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Prototype Implementation of the Continua Design Guidelines: Experiences and Results

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Abstract. This paper presents the results from a prototype implementation of the Continua Health Alliance Guidelines, IHE profiles and HL7 specifications, covering the full path from a sensor system to an electronic health record. Overall, syntactic and semantic interoperability could be demonstrated, even though the practical usage revealed open questions regarding the sensor-patient assignment.

Keywords: telemonitoring, plug&play, standards, IEEE 11073, HL7, IHE, Continua Health Alliance Guidelines

1. Introduction

The Guidelines of the Continua Health Alliance (CHA)[1] aim at establishing inter-operability based on existing standards and inoperability profiles in order to guarantee plug & play for Telemonitoring (TM) systems and Ambient Assisted Living (AAL)[2]. The objective of this poster is to assess the level of interoperability achieved by a prototype implementation for TM according to the CHA guidelines and standards for personal health monitoring. In addition, open issues for a routine usage are discussed.

2. Methods

Figure 1 exhibits the typical interfaces for TM applications as identified by the CHA together with the corresponding standards and profiles. The Personal Area Network (PAN) links sensor systems of the patient with a home or mobile base station, the so-called Manager. The Manager implements plug&play functionality based on sensor system specific Domain Information Models originating form the ISO/IEEE 11073 standard family for medical / health device communication. Sensor data are collected at the Manager and provided via the Wide Area Network (WAN) to the Telemonitoring Centre using the IHE Patient Care Device (PCD-01)[3,4] profile and the HL7 unsolicited observation result (ORU^R01) message. Finally, the Health Record Network (HRN) links the Telemonitoring Centre with physicians at practise or hospital level by providing sensor data and aggregated information for an Electronic Health

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Record based on the Personal Health Monitoring Report (PHMR)[5] of HL7 and the cross-enterprise document reliable interchange (XDR) [6] profile of IHE.

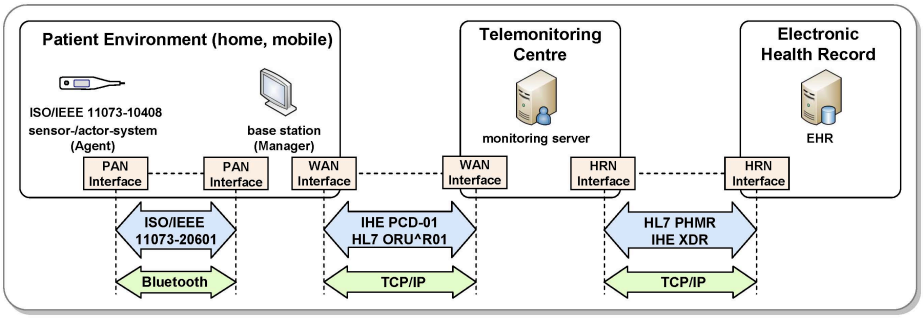

Figure 1. Architecture of the prototype implementation

3. Results

For the prototype implementation (Figure 1) the application profile thermometer has been selected with Bluetooth and TCP/IP for network communication. The prototype confirmed the stated plug & play interoperability. Due to the extensive use of profiles and standards the mapping at each interface could achieved by static and dynamic serialisation of objects for the PAN interface, design of a generic parser at the Manager site and by enterprise application integration tools at the Telemonitoring Centre. Implementation verification of the IHE PHMR profile has been achieved using the test server of National Institute of Standards and Technology (NIST) [6]. Overall, acquired sensor data was successfully recorded and transferred to an electronic health record.

4. Discussion

Looking at the practical usage and the selection of standards and interoperability profiles some open issues remain unsolved: (i) the communication at the interfaces features a mainly unidirectional behaviour, (ii) the usage of sensor system (e.g. a body weight scale) by more than one person is foreseen; however, the exact procedure has not been described yet, (iii) assignment of sensor systems to a person is planned as a function of the Manager [7], but could be shifted to the Telemonitoring Centre when taking a data privacy viewpoint.

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