Towards Exchanging Wearable-PGHD with EHRs: Developing A Standardized Information Model for Wearable-Based Patient Generated Health Data

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About me:

- 2nd Year PhD Student at TU Dublin
- Interests in technologies for health
- MSc ACS (UK), BTech (Nigeria)

Interests:

Digital Health, and Human Computer Interaction (HCI).

Introduction

- Wearables are a prominent source of PGHD identified in literature, that can collect various granular types of data using inbuilt sensors.

- Patient Generated Health Data (PGHD) refers to **health data that a patient (or their authorized representative) records outside the clinic setting** and can be used by them or clinicians for their health management.

- PGHD are collected using many mediums including but not limited to patient diary, **mobile health application (mHealth apps) and wearables**. [1]

Background (State of Art)

Previous works have examined:

- Integration of Wearables, PHR with Electronic health records (EHR) [2] - [4]
- Models that extend the capabilities of standard data exchanges [7], [8], [9], [10].

- **However**, they are often limited to one or a few wearable, hence not generalizable.
- Also, data quality information (such as accuracy and reliability), is not fully considered for integration.

Background

Data Quality: Data quality issues that have hindered PGHD integration [11], [12].

- Kaewkannate and Kim [13], established that Fitbit Flex & Misfit have difficulty in tasks related to using stairs.

New Datasets: Emerging datasets that need to be considered, to account for new and diverse types of data

- Temperature sensing (relating to women's health), ECG (for atrial fibrillation monitoring) and skin temperature etc,

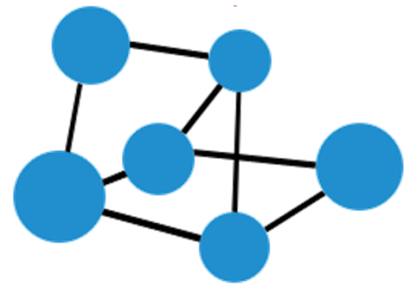
Provenance: Woods, et. al [14] suggests importance of developing industry wide PGHD standards that will include data provenance and context.

Aim:

This paper proposes a generic framework to enable a wide range of wearable-PGHD to be interoperable with EHRs, enabling seamless exchange of clinically relevant data from patients (through wearables) to providers (through EHR).

Methodology

- An Ontology-Driven Information Model (IM) approach – [6]
  - for semantic and syntactic interoperability between wearable-based PGHD and EHR
- Based on Health Level Seven (HL7) FHIR standard



- But that considers more wearables, newer datasets and relevant metadata information

Proposed Architecture

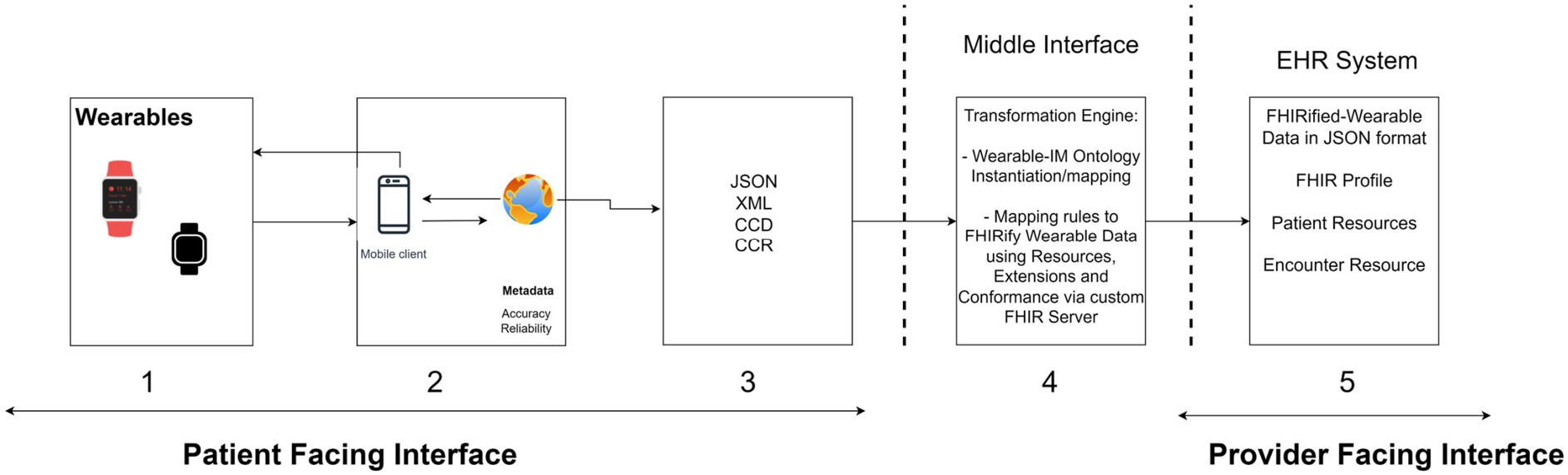


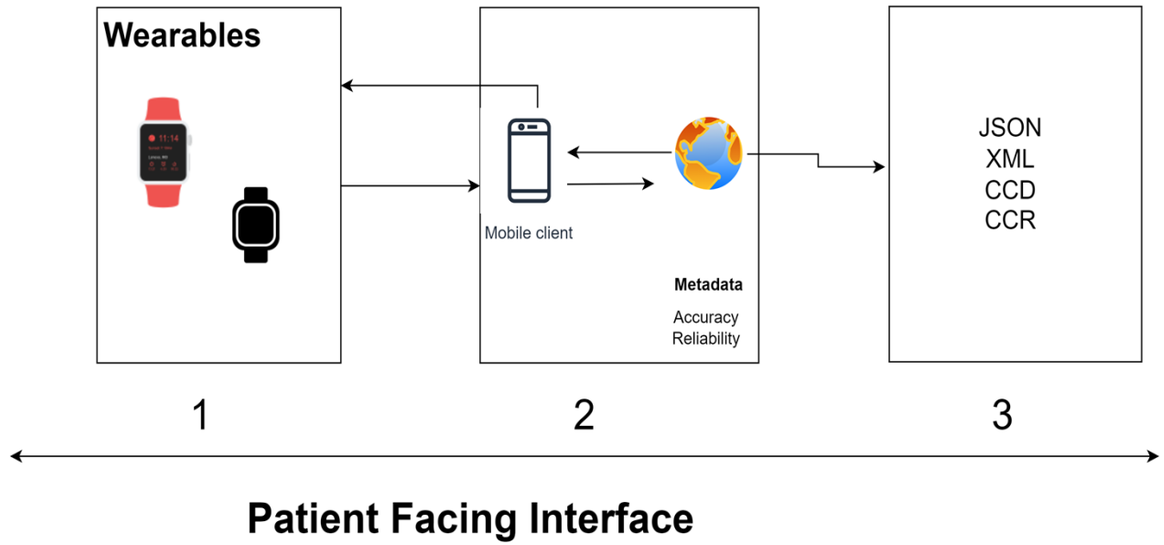
Figure 1. Proposed Wearable-based PGHD-EHR integration

Stage 1 – 3 : Exploring Data Sharing Capabilities of Wearables

- PGHD from Wearables are shared via

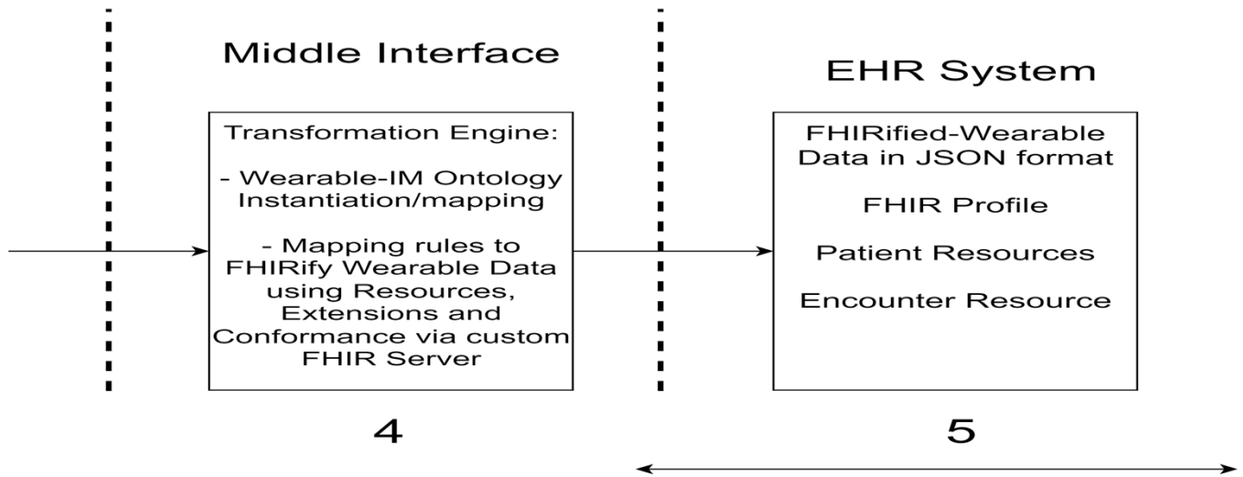
  Mobile App and/or Web Application

- Data received can be in different formats



Stage 4 – 5 : Mapping and FHIRification of Wearable-PGHD

- **Map** wearable PGHDdata to standard and custom ontologies.
- **Transform** received data to fit into existing FHIR Resources and Extension.



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THANK YOU

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QUESTIONS ?

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