Health Data Scientist
- Deep Learning Expert
- AI Chatbot Communications Designer
- Gamification Designer

- Virtual Reality Therapy Designer
- Medical Drone Route Designer
- Plastic/Reconstructive Surgery 3D Printing Specialist
- Voice Assistant Healthcare Content Specialists
- Robotic Clinical Documentation Specialists/ Scribes
- Virtual Hospital Manager

Source: Frost & Sullivan

Where are the Jobs in the Future? (continued)

MEDICAL SPECIALTIES

Telesurgery Specialist

Cyborg Therapist

Augmented/Virtual Reality Surgery Planner

End of Life Therapist

Nanomedical Engineer

Precision Medicine Compounding Pharmacist

(Synthetic) Organ Designer

Cryopreservation Specialist

Source: Frost & Sullivan

Where are the Jobs in the Future? (continued)

HEALTH ADVISORS

- Lifestyle Strategist
- Epigenetic Counselors
- Patient Assistant
- Healthcare Navigator
- Health Finances Planner

WATCH OUT FOR

- Health Data Hacker
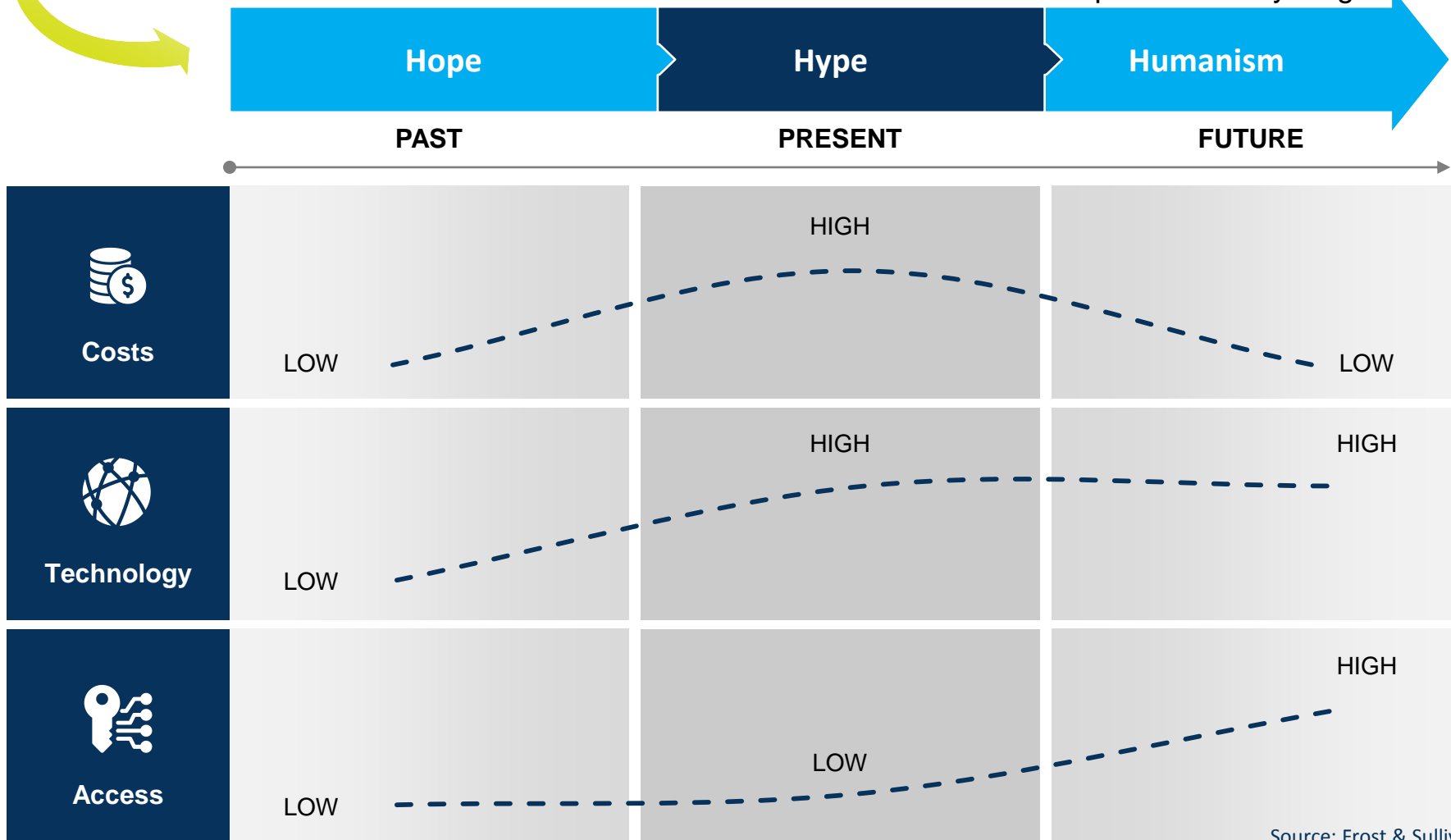- Brain Neurostimulation Specialist
- Biological/Genetic Terrorist

Source: Frost & Sullivan

What will the *"H"* in Healthcare Stand for?

Human interests and value predominate, and supersede everything else

Hope	Hype	Humanism
PAST	PRESENT	FUTURE

Costs

HIGH

LOW · LOW

Technology

HIGH · HIGH

LOW

Access

HIGH

LOW · LOW

Source: Frost & Sullivan

Contact Details

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