

# Sustainable by Design

## Dale Sinclair

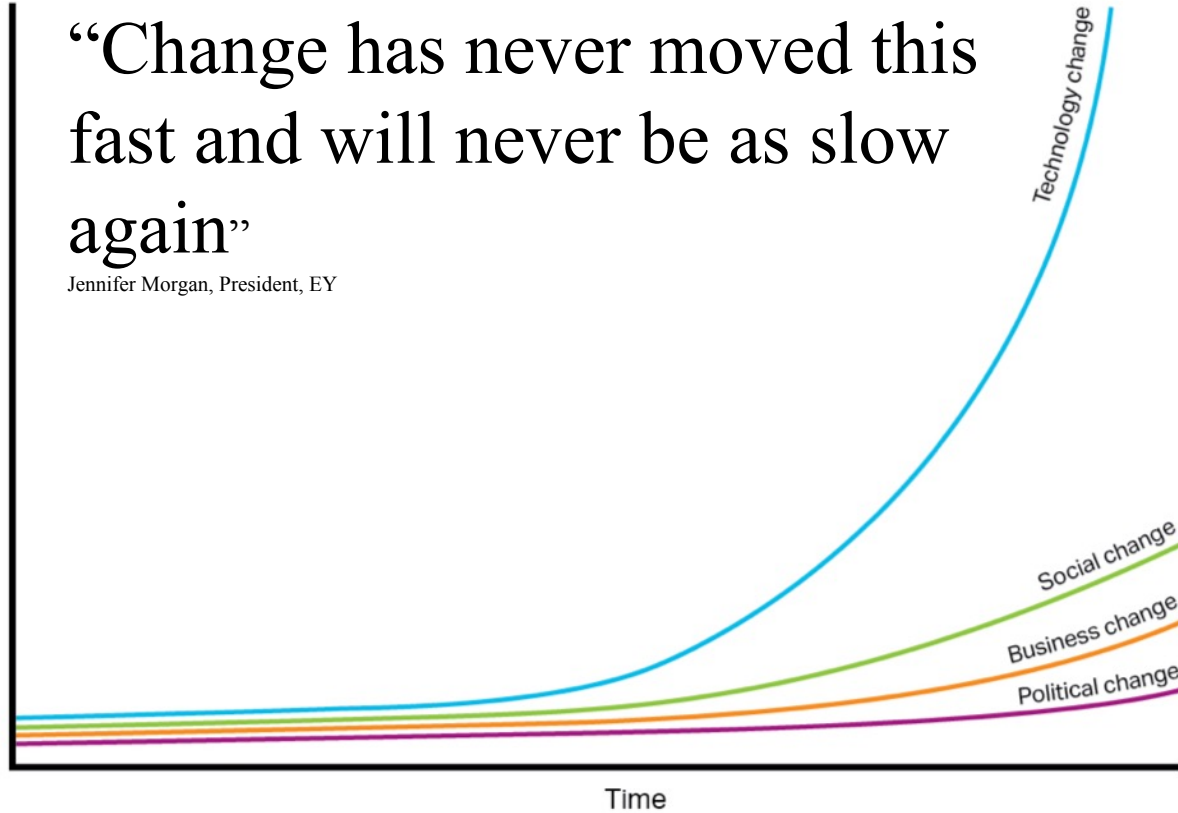
June 2017

**AECOM**

“Change has never moved this fast and will never be as slow again”

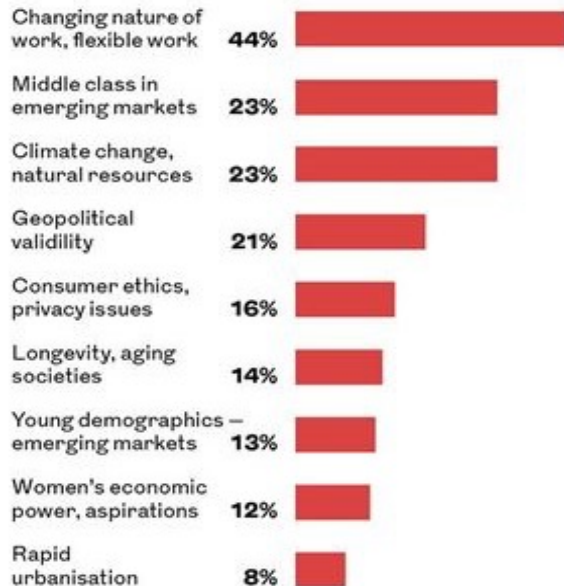
Jennifer Morgan, President, EY

Change

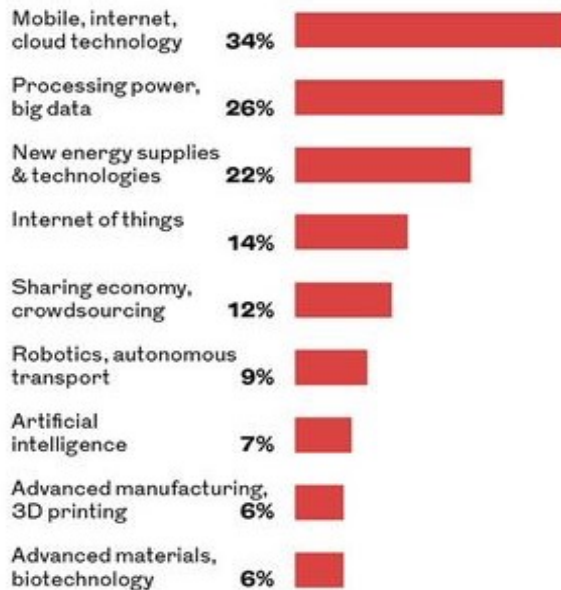


# Drivers for Change

## Demographic and socio-economic

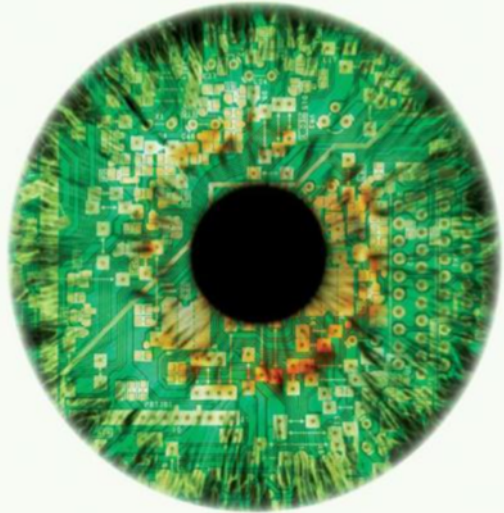


## Technological



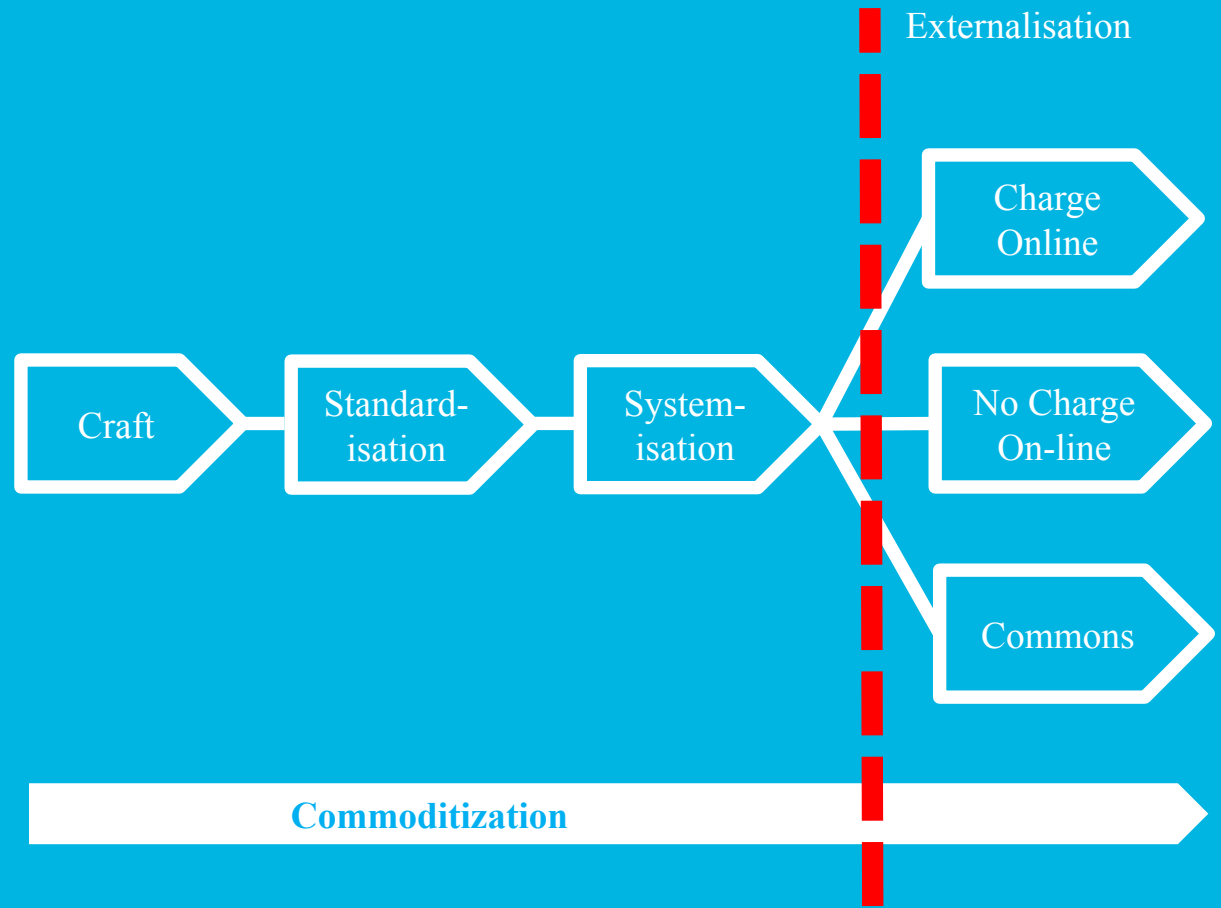
Source: Future of Jobs Survey, World Economic Forum  
Note: Names of drivers have been abbreviated to ensure legibility

RICHARD DANIEL  
SUSSKIND SUSSKIND



# THE FUTURE OF THE PROFESSIONS

HOW TECHNOLOGY WILL TRANSFORM  
THE WORK OF HUMAN EXPERTS



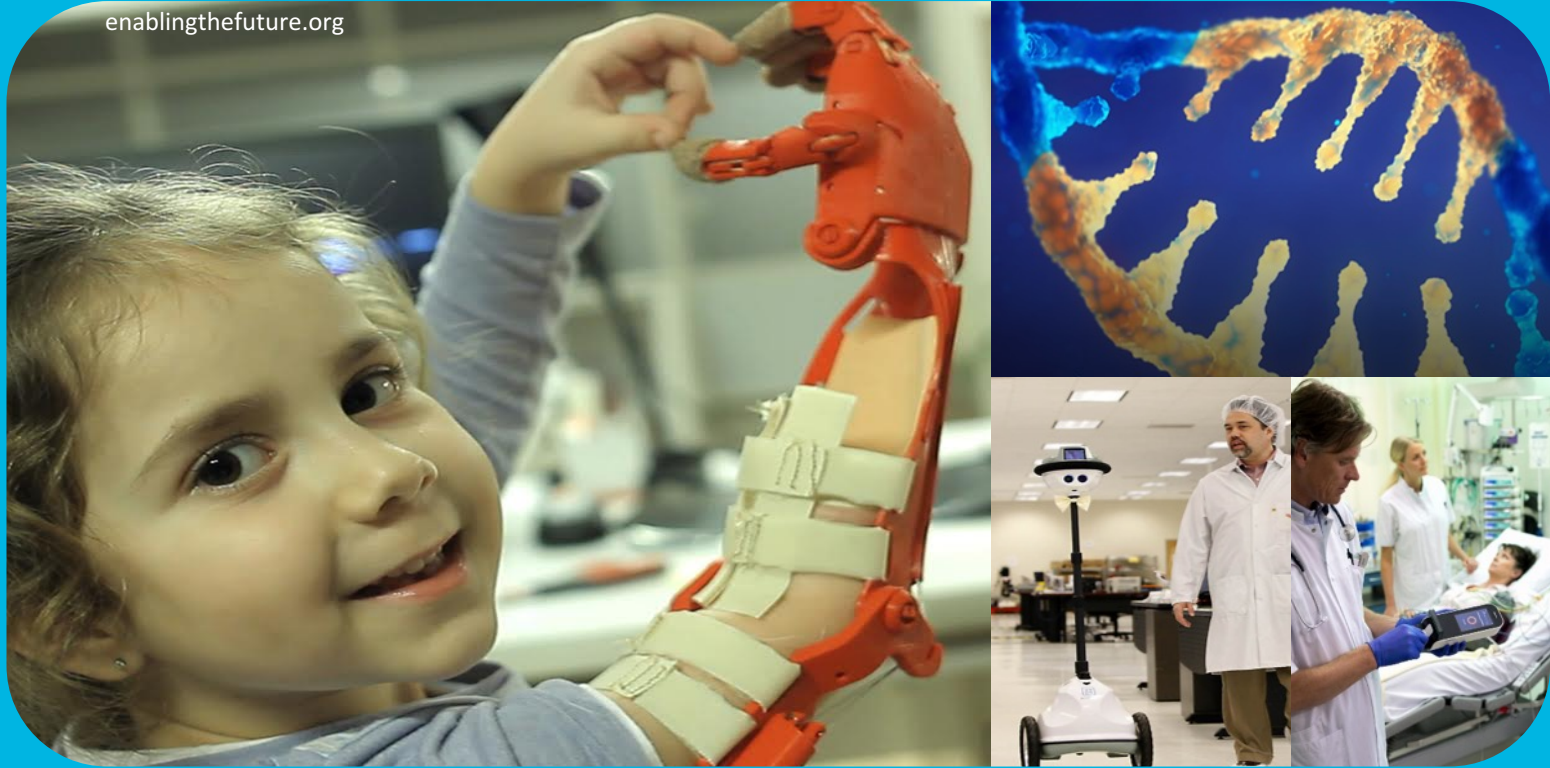
# Digital Transformation – Design to Construction



# Real-time Design

# Digital Transformation – Health and Wellbeing

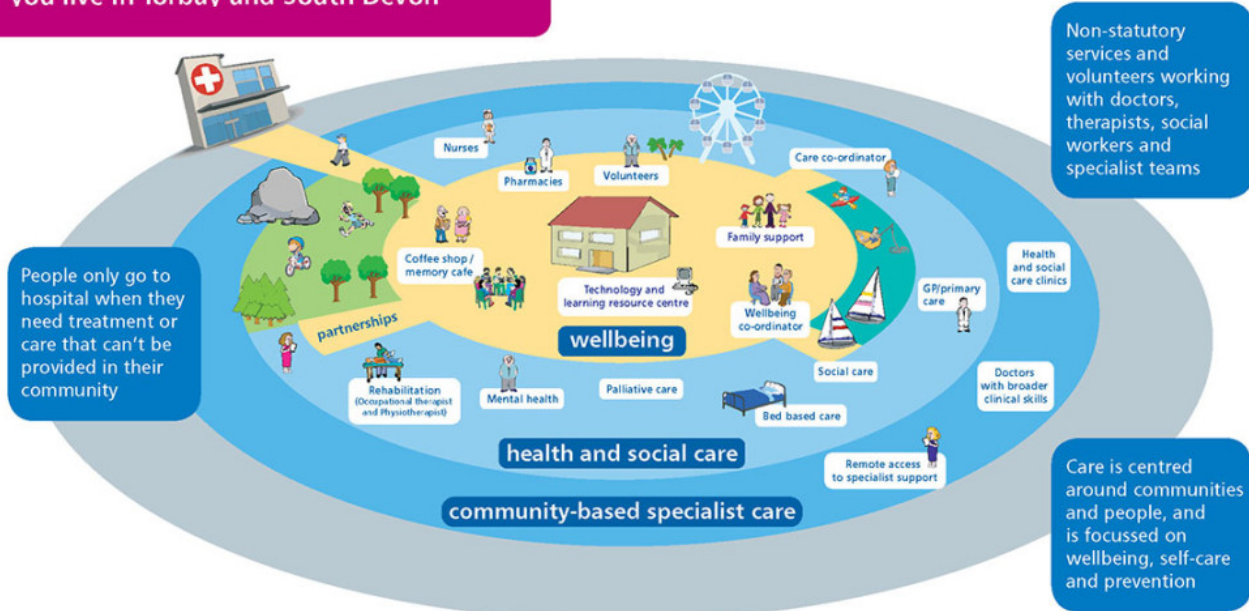
[enablingthefuture.org](http://enablingthefuture.org)



# Changing Models of Care

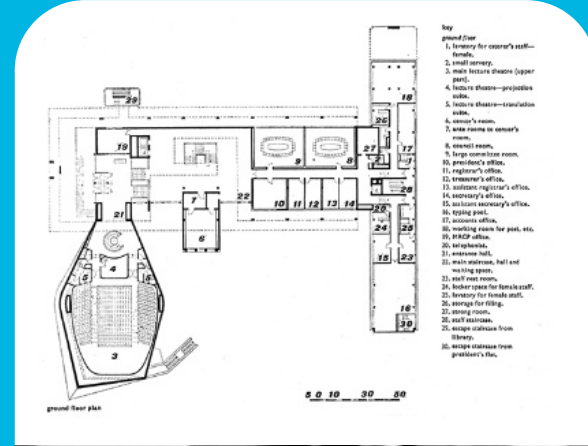
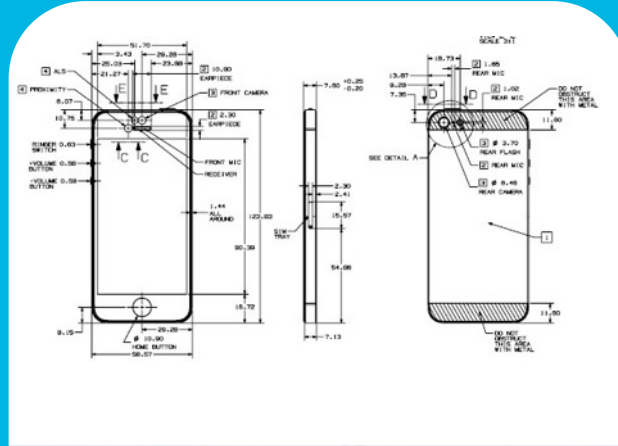
## Model of Care

Our vision of how care will look, wherever you live in Torbay and South Devon

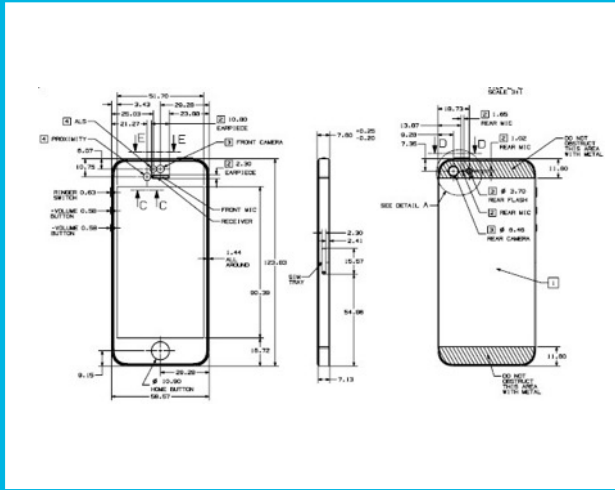




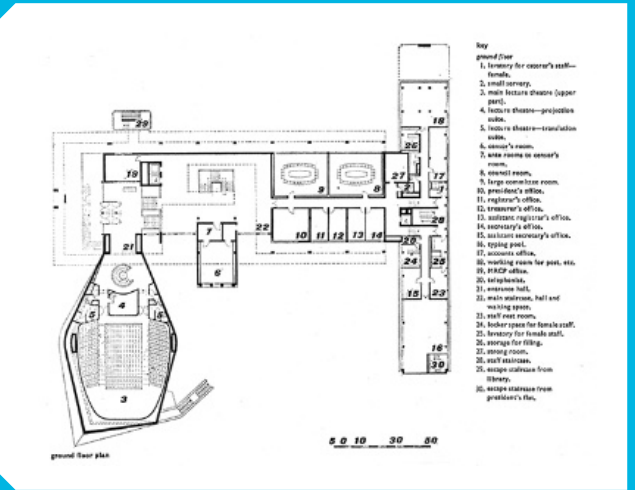
# Design - Products and Projects



# Products and Projects



Mass-customisation

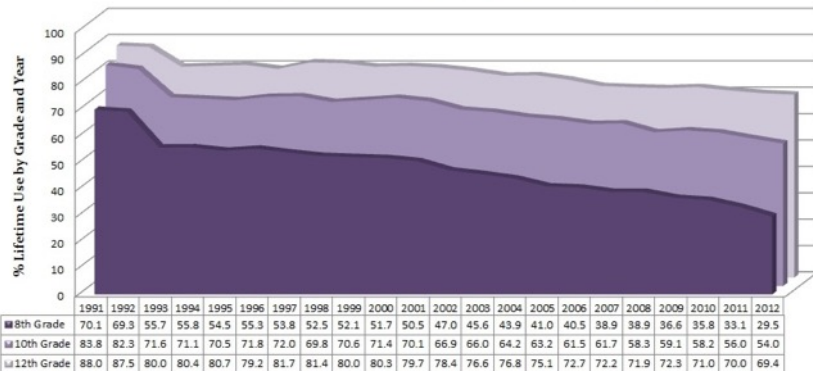


Modular

# Wellbeing Trends

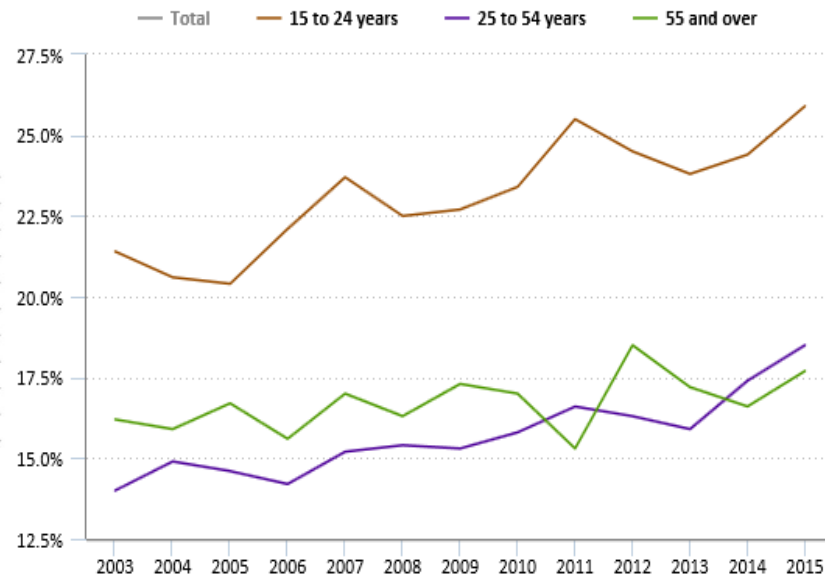
## Have you ever had alcoholic beverages to drink—more than just a few sips?

Trends in Lifetime Prevalence of Alcohol Use in Grades 8, 10, and 12



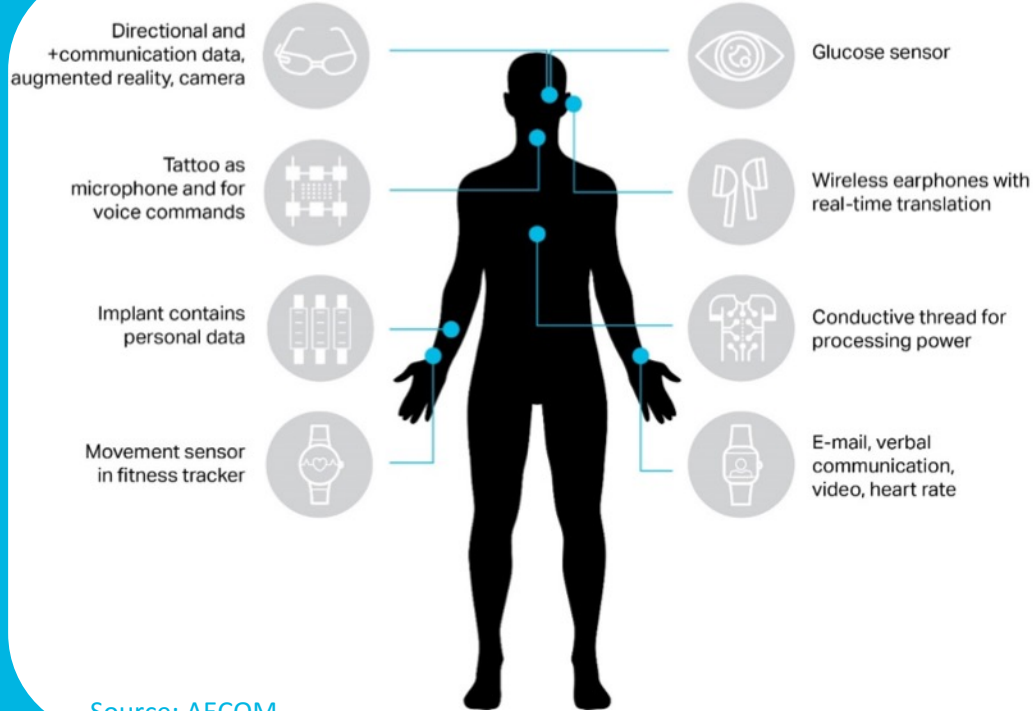
Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (December 19, 2012). "The rise in teen marijuana use stalls, synthetic marijuana use levels, and use of 'bath salts' is very low." University of Michigan News Service: Ann Arbor, MI. Retrieved December 19, 2012 from <http://www.monitoringthefuture.org>

## Percentage of population engaged in sports and exercise on an average day, by age, 2003–15

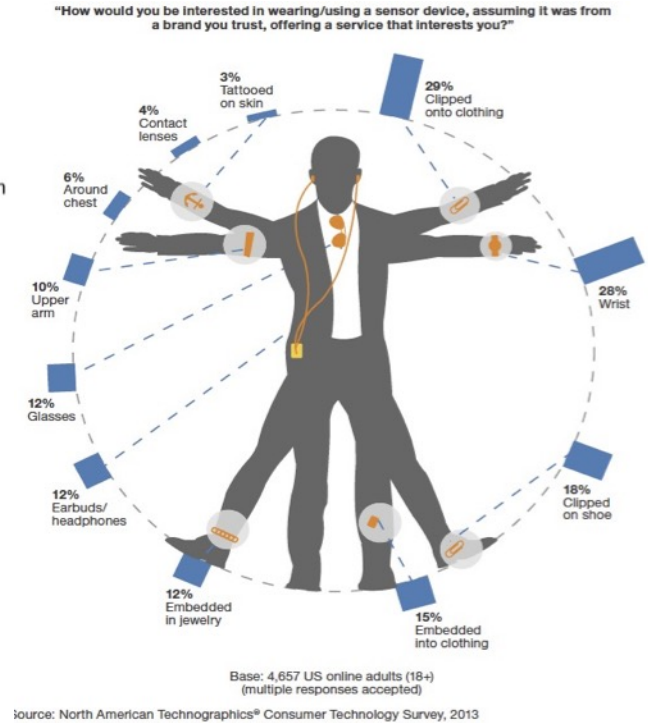


Click legend items to change data display. Hover over chart to view data.  
Source: U.S. Bureau of Labor Statistics.

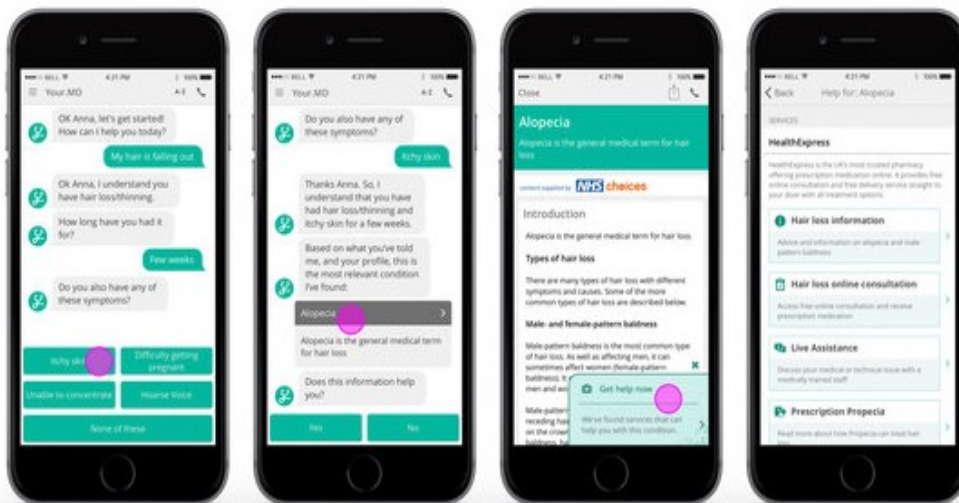
# Wellbeing and Wearables



Source: AECOM



# Patient Experience . . The First Step



Your.MD's AI:

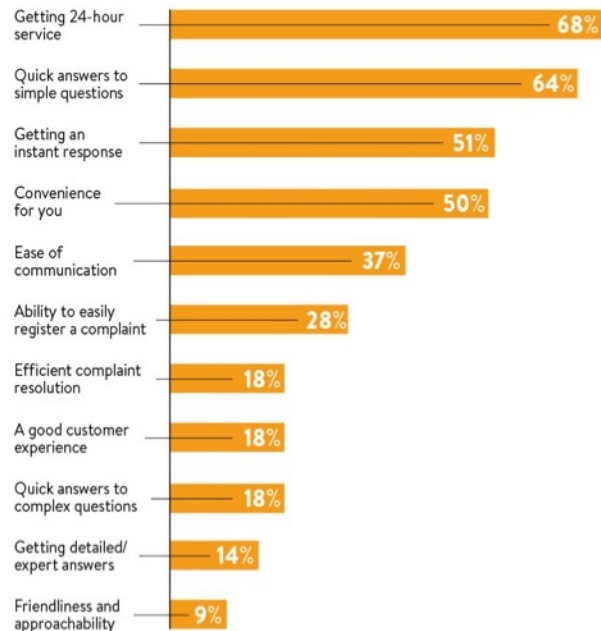
1. Understands what's wrong

2. Provides NHS information

3. Suggests relevant solutions

Source: Your:MD

## CONSUMERS' EXPECTED BENEFITS FROM CHATBOTS



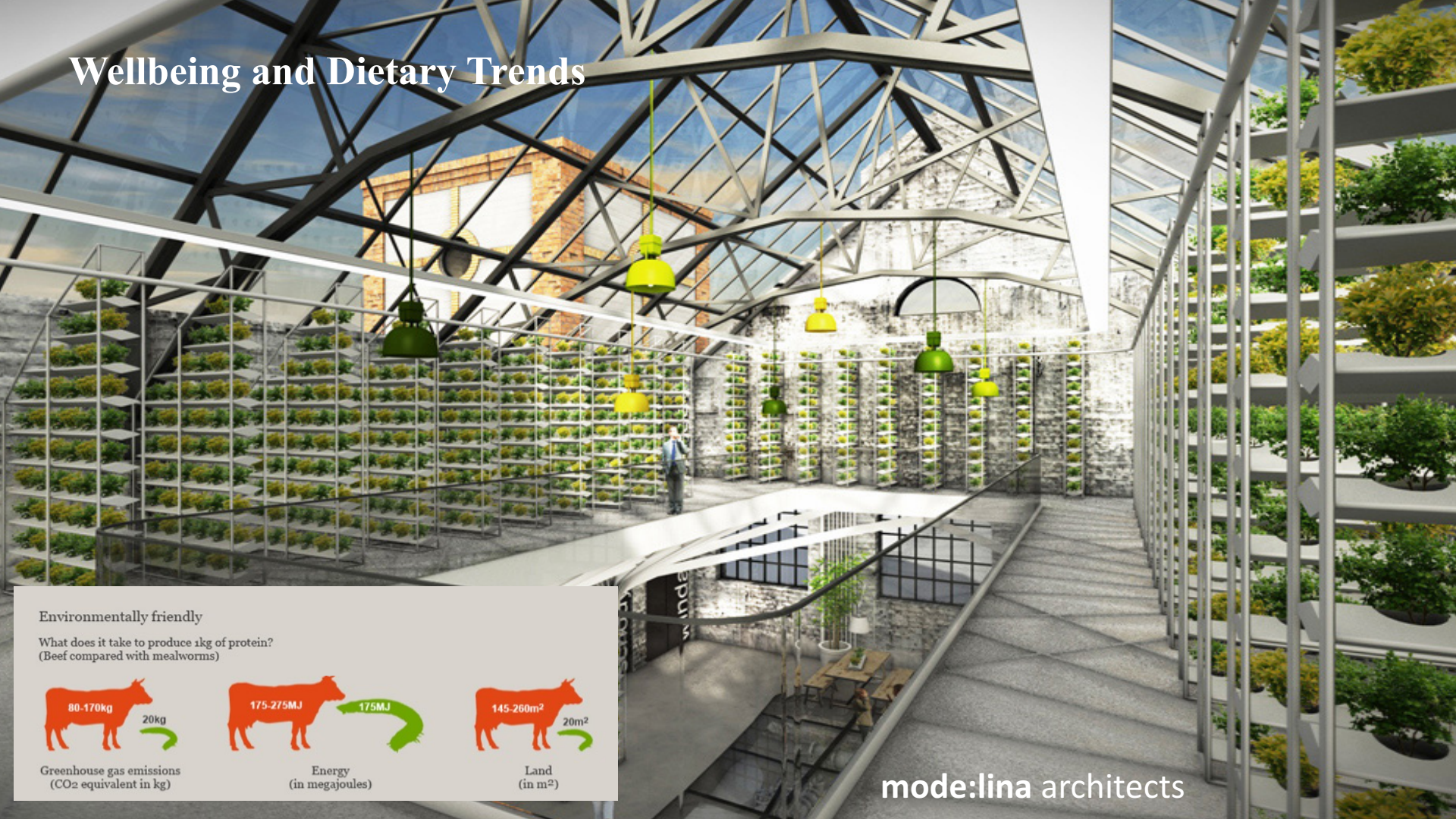
Source: myclever Agency 2016

# Pharmacies: Beyond Dispensing



- Current diagnostics
- bowel cancer screening
- coeliac disease
- (gluten sensitivity)
- H pylori (stomach ulcers)
- cholesterol
- male fertility
- pregnancy
- meningitis
- bacterial vaginosis
- urine infections

# Wellbeing and Dietary Trends



Environmentally friendly

What does it take to produce 1kg of protein?  
(Beef compared with mealworms)



Greenhouse gas emissions  
(CO<sub>2</sub> equivalent in kg)



Energy  
(in megajoules)



Land  
(in m<sup>2</sup>)

mode:lina architects

# Agile Working

Rural GP  
community



Photo: housely.com

The doctor will see you now... by Skype





## INSIGHTS & RISK MANAGEMENT



## HEALTHCARE RESEARCH



## MEDICAL IMAGING & DIAGNOSTICS



## LIFESTYLE MANAGEMENT & MONITORING



## NUTRITION



## EMERGENCY ROOM & HOSPITAL MANAGEMENT



## VIRTUAL ASSISTANTS



## MISCELLANEOUS



FLATIRON, H<sub>2</sub>O, burst IQ, AYASDI

## MENTAL HEALTH



## DRUG DISCOVERY



## WEARABLES

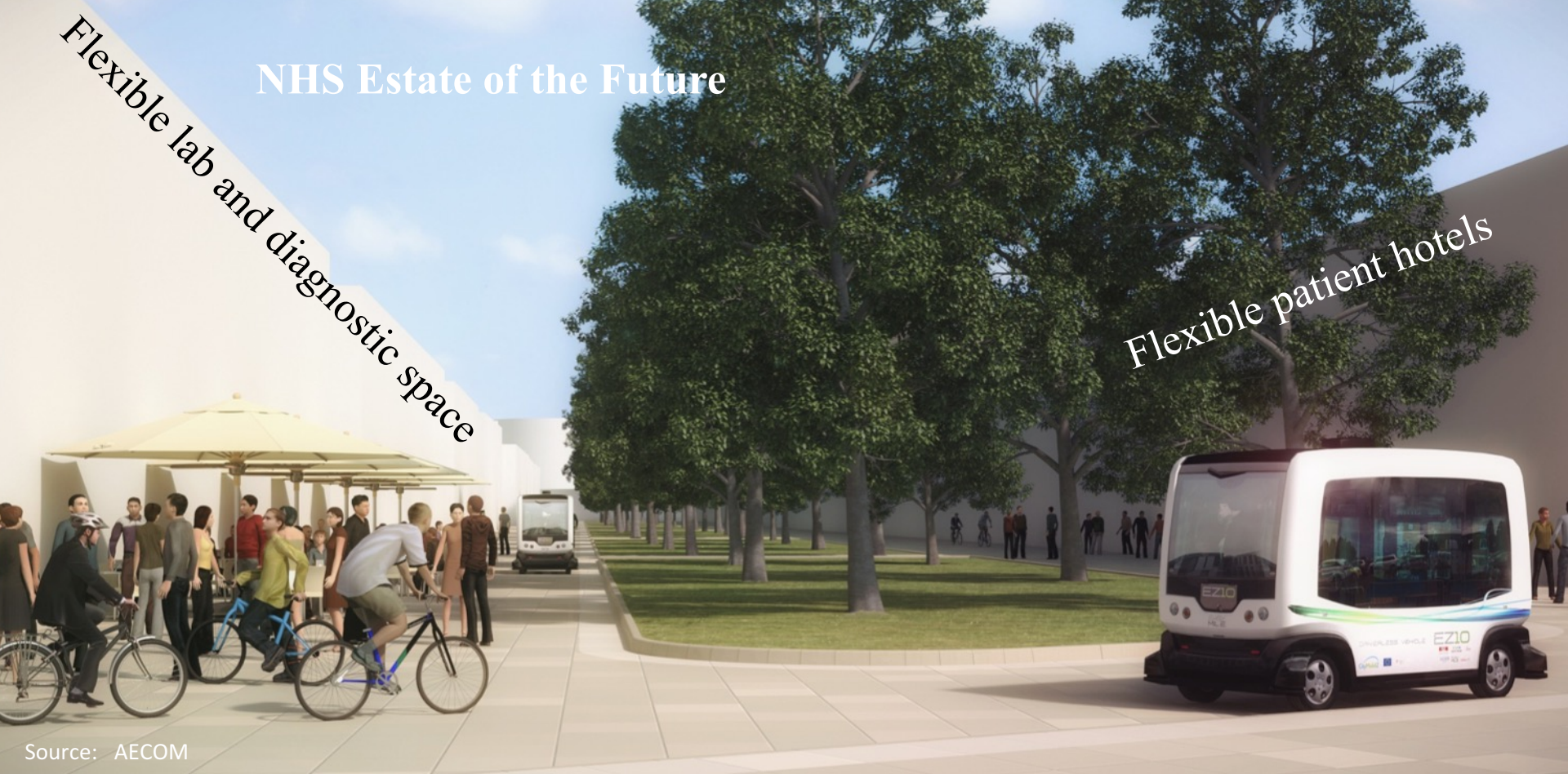


istock.com/hilch

# NHS Estate of the Future

*Flexible lab and diagnostic space*

*Flexible patient hotels*



Source: AECOM

# Patient Experience . . The Patient Hotel



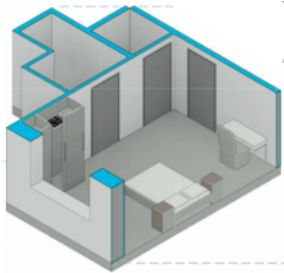
Switchable glazing to balance observation and privacy

Nursing stations and other spaces adaptable for different future use

Rooms fitted out with various sensors to enhance patient experience

Robotic nursing assistants linked to room sensors and on call for various functions

Automatic doors and security sensors: intruders, roaming, autonomous beds/wheelchairs



Hotel  
Junior Doctor accommodation  
Key Worker Housing

# Smart Patient Rooms



Sensors used for various activities including fall monitoring, turn management and movement of patients

Robotic assistants used for lifting patients, providing advice and dispensing drugs – predictive AI minimising dignity issues

Apps used to call medical staff, control room temperature, lights, entertainment and monitor medical gases and drips

Stats transmitted to a local server using Bluetooth technologies and accessed by handheld devices with automated alerts to clinical teams

Switchable glazing in lieu of curtains to balance visibility and privacy – linked to sensors

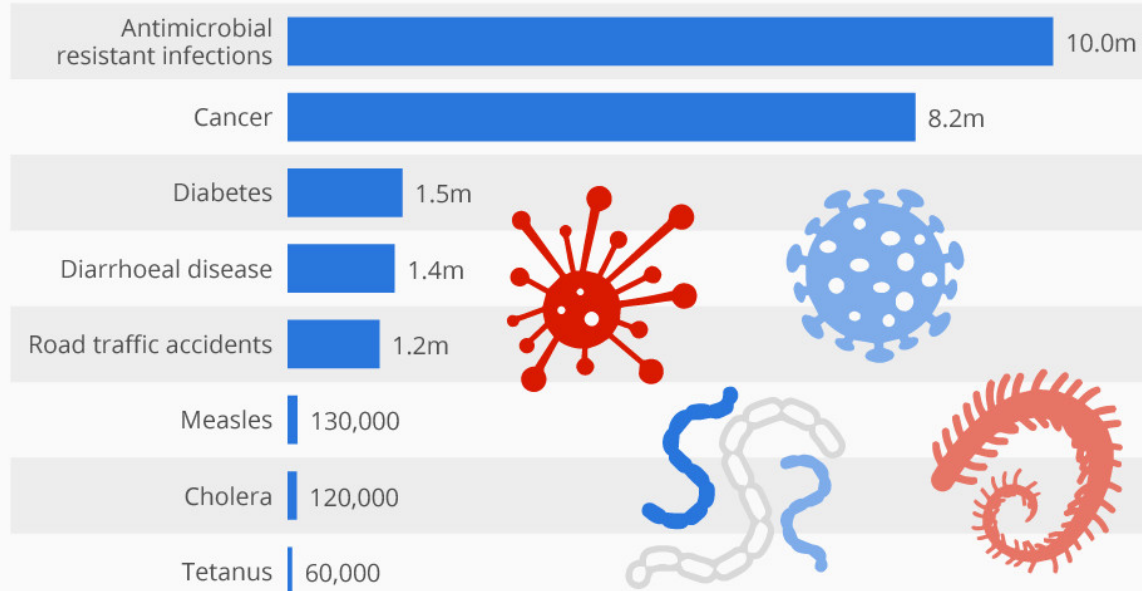
# Customised Apps



# Adaptive Hospitals

## Deaths From Drug-Resistant Infections Set To Skyrocket

Deaths from antimicrobial resistant infections and other causes in 2050



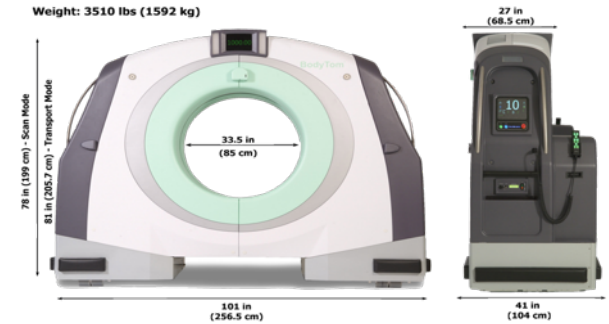
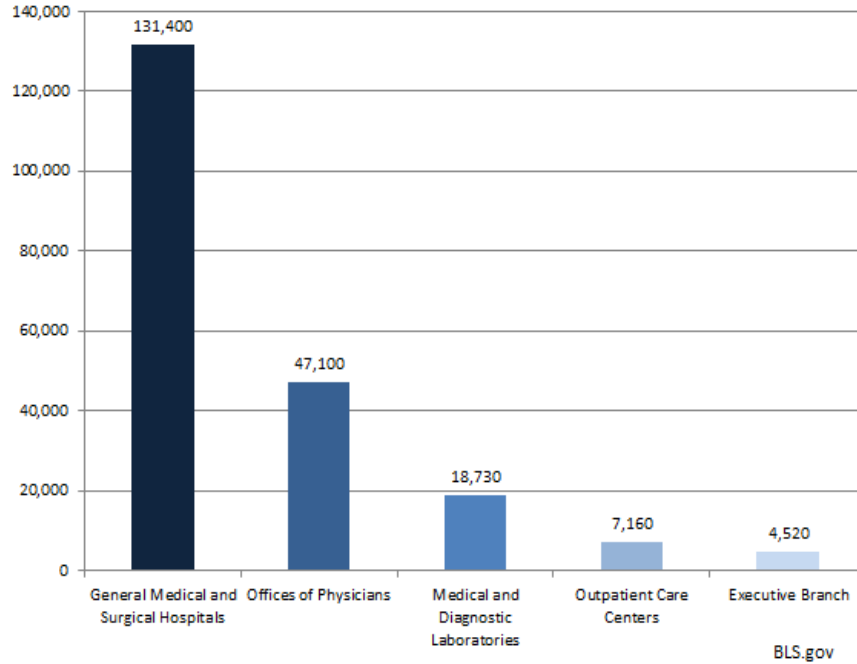
@StatistaCharts

Source: Review on Antimicrobial Resistance

statista

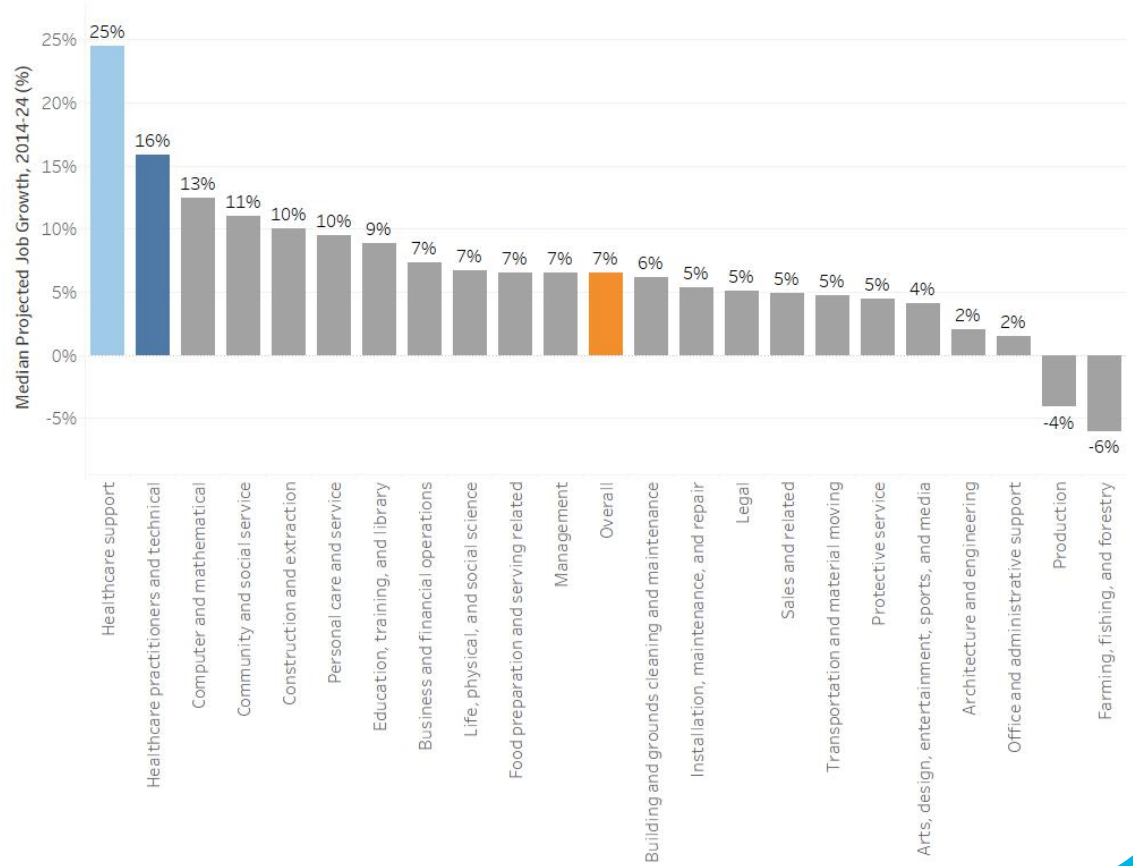
# Relocating the Diagnostics

Industries with Highest Levels of Employment for Radiologic Technicians



# Job Trends

## Job Growth by Occupational Group



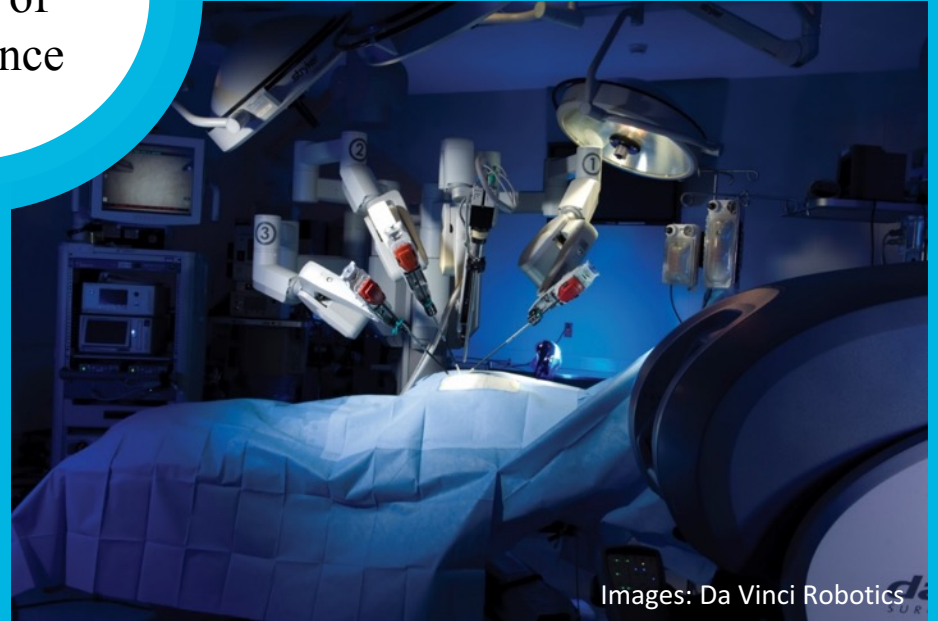


# Humans and Robotic Assistants

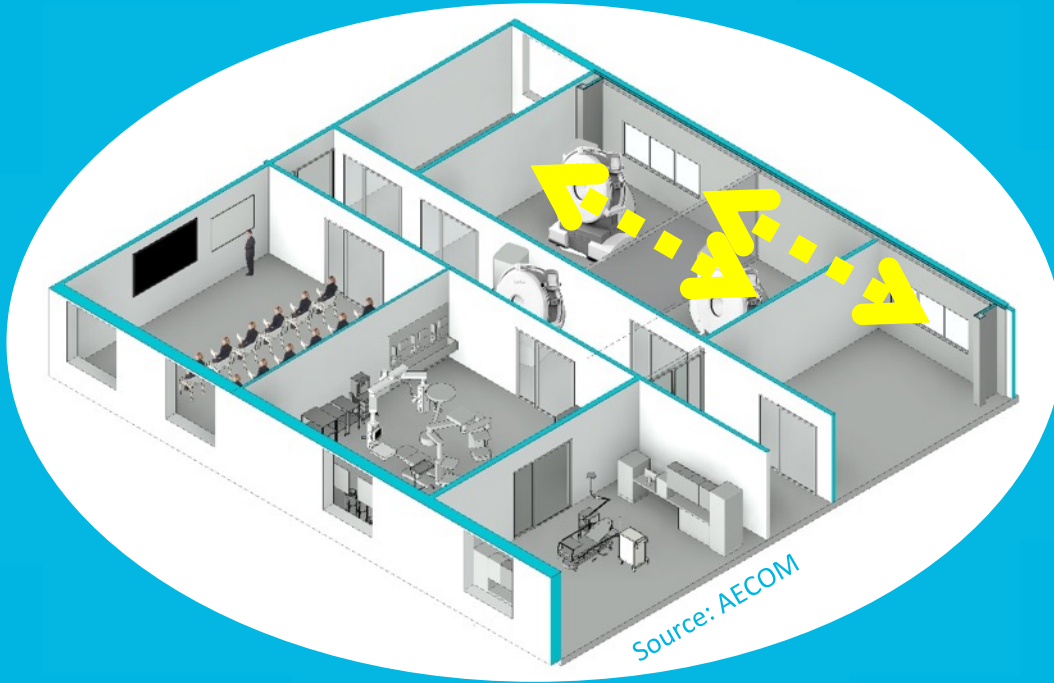


# Where is the Surgeon?

Global  
Centre of  
Excellence



# Adaptive Diagnostic and Treatment Spaces



Narrow plan to maximize daylight and future potential uses

Integrated teaching spaces with VR technologies and real-time links to any operating theatre in the world

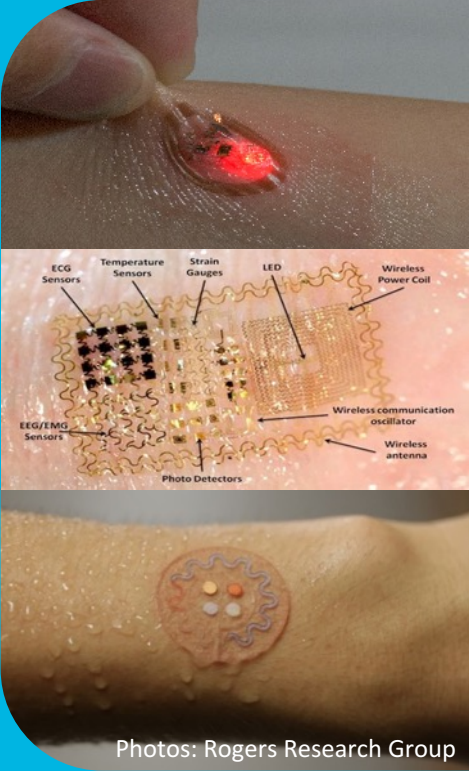
Spaces must be capable of rapid adaptation requiring careful location of medical gases and new movable wall technologies

Doors will be crucial:

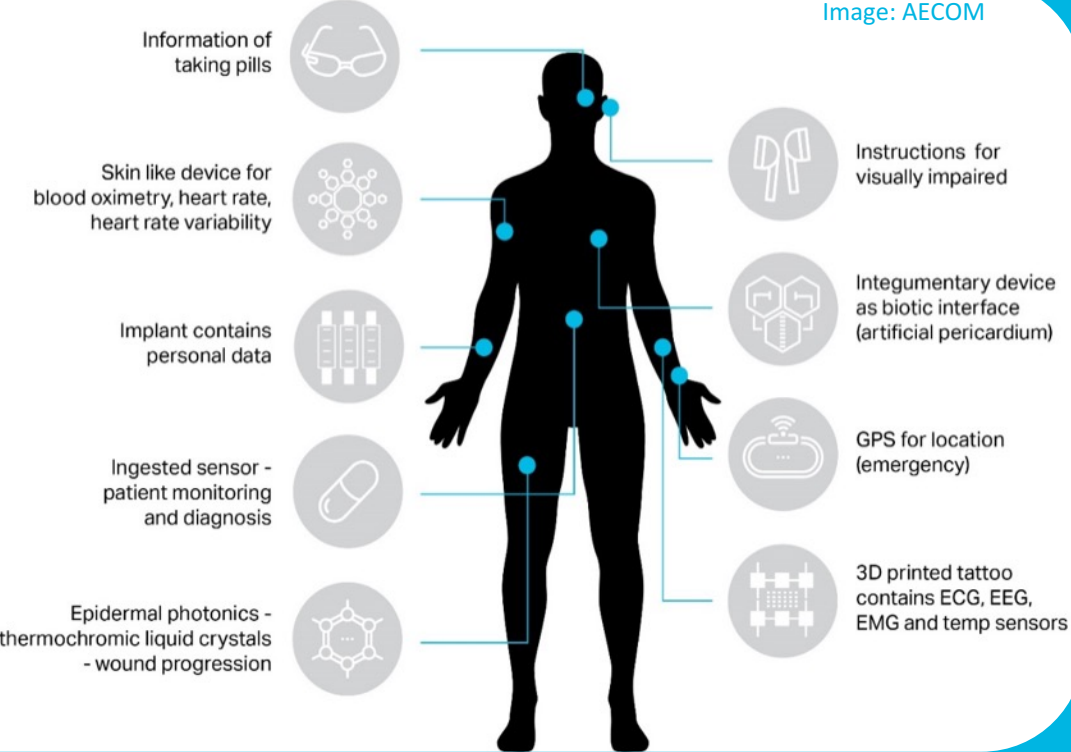
- Switchable glazing to allow visibility or privacy
- Larger to facilitate the relocation of large items of portable equipment
- Automated for safety and to accommodate robotic assistants and autonomous beds and wheelchairs
- Security enabled to prevent intruders or roaming

# Diagnostic and Monitoring Sensors

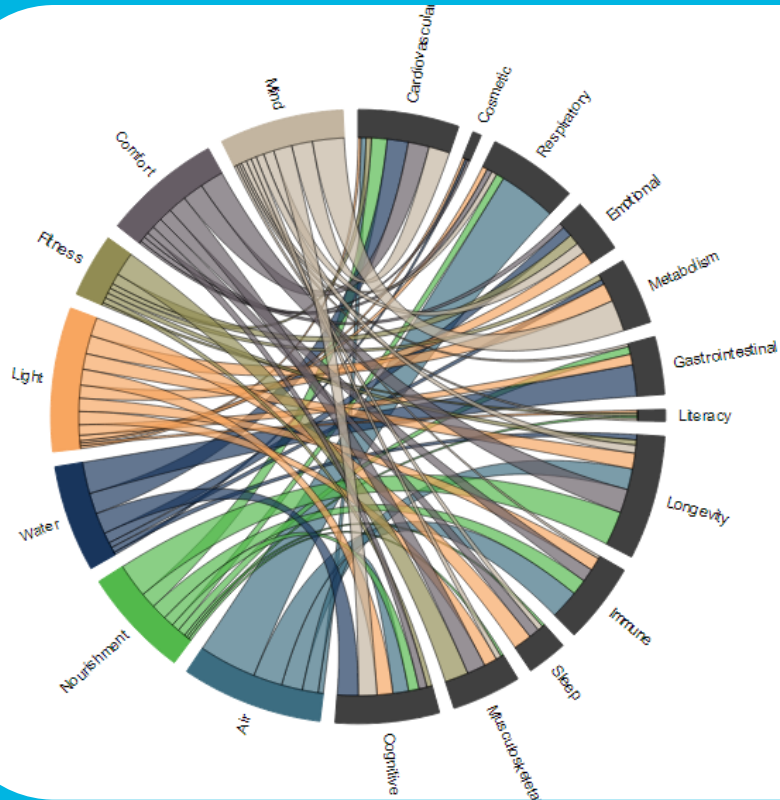
Image: AECOM



Photos: Rogers Research Group



# The Well Building Standard™



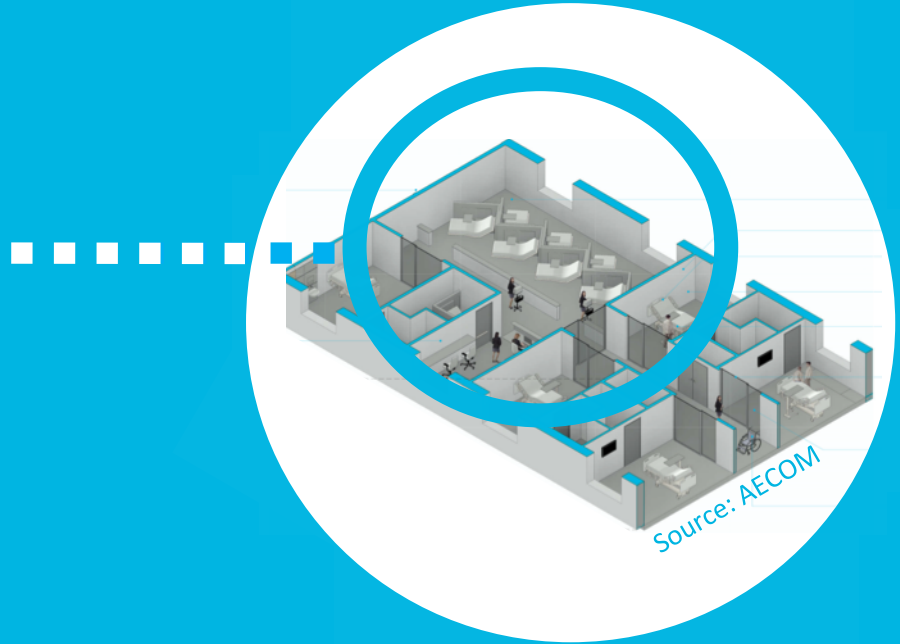
The Seven Concepts of the Well Building Standard

# Recovery Room of the Future

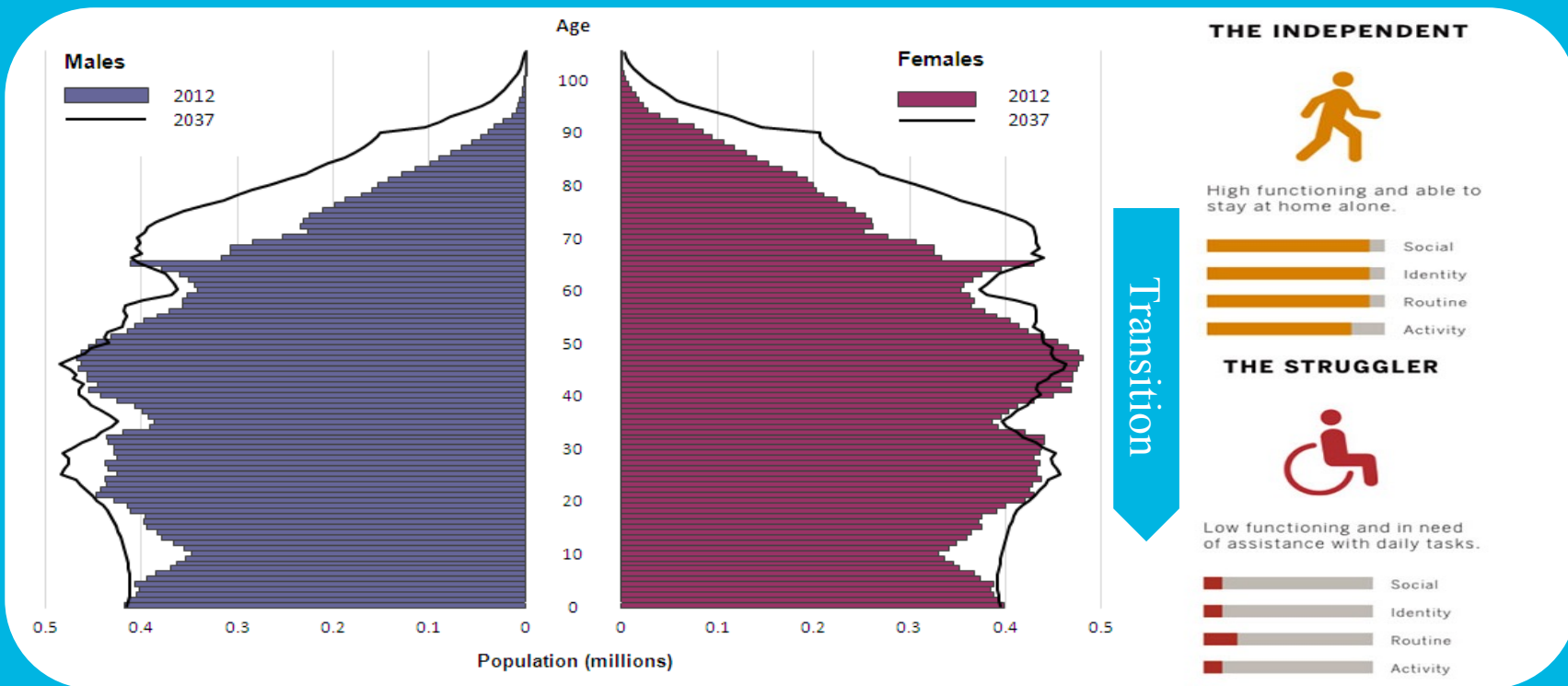


Image: Priestmangoode.com

Photo: www.b2ai.com



# Changing Demographics



Source: UK Government Web Archive

Source: Z-Wave

# New Assisted Living Possibilities

Pull Cord/Alarm Beacon

Door Bell (Video Link)

Door Sensors (security/room)

Smoke / CO2 Sensors

Temperature/Humidity Sensors

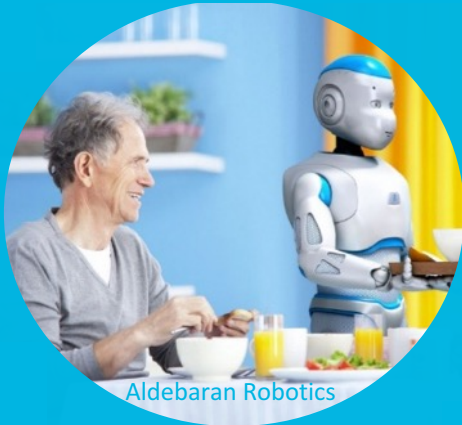
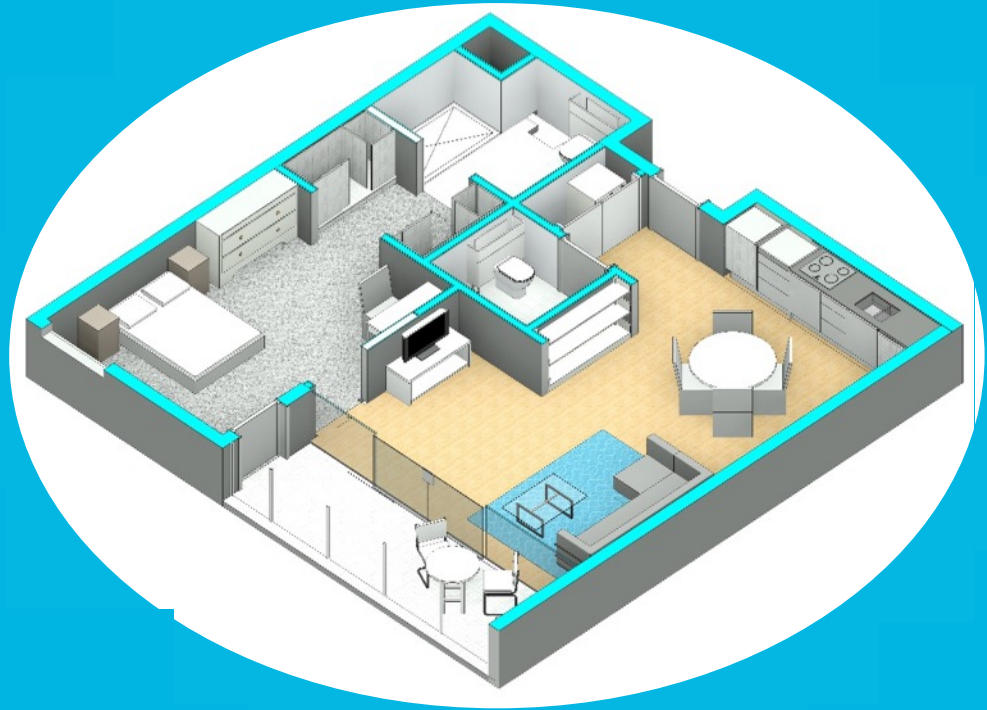
Window/Door Sensors

Flood Detector

Movement Detector( Fall Alarm/Curtains)

Pressure Mats (Bed/Chairs)

Camera

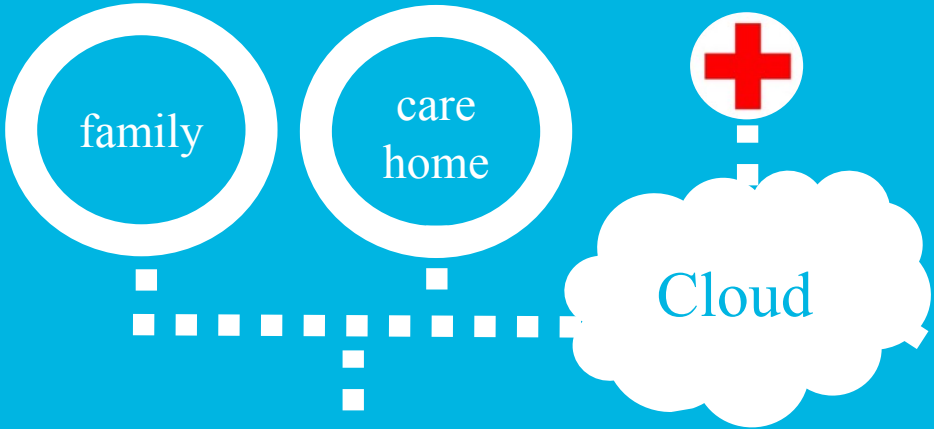


Aldebaran Robotics

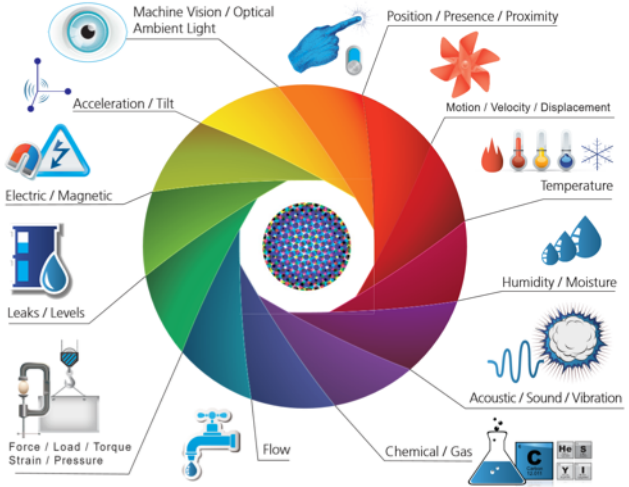
Sensors measure activity levels, drug taking and sleeping patterns and where required alerts can be sent to relatives, robotic assistants, care home staff or even directly to the emergency services



# Connected Devices and Rules

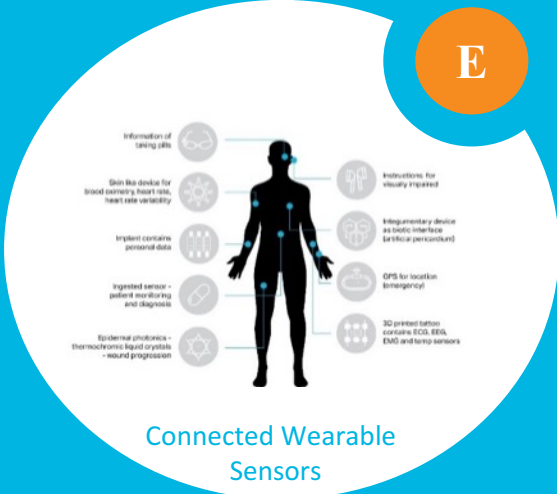


Source: HarborResearch.com



Connected Sensors and Actuators

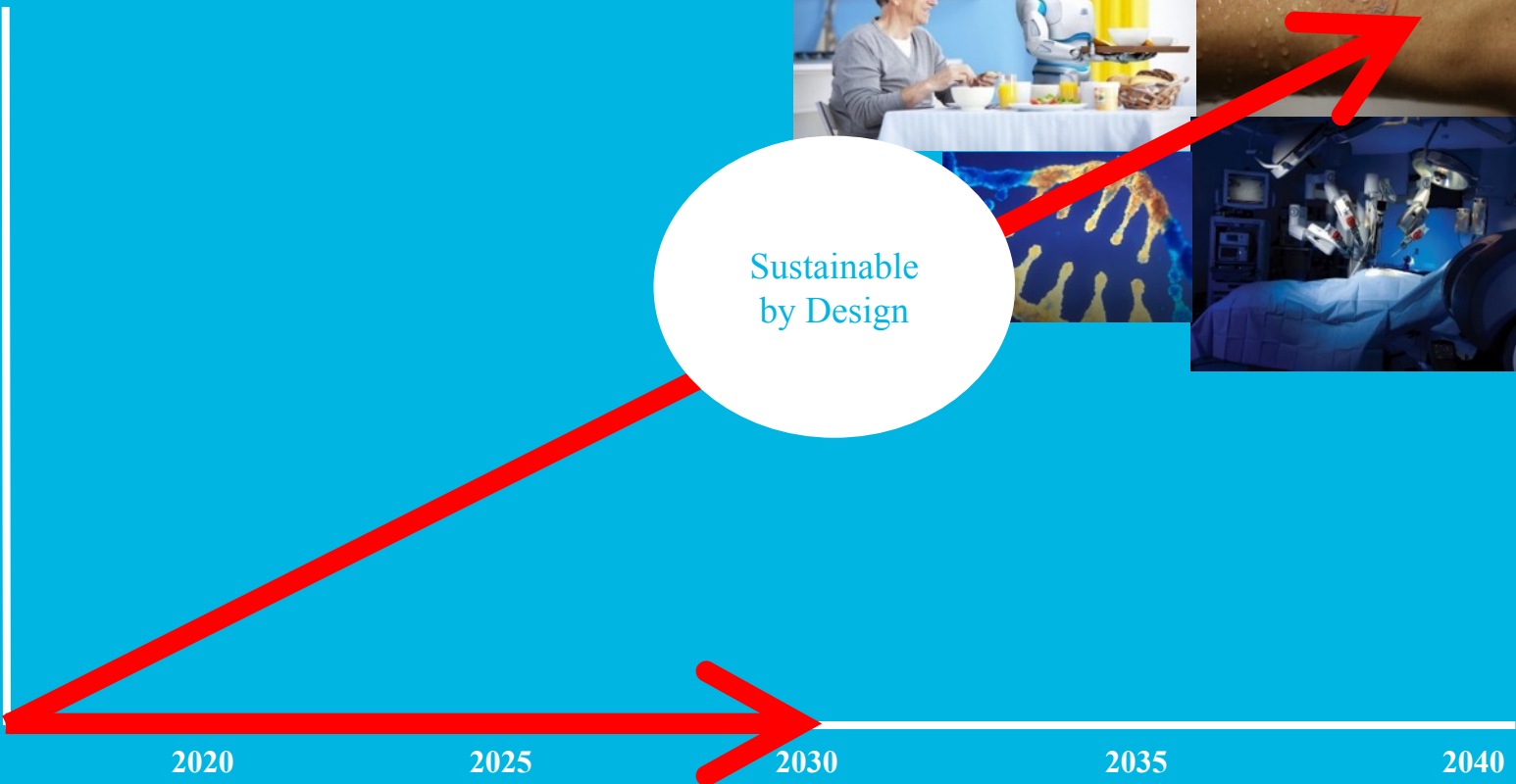
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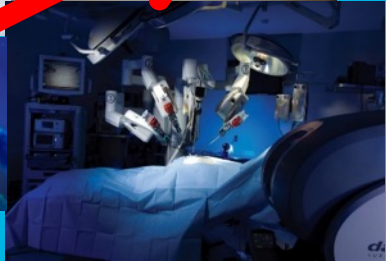
Connected Wearable Sensors

E

change



Sustainable  
by Design



# Sustainable by Design

## Dale Sinclair

June 2017

**AECOM**