Continua Health Alliance

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Chuck Parker
Executive Director
The Continua Health Alliance
The Continua Health Alliance Mission

"Our Mission is to establish an eco-system of interoperable personal health systems that empower people & organizations to better manage their health and wellness"
Remote Patient Monitoring

• Market influence and implementation
• Use case Driven
• Interoperability
  - Approach
  - Constraining
  - Protocol
• Market and Political drive
Remote Patient Monitoring: Standards

- Continua founded to organize and push market in one direction.
- Structure (Working groups) is to model real-world Use Cases from industry and healthcare.
- Process then deconstructs requirements and selects best industry standards
- Then vet processes and fill holes either with direct work within SDO’s or add definitions and refinements
- Ballot and then publish program and guidelines

- **Strongest Value of Continua though is the Certification program for interoperability of devices**
Guidelines
Continua member companies will select connectivity standards and publish Guidelines for strict interoperability.

Certification and Logo
Continua is establishing a test and certification program with a recognizable logo signifying the promise of interoperability with other certified products.
Ecosystem Development

**Developer Resources**
- Web-based environment (repository, collaboration tools)
- Reference source code

**Certification**
- Test and certification tools
- Right to use certified logo upon completion of successful certification

**Market Intelligence**
- Access to market research data
- Access to pre-publication drafts of the design guidelines
- Internal and external education and training

**Collaboration**
- Plugfests participation
- Participation in RFP MatchMaker program
- Unlimited participation in Continua quarterly summits, town hall meetings, and education seminars

Monday, November 16, 2009
• Market influence and implementation
• Use case Driven
• Interoperability
  - Approach
  - Constraining
  - Protocol
• Market and Political drive
• To organize its work, Continua segmented the market in three large use cases:

**Aging Independently**
- An adult child helping their elderly parents age gracefully in their own home.
- Basic life monitoring as appropriate (ADL)

**Health & Wellness**
- Weight loss
- Fitness
- Email / chat / video
- Appt scheduling
- Personal Health Records

**Disease Management**
- Vital sign monitoring (RPM)
- Medication reminders and compliance
- Trend analysis and alerts
- Connect with family care givers
**M1: Decompose UC into requirements**

- V1.5 (Fall 2009)
  - Advanced Medication Monitor
  - Peak Flow Monitoring Device
  - Upload Health Information on the WAN
  - Sneaker-Net xHR Interface
  - Clinical Coding for xHR
  - Errata from V 1
  - Low Power Radio

**M2: Select Standards**

- Exit ➔ Successful TWG Ballot, BOD approval

- V2 (Fall 2010)
  - Insulin Pump Monitor Device
  - ECG and Respiration Monitoring Device
  - Physical Activity Monitoring Device
  - Ultra-Low-Power Body Area Network
  - Low-Power LAN
  - Clinical Coding for xHR
  - Device and Patient Authenticity
  - Controlled Information Sharing
  - Disease Management
  - Multiple Users

**M3: Identify gaps between standards and requirements**

- Exit ➔ Successful TCWG review

**M4: Develop Guidelines**

- Exit ➔ TWG review and ballot

**M5: Create Test Procedures and complete review**

- Exit ➔ Successful TCWG review

**M6: Update Test Tool**

- Exit ➔ Pass Tool Test
V2 Use Cases Underway

PAN Device
- Physical Activity Monitor
- Medication Monitor
- Electrocardiogram (ECG)
- Insulin Pump

LAN Device
- Low Power Radio

Device Hosting Device
- Service (WAN) Interface

WAN Device
- Portable XHR Media Extension

Health Record Device
- Final link in end-end connectivity

V1 Extensions (e.g., Multiple device users, enhanced device authentication)
Remote Patient Monitoring

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Interoperability Standards - Protocol

- 11073-10404 = Pulse Oximeter
- 11073-10406 = Pulse / Heart Rate
- 11073-10407 = Blood Pressure
- 11073-10408 = Thermometer
- 11073-10415 = Weighing Scale
- 11073-10417 = Glucose
- 11073-10441 = Cardiovascular Fitness Monitor
- 11073-10442 = Strength Fitness Equipment
- 11073-10471 = Independent Living Activity
- 11073-10472 = Medication Monitor

Bluetooth Medical Device Profile Specification

USB Personal Healthcare Device Class Specification
V 1 Data Standards - Syntactical

Disease Management Service

Home-based Remote Patient Monitoring (RPM) System

Patient

Vital Sign Devices

CDA/CCD-based Personal Health Monitor (PHM) Specification

XDR Transport Specification

Healthcare Provider

Labs

Electronic Health Record System

EHR / PHR
V1 Interoperability - Semantic

- Use of HL7 and SNOMED CT for semantic understanding
- V2 will have further implementation and conditional understanding
Interoperability in Three-tier Approach

- Continua constrains the outputs at the device level. (PAN interface)
  - Reduces device overhead and intelligence requirements
  - Reduces power requirements
  - Reduces development time
  - Reduces connection complexity

- Intelligence is at the Hub / Manager
  - Understands what it is communicating with
  - What data to expect
  - May issue commands to send certain data
Continua Reference Device Classes
(with real-world examples)

Application Hosting Device

PAN Device

LAN Device

WAN Device

Health Record Device

PAN “Adapter” Device: to represent a device as a PAN Device in the Continua ecosystem

LAN “Sharing” Device: to represent a device as a LAN Device in the Continua Ecosystem
V1 Certification Process

SDO Transport Certificate

Continua Compliance Testing

Continua Certification & Logo

Test Plans

Test Report

Test Suites

Members

TCWG

Test Lab

Test Admin

Logo
Remote Patient Monitoring

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Over 1,400 members participating in the various Working Groups
RPM market now: Current Participants

- Continua membership shows across the board interest both from supply and demand sides:
  - Medical devices
  - Governmental Agencies
  - Health care providers
  - Health insurers
  - Fitness
  - Pharma
  - Telecommunications
  - IT
  - Integrators
  - Applications (PHR, EHR, desktop)
RPM market in the future

- The individual / home as the hub
- Convergence consumer / healthcare
- Consumer health / PHRs fitness - sometimes with public incentives
- Support public health and corporate wellness programs
- Rewards for keeping people healthy
- Greater integration among wellness, health and social care
- Best-of-breed plug and play
- Increased connectivity, evolutionary, scalable, service driven offerings
End-to-end demo - Vancouver 2009

- **Device Interface Device Manager**
  - Glucose Meter (Roche Accu-Chek 360)
  - Pulse Oximeter (LNI Android-based G1 Cell phone 20601 manager)

- **WAN**
  - Based upon proposed protocols for Continua WAN
  - IP network
  - Wi-Fi or 3G

- **XHR Interface Sender Receiver**
  - PHR
  - xHR
  - Disease management platform
Thank you!

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Remote Patient Monitoring

- Additional Content
Remote Patient Monitoring: enablers & drivers

**Health Cost Burden**
Increasing costs of the old model of health care become a national crisis

**New Knowledge**
Modifiable lifestyles are key drivers for population health and disease

**National Action**
Economic pressures force nations to demand new health solutions

**Perspective Shift**
From treatment of disease to proactive nurturing of personal wellness

**Connected Personal Health**
A new path to personal wellness, citizen productivity, and sustainable health costs

**Enabling Technology**
Telehealth devices, personalized biometrics, device interoperability
Our evolution cannot support our current sedentary high-fat activities
Goal: Realize Peak Health Potential

• **Goal**
  - Experience peak health potential throughout life for a high quality of life at minimal costs

• **Reality**
  - Average individual is experiencing much less of full health potential than expected at a high financial & quality of life cost

• **Cause**
  - Adverse health events such as stress, poor nutrition, inactivity... are causing the population to fall away from their peak health potential

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[Diagram showing the relationship between time, peak health potential, health experience, and costs.]

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Adapted from Oregon Medical Labs
The challenge:

- Almost half of all Americans - 133 million people in 2005 - have at least one chronic condition, and the medical care costs of people with chronic diseases consumes more than 75 percent of US medical care costs (CDC).

- Up to 60% of all medication prescribed is taken incorrectly, or not at all (National Council on Patient Information & Education).

Source: Employee Benefit Research Institute estimates from Centers for Medicare and Medicaid Services and U.S. Department of Commerce.
Last Updated: January 6, 2008
• The area of telehealth/home health monitoring is predicted to grow very rapidly, from a $3B market in 2009 in North America and Europe to an estimated $7.7B in 2012 (Data Monitor, 2007)

• Number of telehealth subscribers worldwide will increase to **55.5 million** by 2016, representing a forecast CAGR of almost 72%, (InMedica, 2008)

• There is increasing evidence to support the value of remote monitoring for patients with chronic diseases, including:
  - 35-56% reduction in mortality;
  - 47% reduction in risk of hospitalization;
  - 6 days reduction in length of hospital admission and
  - 65% reduction in office visits;
  - 40-64% reduction in physician time for checks and
  - 63% reduction in transport costs

Many diseases can be broken down into non-modifiable and modifiable contributors.

Non-modifiable contributors:
- Age, gender and genes

Modifiable contributors:
- Lifestyle choices

Today, poor lifestyle choices increasingly are the largest contributors to common adverse health outcomes.
RPM Market: the Market Segments

Multiple providers / service oriented

Device / Systems / Sensors

Bio-metric/Behavioral Responses

Person Centered

Wellness Management/Support Systems

Weight Scale

Blood-Pressure

Blood-Oximeter

Pedometer

Medication Tracking

PHR/PHA

Elderly monitoring services

Activity Hub

Family caregivers

Classes

Biometrics Testing

Glucose Meter

Spirometer

HRA/Health Administrative Assistant

Fitness Equipment

Wellness Center

Fitness Equipment

Gait analysis

Body Fat %

Body Fat Analyzer

Lung Air Volume

Blood Sugar

Triglycerides

Cholesterol HDL/LDL

Information Systems

Disease management service

Healthcare provider

Fitness, nutrition, stress management...

Family care givers

Classes
• **Disease management** market:
  - evolve the current models of care; chronic and post-acute
  - connect patients, families and healthcare providers to the right information at the right time
  - more informed decision-making
  - empowering people to take a more active role in their own care
  - e.g.: Northern Ireland, West Lothian (UK); AOK Cardio Integral (DE)
  - mostly led by public healthcare administrations; statutory health insurers
Continua Use Cases

- **Health and wellness** market:
  - health conscious and worried well
  - fitness and lifestyle trackers, PHRs
  - employer programs and occupational health (HRA)
  - national public health programs, screening
  - e.g.: Diabetes Prevention DEHKO (FI); metabolic syndrome - mandatory HRA (JP); 10K Steps a Day; Nike Plus; Google Health; MS HealthVault; Dossia
  - mostly privately driven; a few national programs
Continua Use Cases

- **Ageing independently** market:
  - residential care, independent living facilities, individual homes
  - support ADL, fall detectors, bed occupancy, medical reminders, …
  - personal emergency response services
  - e.g.: Tunstall, Philips Lifeline, GE Quiet Care
  - driven by a mix of social care providers, group housing, individual subscribers
• Additional Technical Content
Embedded Apps Could subsume PAN interface and expose WAN interface.
- Agent states shown, Manager is similar.

- Configuration state transmits all static data one time for efficiency.

- Operating state is where measurements are transmitted.
WAN Interface Goals

- **Minimal Payload Translation**
  - Keep the device readings consistent with PAN (e.g., same nomenclature)

- **Minimal Payload Transformation**
  - Manager should not be forced to deal with the complexity of transformations from one payload model to another

- **Support for all 3 Continua Domains**
  - Health and Fitness, Aging Independently, and Disease Management

- **Extensibility**

- **Minimize divergence of standards**
WAN Recommendations

- **HL7 v2.6 messages** using IHE PCD-01
  - Initially constrained to IEEE 11073-20601 and 104xx nomenclature for personal health devices
  - Can be extended to support IEEE 11073-10101 terminologies and core components of the -10201 information model for clinical devices
- **Web Services transport** based on WS-I Basic Profile
  - Work with HL7, WS-I, and IHE ITI on further Web Service Profiles
  - TLS for Security
- Define placeholder for alarm, alert, control, and command messages but defer message contents for later versions
WAN Proposed Protocol Stack

Web Services
- HTTP
  - TCP/IP
    - IHE PCD-01

Payload mapping to IHE PCD-01

PAN Protocol(s)

Device Intermediary

Remote Monitoring Management System

Web Services
- HTTP
  - TCP/IP
    - IHE PCD-01

Payload mapping to CCD/PHMR

TCP/IP
- CCD/PHMR
Personal Telehealth

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