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# Leveraging IOT in Healthcare

**Ashleigh Theophanides**

May 2019

# Deloitte's Healthcare Credentials


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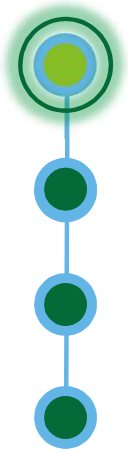
# Agenda



**Connectivity is transforming medtech**

**Challenges and opportunities for medtech**

**Medtech's role in transforming health care**

**Medtech's future in the IOMT**

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# Providing health care is becoming more challenging

Global health care spending expected to grow from **$7.1 trillion in 2015** to **$8.7 trillion by 2020**

The percentage of people aged **65** and over is expected to **double** by 2050

Deaths from noncommunicable diseases are anticipated to increase from **38 million** in 2017 to **44 million in 2030**

To **reduce spending** and **improve outcomes** health care organisations are looking for medtech to demonstrate the **value o**f their products

*People's interactions with the health care system often involve interactions with a wide range of products that diagnose, monitor, and/or treat patients. These devices and equipment are instrumental in helping health care providers to achieve better patient outcomes, lower health care costs, improve efficiency and enable new ways of engaging and empowering patients.*

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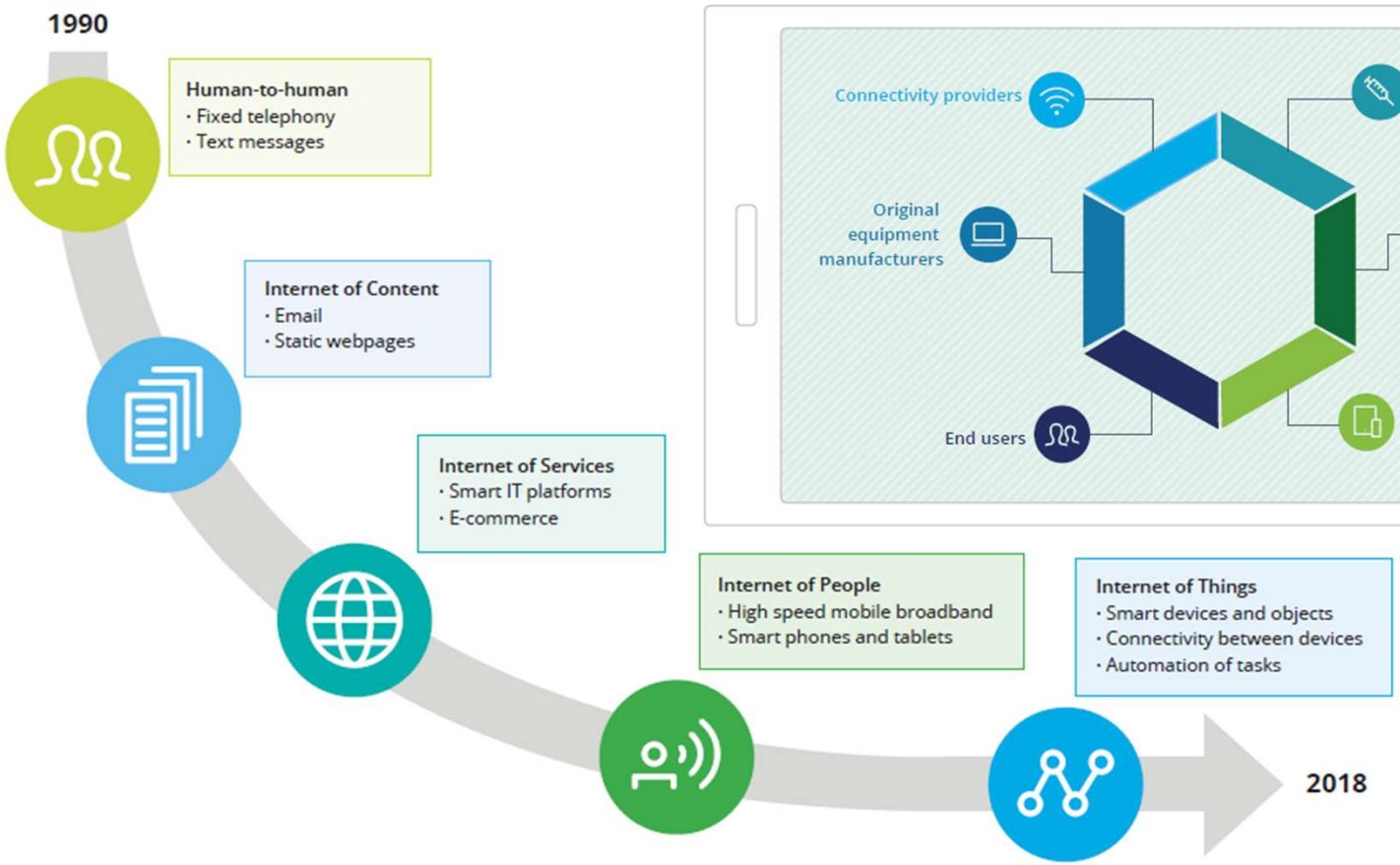
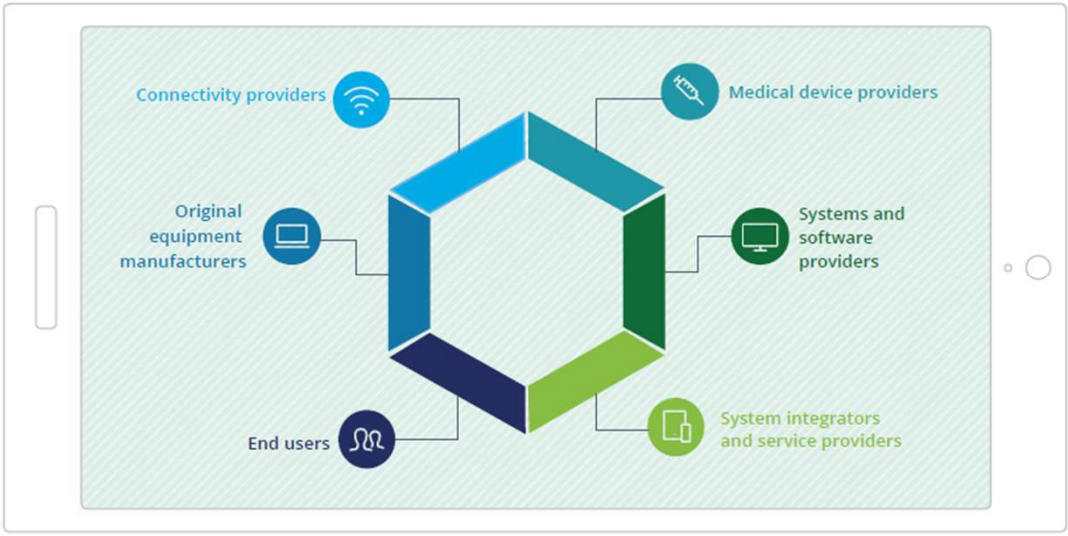
# Series of cultural and technological revolutions leading to IoMT

**The Internet of Medical Things (IoMT)** brings multiple facets of health care together

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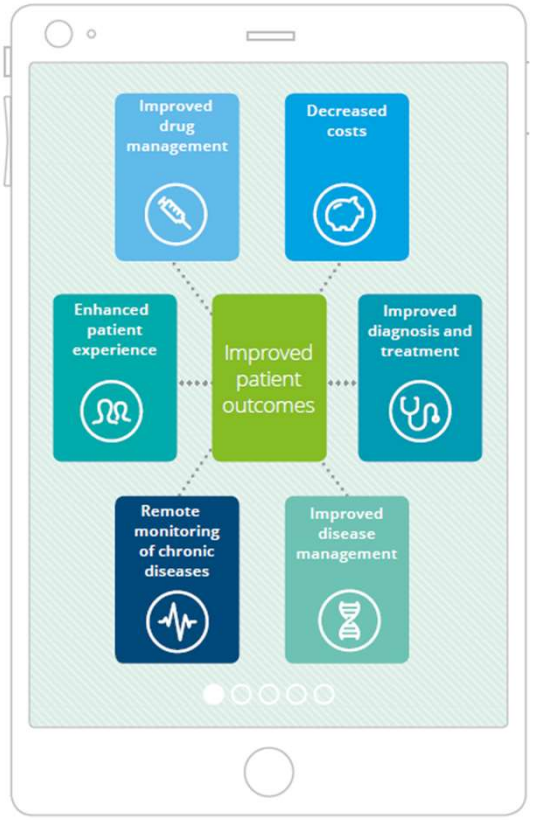
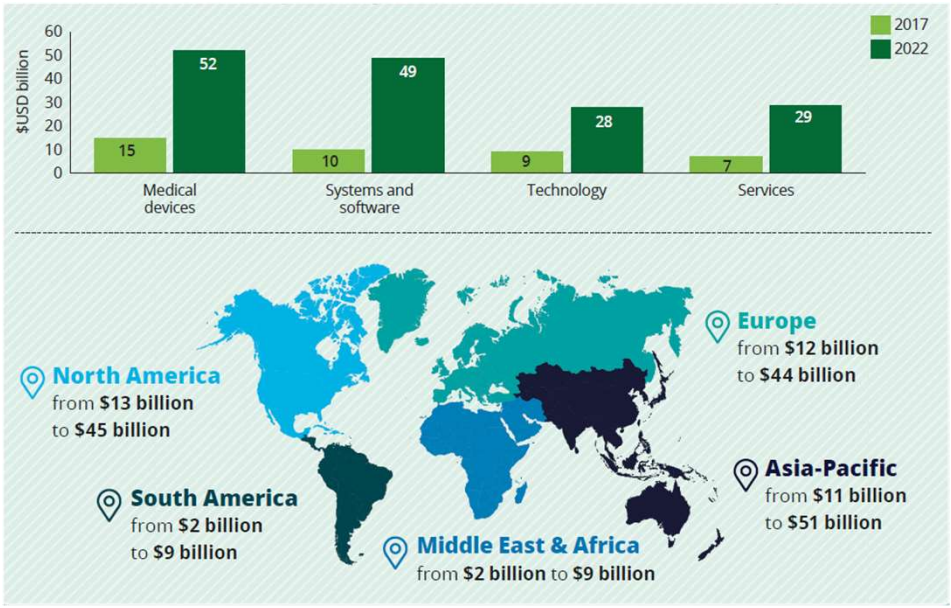
# The IoMT can provide numerous benefits to health care

The IoMT can…




The overall IoMT market is expected to grow from $41 billion in 2017 to $158 billion by 2022

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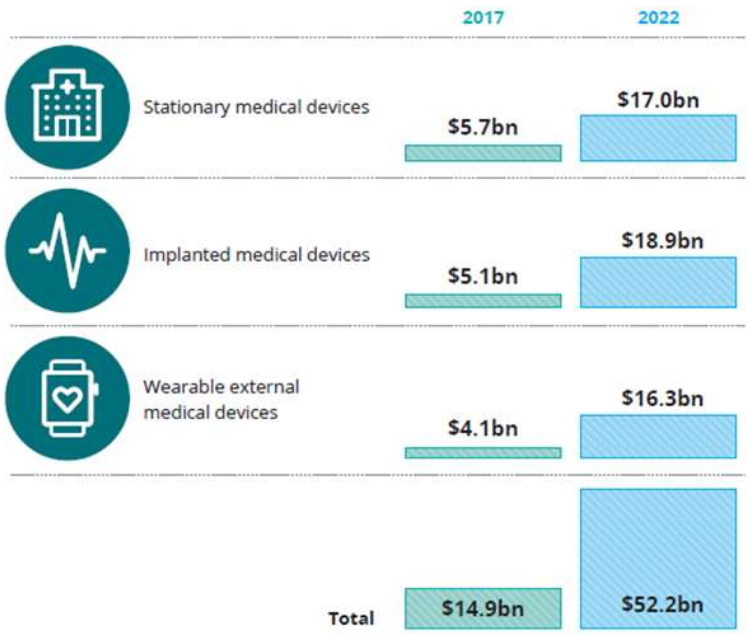
# IoMT Market Growth (2017 – 2022)




**The Three Other Components of IoMT**

**Systems and Software:**
- Primarily focused on reducing delivery time and cost of projects through device management and integration.
- Market Growth: **$9.8 billion (2017) → $48.3 billion (2022)**

**Connectivity Technology:**
- The enablers of the IoMT ecosystem, connecting people and devices to the internet. Includes technology such as Wi-Fi, Bluetooth Low Energy (BLE), Near Field Comms (NFC) etc
- Market Growth: **$9.3 billion (2017) → $28 billion (2022)**

**Services:**
- Services include system integration services, professional services, support and maintenance.
- Providing personalised and optimised services that offer predictable and better business outcomes.
- Market Growth: **$7.3 billion (2017) → $29 billion (2022)**

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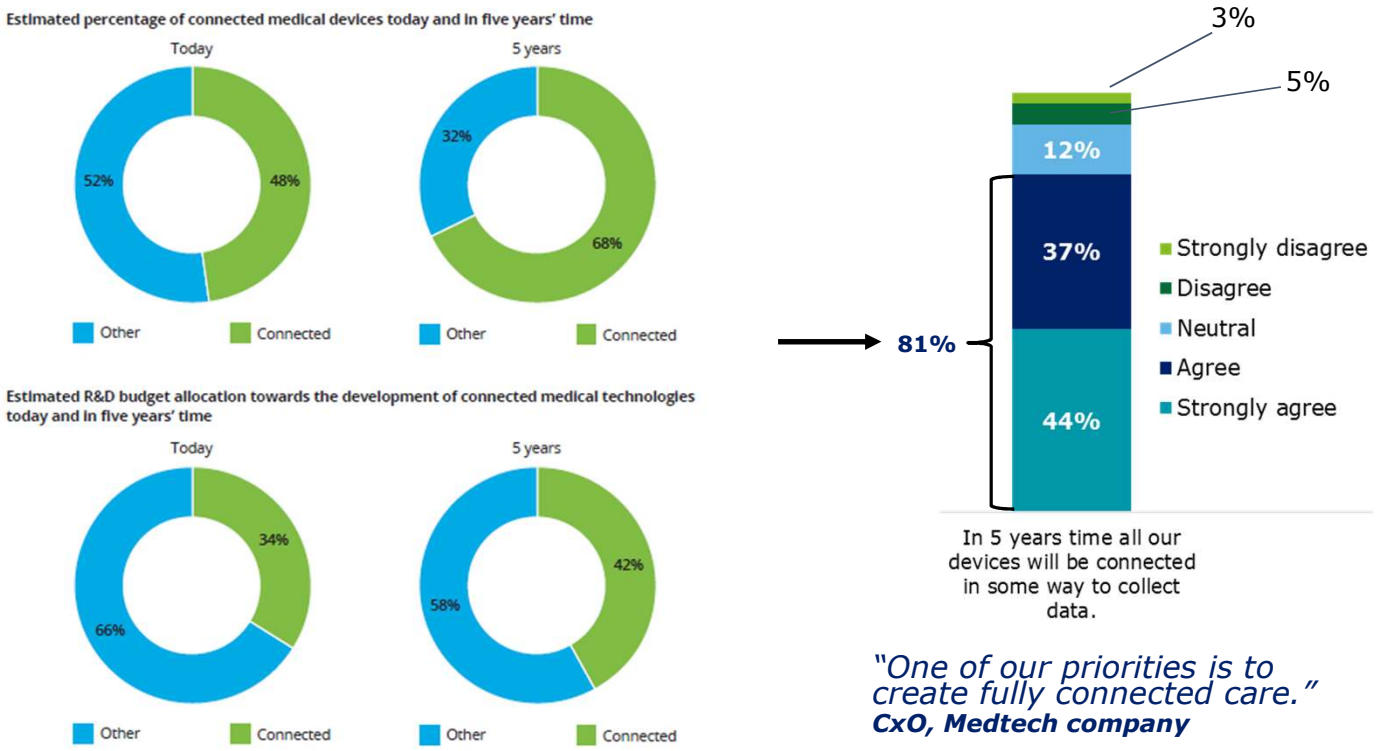
# Medtech are investing in connected medical devices and developing new ways of working

…our survey of 237 respondents working in connected med devices companies revealed that:




*"One of our priorities is to create fully connected care."*
***CxO, Medtech company***

Note. The figures from our research survey relate to medtech companies with connected medical devices and are not entirely representative of the medtech industry as a whole.

Source: Deloitte commissioned research from Research2Guidance, 2018

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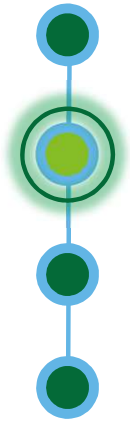

**Connectivity is transforming medtech**

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# The 8 key systemic challenges and opportunities facing the medtech industry


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# Developing an in-depth understanding of end users

As more providers adopt VBC models, the speed of adoption and integration of connected medical devices will increase

Data and insights on patients and processes is key to VBC

Challenges include the extent to which an organisation's IT infrastructure is able to handle or process the connections and data, and whether clinicians and patients can be convinced of the safety and effectiveness of the devices

Medtech companies need to develop a deeper understanding of the end-user and their emerging needs, and create new business models and scenarios that demonstrate how their new and existing devices not only improve patient outcomes but also create value for key health care stakeholders.

***"The industry must have more close relationships with the 'real' health care system and health care providers, namely doctors and nurses. Without the partnership of the medical world all smart devices will stay only 'nice-to-have devices' instead of really connected devices."***
**CxO, Medtech company**

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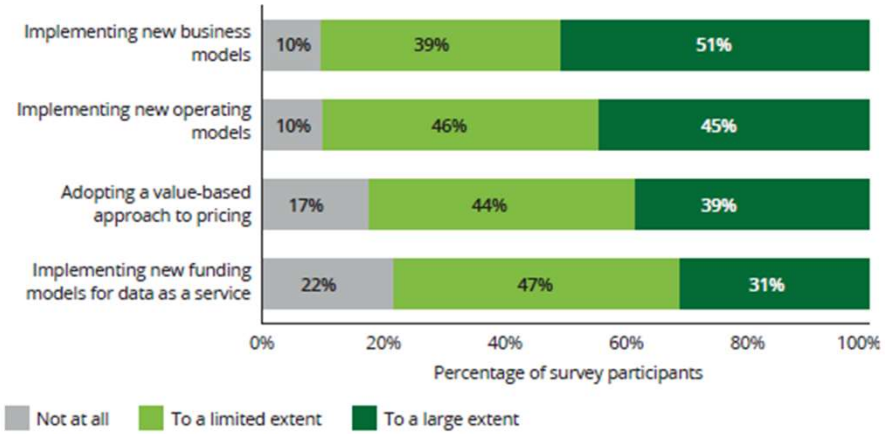
# Developing new funding, business and operating models

**Our survey indicated that medtech companies are working on...**




**Value drivers... in response to health care looking to move towards value-cased care**

**Clinical impact**

The extent of clinical utility and health outcomes associated with medical technology offering

**Non-clinical patient impact**

The impact on non-medical benefits for the patient (or caregiver): patient experience and patient economics (such as out-of-pocket costs)

**Care delivery revenue and cost impact**

The impact of the technology on revenues and costs for the provider, payer, and provider-sponsored plan via bonuses or penalties associated with care quality metrics, as well as the impact on clinical workflow and other sources of operating efficiency

**Public/ population impact**

The impact of the technology to the health care system at large and employers or the public as a whole

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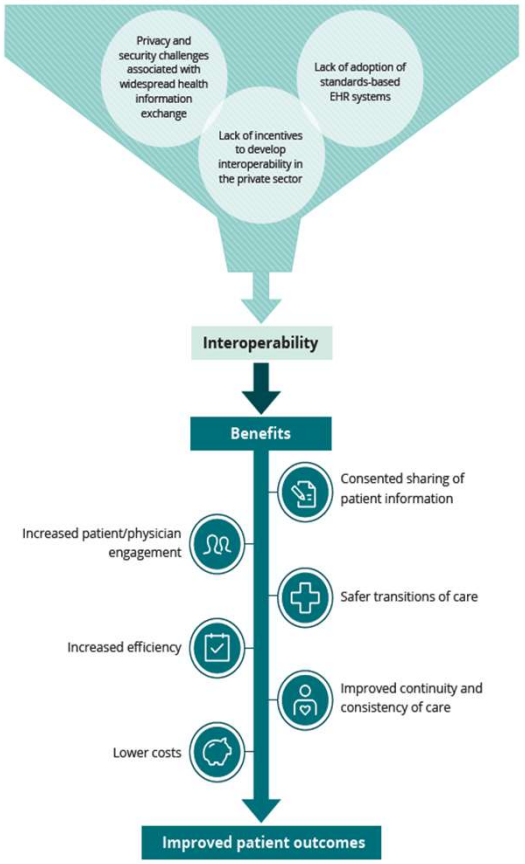
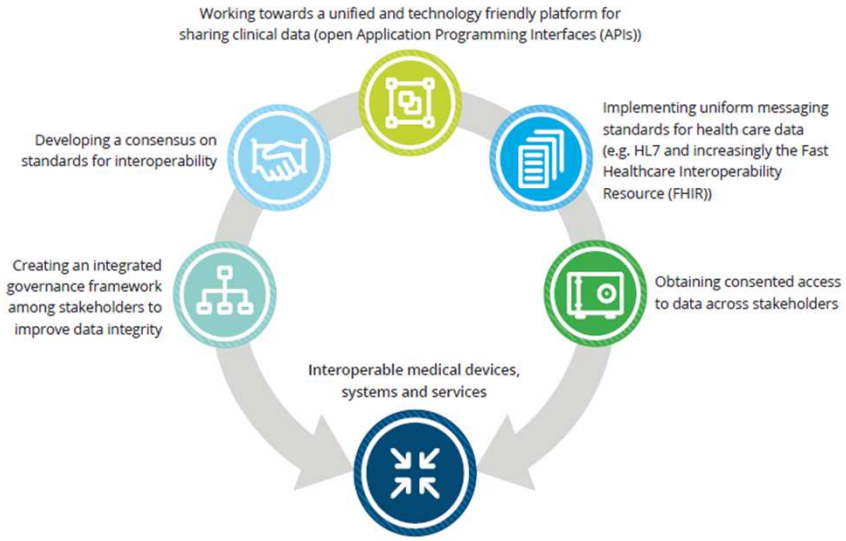
# Addressing the challenge of interoperability




Interoperability is arguably the biggest challenge to health care's ambition for a patient-centred, digitally-enabled, health care ecosystem.
If the challenge is to be addressed, open platforms, based on open data standards is the direction of travel that needs to be followed to enable payers, providers, and technology vendors to finally come together to make data more available to one another.

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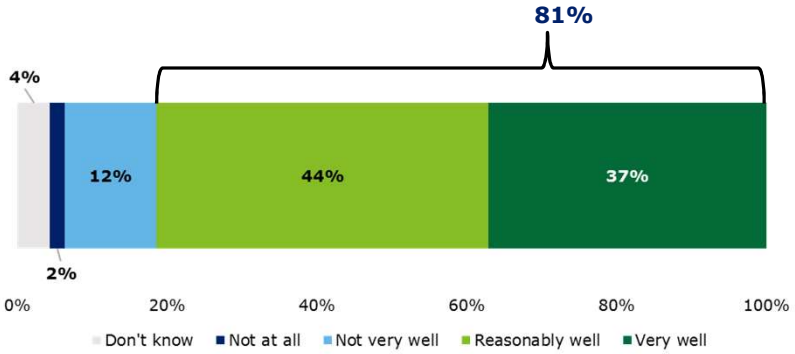
# Maintaining cybersecurity

**Data breaches** in health care can be **large** and **costly**

One data breach in health care affected **78.8 million people**

The **cost per capita** of a data breach in **health care** is the **highest** among 17 industries analysed

Our survey suggest medtech are prepared to maintaining the cybersecurity of connected medical devices




**Research by the Ponemon Institute has also shown that…**

**Medtech:**

- 67% of medical device makers believe an attack on their medical devices is likely
- Only 17% of medical device makers taking significant steps to prevent attacks

**Health care providers:**

- 56% of providers believe such an attack the medical devices they use is likely
- Only 15% of health care providers are taking significant steps to prevent attacks

Given the scale of potential security issues affecting connected medical devices, all stakeholders managing and utilising the data generated from connected medical devices need to take a more proactive and collaborative approach to identify and resolve security issues. Medical device manufacturers need to adopt 'security by design' approach where a device is designed from the ground up to be secure instead of adding security features after it has been delivered and deployed. To mitigate cyber security risks, organisations will need to avoid disconnected governance and establish real-time monitoring, cyber threat modelling and analysis, threat mitigation and remediation. Artificial intelligence (AI) and machine learning can help medtech and health care organisations anticipate emerging cyber threats.

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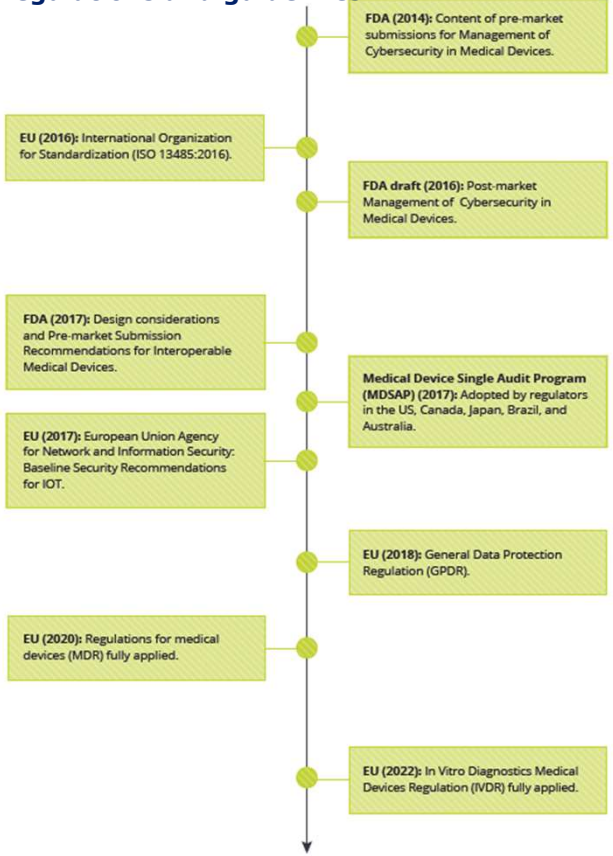
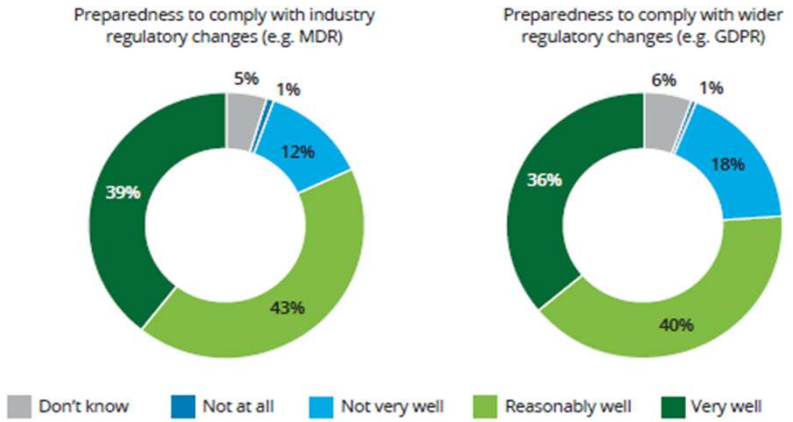
# Navigating regulatory change

**Wide range of security issues found in connected medical devices, which has lead to the development of a number of regulations and guidelines**




**Our survey suggest medtech are prepared to comply with regulatory changes such as MDR, IVDR and GDPR**




If medtech companies are to create a sustainable innovation model they need to build engagement with regulators into their innovation models and involve clinicians and patients in product design.

Medtech should consider establishing cross-functional steering committees to integrate R&D with commercial, manufacturing and market access. The FDAs initiatives to develop a more collaborative approach to innovation may have lessons for other regulators to follow.

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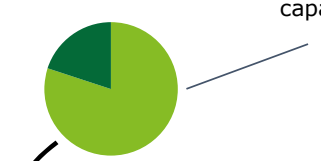
# Attracting digital talent and building digital capability

Concern among health stakeholders about the **lack of skills** to **deploy IoMT** solutions and the risk this will constrain market growth due to ineffective implementation.

**Respondents from our survey suggest that:**

**79 %** of respondents believe that they are prepared to build digital capability within their company



**22 %** believe that recruiting digital talent within their company as a top three priority

However there is a **growing digital skills gap** which may make **recruiting** more **difficult** in the **future**.

*"The health care system is not fully ready for IoT, [and] has a lot of catching up to do. [It] does not have the technical capabilities, nor the professional technical manpower to handle and manage the technology. Technology is moving at faster pace than the healthcare system and the regulatory system."*

***CxO, Medtech company***

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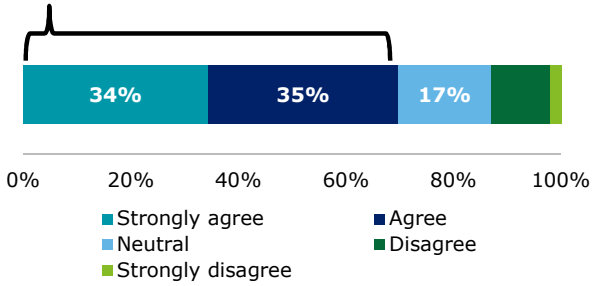
# Maintaining trust in a digital age

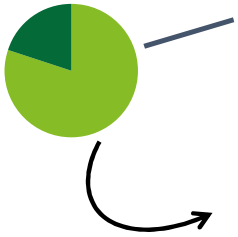
Patients' willingness to share data is critical to the long-term success of connected medical devices. For this to happen patients need to have trust in how their data will be used.

Medtech must remain vigilant in protecting patient data as more and more of their devices become connected.

**Respondents from our survey suggest:**

**69 %** agree that patients will be the owners of their data



**80 %** of respondents believe that their company is prepared to gain patient trust in the willingness to share data

*"There is always something you don't know around managing and using data. Exposure to more use cases will definitely help us."*

***CxO, Medtech company***

Medtech companies need to be able to provide robust and reliable evidence to health care organisations on how technological advancements and the data generated by connected devices improves the efficiency, cost-effectiveness of care delivery.

This includes ensuring that the devices are more intuitive and easy to use, and, where necessary, providing training and support to staff to embed the skills necessary to optimise the use of the technology and realise the cost-benefits of adoption.

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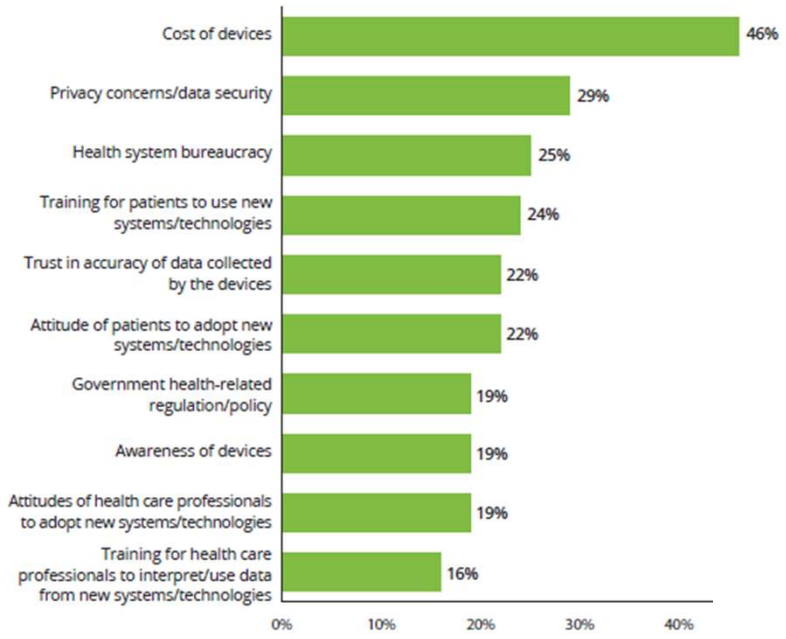
# Improving the adoption of medical technology at scale

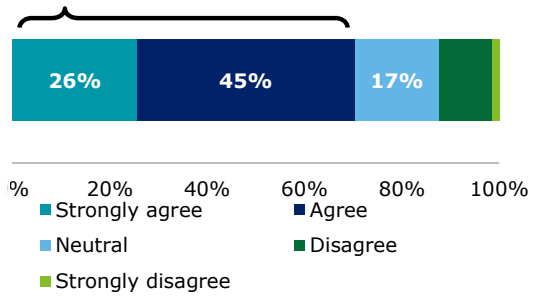
The **main barriers to adoption** of connected medical technologies around **acceptance by health care systems** as a whole, **as well as** by **health care professionals**

**Figure 15: Top ten perceived barriers to adoption of connected technology***




Source: Philips Future Health Index, 2016
*Respondents were asked to select their top three perceived barriers to adoption.

**Respondents from our survey suggest:**




**71%** agree that healthcare providers and clinicians are not ready to utilise data generated from connected medical devices.

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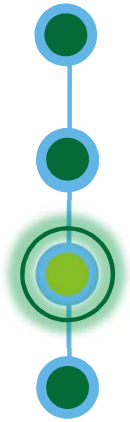

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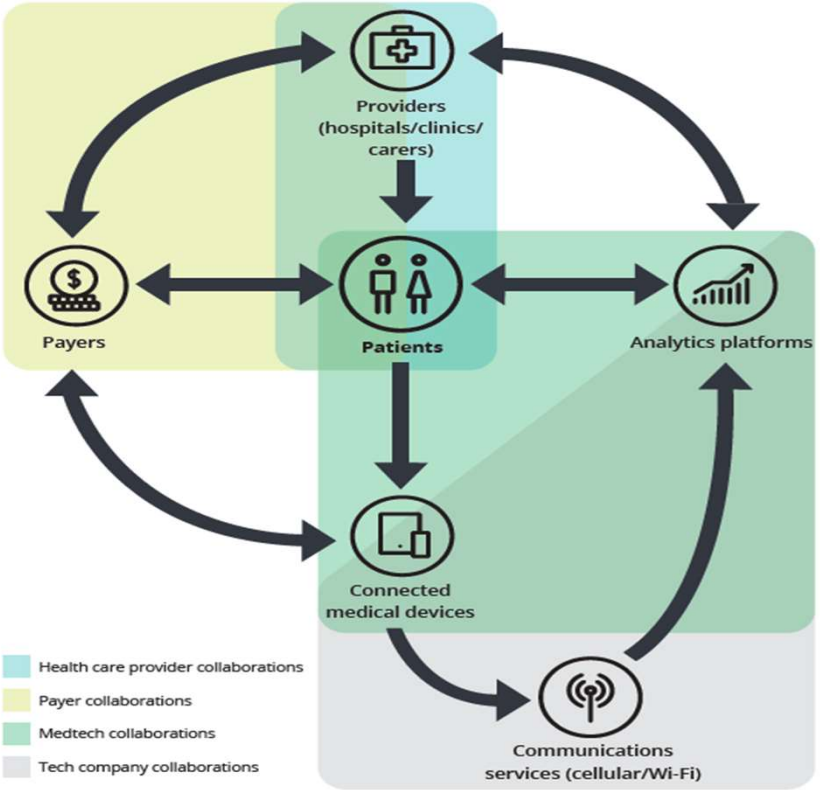
# Collaboration between health care providers and medtech is a core component of the IoMT

Creating the IoMT at scale requires close collaboration with patients, providers, payers, pharma and other medtech manufacturers. Our research identified multiple ways in which medtech is working towards building the IoMT, deriving value from it, and transforming health care.

**Connected medical device collaborations can occur at multiple intersections and across industries**

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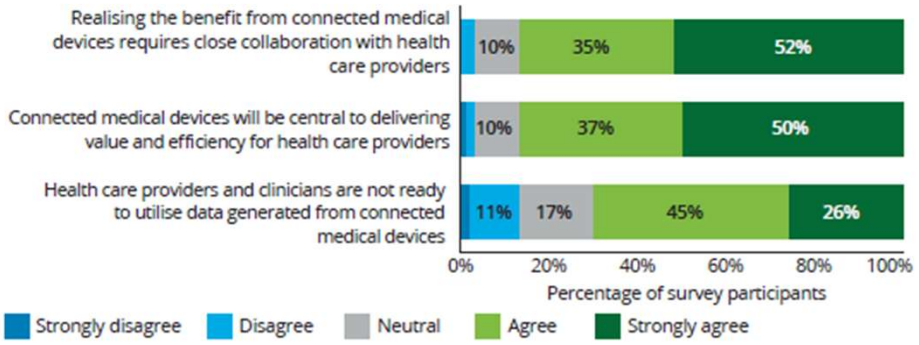
# Collaboration between health care providers and medtech is a core component of the IoMT

Our survey ranked collaborations with…

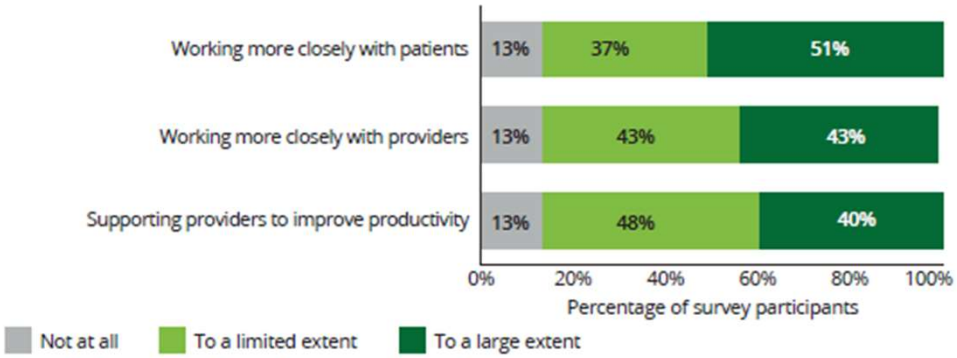
1. Health care providers (68%)
2. Health care payers (45%)
3. Medtech companies (42%)

… as the most important to their respective businesses.

**87%** of respondents agreed that realising **the benefits** of **connected medical devices** and delivering value and efficiency can only be **delivered through collaboration** with **health care providers**




However, in practice connected medical device companies indicated slightly **greater success** in **collaborating** with **patients (88%)** than they have with **health care providers (86%)**

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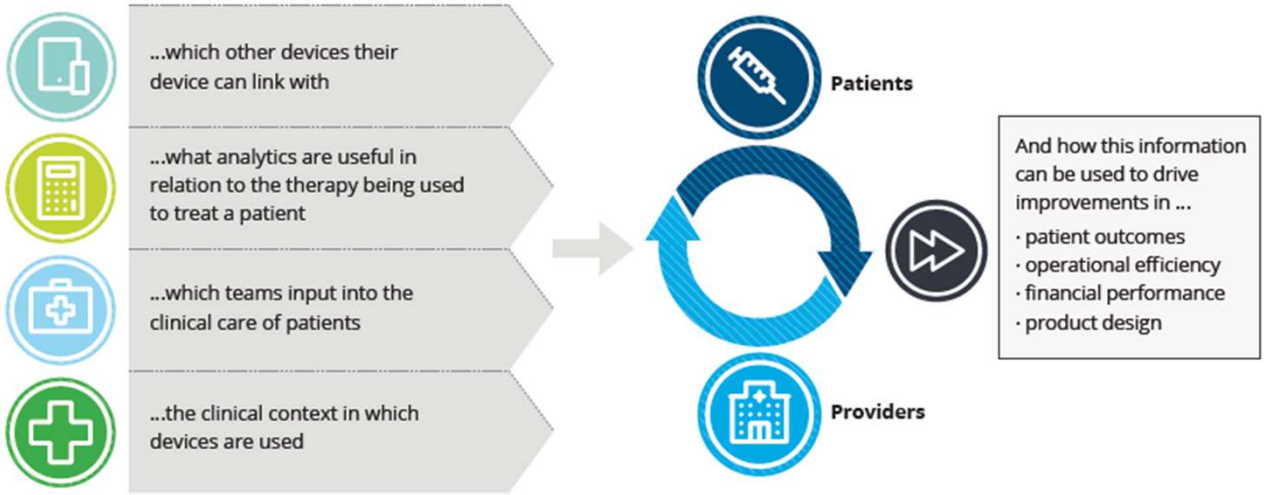
# Digitally connected medical devices are benefiting both patients and hospital providers

**Collaborating with health care providers allows medtech organisations to understand...**




**Connected medical devices leveraging this information are improving patient outcomes and health care operations.**

| Medtronic CareLink |
| --- |
| The Medtronic CareLink network is an Internet-based remote monitoring system compatible with 99.9% of devices.<br>Evidence from the operation of CareLink for patients with heart failure suggests that it:<br>• Decreases the time from the detection of a clinical event to clinical decision<br>• Decreases in the number of emergency visits |

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# Joining the dots between connected medical devices and health care IT systems will enable transformation of health care operations

**88%** of our survey respondents agreed that optimising the value from connected medical devices requires data sets to be linked to one another

However, there is no consensus on what the best method is to achieve large scale interoperability.

**There are number companies working to link data, devices and systems together**

| Philips HealthSuite connects devices and services around a common platform | Qualcomm Life connecting the dots for health care and medtech companies |
|---|---|
| Phillips HealthSuite is a cloud-based service that allows medical devices to share data in a secure, unified and open platform that collects, compiles and analyses clinical data from a wide range of devices and sources. Currently, it is estimated that it has over 15 petabytes of patient data gathered from 390 million imaging studies, medical records and patient inputs. | In 2014, a large US hospital utilised Qualcomm's Capsule product to automate the **collection and transfer of vital signs** to the hospital's EHR system.<br><br>By avoiding manual collection and transcribing data into the EHR system, the unit was able to save more **than 164 hours annually** and increasing the data collection from patients by 54%. |

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# Joining the dots between connected medical devices and health care IT systems will enable transformation of health care operations

**UK NHS utilizing Bruin Biometrics' connected medical technology to improve patient outcomes and workforce productivity**

Pressure ulcers (PU), are an area of localised damage to the skin and underlying tissue and are a prevalent medical problem that can result in pain, disfigurement, infection and death.

The prevalence of PUs in nursing homes across Europe ranges from 18% to 23% and can be up to 57% in some critical care units.

However, with early detection, around 80 per cent of PUs are preventable. Bruin Biometrics' hand-held skin tissue assessment device – the SEM scanner™ – detects early, pressure-induced tissue damage, including PUs.

The device detects changes in the sub-epidermal moisture (SEM), which has been found to indicate tissue damage three to ten days prior to visual skin damage or PU formation.

The device has been used successfully in 13 participating NHS hospitals. Analysis of the outcomes for over 1,200 patients indicated that:

- over 50% of hospitals achieved no new bedsores during the evaluation
- hospitals observed reductions in bed sores of up to 90%
- nursing managers reported improved productivity and the release of nursing time, as well as significant cost savings related to reduced length of patient stay and treatment costs
- one hospital estimated that it could save £600,000 and 1,420 nursing hours annually if the technology was rolled out across the hospital

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# Joining the dots between connected medical devices and health care IT systems will enable transformation of health care operations

## Medtronic Integrated Health Solutions' Cath Labs managed services

In 2013, Medtronic formed Integrated Health Solutions (IHS) – a business focused on developing long-term partnerships with hospitals, health systems, physicians and payers to develop tailored services and solutions to improve clinical, operational and financial outcomes.

The services include the development, management, modernisation and optimisation of cath labs, with the objective of helping hospital cardiology departments to: improve patient outcomes, enhance operational performance, contain and manage costs.

Medtronic's Cath Labs managed services (CLMS) is vendor independent and manages all aspects of a cath lab (regardless of the products used within them). Currently, Medtronic IHS has 170 ongoing long-term partnerships in 24 countries across Europe (such as the UK, Italy and the Netherlands ) and the Middle East, delivering value to health care organisations and supporting the delivery of high quality care more cost effectively.

For example – the Maastricht University Medical Centre in the Netherlands Medtronic IHS realised:

- $2.5 million in savings in one year
- a 90% reduction in patient admission time
- a 33% reduction in the length of stay for cardiac resynchronisation therapy patients
- a 37% reduction of cancelled procedures through better planning and scheduling
- a 43%reduction in staff overtime.

IHS Managed Services offer also covers other care settings beyond the CathLab, such as Operating rooms and ICUs

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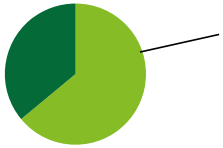
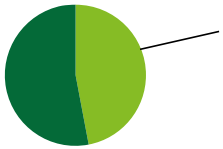
# Advanced analytics of connected medical devices and health data are developing insights and empowering better decision-making

**Results from our survey indicate that:**



**64%** of respondents believe developing a **stronger analytical capability** to **manage** and **interpret data** is a **top three priority** for their company.



**47%** of respondents believe that **linking data** with **other patient data** sets is a top three priority for their company.

**There are number companies working to provide advanced analytics to health care**

| GE and Roche Diagnostics working together to provide clinical insights in oncology | IBM Watson collaborations with medtech companies |
|---|---|
| The collaboration aims to develop dashboards that bring together data generated by the companies' in vitro diagnostics and medical scanners to aid decision-making among oncology and critical care teams. | Watson has collaborated with both Medtronic and Electra to analyse, interpret and provide insights based on data generated from medical devices in diabetes and oncology. |

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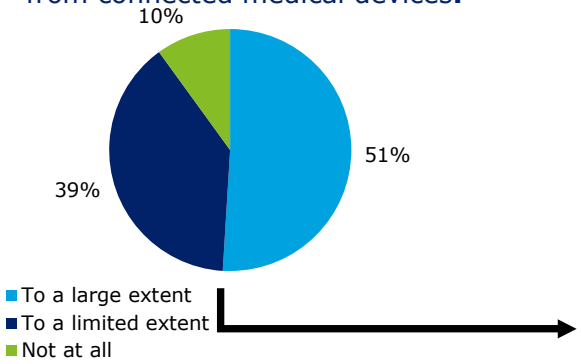
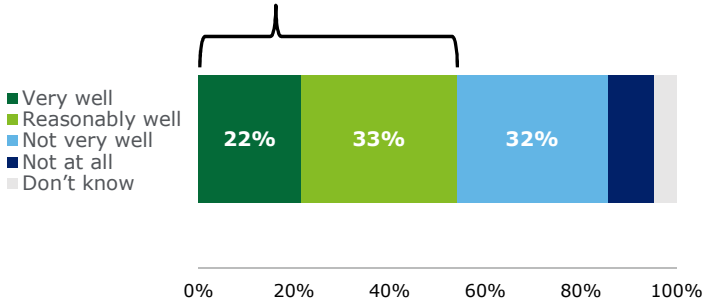
# The transformation of medtech business models

**90%** of medtech companies developing are implementing new business models in response to data from connected medical devices**:**




**55%** of respondents indicated they are **prepared** to **monetise** the **data** generated from **connected medical devices**



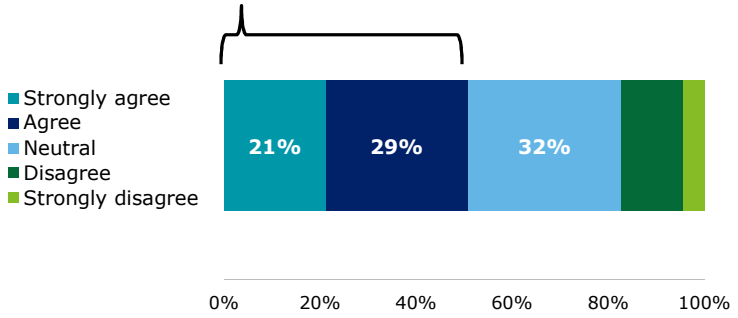

A number of medtech companies have already transformed their business models to benefit health care. For example:

**From manufacturer to service provider – the transformation of Fresenius**

Fresenius Medical Care now operates one of the largest dialysis services in the world, providing both the equipment and delivery of the service. The organisation has served **322,253 patients**, delivered **48 million treatments** and the **largest number** of **dialysis clinics** globally **at 3,790.** Results running from October 2015 through to December 2016 include:

- a **9% decrease in hospitalisation** rates for these patients; more than **$43 million in gross savings**; an average **5.4% reduction** in expenditures per patient

**50%** of respondents **agree** that their company will be a **data business** and **not** a **product business**

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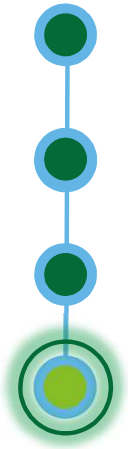

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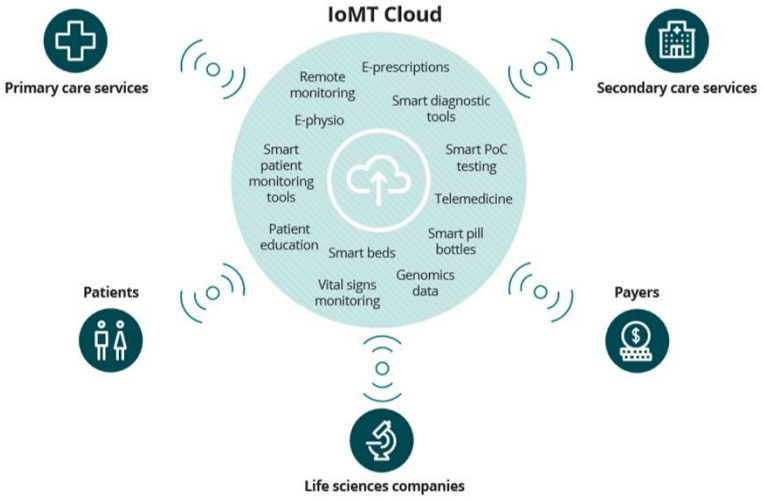
# The interconnected IoMT health ecosystem

VBC, RWE and PHM are pivotal to the future operation of health care providers and payers. Medtech companies and the IoMT can capitalise on the possibilities presented by these changes, to help to connect patients, providers and payers to enable them to become more patient centric, productive and cost effective.




*"We Strongly believe that the health care ecosystem is inevitably evolving to a model that closes the value chain in healh care delivery.*

*This requires payers to shift from a legacy transaction-oriented, claim adjudication business to a new, analytics-based, shared risk provider compensation model."*

***CxO, Medtech company***

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# Thank you


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