Personal Connected Healthcare – How oneM2M can help Develop the Market

oneM2M Membership
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The Opportunity

- Drivers motivating the need for change in the manner healthcare is delivered:
  - Aging populations (global trend)
  - Increasing complexity of medical care - clinical error rate
  - Declining ratio of healthcare professionals to patients (global issue)
- *Current practice in the delivery of Healthcare per capita is globally unsustainable with respect to cost.*

A Shift

- In US, there is currently a dramatic shift away from Institutional and episodic care to Personal monitoring and continual care
  - US Healthcare market is $2.7 trillion
  - Remote care and home monitoring is now $1.7 billion
  - Desire is to move market to a 30% shift to new models
  - This would increase size of home care to nearly $100 billion by current projections (2025)
- And, personal self care is also shifting to self-funded (i.e. I buy my sensors for me or my family)
- LNI is targeting 10% of this Sensor and Connectivity market with tools and services ($100 million)

US Model Through Incentives

The US (Medicare/Medicaid) fosters innovation via incentives based on meaningful achievements. Healthcare providers have objectives they must achieve to get incentive payments.

Stage 1 2011-2012 Data capture and sharing	Stage 2 2014 Advance clinical processes	Stage 3 2016 Improved outcomes

Stage 1: Meaningful use criteria focus on:	Stage 2: Meaningful use criteria focus on:	Stage 3: Meaningful use criteria focus on:
Electronically capturing health information in a standardized format	More rigorous health information exchange (HIE)	Improving quality, safety, and efficiency, leading to improved health outcomes
Using that information to track key clinical conditions	Increased requirements for e-prescribing and incorporating lab results	Decision support for national high-priority conditions
Communicating that information for care coordination processes	Electronic transmission of patient care summaries across multiple settings	Patient access to self-management tools
Initiating the reporting of clinical quality measures and public health information	More patient-controlled data	Access to comprehensive patient data through patient-centered HIE
Using information to engage patients and their families in their care		Improving population health

How much will you get paid?

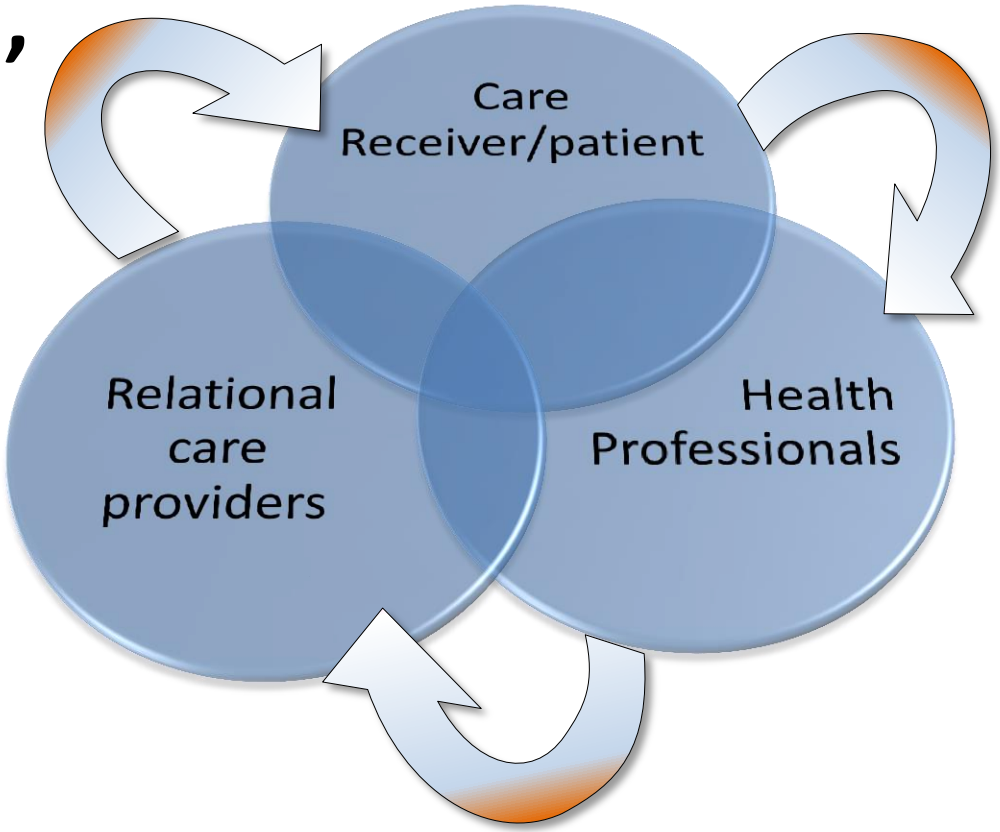
The amount of your incentive payment depends on when you begin participating in the program. The incentive payment is 75% of your Medicare allowed charges up to a maximum annual cap. The table below shows the maximum incentive amounts broken down by the year you start participating in the program.

Calendar Year (CY) for which EP Receives an Incentive Payment					
	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015 and later
CY 2011	$18,000				
CY 2012	$12,000	$18,000			
CY 2013	$8,000	$12,000	$15,000		
CY 2014	$4,000	$8,000	$12,000	$12,000	
CY 2015	$2,000	$4,000	$8,000	$8,000	$0
CY 2016		$2,000	$4,000	$4,000	$0
TOTAL	**$44,000**	**$44,000**	**$39,000**	**$24,000**	**$0**

http://www.healthit.gov/providers-professionals/how-attain-meaningful-use
http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/downloads/Beginners_Guide.pdf

LNI Vision

To enable a higher quality of life through continuous collection, distribution, and application of health Information



Vision Enablement

- Monitoring – To integrate new sensor technology into systems that collect health data as unobtrusively as possible
- Distributing – To make the collected data as usable as possible through proper representation and sharing for both human and machine consumption
- Understanding – To aggregate health information and apply analytics to identify issues and propose interventions
- Intervening – To support complex and divergent communities of people in creating effective viable workflows for patient care.

Application Areas

- Reduce the impact on care givers helping people live at home
- Improve the quality of life for those battling chronic conditions
- Consumer Empowerment
- Pharma trials

- Post operative care transition
- Disaster management
- Field based health data capture

Continua

Continua is a non-profit, open industry organization of healthcare and technology companies joining together in collaboration to improve the quality of personal healthcare. In February 2014, Continua, HIMSS and mHealth Summit created the Personal Connected Health Alliance (PCHA).

Continua is dedicated to providing chronic disease patients with interoperable, unobtrusive devices that can be used at home, at work, or on the move, allow them to regularly track and share their health status. It also enables care givers to make necessary interventions and family members to play a greater role.

ITU adopted Continua guidelines in December 2013.
(recommendation ITU-T H.810)

Continua Unique Value Proposition

The only organization in Connected Health at home to focus on interoperability from the patients to the caregivers, with clear, detailed, and ready-to-use guidelines based on existing standards such as IEEE, HL7, or SNOMED CT.

Continua is to the Connected health at home what IHE is to the hospital environment (definition of profiles).

It also provides certification, assistance, and extensive source code library.

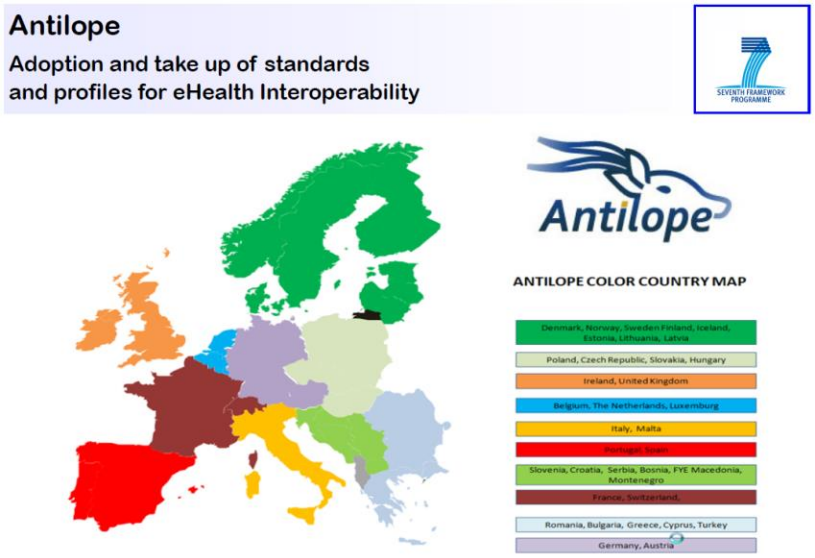
"We do not see any alternative to Continua" wrote Roald Bergstrom, the Principal Advisor to the National Health Authority in Norway.

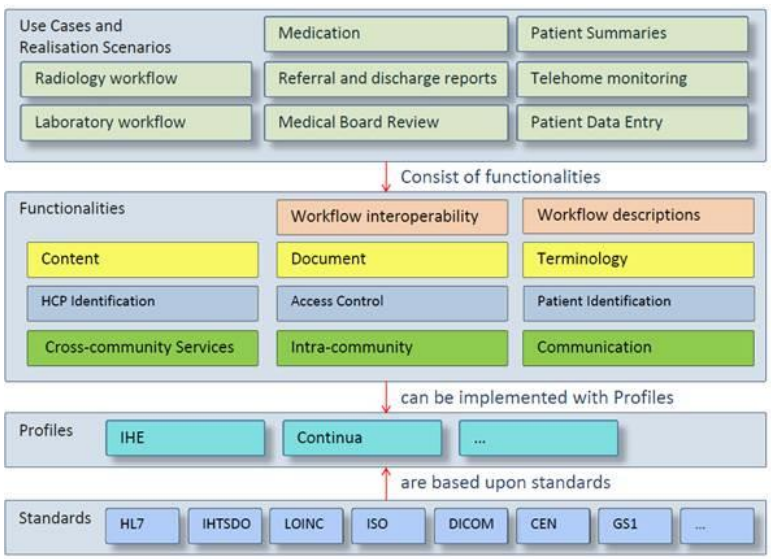
Continua - Latest on Adoption

- ITU endorsed the Continua guidelines in Dec. 2013 (ITU-T H.810).
- In December 2014, Norway announced the adoption of Continua following Denmark. Other Nordic countries (Finland, Sweden, Iceland) should follow.
- The Continua guidelines are stated in the European Commission's eHealth Interoperability Framework (2013) and their refinement are proposed in the Antilope project (2014).
- In the US, ONC is requesting Continua to support DIRECT and FHIR and the FDA has initiated works with Continua to create a quality framework for implementation and testing with Continua.
- Singapore promotes Continua.
- In China, as local governments build their healthcare systems to care for a growing population, and as they look to promote Chinese manufactured medical devices, interest in Continua is growing.

The European Interoperability Framework

The Antilope project has refined the European eHealth interoperability framework to advise and guide national and regional health administrations on promoting interoperability locally. Continua and IHE are both core partners.





2015 Guidelines - Continua Profiles

3 IEEE domains: Disease Management, Health and Fitness, and Independent Living (Aging Independently)

- Pulse oximeter
- Blood pressure monitor
- Thermometer
- Weighing-scales
- Glucose meter
- Cardiovascular fitness
- Step counter
- Strength fitness
- Activity hub
- Adherence monitor
- Peak flow meter
- Fall sensor
- Motion sensor
- Enuresis sensor
- Contact closure sensor
- Switch sensor
- Dosage sensor
- Water sensor
- Smoke sensor
- Property exit sensor
- Temperature sensor
- Usage sensor
- PERS sensor (Personal Emergency Response Sensor)
- CO sensor (Carbon Monoxide)
- Gas sensor
- Heart-rate sensor
- Basic 1-3 lead ECG sensor (ElectroCardioGram)
- Body composition analyzer
- INR meter
- Sleep Apnea Breathing Therapy Equipment (SABTE)

MoU Continua / Bluetooth SIG

Bluetooth Smart (BLE) Continua profiles:

HTP - Health Thermometer Profile
HRP - Heart Rate Profile
BLP - Blood Pressure Profile
GLP - Glucose Level Profile
WSP - Weighing Scale Profile
BCS - Body Comp Analyzer Service

Bluetooth® SMART

Continua - Beyond Connected Health

3 IEEE domains: Disease Management, Health and Fitness, and Independent Living (Aging Independently)

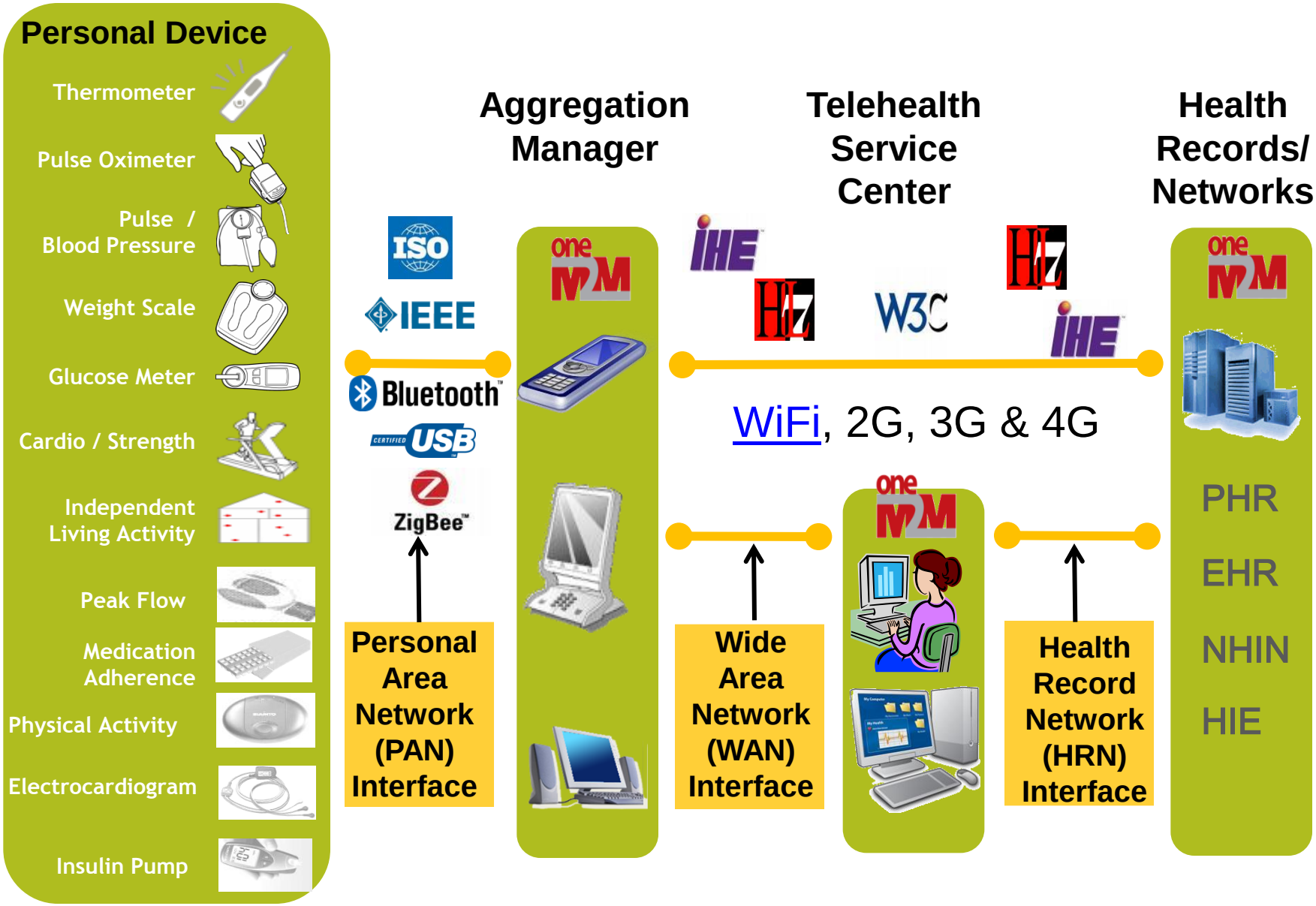
Connected Health data systematically sent to caregivers

- Disease Management

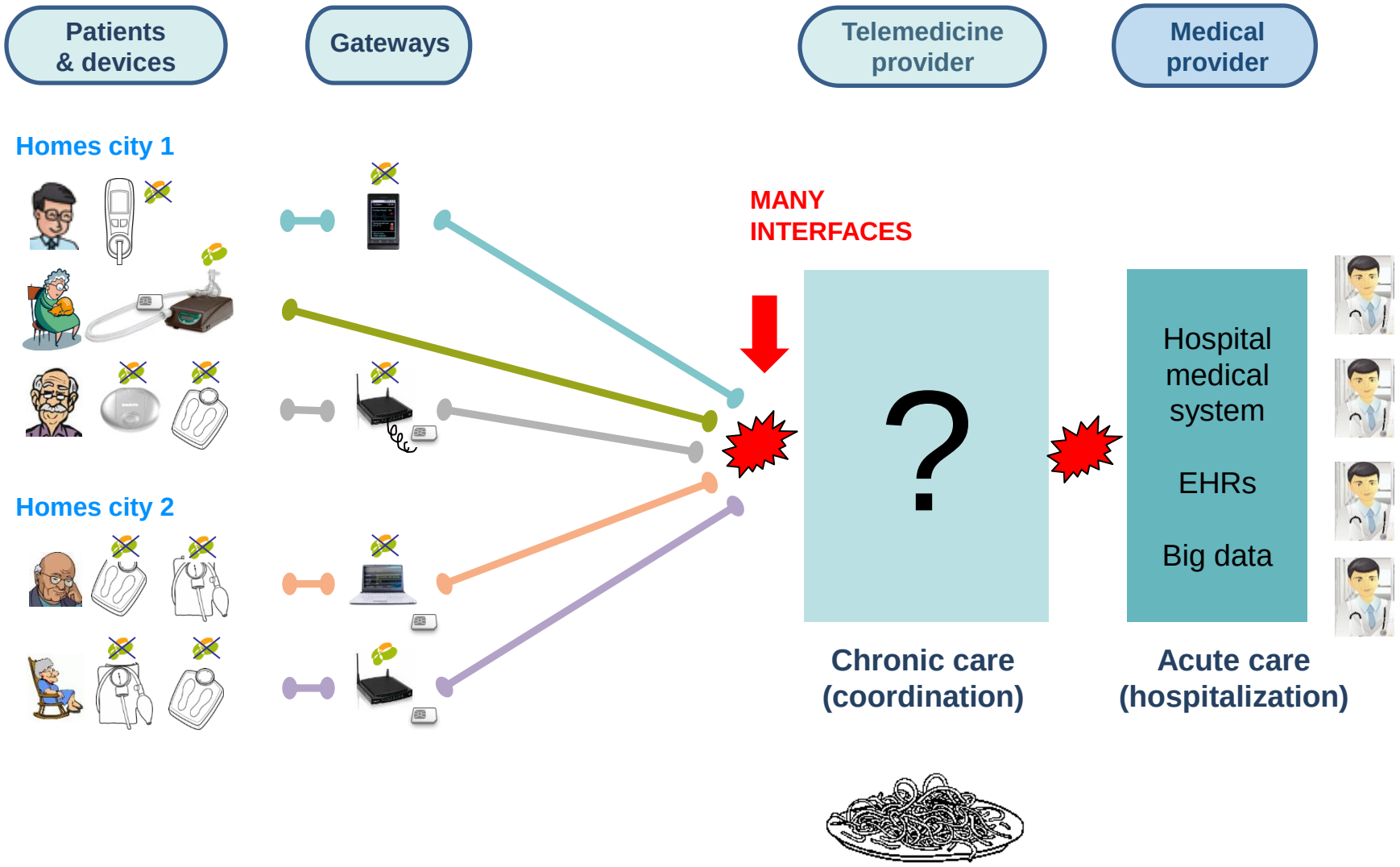
Beyond Connected Health data occasionally sent to caregivers

- Health and Fitness
- Independent Living (Aging Independently)
- Smart home

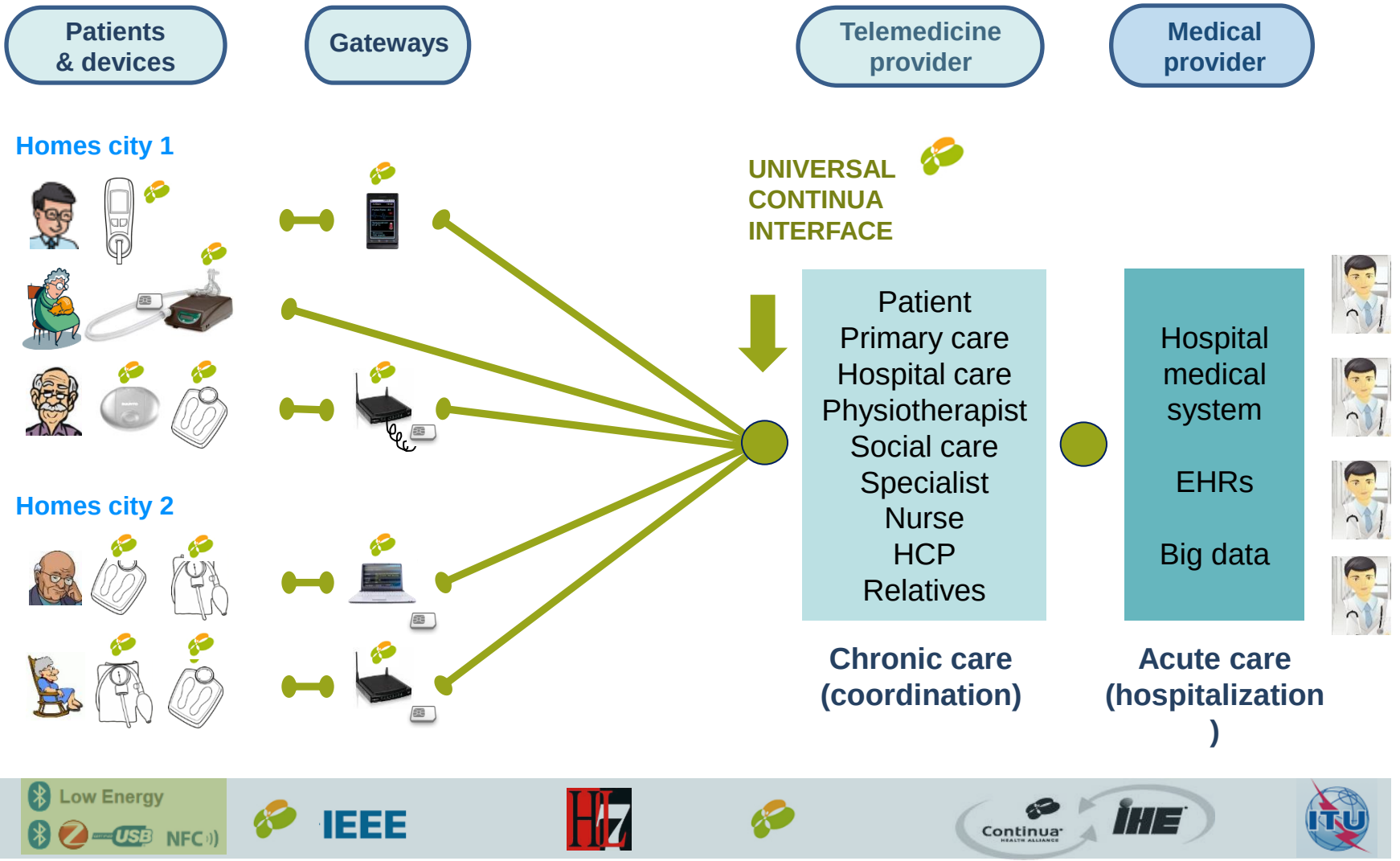
Continua utilizes standards



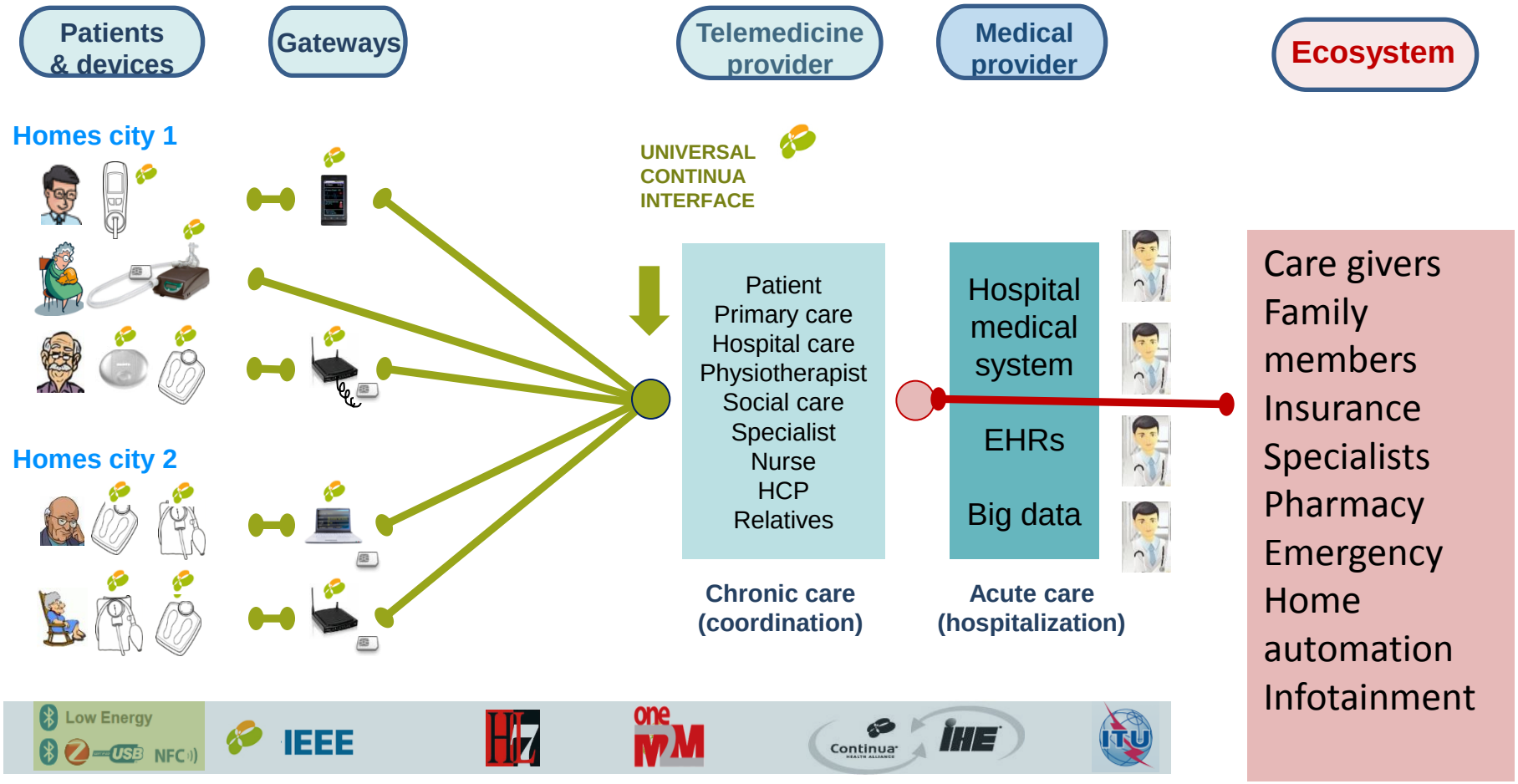
What Happens Without Continua



With Continua



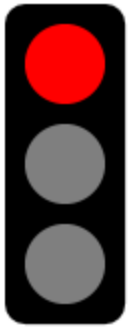
With Continua and oneM2M

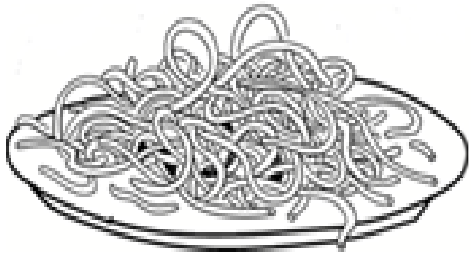


Without Continua

several devices	=	several interfaces
several interfaces	=	several data models

- integration
- maintenance
- rollout
- cost
- security
- reliability





With Continua

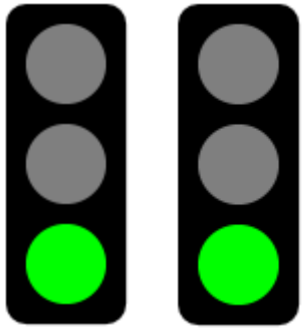
several devices	=	one interface
one interface	=	one data model
one data model	=	one application
one application	=	one portal

- integration
- maintenance
- rollout
- cost
- security
- reliability
- care coordination
- pooled resources
- EHRs

With Continua and oneM2M

one application	=	one portal
one portal	=	one data stream
one data stream	=	one ecosystem
one ecosystem	=	multiple users

- integration
- shared data
- enterprise class
- economies of scale
- ecosystem enabler
- service platform
- data independence

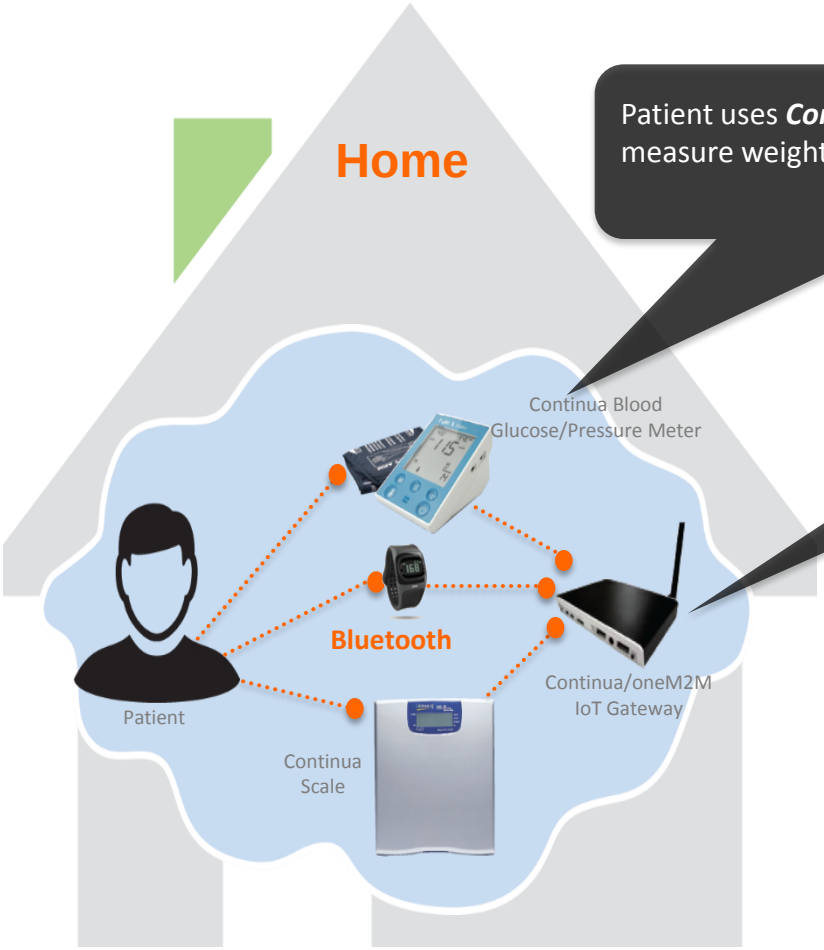


oneM2M Application





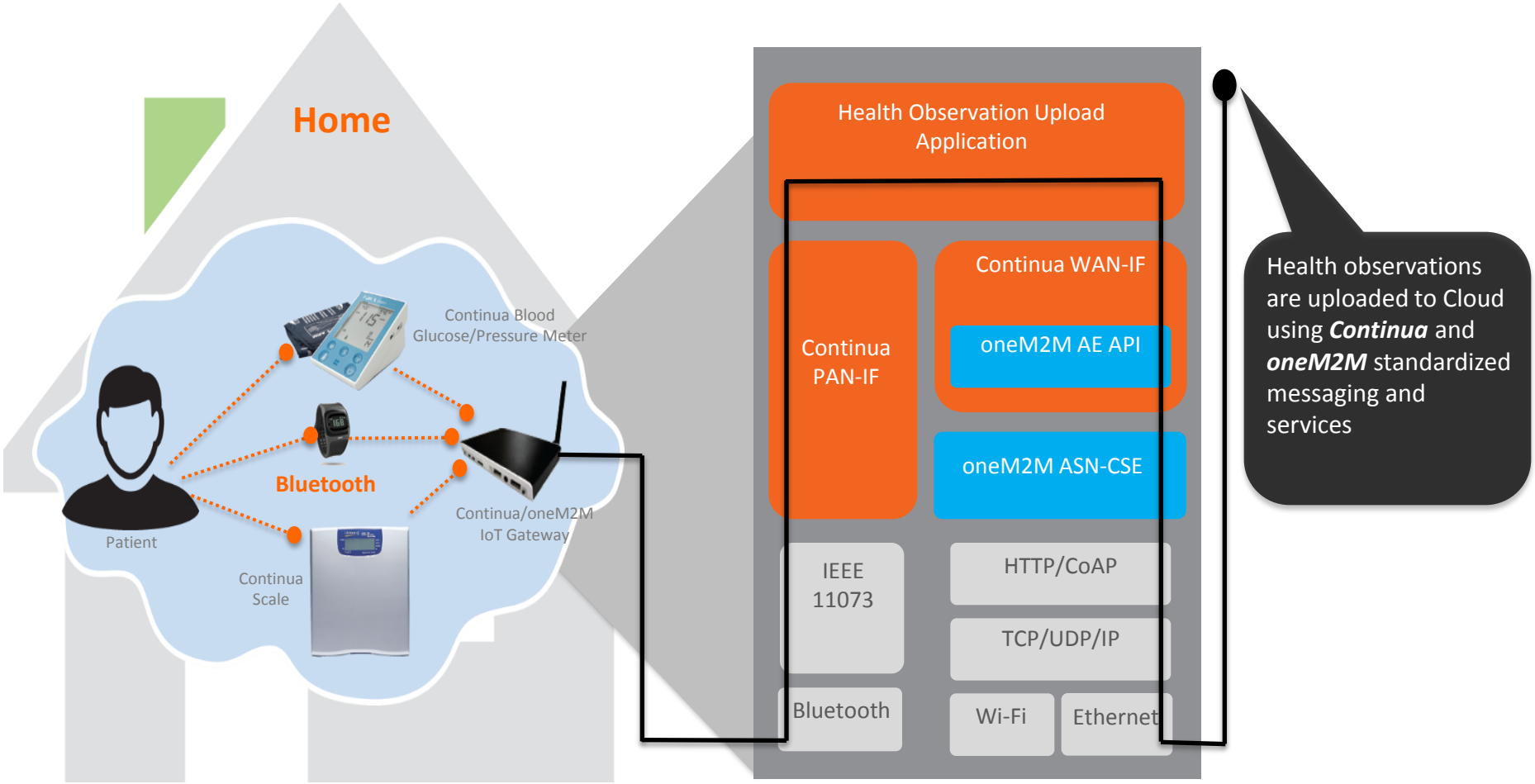
Continua/oneM2M Remote Healthcare Monitoring Solution



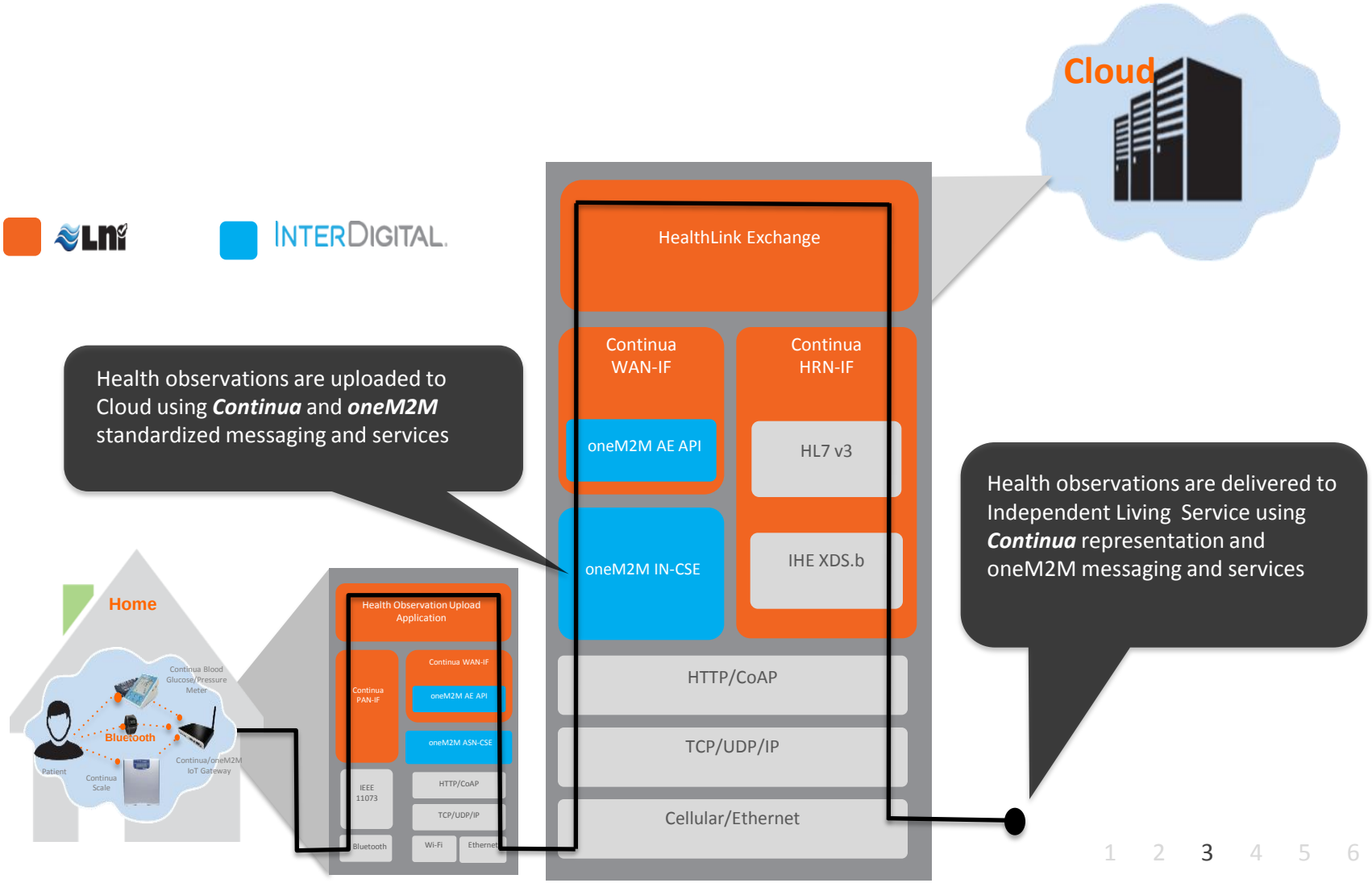
Patient uses ***Continua*** certified health devices to measure weight, blood pressure and glucose levels

Health observations are uploaded to IoT Gateway via ***Continua*** Standardized messaging and services.

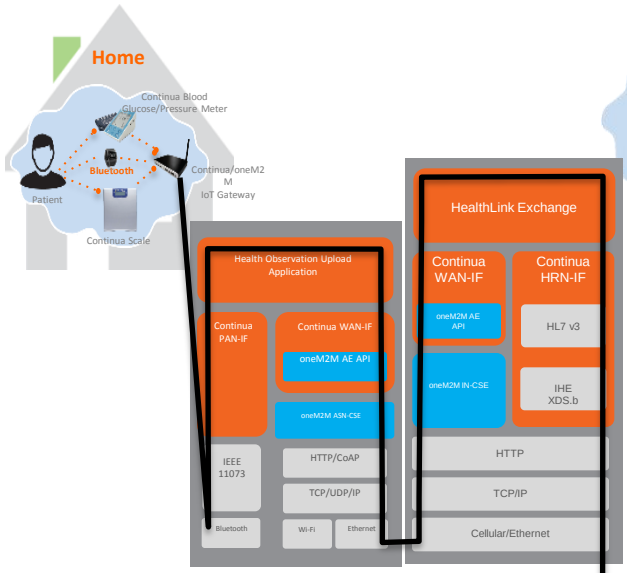
Continua/oneM2M



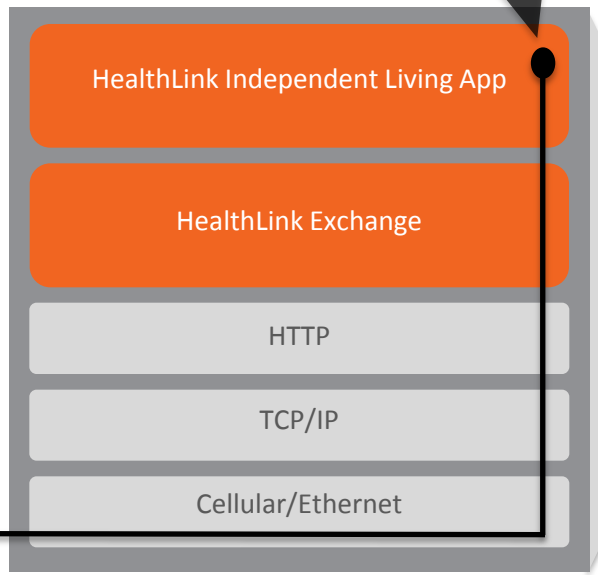
Continua/oneM2M

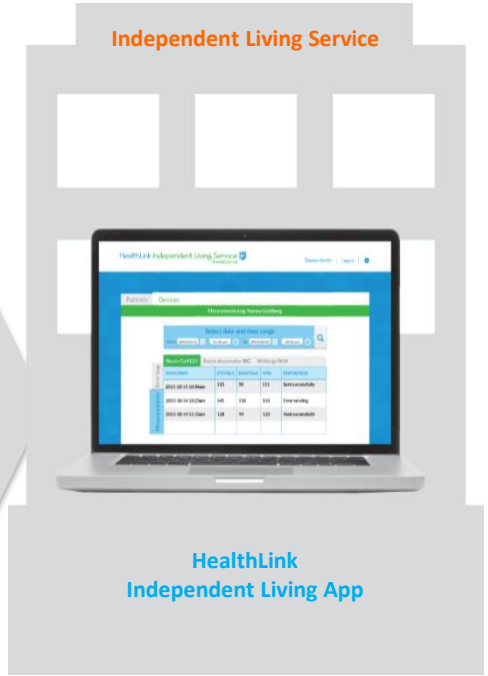


Continua/oneM2M

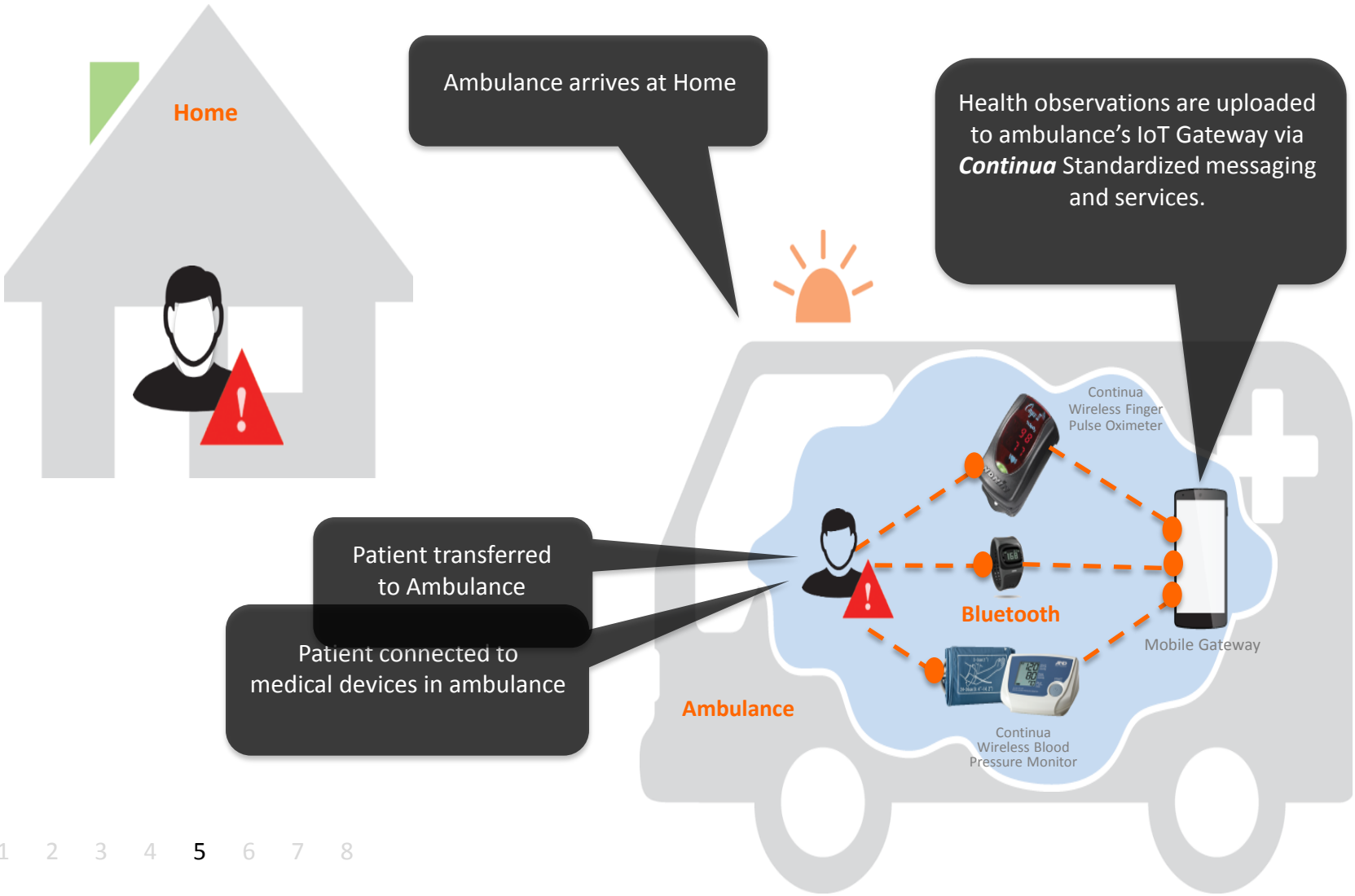


Independent Living Service processes health observations & detects condition that requires intervention. A call is placed to EMS to have ambulance dispatched to patient's home.

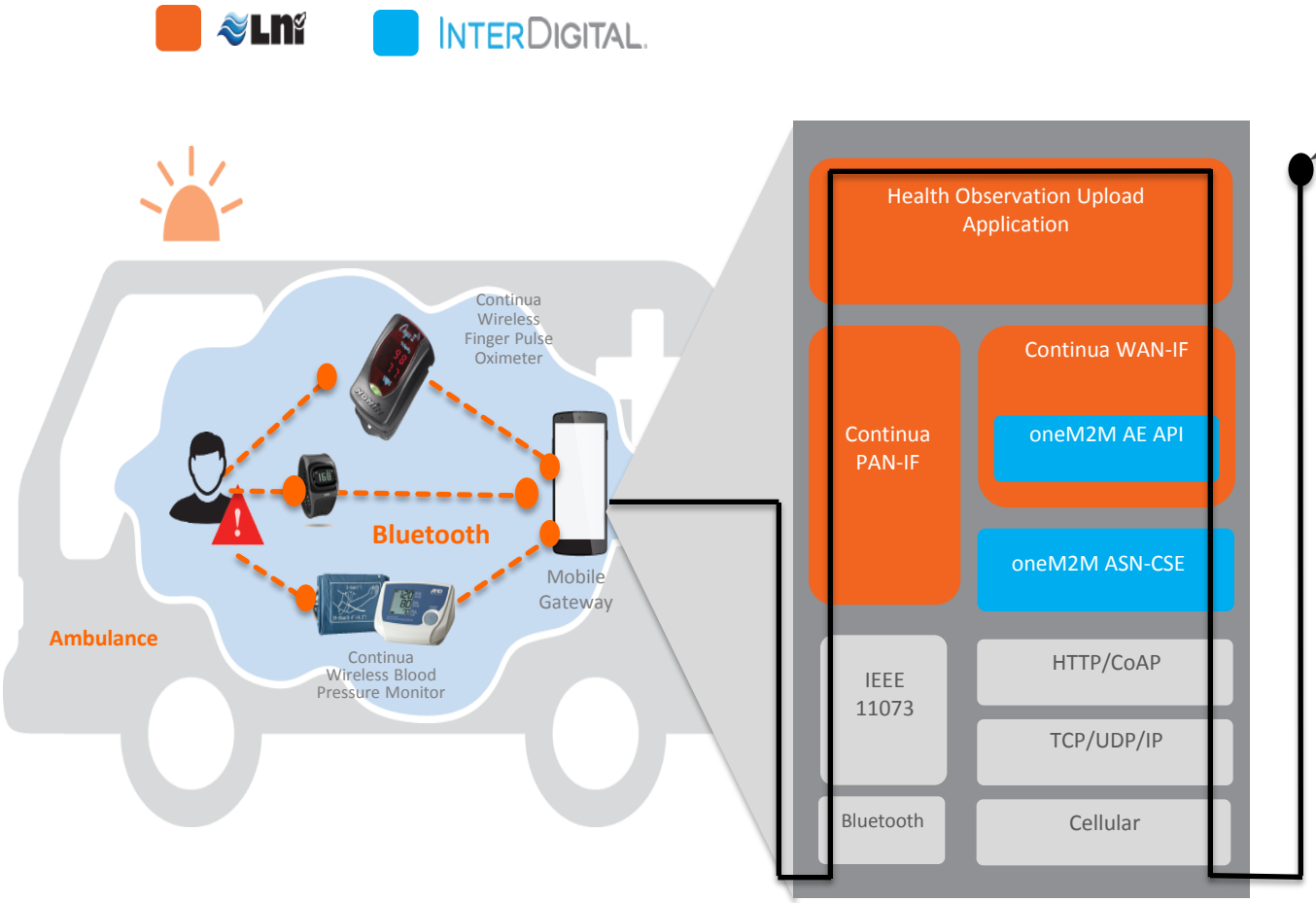




Continua/oneM2M

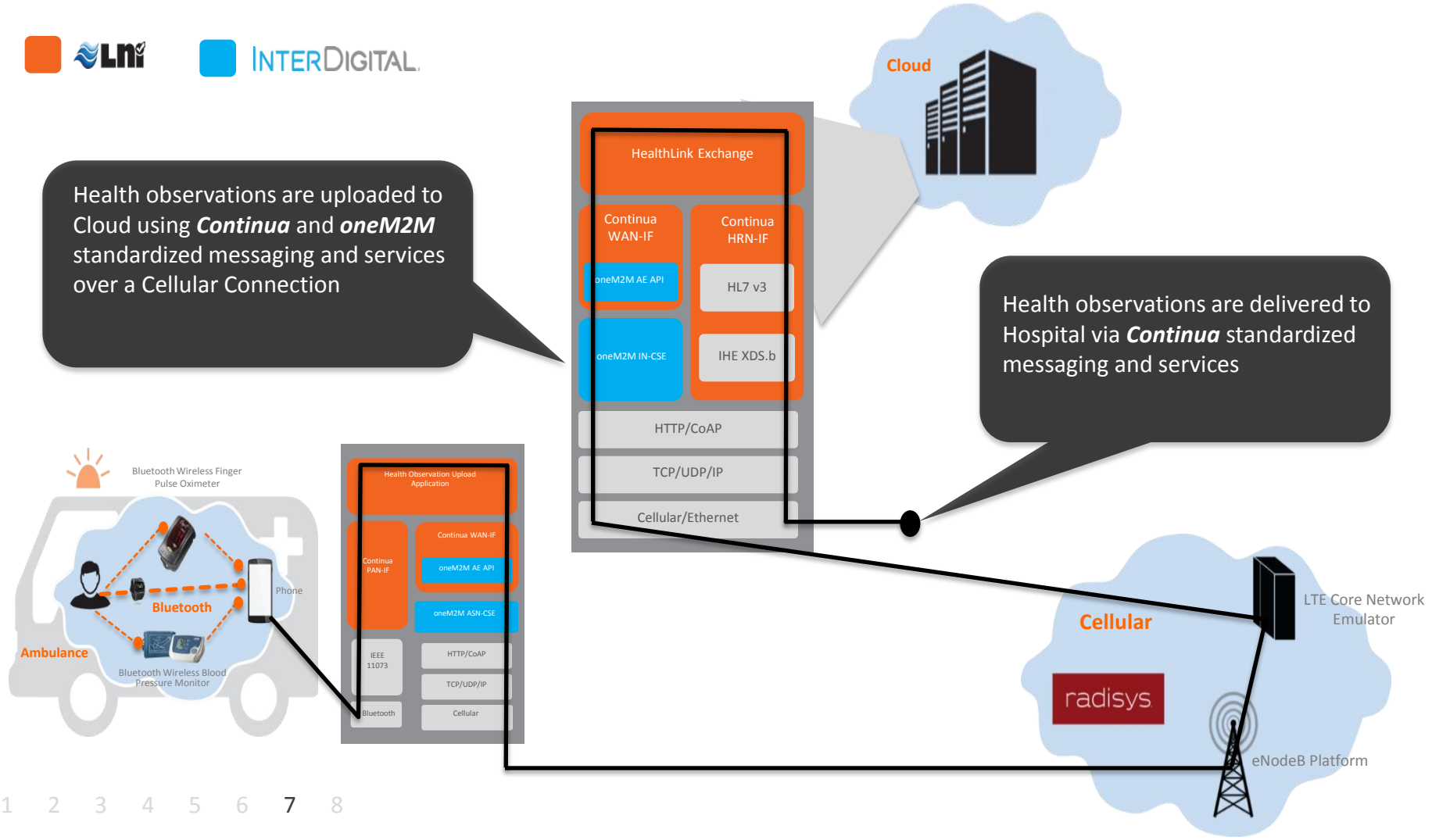


Continua/oneM2M



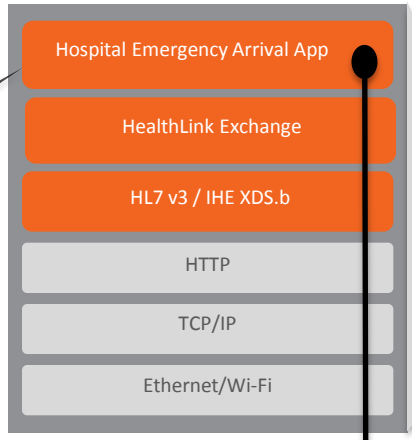
Health observations are uploaded to Cloud using ***Continua*** and ***oneM2M*** standardized messaging and services over a Cellular Connection

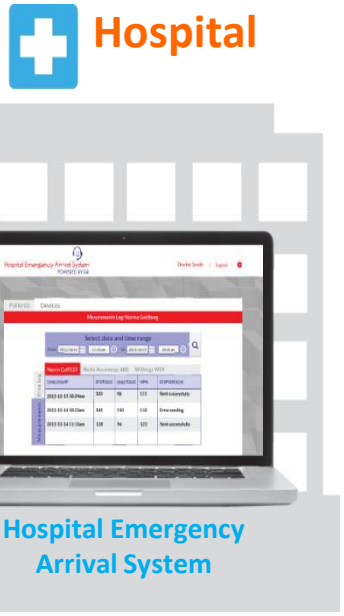
Continua/oneM2M

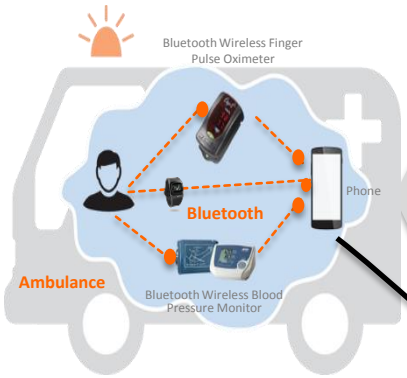


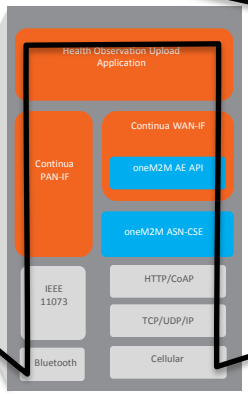
Continua/ oneM2M

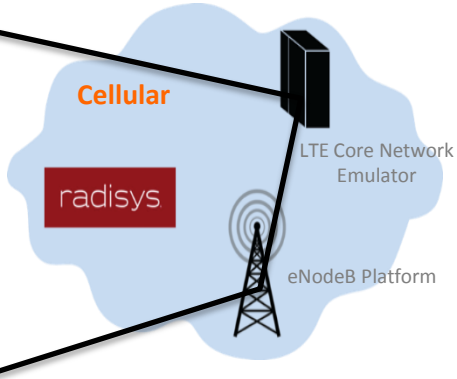
Hospital Emergency Arrival app processes observations and monitors patient's vitals while travels to hospital



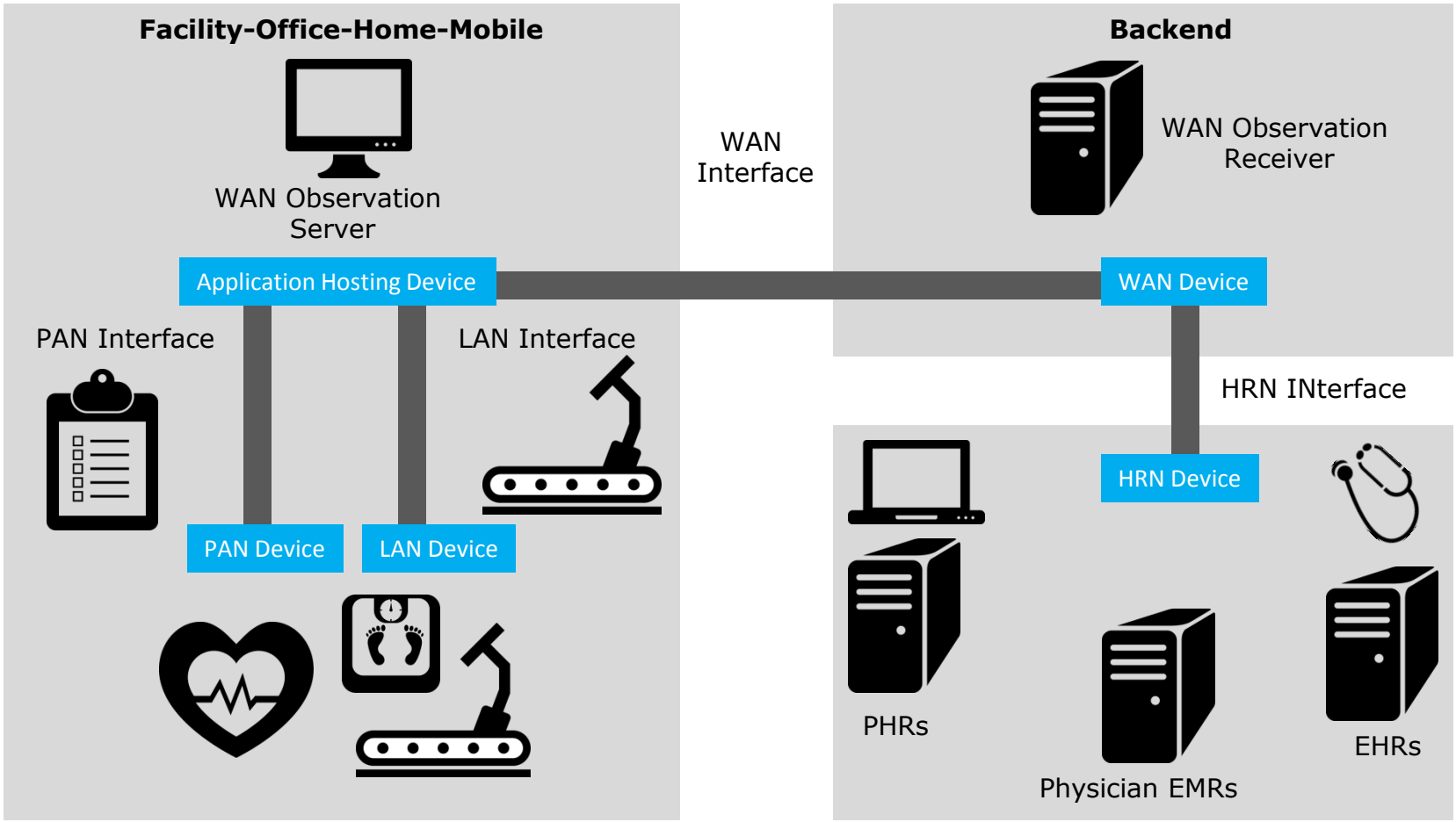




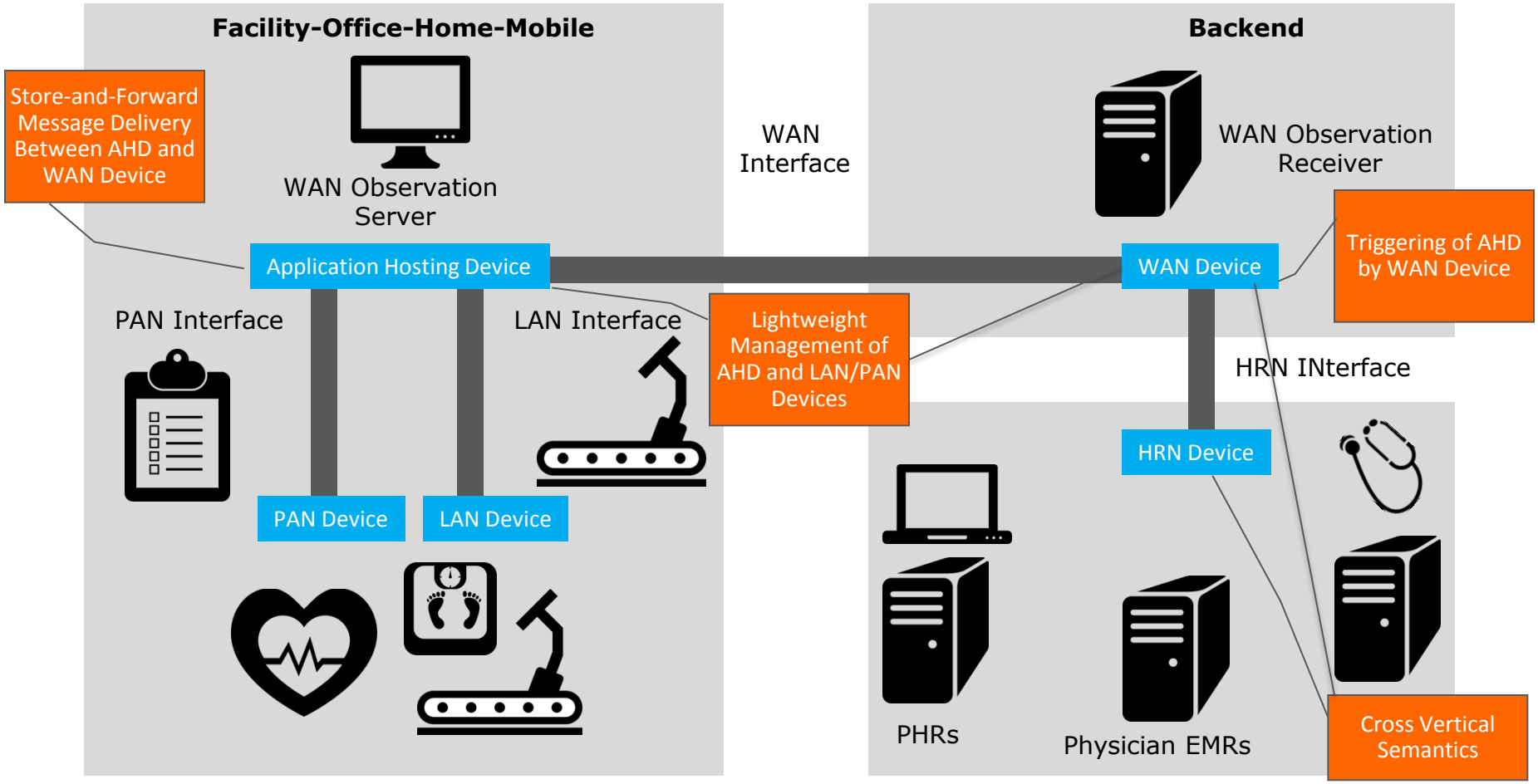




Continua/PCHA Architecture

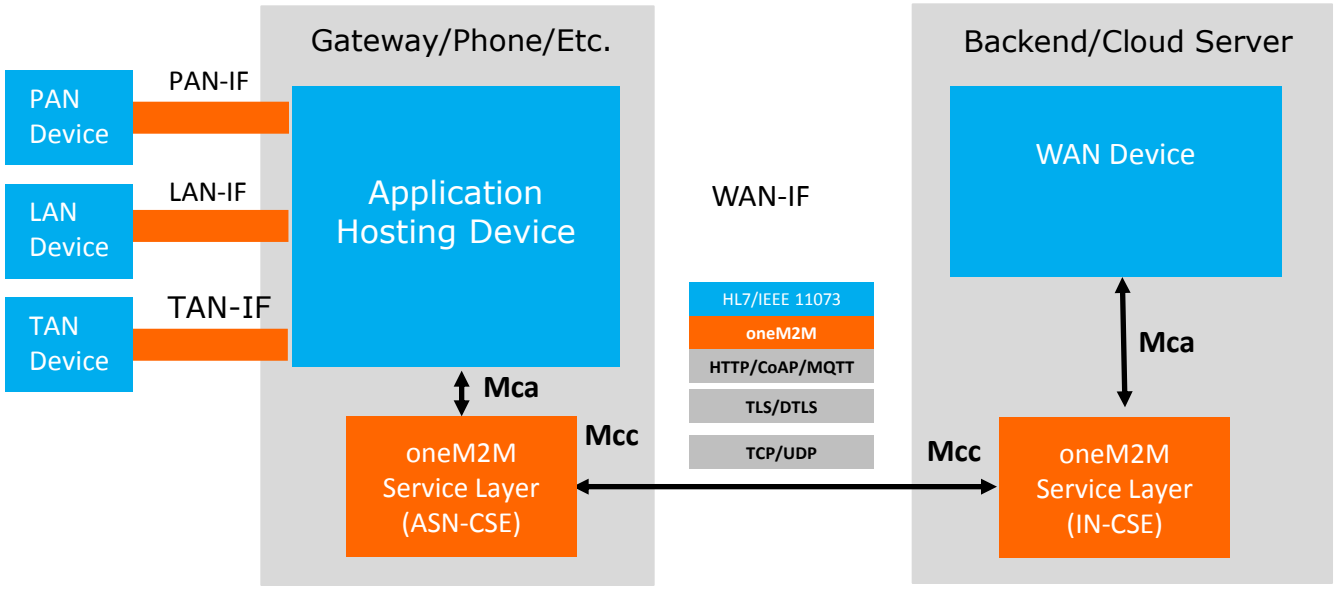


Longer Term Picture



Source: Continua/PCHA

Near term → *oneM2M over WAN I/F*

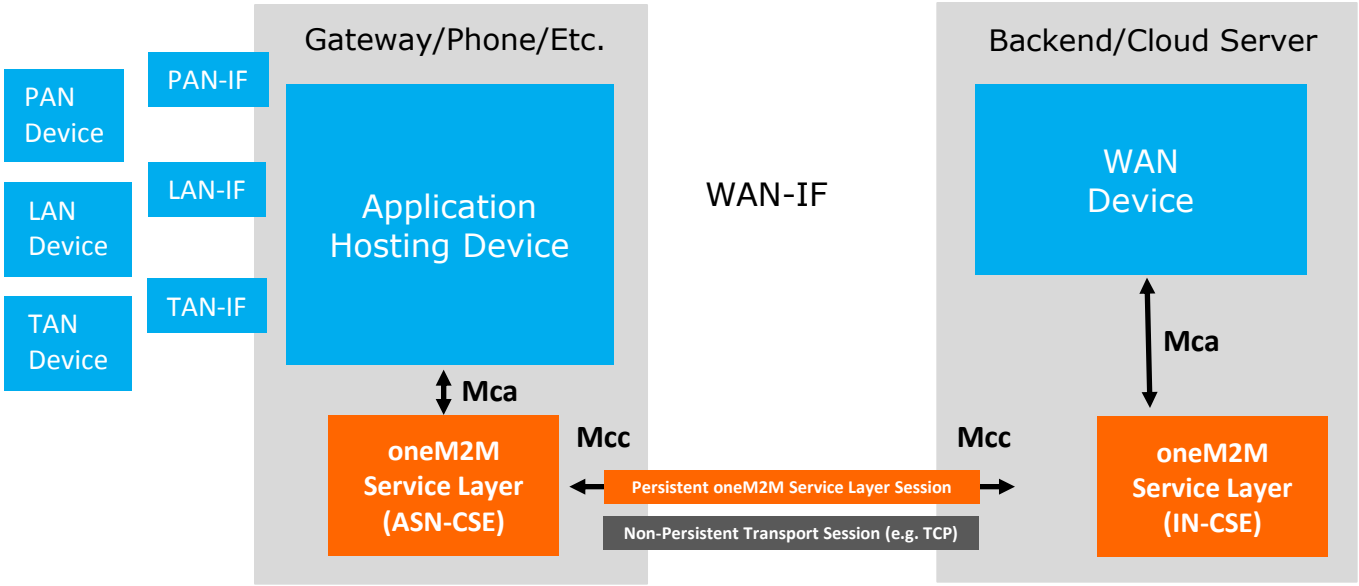


Examples of value-add oneM2M features currently leveraged:

Efficient RESTful oneM2M Interfaces and APIs:

- oneM2M resources
  - AE, remoteCSE, container, contentInstance, and subscription
- oneM2M primitives/procedures
  - AE and CSE registration - Persistent Session between AHD and WAN Device
  - Container/ContentInstance CRUD operations
  - Subscription/Notifications
  - pointOfAccess proxying between ASN-CSE and IN-CSE over Mcc reference point

E.g. Persistent Session between AHD and WAN Device



oneM2M Service layer hosted on AHD registers to service layer hosted on WAN Device. This registration persists independently of underlying transport session being setup and torn-down.

Thank You

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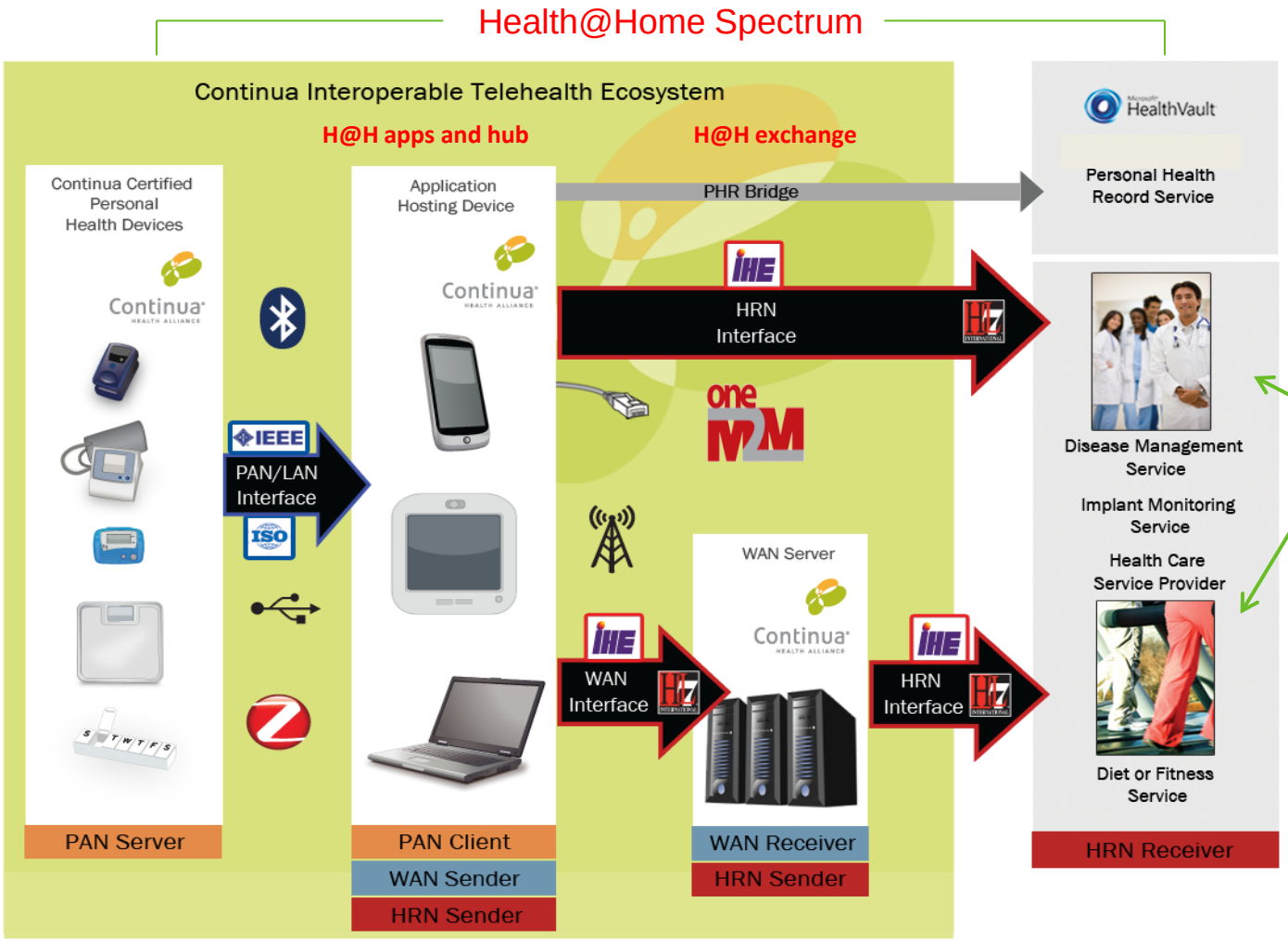
Backup





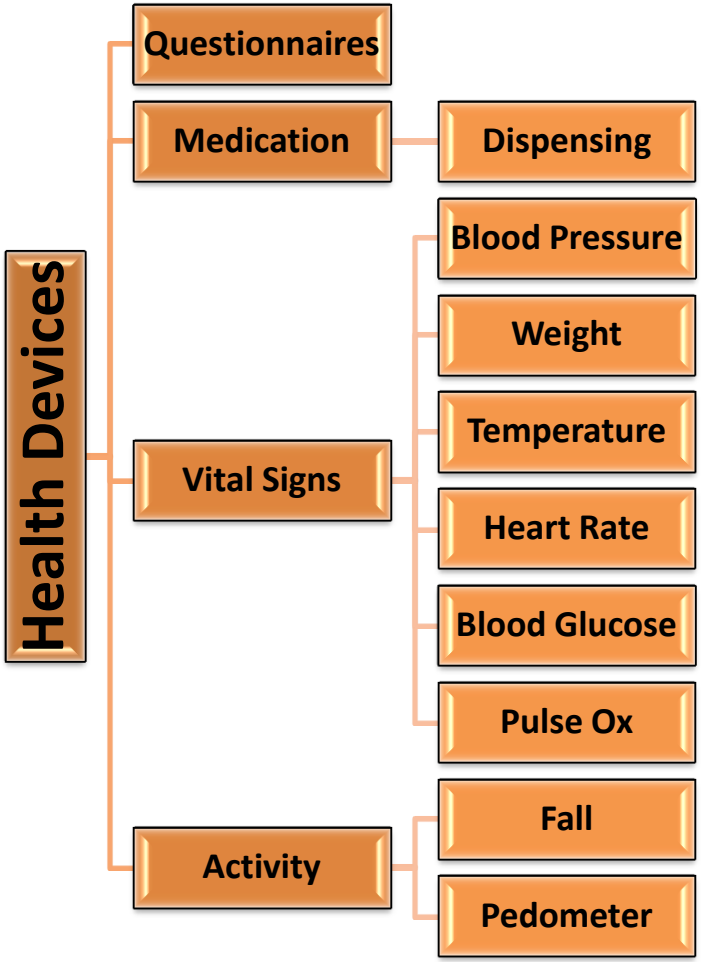
LNI: End-to-end Architecture



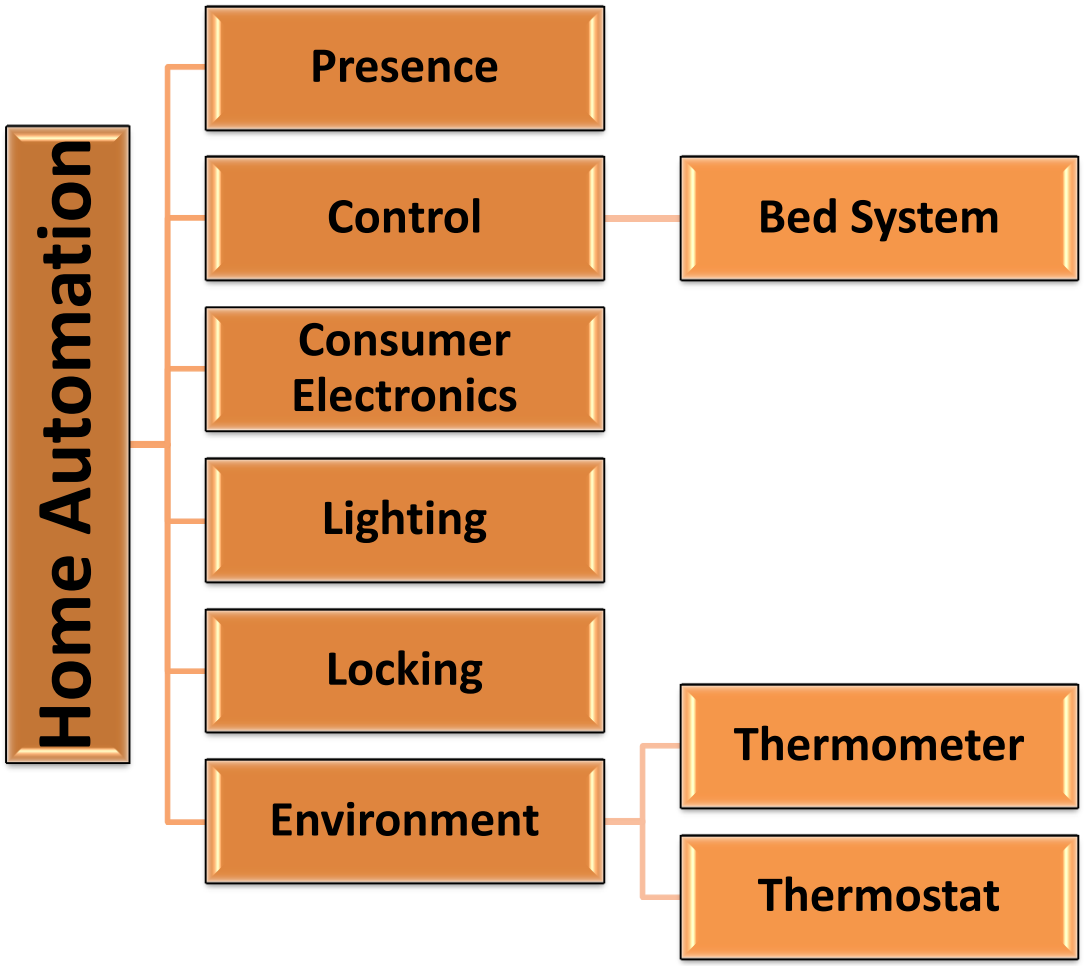
H@H Analytics

Provides data visualization and real-time reporting on sensor measurements for teleheath service centers or physician offices

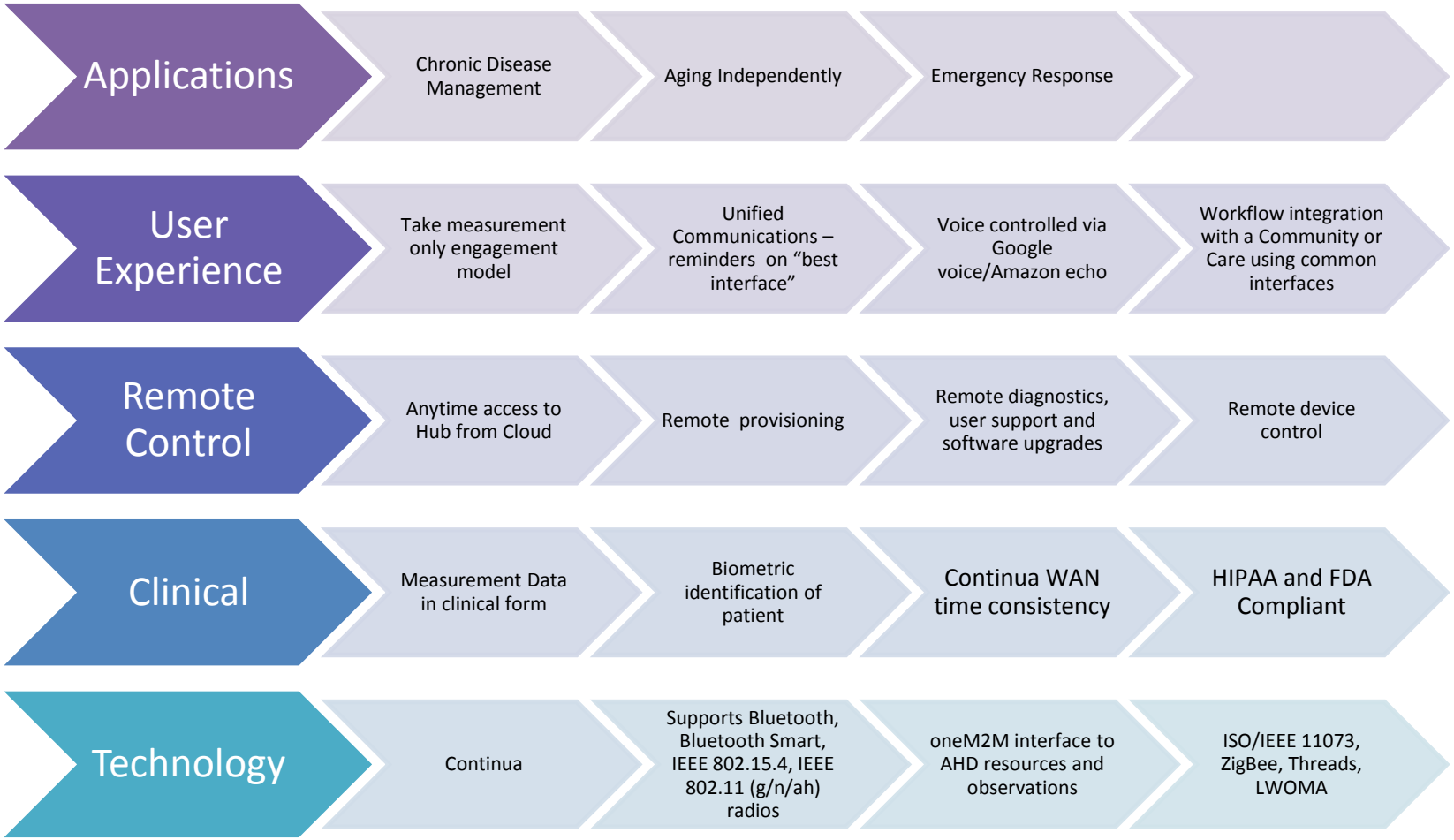
Device Support - Health



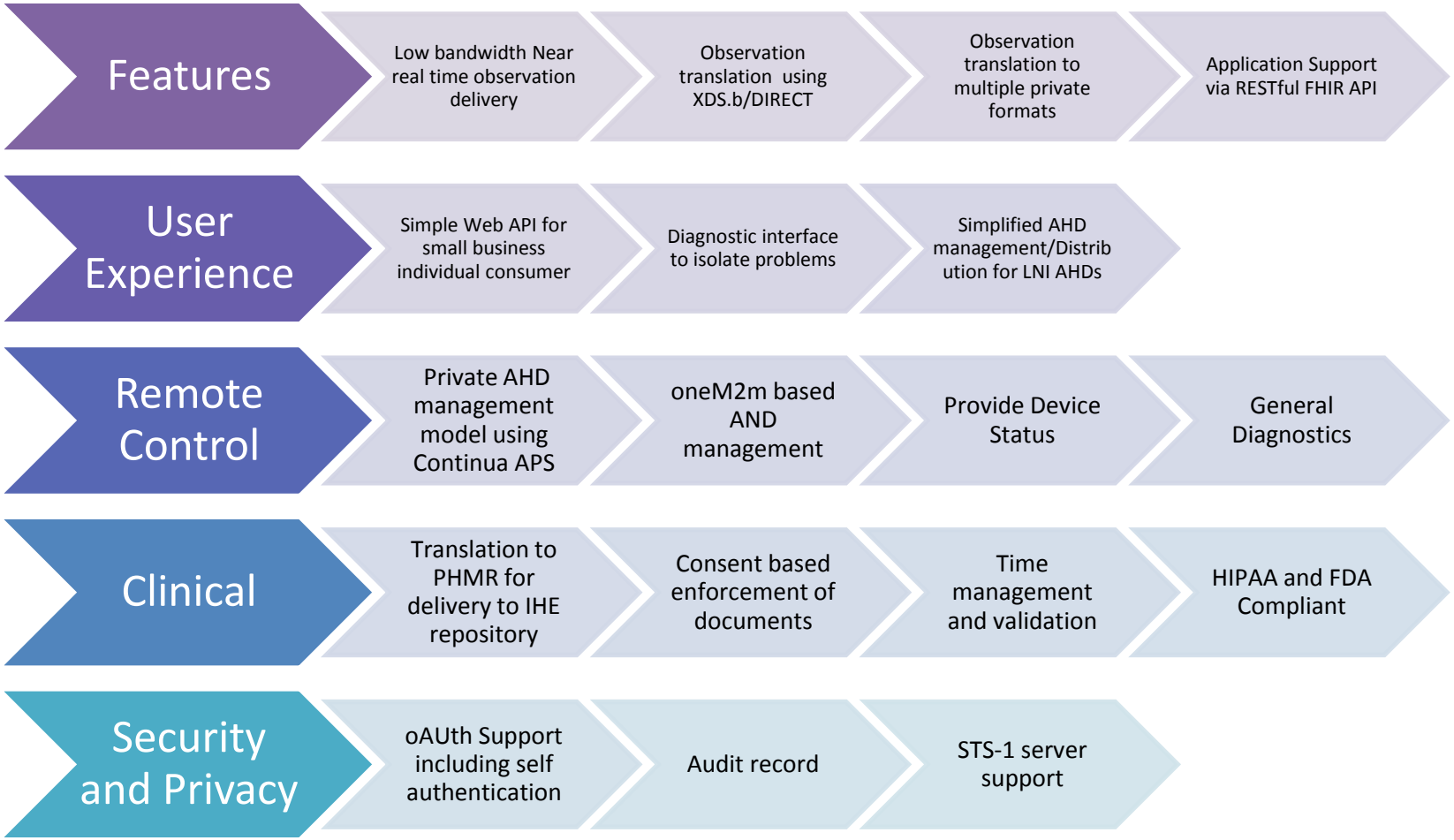
Device Support - HA



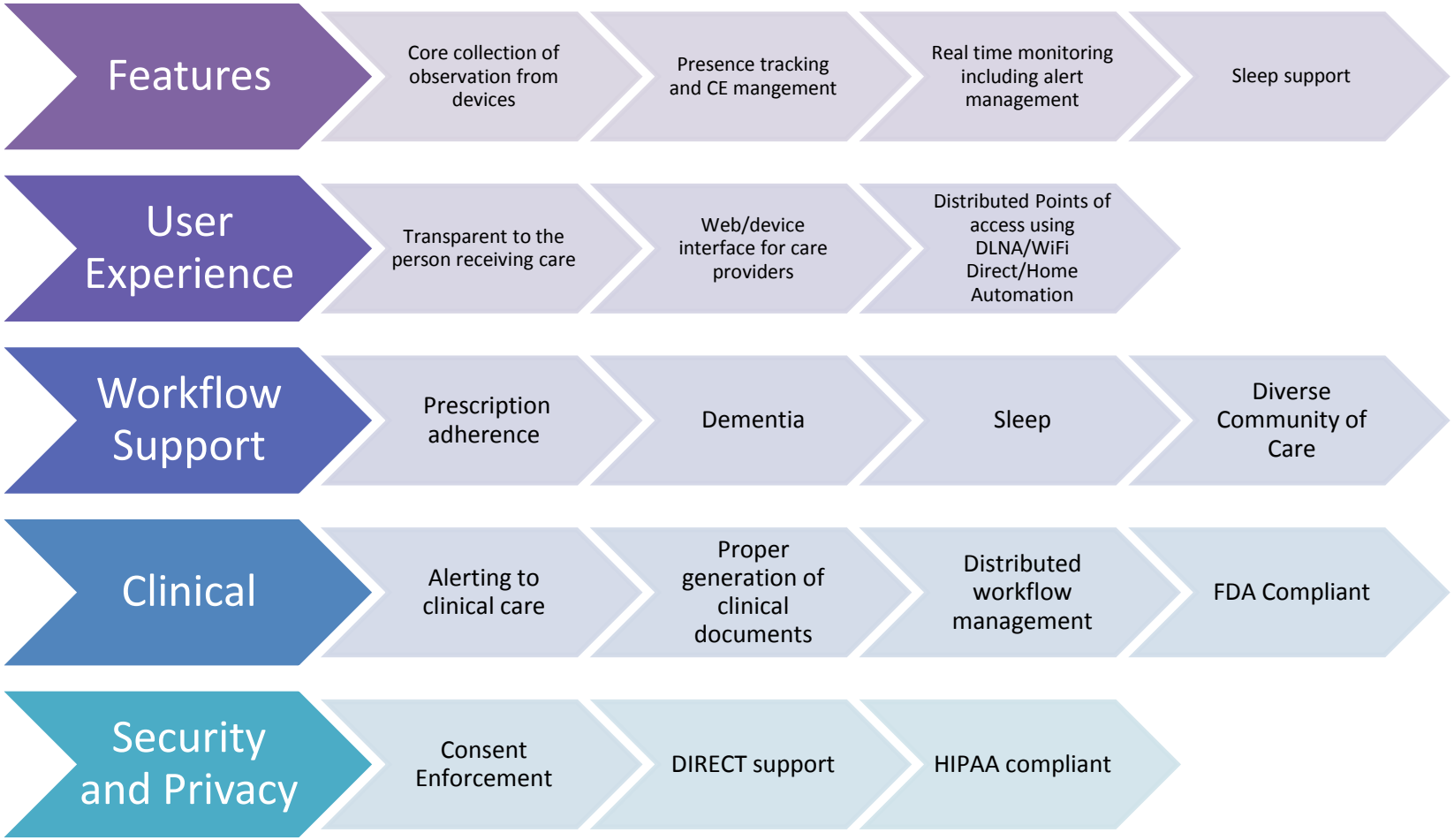
Health@Home Hubs



Health@Home Exchange



H@H InSight


Features
Core collection of observation from devices
Presence tracking and CE mangement
Real time monitoring including alert management
Sleep support
User Experience
Transparent to the person receiving care
Web/device interface for care providers
Distributed Points of access using DLNA/WiFi Direct/Home Automation
Workflow Support
Prescription adherence
Dementia
Sleep
Diverse Community of Care
Clinical
Alerting to clinical care
Proper generation of clinical documents
Distributed workflow management
FDA Compliant
Security and Privacy
Consent Enforcement
DIRECT support
HIPAA compliant

Technology

Leader in Health Remote Monitoring System

Standards Based Plug and Play Healthcare Data Networks

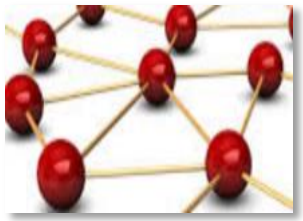
Interoperability leader with oneM2M, Continua, and DLNA

Engineering standards hardware

Custom services and coding for interoperability

Plug & Play → Standards Based Interoperability → E2E Data Connectivity

Health@home - Freedom to Scale



PLUG & PLAY	INTEROPERABILITY	E2E CONNECTIVITY	ENGINEERING
Clinically acceptable, Plug and Play Healthcare Data Networks	Seamless interoperability between PAN Devices and HRN System	*End-to-End Data Connectivity*	*Custom solutions to bring interoperability to legacy systems*

Health@home Solution