Using IEEE 11073 Standards to Support Biomedical Engineering Research

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Abstract—The IEEE 11073 Personal Health Device standards have been in development since 2006 and have now reached maturity. A base protocol supports plug and play interoperability between all devices connected using the standard, and specialization standards for 10 distinct end devices and a set of devices for independent living have been produced. The standards are further profiled by Continua Alliance with industry defined standards for Bluetooth, ZigBee and USB. IEEE 11073 may be directly mapped to IHE-PCD01 (HL7) messages for the WAN interface, providing a standards based end to end messaging architecture. For research, basing devices on the standard offers many advantages: off the shelf data collection units; existing readily available devices; ready specification, protocol and nomenclature for new devices; readymade communication modules to integrate new devices. All these can expedite development of biomedical instrumentation, reduce need for resource for development, and improve ability to deliver final results.

I. INTRODUCTION

The IEEE 11073 standards are based on an object model that has a restricted and consistent set of object classes and attributes that is described in IEEE 11073-20601 [1], together with ASN.1 representation of the protocol, definition of object services, and MDER as a binary presentation of data format. Nomenclature is fully defined in IEEE 10073-10101. On association between sensor and AHD, the sensor will fully describe its static information, thereby supporting plug and play interoperability. Device specializations specify define an agreed specification for standard devices to constrain terminology. The standardized object model methodology allows a unique mapping to IHE-PCD01 messages, which may be transported over a WAN interface using a number of transport methods, a web services interface being profiled by Continua Alliance.

Figure 1 : IEEE 11073 and IHE-PCD01 object model and layered architecture

The advantages to research that standards based medical device interoperability may bring are clear: more time may be devoted to the biomedical research in place of development of instrumentation and telemetry; and high quality tools will become available. The standard modeling technique allows rapid development of consistent device representations and implementation, and thereby supports interoperability between existing and new sensors in the platform; consistent nomenclature and object classes supports semantic interoperability in applications.

As an example, the IEEE PHD group is currently developing specializations for the continuous glucose monitor and insulin pump, which will support consistent interfaces for use in research in the artificial pancreas. Our own laboratory has implemented an interoperable platform that combines physiological and independent living monitoring devices to support research that combines these measures to make new inferences and correlations with clinical events.

REFERENCES