Teaching eHealth in the Czech Republic

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Presentation Outline

- Historic context of medicine in the CR
- Tertiary education related to eHealth
- Target audience: Whom do we teach?
- BME and eHealth related study programs in the CR
- Experience from preparing a new study program
- Materials and methods: How do we teach and assess?
  - Example of ICT teaching support tools
- Main eGovernment and eHealth projects in the CR

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Historic context of medicine in the CR

- Charles University
  - Established 1348
  - First university in Central Europe
  - Faculties: Arts, Law, Theology, **Medicine**
  - Currently 50.000 students, 5 faculties of medicine
- Cold War
  - Border zone between East and West
  - Battlefield – most casualties expected there
  - Largest quantity of hospital beds in the East – more than reasonably useful in the peace time
  - After the Velvet revolution the number decreased
  - According to World Bank in 2004
    - 7.1 beds per 1000 people in Czech Rep.
    - 3.3 in Norway
    - But 13.7 in Japan

Faculty of Biomedical Engineering

- Part of Czech Technical University in Prague (the oldest civil technical university in Europe)

- Located in Kladno – 30km west of Prague

- 1600 Students

- 145 research and teaching staff

- Established 2005

- The only growing faculty at CTU
  - Thanks to recent introduction of medical bachelor study programs (physiotherapy, radiology assistant, optometrist)

- Financial resources: 65

Tertiary education in the CR

- Free education for all students studying in Czech language
- 26 public + 2 state universities
- 3 + 46 (BSc + MSc only) private universities
- 8 faculties of medicine
- 1 faculty of Biomedical Engineering (CTU)
- Strong increase in number of students 1990-2010 (400%)
  - Focus on quantity
- Since 2010 more focus on "quality" over "quantity"
- Currently around 60% of young people enroll university
- Student quotas: number of state funded students decrees 10% each year
- Demographics problems
- Low interest into technical career among students
- Strong software development industry (AVG, Avast, Skype, Cisco)

Target audience: Who do we teach?

- Based on my personal experience from FBME and FEE, CTU
- "Day form" vs "combined form"
- The day form students
  - Majority around 19 years old
  - Mostly from gymnasiums (preparatory high school) and secondary technical high schools few from nursing high schools
  - "Quality" dropped significantly in last 10 years – low admission requirements – demography
  - Roughly 50% successfully graduate (bachelor)
  - Low interest in Erasmus (5 in 2013!!!) – the language barrier
- Combined form
  - Weekend students, usually 8h Friday, Saturday once in 2 weeks
  - Age 25-55
  - Motivation: recent changes in legislative requirements on certain management positions in healthcare
- Biggest difference among students is in IT skills

Definitions

- Biomedical engineering (BME)
  - A broader term than eHealth
  - Everything at the edge of technology and medicine
  - Including technical/scientific approach to medicine
  - Design of medical software and hardware
  - Also material engineering, biophysics etc.
- eHealth
  - Subarea of biomedical engineering
  - Activities in healthcare practice that are supported by electronic processes and communication
  - Systems being at the edge of healthcare and information technology
  - HER, telemedicine, consumer health informatics, health knowledge management, medical decision support systems, mHealth etc.

Education of BME eHealth in CR

- Keywords: biomedical engineering, biophysics, medical informatics
- Biomedicine as a study program being taught mostly by engineering faculties
- There is only one strictly eHealth oriented Ph.D. program
  - Biomedical Informatics, 4 years nominal
  - First Faculty of Medicine, Charles University in Prague
    - Two courses related to thesis topic
    - FCE or equivalent
    - Two IF publications
    - State exam in Biomedical Informatics
    - Defended thesis
  - Equivalent program is also at Second Faculty of Medicine
- There are no eHealth focused bachelor nor master programs
  - The closest one was canceled 4 years ago due to lack of student interest
  - First Faculty of Medicine, Charles University in Prague: Medical technologies and informatics
- Most BME study programs include few courses focused on eHealth

Examples of BME study programs 1/2

- There is in total about 3000 study accredited study programs in the CR
- Czech Technical University in Prague, Faculty of
  - Biomedical Engineering
    - Biomedical Informatics: B
    - Biomedical and Clinical Technology: B, P
    - Biomedical Engineering: M
  - Electrical Engineering
    - Biomedical Engineering and Informatics: M
  - Mechanical Engineering
    - Biomechanics and Medical Instrument: M
- Charles University in Prague
  - First Faculty of Medicine
    - Biomedical Informatics: P
    - ~~Medical technologies and informatics: M~~
  - Second Faculty of Medicine
    - Biomedical Informatics: P

Examples of BME study programs 2/2

- South Czech University in Czech Budweiss
  - Faculty of Natural Science
    - Biomedical and Laboratory Technologies: B
  - Faculty of Health and Social Science
    - Biophysics: B
- Technical University in Liberec
  - Institute of Healthcare Studies
    - Biomedical technology: B
- Palacky University in Olomouc
  - Faculty of Medicine
    - Medical Biophysics P
- Technical University in Brno
  - Faculty of electrical engineering and communication technologies
    - Biomedical Engineering and Bioinformatics: B, M, P

Creating a new study program

- Study programs needs to be approved by the independent (and powerful) Accreditation committee (Ministry of Education, 21 members)
- In medicine-related education there are some extra legislative restrictions (strong decision factor for students)

- Important factors:
- To fit in to the ministry quotas
  - Bachelor program
- Name of the program – important for not distracting students
  - We tried to avoid "electronics", "informatics" etc.
  - Information and communication technologies in medicine
- Potential employers
  - Most eHealth related study programs focus on large enterprises: hospitals, universities, medical equipment vendors
  - Our aim: SME's and technology startups (telemedicine, mHealth)
- Specificity
  - Two branches: hardware design, software design
- Waiting for the accreditation, we hope to open during summer 2014
- We expect around 20 students to enroll
- Next step: A master program
 - Dual degree, triple degree in cooperation with FTW and Arctic University in Tromso

ICT teaching support tools

- Locally most faculties use Moodle with faculty/university authentication
- Sometimes a standalone Moodle installation for a single course
- Example of interesting projects:
  - MEFANET - MEdical FAculties NETwork
  - Wikiskripta
  - Slideslive.com

MEFANET

- MEdical FAculties NETwork
- Czech and Slovak IT network for study material sharing – mostly in Czech language
- "eduroam for medical study materials"
- All Czech and Slovak medical faculties are members, plus FBME CTU (10 members)
- Textbooks, slides and lecture recordings are shared
- Based on Shibboleth single-sign-on infrastructure
- Only metadata are physically shared on MEFANET servers
  - Data necessary for search
- No data is stored outside service (resource) provider's network
- Content have detailed access right assignment (students, faculty staff, students of other faculties, public etc.)
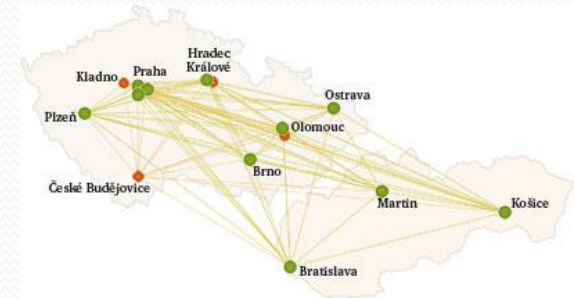
Wikiskripta

- Wikipedia style web site focused on medical study materials
- Public access: anybody can became editor
- Only in Czech language – there is a machine translation tool
- Content periodically checked by the board (medicine students and teachers)
- Content can be "approved" by a faculty staff member or other expert
- Criteria for passing a subject: create or significantly improve a Wikiskripta page

Slideslive.com

- Successful startup by three CTU students
- In 2013 received seed capital investment
- Easy synchronization between video recorder lecture and presented slide (local screen)
- Video is expected to be on youtube
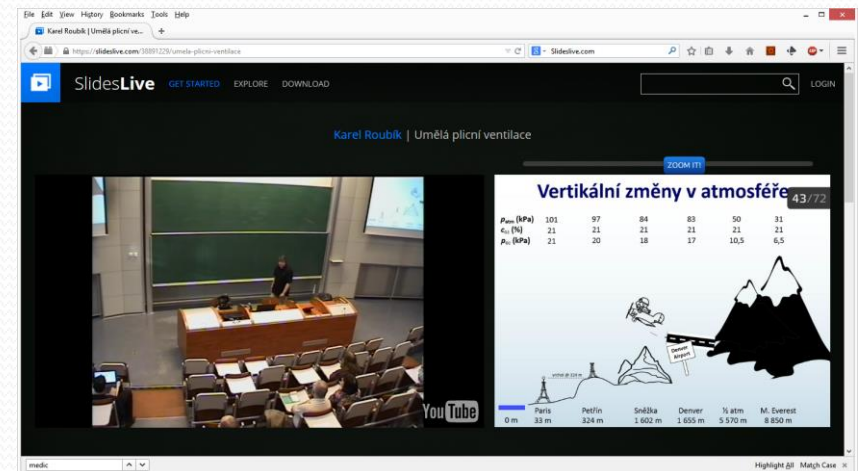
Main eGovernment and eHealth Projects

- Data mail box – success
  - Electronic storage of messages sent between public authorities and legal entities or individuals
- Basic registers – success
  - National unified yet decentralized databases
- ePrescription – not used in practice
- eNeschopenka (sick note) – not used in practice
- Centralized EHR (IZIP) – canceled
- Dasta (data standard for medical data exchange) – mixed results
  - Czech version of HL7

Resume

- In the Czech Republic there is a lot of opportunities for improvements in both eHealth practical use and education
- Successful eGov projects could be a base for eHealth projects
- Importance of international cooperation with leading countries, including Erasmus, dual degrees

Thank you for your attention!

Questions?

Datová schránka (data mail box)

- Electronic storage of messages sent between public authorities and legal entities or individuals
- In operation since 2009, operated by Czech Post
- Law requires priority use of DS (over the ordinary mail) when it exists
- Compulsory for legal entities, optional for individuals
- Legal fiction of delivery in 14 days
- CR was the first country to make such communication compulsory
- Data message (max 10MB) consist of:
  - Envelope (digital signature)
  - Qualified time stamp
  - Documents in form of attachments (20 formats)
- One data mailbox per legal entity (no employee differentiation)

Datová schránka (data mail box)

- Automatically generated random user name
- Recent use for spamming by the Czech Post (state enterprise)
  - Offering paid extra services
  - Scaremongering
- Email or SMS notification of incoming message
- Optional login using OTP
- Every message delivery is confirmed by a delivery report
- Weird long URL's prone to phishing
  - https://www.mojedatovaschranka.cz and http://www.datoveschranky.info/
- Legal regulation
  - Binging nature
  - Delivery guaranteed
  - Legal fiction of delivery
- Document conversion: to and from the paper form at Czech POINT offices (6500 locations)
- Web portal + SOAP web service
  - Many third party client program and libraries
  - Most DMS have connector for DS

Basic registers

- Created in effort to resolve multiplicity and in actuality of data of various state databases
- Strong focus on protection of privacy
- Separation of information stored in each register
- Operated by National Registers Authority (Ministry of Internal Affairs) since July 2012
  - ROB – register of inhabitants
  - ROS – register of persons (companies)
  - RUIAN – register of territorial identification, addresses and real estates
  - RPP – register of rights and responsibilities of public authorities
- Very successful project
- In production – so far 300M transaction (march 2014)

Basic registers – IS ORG

- To protect personal data and avoid extraction of aggregate information about one person
- All 4 basic registers and all other connected information systems use different identifier for each person (AIFO)
- Separate component – IS ORG – is the only place where the identifiers are mapped (matrix)
- IS ORG on the other hand does not contain any other data
- IS ORG is operated by separate independent organization – The office for personal data protection
- IS ORG:
  - Generates AIFO
  - Converts AIFO from one Agenda IS to AIFO in another
  - Communicates solely with Basic registers
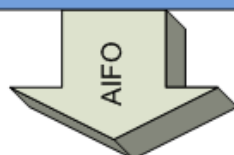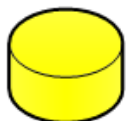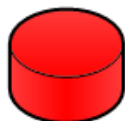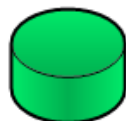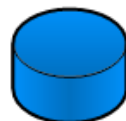
Basic registers

- Every year all subject (who activated Datová schránka) are informed about usage of their data (requests for data from public authorities)

eRecept (ePrescription)

- Supported in the law (not mandatory)
- Developed and operated by the State Institute for Drug Control since 2009
- Alternative to the paper prescription
- Obligatory for pharmacies (1260)
  - But not used by the doctors (2408 registered)
  - Doctors are concerned about potential misuse of their patients' sensitive personal data
- Neither benefit for using it nor penalty for not using it
- Centralized solution
- Nearly 1 million prescriptions prescribed until January 2014

eNeschopenka (Sick Note)

- Documentation that an employee is unfit for work
- Project operated by Czech Social Security Administration (CSSA) since 2011
- Aim to replace 5 paper forms provided by CSSA
  - Currently replaces only 3 of them
  - 2 still must be printed by doctor
- Not much use
- The use will be required by law soon

IZIP EHR

- Company IZIP founded by two politics and a doctor in 2001
- In 2012 ministry of health stopped the financing of it through the biggest state owned health insurance company (VZP)
  - 72M EUR have been invested from public health care system
  - 2.5M patients registered
  - 20000 health professionals registered
- Since the beginning a lot of criticism due to financial aspects and lack of use in practice
  - Development funded by the public healthcare company but the result is owned by a private company
  - All data centrally stored on servers owned by a private company

Portál zdravotních pojišťoven (Health insurers portal)

- Billing portal for health care providers to 6 smaller health insurance companies
- The biggest insurance company (VZP) has its own portal
- Both portals use the same proprietary data format
- Most HIS has connector to export data to the portals
- Routinely used by most hospitals and private practises

Dasta

- The data standard of Ministry of Health for data exchange
- The Czech HL7, similar to V2
- Proprietary solution created in 1992 after review of existing standards (EDIFACT, SNOMED, HL7...)
- Created by HIS and LIS developers and experts from medical faculties
- Supported by all major NIS being used in Czech Republic and Slovakia
- Until 2007 txt and dtd format (DS3), since 2007 xml (DS4)
- DS3 still updated and in use
- Mostly used for:
  - Reporting to state authorities
  - Laboratory data exchange with LIS
  - Export-import in case of switch from one NIS to another

Dasta

- Definition of codebooks
- All data (codebooks and data definitions) available via web services for free http://ciselniky.dasta.mzcr.cz/
- Types of data
  - Patient identification and basic data
  - Insurance data, financial reporting
  - Anamnesis, drugs, allergies
  - Clinical events – examinations, outpatient report, etc.
- Discussion about transition to HL7 since 2001
- DASTA-HL7 gateways under consideration

Hospital information systems

- Oligopoly of local software suppliers
- All are member of HL7 Czech
  - Guarding there is nothing threatening the status quo
- Official support for HL7 – not used in practice
- Interoperability:
  - Dasta
  - Laboratory data imports
  - Reports to authorities
  - Billing to insurance companies
- Several PACS pilot project (research)
  - In practice image data are exchanged by email

Telemedicine

- Mostly research or pilot project, few commercial
- MDT – remote ECG holter data collection and evaluation as a service
- CleverTech – SeniorInspect – mobile emergency system for elderly peoples
- eVito – mobile application and sensors for fitness