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# Health IoT on the Edge: Accessible, Smart, Secure

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# Health IoT on the Edge: Accessible, Smart, Secure

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# TOPICS WE ARE DISCUSSING TODAY



**USE OF HEALTH DEVICE DATA TO EMPOWER PATIENT CARE**

**THE ROLE OF AI & ALGORITHMS IN ENABLING NEW USE CASES**

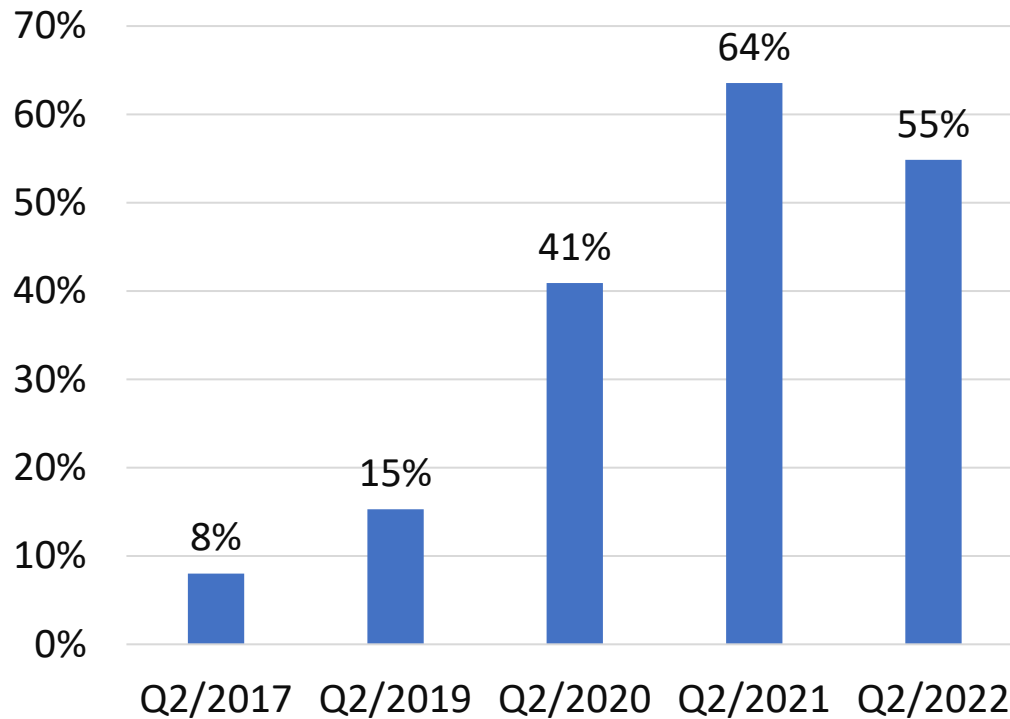
**LOW-POWER EDGE AI SOLUTIONS**

**TOP USE CASES: REMOTE PATIENT MONITORING & SENIOR CARE**

**HEALTH IOT ON THE EDGE: ACCESSIBLE, SMART, SECURE**

# Telehealth is the New Normal

Telehealth Service Use in Prior  
12 Months



Virtual Visits



RPM for Chronic and  
Post-Discharge



Remote  
Diagnostics



Hospital at Home

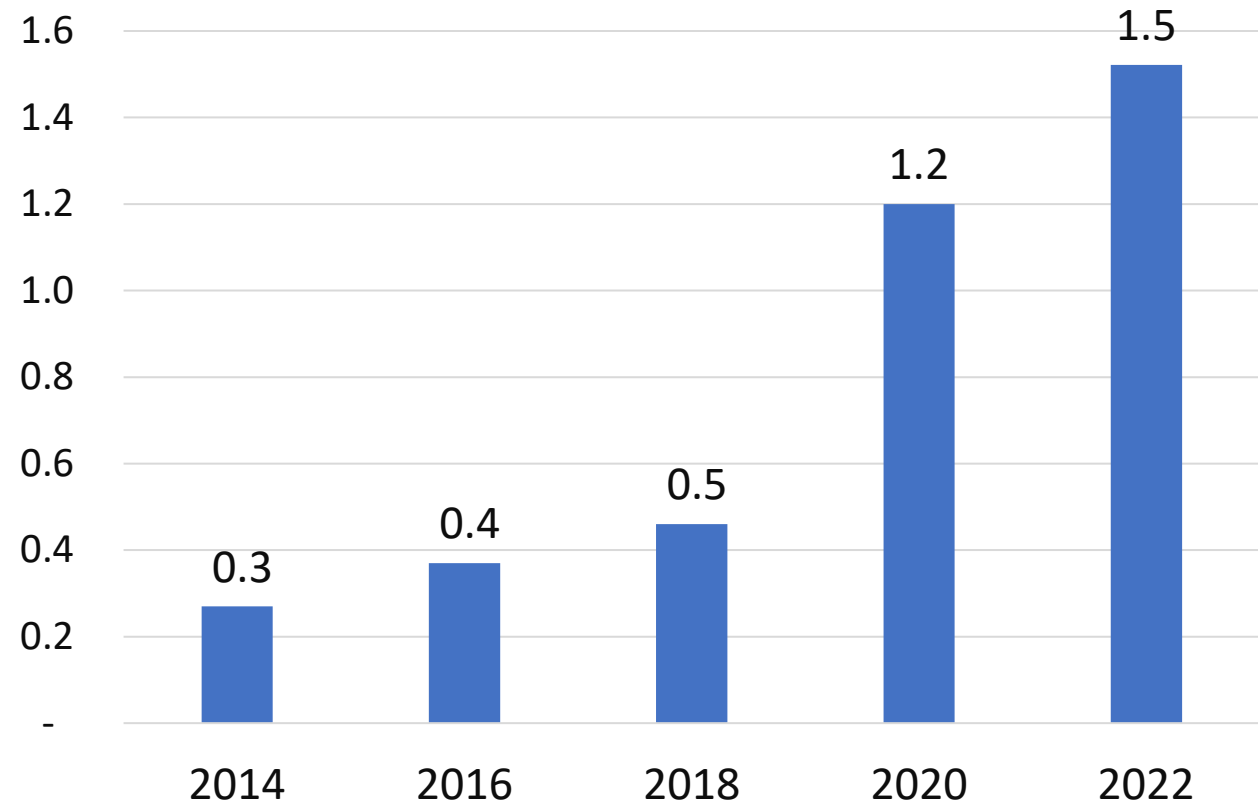
# The Missing Link: Devices & Vital Sign Data



# Patients Willing to Engage with Remote Monitoring

- **54%** of US internet households own and use at least one **connected health product**.
- The average US internet household owns and uses between **one to two connected health products**.
- Driven by smart watch adoption, consumers and patients have become used to **using devices to collect, transmit, and interpret health data**.

Average Number of Connected Health Devices Owned by US Internet Households





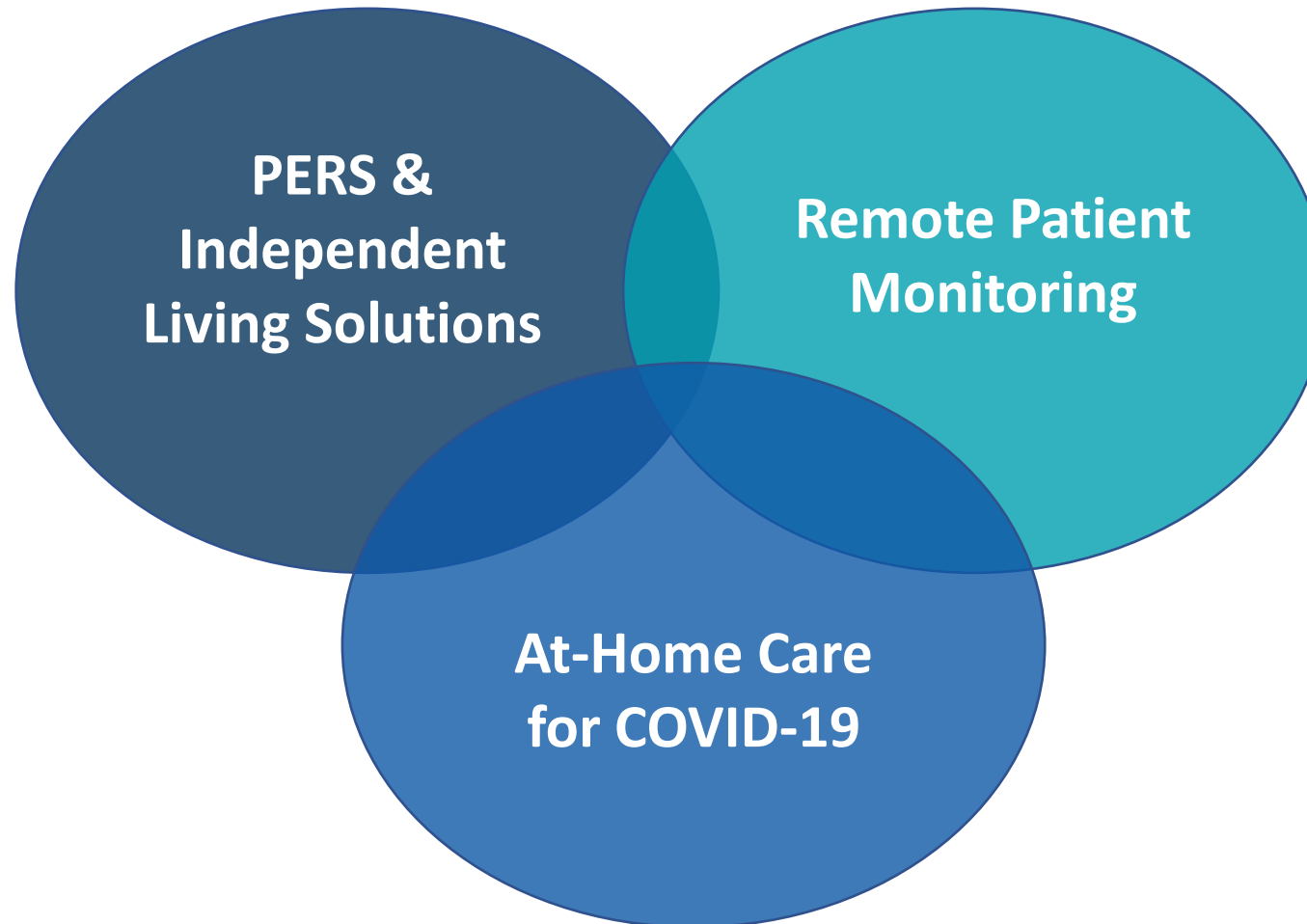
# Consumers Demand Data-Sharing

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**57%** of consumers find the ability to **share health data** collected through devices appealing; **38%** seek **care providers** who offer this

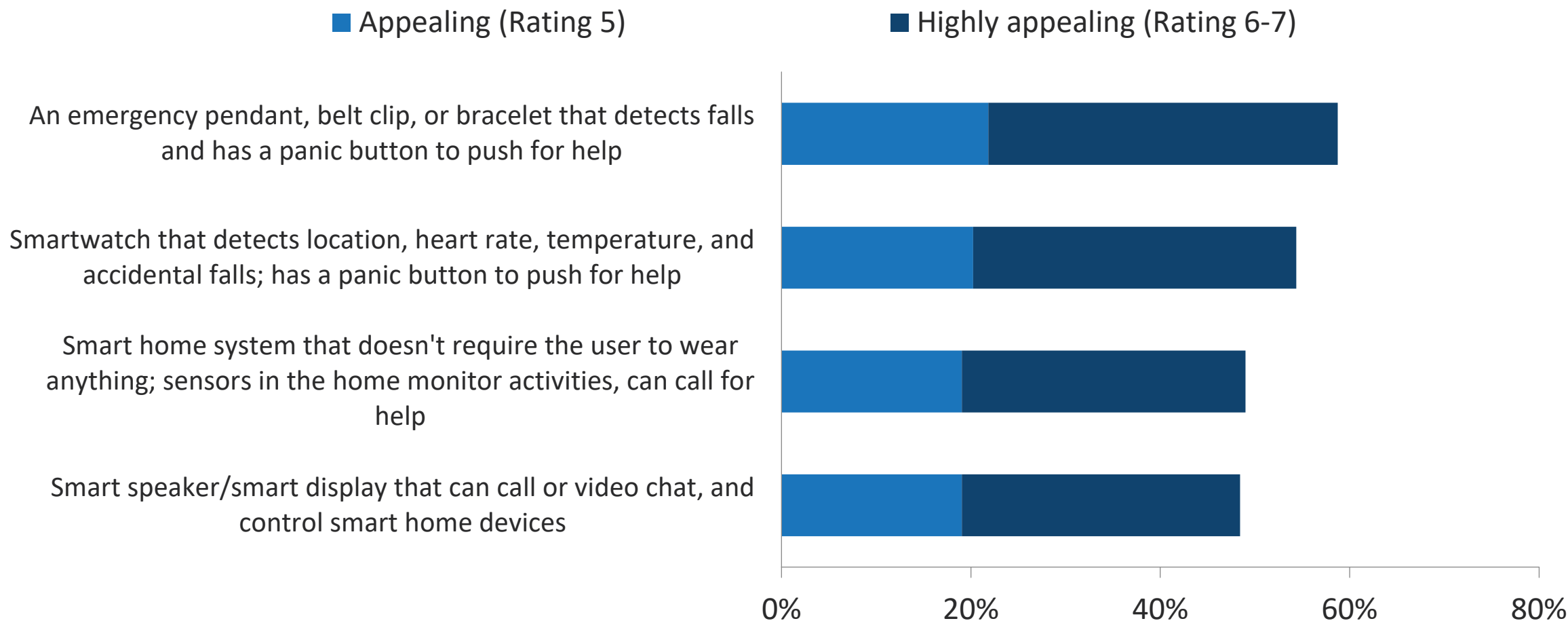
# Senior Care: at the Intersection of PERS, RPM, and At-Home Acute Care





# Caregivers See Appeal in Smart Products

## Appeal of Smart Products Used to Care for Loved Ones



# Care Provider View

- Few providers are equipped to drink directly from the firehose
  - Alert fatigue, poor EMR integration, primary concerns
- Privacy, security are growing threats worldwide
  - Critical applications require unparalleled performance, reliability
- Need for automated solutions solving key pain points
  - New hybrid edge computing models enable new use cases

# SYNTIAN<sup>®</sup>

Making Edge AI a Reality

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# Wearables in Health Management

## Past, Present, and Future

Abraham-Louis Perrelet develops the first pedometer



1780

First wireless heart-rate monitor: Polar Sport Tester PE 2000



1982

Casio released the first GPS-enabled watch for runners: Casio PRT-1GP



1999

Abundance of choice but mostly used for prevention of disease and maintenance of health: e.g., weight loss control, activity tracking, etc.



Today

AI enabled, enhanced clinical assessments

Ethical concerns about data can be mitigated by making such assessments on the edge device



Tomorrow

# What Is Deep Learning?

## & What Is It Good For?

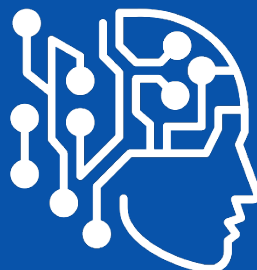
### Artificial Intelligence

Making intelligent machines by programming them to respond to specific input



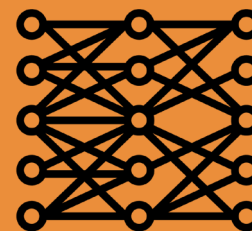
### Machine Learning (ML)

Train machines to learn without being explicitly programmed



### Deep Learning

ML with brain-like logical structures called deep neural networks (DNN)



1950s

1960s

1970s

1980s

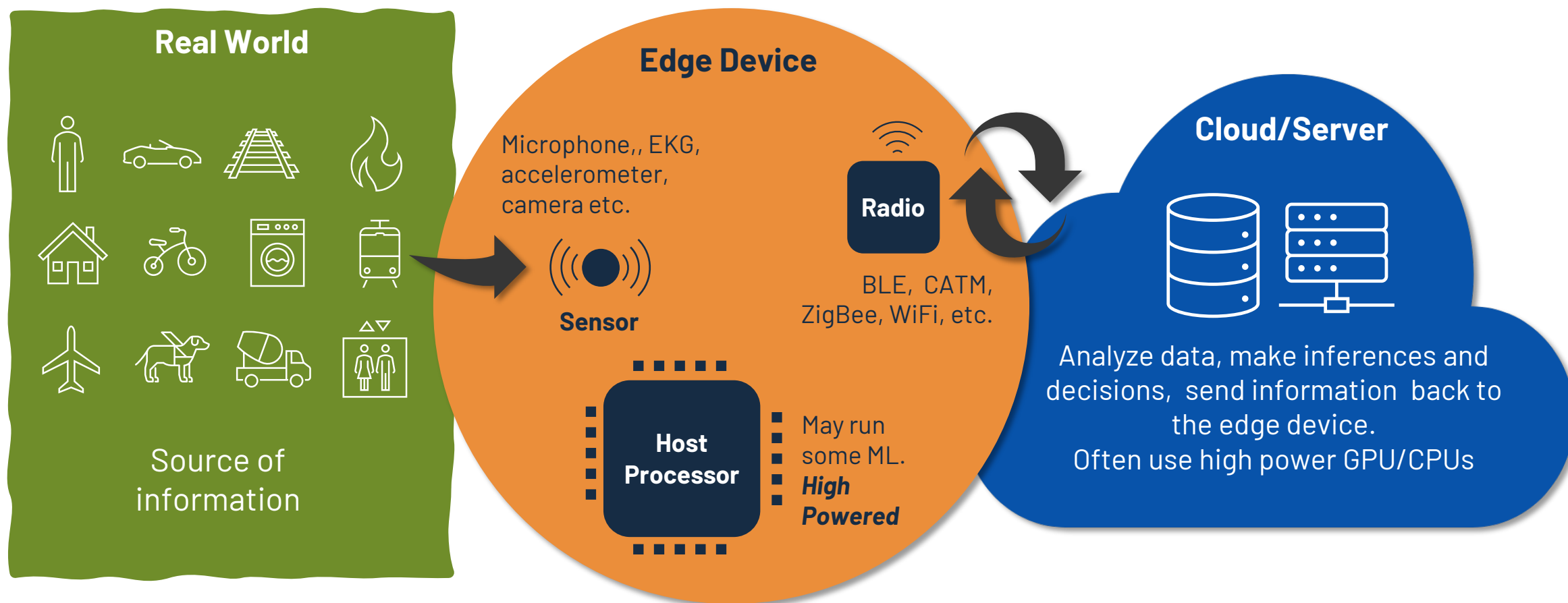
1990s

2000s

2010s

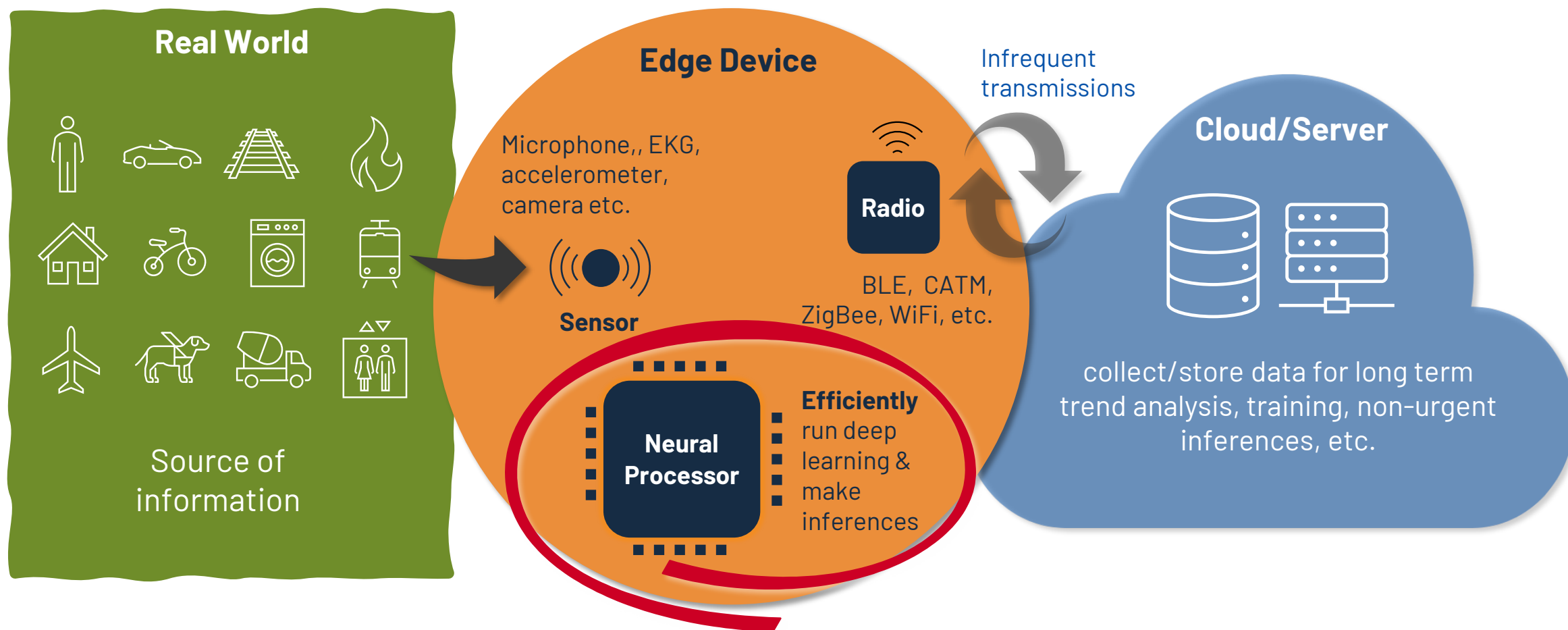
2020s

# Edge Deep Learning Until Now





# Edge Deep Learning Moving Forward



# Deep Learning on the Edge of Healthcare

## Moving Beyond Maintenance to Patient and Disease Management

- Medical/health wearables are great at continuously monitoring human vital signs and physical activity
- On-device deep learning enables predictions on that data, alerting the user and equipping physicians with potential outcomes
  - Improve speed of inference
  - Eliminate need for transmitting large data
  - Reduce privacy/security concerns



Respiratory  
Disease



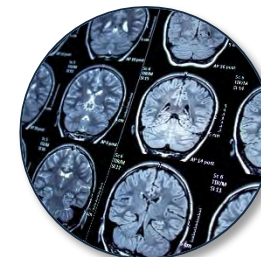
Alzheimer's



Parkinson's



Sports Rehab



Epilepsy



Mental Health

Evolution of healthcare relies on enabling on device deep learning

Source: [Healthcare Information and Management Systems Society](#)

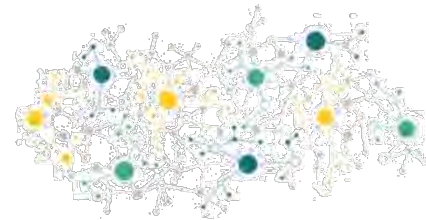
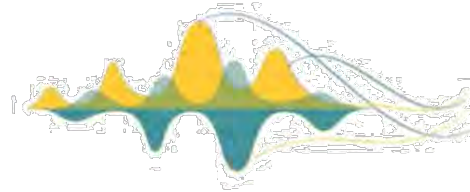


Improving Our Health, One Voice at a Time

## Canary Approach

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1. Identify Bio Markers in Speech
2. Develop Models Targeting a Disease
3. Identify Human Conditions



## Canary & Syntiant Use Case

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- Use of vocal bio-markers in managing discharged congestive heart failure (CHF) patients
- Allow patients to be monitored much more frequently than currently possible
- Goal is to reduce re-admission in the first 30 days after discharge



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# Thank You



**Kristen Hanich**

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