IEEE standards in eHealth, AAL

IEEE Standards Association Workshop
Advancing Technology, Businesses, and Careers
23.3.2015

Stefan Sauermann

IEEE STANDARDS ASSOCIATION

FACHHOCHSCHULE TECHNIKUM WIEN

> So spannend kann Technik sein.

FACHHOCHSCHULE TECHNIKUM WIEN

University of Applied Sciences (UAS) Technikum Wien – Hoechstaedtplatz and ENERGYbase

Austria's Largest Purely Technical UAS

- 2013 | Moved into the new building at Hoechstaedtplatz
- 2011 | Start of construction of the new building at Hoechstaedtplatz,
- 2008 | Moved into the second location at ENERGYbase
- 2004/05 | Degree programs switched to bachelor's/master's system
- 2003 | Opening of the headquarters at Hoechstaedtplatz
- 2000 | Became Vienna's first university of applied sciences
- 1994 | Founded at the initiative of FEEI – Association of the Austrian Electrical and Electronics Industries and respected industrial enterprises

Organization

- Institution | University of Applied Sciences Technikum Wien
  - ~ 3,100 students, about 6,000 alumni
  - 28 degree programs: organization of the courses of study, development and advancement of the curricula
  - 16 departments: technical know-how and expertise in the areas of instruction and research
  - 4 study centers
  - Steering and decision-making comittee: University of Applied Sciences Council
- Operator | University of Applied Sciences Technikum Wien Association
  - Overall financial and legal responsibility

Academics

- 12 bachelor's degree programs
  - Biomedical Engineering
  - Business Informatics
  - Computer Science
  - Electronic Engineering
  - Electronics and Business
  - Information and Communication Systems and Services
  - International Business and Engineering
  - Mechanical Engineering*
  - Mechatronics/Robotics
  - Sports Equipment Technology
  - Transport and Environment
  - Urban Renewable Energy Technologies

* subject to approval by the AQ Austria

Academics

- 17 master's degree programs
  - Biomedical Engineering Sciences
  - Embedded Systems
  - Environmental Management and Ecotoxicology
  - Game Engineering and Simulation
  - Healthcare and Rehabilitation Technology
  - Industrial Electronics
  - Information Management and IT Security
  - Information Systems Management
  - Innovation and Technology Management
  - Intelligent Transport Systems
  - International Business and Engineering
  - Mechatronics/Robotics
  - Renewable Urban Energy Systems
  - Software Engineering
  - Sports Equipment Technology
  - Telecommunications and Internet Technologies
  - Tissue Engineering and Regenerative Medicine

Research & Development

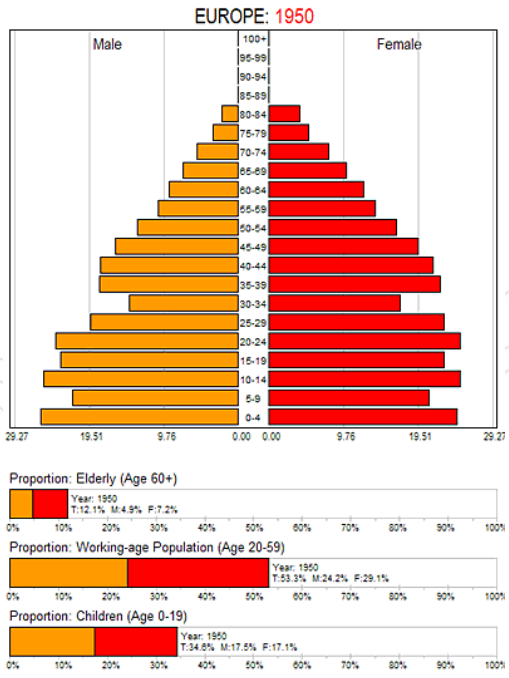
- Four main areas of research
  - Embedded Systems
  - Tissue Engineering
  - eHealth
  - Renewable Energy
- Funded R&D projects | contract R&D projects
- Among the top 5 in the UAS sector in terms of research & development
  - At the moment 3 major FHplus structural development projects (Embedded Systems, Tissue Engineering, eHealth) at the moment
  - Currently about 40 funded research projects
  - Appr. 20 innovation checks every year
- Josef Ressel Center for Verification of Embedded Computing Systems

Who am I?

- Electronics Engineer
- 15 yrs Med. University of Vienna, research
- Biosignal work
- Then standards, medical informatics

www.technikum-wien.at

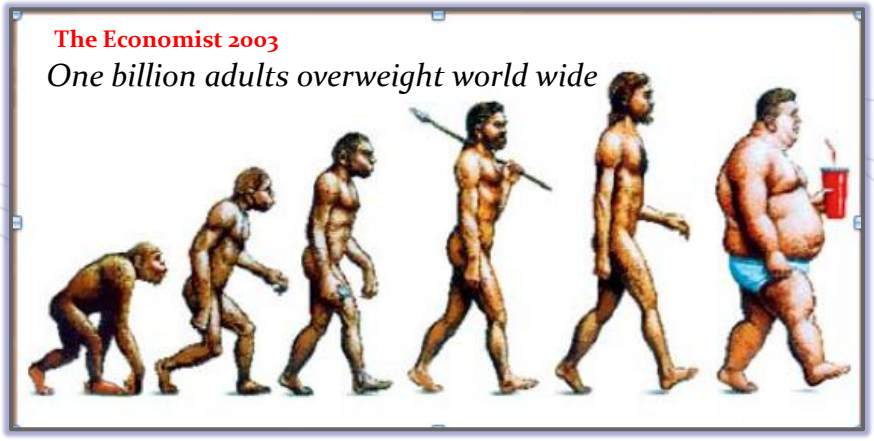
- Program director Biomedical Engineering Sciences (Master)
- Former chairman of national CEN and ISO mirror, founding member of IHE Austria, member of IEEE 11073 PHD WG
- Consulting the national EHR project (CDA documents harmonisation)



The age pyramid

CHINA - EUROPE - USA: Who will win the global race. Vienna, Austria (Web Site, Revision Beta 0.3)

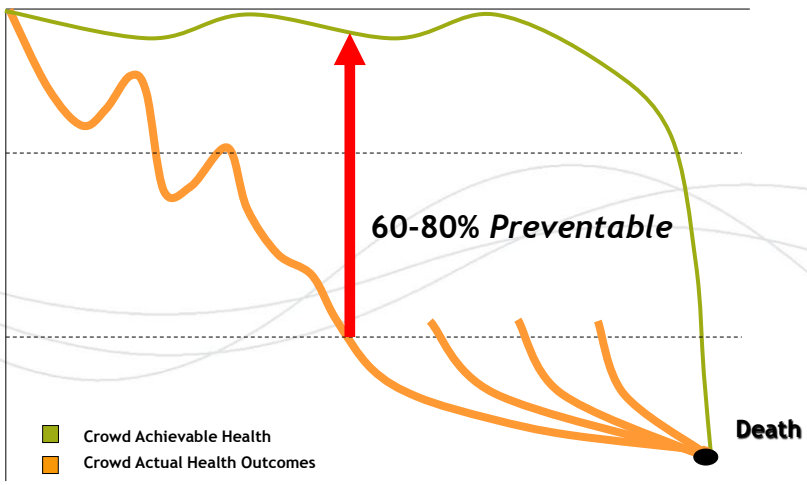
Evolution of „them out there“



5-6 Million Years

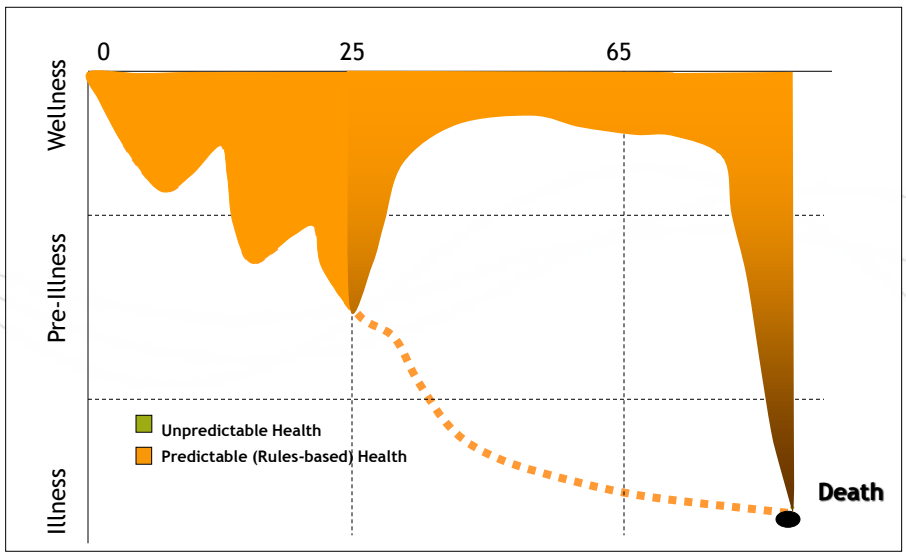
30-40 Years

Life as it is



Source: Piniewski, B.; Codagnone, C. & Osimo, D.: Nudging lifestyles for better health outcomes: crowdsourced data and persuasive technologies for behavioural change European Commission, Joint Research Centre, Institute for Prospective Technological Studies, 2011, 1-78. http://ftp.jrc.es/EURdoc/JRC64206.pdf

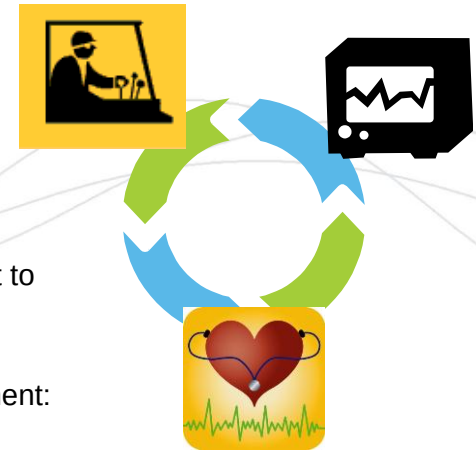
Steer to the top



Source: Piniewski, B.; Codagnone, C. & Osimo, D.: Nudging lifestyles for better health outcomes: crowdsourced data and persuasive technologies for behavioural change European Commission, Joint Research Centre, Institute for Prospective Technological Studies, 2011, 1-78. http://ftp.jrc.es/EURdoc/JRC64206.pdf

Bio-Feedback: A Solution

- Enable numeric sensing
- Directly feed to the individual "in the driver's seat"
- They will consciously change their behavior and react to sensor data
- Needed: Compliance management:



Definitions (abridged) from Tania M. Slawecki: How to Distinguish Legitimate Biofeedback / Neurofeedback Devices. January 2009 Report. Penn State University, Materials Research Laboratory, PA, USA. Available online: http://www.aapb.org/tl_files/AAPB/biofeedback/Legitimate%20Biofeedback%20January%202009.pdf

Rewards are better than punishment

16,749,781
like this

77,801
talking about this

Juan Antonio Perez, Bernice Gaughan, Svetoslav Georgiev and 14,117 others like this.

View all 957 comments 1,552 shares

4,6 von 5

8 Beurteilungen

IEEE 11073 Personal Health Devices (PHD) series of standards … growing fast!!

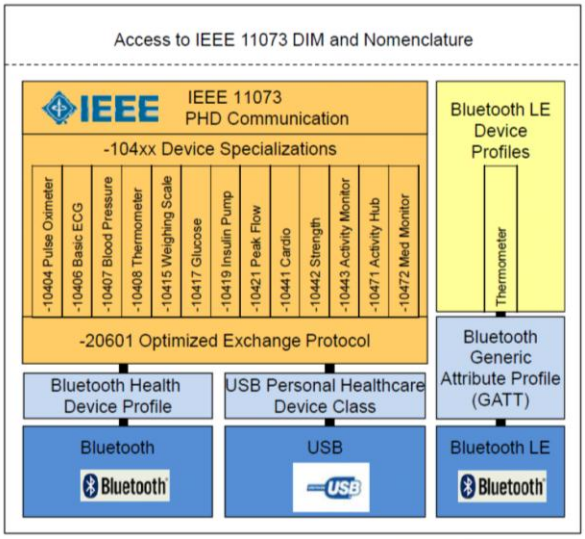


Image: Continua Health Alliance, see Continua_Overview_Presentation_14_09_2011_-_PARIS.pdf', www.continuaalliance.org

IEEE PHD standards: massively used by Continua Health Alliance

- Healthcare providers
- Makers of:
  - Chips (IC)
  - Medical devices
  - IT
- Academia
- >200 members

… 24eight, LLC, Alcatel Lucent, Alere, All Medicus Co., Ltd., Allion Test Labs, Inc., American Heart Association, Analog Devices, Andago Ingenieria, AppsHub, Inc., AT&T Mobility, AT4 wireless, S.A., AViTA Corporation, BiancaMed, BIOSPACE Co., Ltd., Bluegiga Technologies Oy, Boston Scientific Corporation, Cambridge Consultants Ltd, Capital Health, Card Guard AG, Cardiff University, Cardiomedix Inc., CELS Ltd., Centre for Global eHealth Innovation, Cerner Corporation, Chiptech Limited, Christus Health, Chunghwa Telecom Co., Ltd., Claricode, Inc., Computerized Screening, Inc., ConnectBlue AB, Continuity Health, Convergence Wireless, Inc., CSR plc, CYPAK AB, Dell Inc., Denso Corporation, Dossia Consortium, Dovetail Health, Duodecim Medical Publications, Dynastream Innovations Inc., Ember Corporation, empirica Gmbh, Ericsson Nikola Tesla d.d., ETRI, EuroTech, Inc., Fairbanks Scales, FitLinxx, Foundation for Research and Technology, France Telecom R&D, LLC, Freescale Semiconductor, Frontline Test Equipment, Inc., Fujitsu Limited, Fullpower Technologies, Inc., GC Healthcare Corp, GenerationOne, Inc., GlaxoSmithKline, Google Inc., H3System Co., Ltd., Hitachi, Ltd., Holst Centre (IMEC), Home Guardian, LLC, Honeywell HomMed LLC, Hosiden Corporation, Industrial Technology Research Institute, Infineon Technologies, INFORSON Co., Ltd., Innomed Medical Zrt, Institute for Infocomm Research, Institute of Biomedical, InterComponentWare Inc., Intramed A/S, Kai Sensors, Inc., KDDI, Konami Sports & Life Co., Ltd., Korea Electronics Technology Institute, Lamprey Networks, Inc., LAXTHA Inc., LG CNS, LG Electronics, LifeGate Inc., Lifescan, Logic, LS Research, LLC, MEDCEL, Medgate AG, MedHelp International, Medixine Oy, MedSignals, Microlife Corporation, Midmark Corporation, MIR - Medical International Research, Monitray, LLC, Motorola, Inc., Murata Manufacturing Co., Ltd., Neusoft Medical Systems Co., Ltd., Nippon Telegraph and Telephone Corporation, Nitto Denko Corporation, Nordic Semiconductor ASA, Novo Nordisk, Nuubo (Smart Solutions Tech), ON Semiconductor, Oracle Corporation, Oregon Medical Labs, Oregon Scientific Inc., PA Consulting Group, Pfizer, Precor, Proskauer Rose LLP, Proteus Biomedical, Inc., RMD Networks, Inc., Ryoyo Electro Corporation, Sagem Communications SAS, Sensor Technology & Devices Ltd., Shimmer Research, SHL Telemedicine, Shorewood Packaging, Silicon and Software Systems, Smartlife Technology Ltd, Sony Electronics Inc., Southern Nevada Wellness, STMicroelectronics, Stollmann E+V GmbH, TaiDoc Technology Corporation, TANITA Corporation, Technogym, Tekoa Technologies Inc., Telbios SpA, Telecom Italia S.p.A., Telefonica S.A., Telehealth Solutions Ltd., Telus Communications Company, Terumo Corporation, The Scottish Centre for Telehealth, Toshiba Home Appliances Corporation, Toumaz Technology Ltd., Triage Wireless Inc., TSB, TTA, Tynetec Ltd., UnitedHealth Group, University of Miami - Miller School of Medicine, Verizon, VivoMetrics, Inc., Vodafone Group Services Ltd., VTT Technical Research Centre of Finland, Westchester Institute for Human Development, Whole Health Management, Wipro Technologies, Zarlink Semiconductor, Zensys Inc.

Continua System Topology

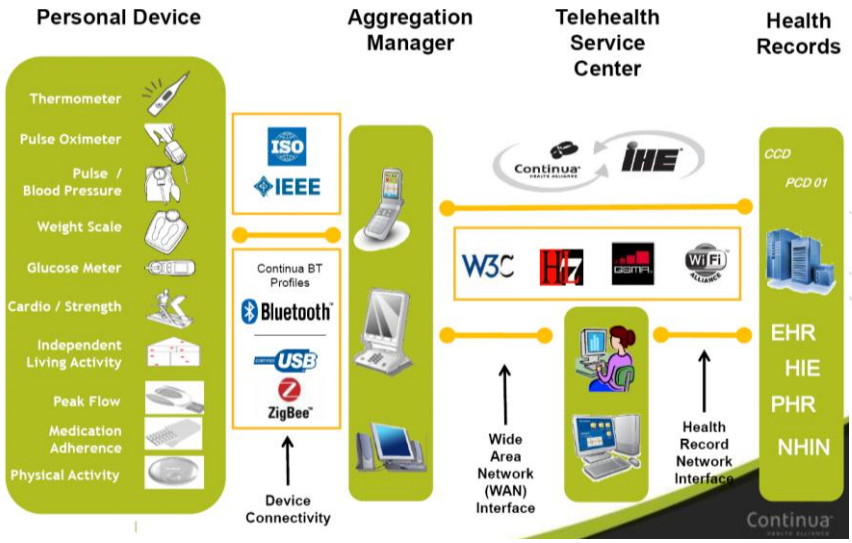


Image: Continua Health Alliance Guidelines implementation chart as in the Continua_Overview_Presentation_14_09_2011_-_PARIS.pdf', www.continuaalliance.org

IEEE PHD in the wide area network interface

Messaging	**HL7 V2.6** constrained by **IHE DEC PCD-01 and RTM**	
Semantics	**IEEE 11073**-20601 and 104xx terms	**IEEE 11073**-10101 terms and –10201 info model
Transport	***Web Services WS-I BP*** **IHE IT Infrastructure TF Vol 2 Appendix V Rev 6.0** ***WS-I BP*** *over* ***SOAP*** *1.2* *Plus* ***WSI-BSP***, ***TLS*** *and* ***IHE ATNA***	

Image: Continua Health Alliance, see Continua_Overview_Presentation_14_09_2011_-_PARIS.pdf', www.continuaalliance.org

IEEE PHD in the Health reporting network interface

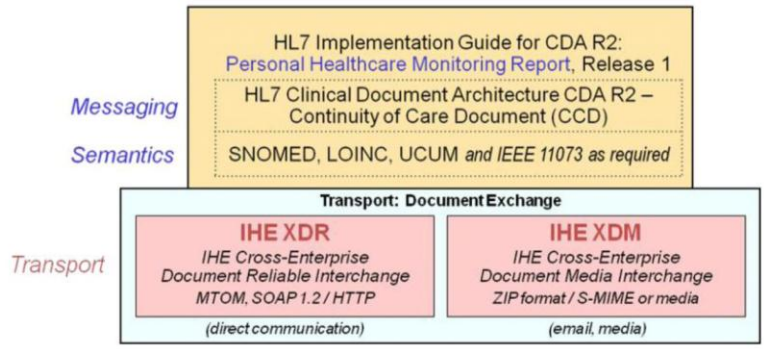


Image: Continua Health Alliance, see Continua_Overview_Presentation_14_09_2011_-_PARIS.pdf', www.continuaalliance.org

- European Use Cases:
- eHealth EIF: Usecases / Profiles I
- IHE (*)
- Continua (+)

- eHealth EIF eHealth European Interoperability Framework European Commission – ISA Work Programme First proposal technical layer. A study prepared for the European Commission DG Connect. Specific contract N° 60, Framework contract N° DI/06691-00 Version 1.2, 14/02/2013

Nr	Level	Use case	Profiles
1	Cross-border	epSOS project : e-Prescription and e-Dispensation for cross-border information sharing for citizens travelling in Europe	• IT Infrastructure: XCPD*, XCA*, CT*, ATNA*, BPPC*, XUA* • Pharmacy: PRE*, DIS*
2a	Cross-border	epSOS project : patient summaries for cross-border information sharing for citizens travelling in Europe	• IT Infrastructure: XCPD*, XCA*, CT*, ATNA*, BPPC*, XUA* • Patient Care Coordination: XPHR*
2b	Cross-border	epSOS project - patient having access to his or her patient summary.	• IT Infrastructure: XCPD*, XCA*, CT*, ATNA*, BPPC*, XUA* • Patient Care Coordination: XPHR*
3	National/Regional	Request and results (imaging results, diagnostic examinations) sharing workflow for radiology in inter-hospital setting on national/regional scale	• IT Infrastructure: PIX*, PDQ*, XDS*, CT*, ATNA*, BPPC*, XUA* • Radiology: XDS-I*
4	National/Regional	Request and results (laboratory reports, test results) sharing workflow for laboratory in inter-hospital setting on national/regional scale	• IT Infrastructure: PIX*, PDQ*, XDS*, CT*, ATNA*, BPPC*, XUA* • Laboratory: XD-LAB*
5a	National/Regional	Cross-Enterprise Sharing of Medical Summaries: Ambulatory Specialist Referral	• IT Infrastructure: PIX*, PDQ*, XDS*, CT*, ATNA*, BPPC*, XUA* • Patient Care Coordination: XDS-MS, XPHR*
5b	National/Regional	Cross-Enterprise Sharing of Medical Summaries: Acute Care Discharge to Ambulatory Care Environment	• IT Infrastructure: PIX*, PDQ*, XDS*, CT*, ATNA*, BPPC*, XUA* • Patient Care Coordination: XDS-MS, XPHR*
6	Intra-Hospital	Request and results (imaging diagnostics tests) distribution workflow for radiology in intra-hospital setting	• IT infrastructure: CT*, ATNA*, PDQ*, PAM*, SVS* • Radiology: SWF*

- eHealth EIF: Usecases / Profiles II
- IHE (*)
- Continua (+)

Nr	Level	Use case	Profiles
7	Intra-Hospital	Request and results (clinical laboratory tests) sharing workflow for laboratory in intra-hospital setting	• IT infrastructure: PAM*, PDQ*, CT*, ATNA*, SVS* • Laboratory: LTW*, LCSD*
8	Citizens at home and on the move.	Involvement of patient in documentation of his/her specific chronic disease and making it available via PC or web based applications to healthcare provider (e.g., diabetes, cardiac diseases, COPD, hypertension)	• IT Infrastructure: PIX*, PDQ*, XDS*, XDR*, XDM*, CT*, ATNA*, BPPC*, XUA* • Patient Care Device: HRN+, WAN+, DEC*/RTM*, LAN+ or PAN+
9	Citizens at home and on the move.	Involvement of patient in documentation of his/her specific chronic disease and making it available via mobile monitoring devices and mobile phones to healthcare provider (e.g., diabetes, cardiac diseases, COPD, hypertension)	• IT Infrastructure: PIX*, PDQ*, XDS*, XDR*, XDM*, CT*, ATNA*, BPPC*, XUA* • Patient Care Device: HRN+, WAN+, DEC*/RTM*, LAN+ or PAN+
10	Citizens at home and on the move.	For ever-present care outside conventional care facilities, involving the interoperability necessary from sensor devices to monitor activity, e.g. of elderly people	• IT Infrastructure: PIX*, PDQ*, XDS*, XDR*, XDM*, CT*, ATNA*, BPPC*, XUA* • Patient Care Device: HRN+, WAN+, DEC*/RTM*, LAN+ or PAN+

- eHealth EIF eHealth European Interoperability Framework European Commission – ISA Work Programme First proposal technical layer. A study prepared for the European Commission DG Connect. Specific contract N° 60, Framework contract N° DI/06691-00 Version 1.2, 14/02/2013

www.projectsolutions.at

- Adoptions by EU member states:
  - Denmark, Finland, Sweden, Norway

Device examples

Image: Continua Health Alliance, see Continua_Overview_Presentation_14_09_2011_-_PARIS.pdf', www.continuaalliance.org

Intelligent Clothes, Biochips, Lab-on-Chips, etc.

Agilent Technologies

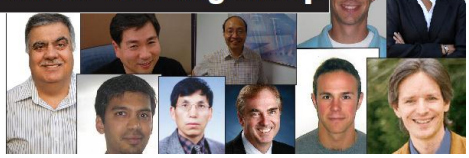
- Genetic profiling
  - Identification of genetic predispositions
- Prognosis and treatment
  - Prediction of response to treatment
  - Tailoring treatment to tissue subtype
- Diagnostics – early detection of disease
  - Serum protein biomarkers
- Identification of novel drug targets
- Application to multi-factor diseases

(McConkey)

„Smart Pills Initiatives“, Nanobiosensors (Novartis, Proteus, Imaging, etc.) Public Health Services Education and Training of Stakeholders

IEEE PHD wins one of two 2010 IEEE-SA Emerging Technology Awards

IEEE 11073 Personal Health Devices Working Group



IEEE 11073 Part 00103 „Overview“: Made in Vienna (to some degree)

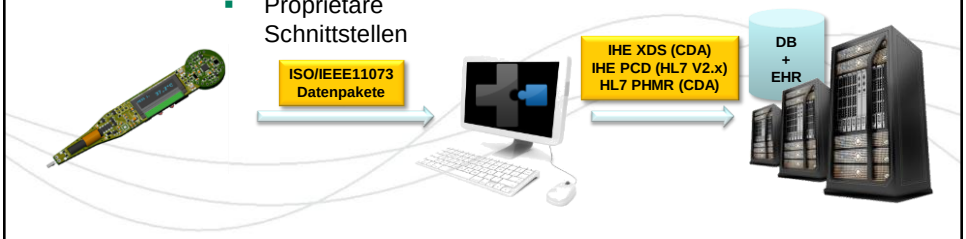
IEEE PHD enables plug and play wireless interoperability:

- USB “PHD device class” released
- Bluetooth Special Interest Group (SIG) released “Medical Device Profile” for Bluetooth wireless technology
- ZigBee “Health Care public application profile” is available
- Near Field Communication (NFC) implemantations available

Implementations @ Technikum since 2009

First Hop:
- Bluetooth, USB, ANT+
- Proprietäre Schnittstellen

Long Range:
- Webservices
- HL7 Messaging



Datenquellen:
- Am Markt verfügbare Geräte
- Eigenentwickungen

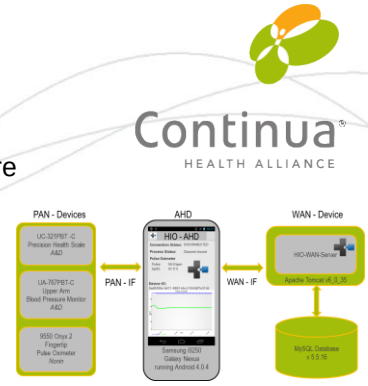
Plattformen:
- Windows, PC
- Android, Tablets, Smartphones

Mit:
- Klinik
- Arztsoftware
- ELGA
- ..

www.healthy-interoperability.at

Participating at Continua Plugfest Berlin 2012

- Successful testing of:
  - PAN Manager
  - Bluetooth HDP
  - WAN Sender
- Tested eHealth App against more than 9 international vendors
- www.continuaalliance.org



Concluding

- Lets have a break!
- Take in some IEEE conformant devices,
- right next to the food and drinks!!

stefan.sauermann@technikum-wien.at