EPD: CONNECTED HEALTH – DIGITAL.TRANSPARENT. PATIENTENORIENTIERT.
www.ehealthsummit.ch
Fallstricke und Meilensteine - Interdisziplinäre eHealth-Projekte

FH Prof. DI Dr Stefan Sauermann
Fachhochschule Technikum Wien
UAS Technikum Wien
Austria’s University of Applied Sciences for Innovation and Technology
University of Applied Sciences (UAS) Technikum Wien – Hoechstaedtplatz and ENERGYbase
Austria’s Largest Purely Technical UAS

- 2016 | 13 Bachelor and 18 Master degree programs, 5 Master courses
- 2013 | Moved into the new building at Hoechstaedtplatz
- 2008 | Moved into the second location at ENERGYbase
- 2005 | Founded the AUS Technikum Wien Academy (fk. LLL Academy)
- 2004 | 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**
  - ~ 4,000 students, about 9,000 alumni
  - 31 degree programs: organization of the courses of study, development and advancement of the curricula
  - 15 departments: technical know-how and expertise in the areas of instruction and research
  - 4 study centers
  - Steering and decision-making committee: University of Applied Sciences Council

- **Operator | University of Applied Sciences Technikum Wien Association**
  - Overall financial and legal responsibility
Academics

- 13 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
  - Smart Homes and Assistive Technologies
  - Sports Equipment Technology
  - Transport and Environment
  - Urban Renewable Energy Technologies

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Academics

- 18 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

- Integrative Urban Development – Smart City
- International Business and Engineering
- Mechanical Engineering*
- Mechatronics/Robotics
- Renewable Urban Energy Systems
- Software Engineering
- Sports Equipment Technology
- Telecommunications and Internet Technologies
- Tissue Engineering and Regenerative Medicine

* subject to approval by the AQ Austria
Research & Development

▪ Five main areas of research
  – Embedded Systems & Cyber-Physical Systems
  – Renewable Urban Energy Systems
  – Secure Services, eHealth & Mobility
  – Tissue Engineering & Molecular Life Science Technologies
  – Automation & Robotics

▪ Funded R&D projects | contract R&D projects

▪ Among the top 5 in the UAS sector in terms of research & development
  – FHplus/COIN structural development projects (eHealth, Embedded Systems, Tissue Engineering) so far
  – Currently about 40 funded research projects
  – Appr. 9 innovation checks every year

▪ Josef Ressel Center for Verification of Embedded Computing Systems
Partners

- Network partner of the FEEI – Association of the Austrian Electrical and Electronics Industries and respected industrial enterprises
- Partnerships with national and international companies from business and industry
  - Partners include ABB, AIT, Alcatel-Lucent, AT&S, Boyden, Kapsch, Schrack, Siemens, Anecon, Beko, Bundesrechenzentrum, EEP Maschinenbau, Frequentis, IVM, Knorr-Bremse, MonTech, OVE, Rehau, Raiffeisen Bank International, Wien Energie
- Partner institutions in 36 countries around the world
- Partnerships with academic institutions
- Partnerships with schools
Innovationskraft - Aufbruchstimmung

• Hier braucht es die Welle: Kontradieff
• Gartner Hype Cycles
Nikolai Kondratiev: Anti-Marxist theory about 1920’s; empirical study UK/USA
Josef Schumpeter: Definition of a "Kondratiev"-Unit
Leo A. Nefiodow: 6th Kondratiev "Psychosocial Health"

"applicable" to a national economy in general, not applicable to all participants in a "market"

Kondratiev-"World Economy Act"

steam engine cotton
railway steel
electrical engineering chemistry
Petrochemicals automobiles

IT Psychosocial Health

Phase shift and overlap

1825
1847
1893
1913
died 1938
40 years
1956
1980
1990
2000
2020
1800 +50 1850 +50 1900 +50 1950 +40 1990 +20 1990 +60


1793 50 years thesis 1920

Nikolai Kondratiev

Leo A. Nefiodow

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Gartner Hype Cycle

Selected technologies:
- On the Rise
  - FHIR
- At the Peak
  - C-CDA
- Sliding Into the Trough
  - Continua
- Climbing the Slope
  - IHE XDS.b

Gartner: Hype Cycle for Healthcare Provider Technologies and Standards, 2015
https://www.gartner.com/doc/3086917:
Innovation – Wunderbar, ein tolles Gefühl!

• Oder schmerzt es doch mal so zwischendurch?
• Lernen wir aus Erfolgen
Into the max rise of railways:
Semmeringbahn (Built 1848-1854) under the lead of **Carl Ritter von Ghega**

  Digitised, Online (22.6.2014): [http://digital.slub-dresden.de/id321385993/0](http://digital.slub-dresden.de/id321385993/0)
1849: This is impossible!!

• The commission of leading engineers elaborately
  – compared the adhesive railway to a cable car
  – and concluded:

• Let us build a cable car!!
  – 1:40 uphill is too steep
  – The money invested will be lost

Impressions from Semmeringbahn, now a „Cultural World Heritage“ still in full operation, 160 trains per day

Top: Haeferl (Wikimedia Commons): Semmering - 2013-09-07 - Nostalgiezug mit Lok 109-13, URL License CC-BY-SA 3.0-at


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The Engineers then changed their mind

- The „Architekten und Ingenieursverein“ erected a monument for Carl Ritter von Ghega in 1869, at the Semmering Train Station

- 1902: 1.9 million tons of freight per year
- 1953: 2.3 million tons
- 2000: 24 million tons, 17,000 trains
Innovation – Wunderbar, ein tolles Gefühl!

- Erfolgreiche Technologien
  - Haben viele „Anwender“
  - Sind in vielen Produkten angewandt

- Diese Produkte basieren auf
  - Technologie
  - Wissen
  - Gemeinsame Infrastruktur
  - Kooperation
Eisenbahn: Produkte, Dienstleistungen, ...

- Weltweiter Gütertransport
  - Logistik, „Container“, ...

- Tourismus
  - Events, Gastronomie, ...

- Kooperations-Muster
  - Kongresse, Treffen, Wissensmanagement
Power Grid Infrastructure

Behind the wall you find …

http://diy-resources.com/Basic-Wiring-Techniques_orth-0.html
Power Grid: Produkts, services, ...

- Power generation
  - Hydroelectric, wind, gas, solar, biomass, ...
- Distribution
  - ...
- Machinery, devices
  - Tools, lighting, ...
- IT
  - ...
- (we keep collecting for ages – this is enormous)
AI, Decision Support: Main innovation goal in Healthcare IT

- The need to develop national and international biomedical-networking infrastructures that use existing and future technologies for communication, data exchange, and information retrieval.

- The need for credible international standards for communications, data, and knowledge exchange that will allow both commercial and academic developers of medical information systems to know what to do in order to assure the integration of their products with other developing systems.

One more Shortliffe slide: Governance !!!

• „I do believe that we must accept the impossibility of viewing the introduction of decision support tools as a grass-roots activity that emerges from the research lab, (....) and then grows by some kind of mass effect to encompass an entire medical community.

• (...) will be realized when the infrastructure for introducing computational tools in medicine has been put in place by visionary leaders,

• who understand the importance of networking, integration, shared access to patient data bases, and the use of standards for data-exchange, communications and knowledge-sharing.
How much IT support is available?
And in large groups communities????
IT support for OODA: status

- Observe
  - Recording of feedback: not much, improving
  - Recording outside information: not much, improving
- Orient:
  - ...
- Decide
  - for limited use cases
- Act:
  - some workflow support

- There are open issues!!!!
Some „power plants“ of healthcare

Radiology

Lab

Telemonitoring

IT Infrastructure

GPs, resident doctors

All of us, friends, relatives, ...

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Records

Medical Record

Radiology

GPs, resident doctors

Medical Record

La

Medical Record

Healthcare Record

All of us, friends, relatives, …

Personal Healthcare Record

IT Infrastructure

Telemonitoring

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## Terms

<table>
<thead>
<tr>
<th>Type</th>
<th>Syn</th>
<th>Who, where</th>
<th>Contains</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic Medical Record</td>
<td>EMR</td>
<td>Locally at healthcare providers, Hospitals, Labs, GPs, …</td>
<td>Messages, records, transient info, all details</td>
<td>Complete documentation, process flow, quality assurance, liability</td>
</tr>
<tr>
<td>Electronic Healthcare Record</td>
<td>EHR</td>
<td>„The community“</td>
<td>Stable information, reports, summaries</td>
<td>Overview, coordination</td>
</tr>
<tr>
<td>Personal Healthcare Record</td>
<td>PHR</td>
<td>Patients provide information via medical devices, using apps etc</td>
<td>Readings of blood pressure, weight, blood glucose, wellbeing, nutrition</td>
<td>Patient empowerment, management of chronic disease, prevention</td>
</tr>
</tbody>
</table>
Which products and services can we expect?

- Decision support in healthcare, big data, analytics, wearables, apps, crowd sourced healthcare, community services, peer groups, patient empowerment, learning tools, data enhanced social media, ...

- See e.g. Health Level Seven® International 29th Annual Plenary & Working Group Meeting, Atlanta, GA, October 4-9, 2015, Plenary Packet [http://www.hl7.org/events/wgm102015/#](http://www.hl7.org/events/wgm102015/#)
Infrastructure requirements

• Electronic Healthcare Records – Worldwide!!
• Telemonitoring – Worldwide!!

• Why worldwide?
  – We must get the N up
  – For products and services
  – So that the single unit €$ goes down
Now: Which contributions do we need?

- Build EHRs and telemonitoring infrastructure
  - everywhere, invisible, reliable
  - Owned by communities, large stakeholders
  - \( N << \) €, $ \( >>> \)

- Generate attractive products and services using the infrastructure
  - Fast, user centered, beautiful, individual
  - Creative!
  - \( N >>> \) €, $ \( <<< \)
Now: Who does what?

• Build EHRs and telemonitoring infrastructure
  – Giant Projects!!
  – Large companies
  – Think Global

• Generate attractive products and services using the infrastructure
  – Adaptive networks, fluid cooperations
  – Act local
Success Factors for Giant Projects

• “Formulation and change of goals”
  – Decide what you want, fast
  – Keep change limited and controlled

• “Basic configuration, Initial design”
  – Have SOME idea how you will do it, before you start
  – Do not go into too much detail,
  – learn as things evolve, learn from previous examples

• “Socio-political environment”
  – Involve the stakeholders, users, and everybody who needs to be involved
  – Let no one dominate the others

• “Management structure and capacity.”
  – See that those who have to do it really can do it
  – Give them what they need


Image: o. Univ. Prof. Dipl.-Kfm. Dr. Oskar GRÜN, Vorstand des Institutes für Organisation und Materialwirtschaft, Wirtschaftsuniversität Wien, Österreich
http://wwwap.wu.ac.at/inst/orgmat/institut/personal/mitarbeiter/cv_gruen.html
Networks of humans

• A network needs investments
  — Development and maintenance
    • goals, visions, processes, working relationships, „culture“, ...

• A network will only last as long as there is a felt benefit for those involved
  — „Egoism“ needs to be satisfied!!

• IT networking tools can help
  — communication and cooperation
    • can not replace „face-to-face“ meetings

• Everybody is representing an organisation
  — Does this fit my „folks at home“?
  — Will they be happy with this if I tell them?


Image of Hubert Lobnig: http://www.lemon.at/Hubert_Lobnig.html
Infrastructure requirements

- Electronic Healthcare Records – Worldwide!!
- Telemonitoring – Worldwide!!

- Why worldwide?
  - We must get the N up
  - For products and services
  - So that the single unit €$ goes down
Challenges

- EHRs and telemonitoring infrastructure
- need to provide functions
- that the innovative services and products require
Challenges

• Giant projects

• need to cooperate

• with dynamic and fluidic networks of small organisations

• (and with other Giant Projects)
Contributing to the system change

- Administration
  - Laws, contracts
  - Priorities, Goals, Environments
  - Ressources

- Medicine
  - Core Competence
  - Background, Research
  - Processes

- Engineers, Industry
  - IT, Applications
  - Devices
  - Innovation

- Education
  - 2005: 20 “knowing“ Persons available in AT
  - 2013: 200
  - 2018: 25.000

- Exciting!!
Looking forward to learn more!

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  - Department of Biomedical, Health & Sports Engineering
  - www.healthy-interoperability.at
  - My Portfolio

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