# An introduction to GNUmed

- Electronic Health Care Records (EHCRs)
- Problem Oriented Medical Record Paradigm (POMR)
- Open Source Software (OSS)
- OSS in Health Care
- GNUmed

# Electronic Health Care Records

- Health Care Record
- Electronic Health Care Record
- Data in the EHCR
- Benefits of using EHCR Systems
- Clinical encoding systems
- EHCR architecture
- Electronic Data Interchange
- EHCRS requisites

# Health Care Record

- The total amount of data pertaining to one single patient
- Paper
- Different files, locations...

# Electronic Health Care Record

- Comprehensive copy of the HCR +
- Digital stored
- Multiple formats and locations

# Data in the EHCR

- Context preservation
- Clinician's understanding
- Formulated in natural terms
- Allow conflicting and uncertain statements
- Allow arbitrary level of descriptions
- Permanent
- Mutable status
- Multiple paradigm support

# EHCRS benefits

- Time saving
- Improved quality of treatment
- Communication with patients and professionals
- Report generation, results access…
- Support for public health and research functions

# Clinical Encoding Systems

- Heavily used in EHCR Systems
- Concepts → Patient data

# EHCR Architecture

- HCR logical structure
- Separation between record and system requirements
- Thoroughly documented

# Electronic Data Interchange

- Communication features
  - Integration of reports and other data.
  - Multiple data sources and media types support.
  - Importation/exportation from/to other systems.
- Conformance to standards

# EHCRS Requisites

- Reliability
- Security
- Confidentiality
- Access control
- Authentication
- Failure tolerance
- Data integrity and availability

# POMR

- Weed L. Dr.  - 1968
  - Problem list
  - Data base
  - Initial plan
  - Progress notes (SOAP)

# POMR

- Weed L. Dr.  - 1968
  - Problem list
    - Clinically relevant events and factors
    - Active ⟷ Inactive
  - Data base
  - Initial plan
  - Progress notes (SOAP)

# POMR

- Weed L. Dr.  - 1968
  - Problem list
  - Data base
    - Problem specific information
      - Patient complaints
      - History taking
      - Physical examination
    - General information
      - Routine laboratory tests...
  - Initial plan
  - Progress notes (SOAP)

# POMR

- Weed L. Dr.  - 1968
  - Problem list
  - Data base
  - Initial plan
    - Further diagnostic information
    - Patient monitoring
    - Therapy
    - Education
  - Progress notes (SOAP)

# POMR

- Weed L. Dr.  - 1968
  - Problem list
  - Data base
  - Initial plan
  - Progress notes (SOAP)
    - Subjective
    - Objective
    - Assessment
    - Plan

# Open Source Software

- What is?
- Development model
- How much costs?
- Who supports it?
- Benefits
- Risks

# OSS. What is?

- Software that comes with the source code.
- The source code ca be modified, resold, given away to others.
- Customer constructed software

# OSS. Development Model

- Traditional software depends on any central authority that takes decisions.
- Open model:
  - The efforts of developers and users are coordinated through Internet.
  - Feature decisions are proposed, discussed and somehow agreed by collaborative and decentralized means.
  - The development team gets enriched with multiple kind of contributions (not only code)

# OSS. How much co$t?

- Nothing:
  - To 'buy'
  - To 'use it'
- What you want to invest … to make it better:
  - Contribution time
  - Financial support

# OSS. Who supports it?

- The users themselves...
  - By working on the software
  - Contracting someone to do it

# OSS. Benefits

- Lower software costs
- More flexibility
- More reliable products
- Better standardization and long term stability
- Faster pace of innovation
- New projects can be built on it
- Data not 'hidden away' in propietary formats
- Increased security

# OSS. Risks

- Projects failure
  - Similar for proprietary software
- No deadline driven
  - When depending on anticipated enhancements
  - Customers can manage it by participation in the open source project

# OSS in Health Care

- Reference implementations of medical record standard (openEHR, UMLS)
- Lower costs (license, implementation, support)
- Complete control over the software and data
- Independence of any software company strategy or failure

# GNUmed

- What is?
- Who is for?
- What is not?
- What computer systems will it run on?
- License
- What might it cost to run?
- Architecture
- What can do for me today?
- On the WWW

# GNUmed. What is?

- Software solution for paperless medical  practice
- Developed by practicing doctors, programmers and free software enthusiasts
- Flexible, supporting adaptation to several countries
- Based in PostgreSQL, Python, wxWindows

# GNUmed. Who is for?

- General practice
- Comprehensive care departments
  - General internists
  - Pediatricians
  - ...
- Network environments / single computer
  - Rural, disadvantages areas
  - Limited economic resources

# GNUmed. What is not?

- GNUmed is not currently intended for use in hospitals
- Interface well with hospital information systems
- May be suitable for some hospital departments
  - Hospital associated general ambulatory care

# GNUmed. Computer systems

- GNU/Linux
- Other UNIX variants
- Mac OS X
- Microsoft Windows

# GNUmed. License

- GNU – General Public License (GPL)
  - You can use, copy, modify and redistribute free  software
  - The source code must be provided/accessible
  - The modified software is required to be covered by the GPL

# GNUmed. How much to run?

- First deploy
  - Installation, configuration and troubleshooting
  - Training and support for your office staff
  - Improving, adaptation to local or specific needs
- Once functioning
  - Usual maintenance
  - Coordination with other GNUmed  based medical practices

# GNUmed. Architecture

- Overview
- GNUmed EHCR

# GNUmed. Architecture overview

- Client-server architecture
- Optional middleware components
- Distributed database services
- Stable, robust and extremely well designed data base
  - Table normalization
  - Data integrity
  - Audit trailing
  - Authentication, secure communication

# GNUmed. EHCR

- Health Issue
  - Several Episodes
    - Several encounters
      - Several items

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# What can do for me today?

- Login
- Workspace
- Patient management
- Vaccination status
- Progress notes and EHRC
- Medical documents
- Lab results

# GNUmed. Login

- By selecting one of the available user defined profiles:
  - 'gnumed at localhost'
    - Host: localhost
    - Port: 5432
    - Data base: gnumed
- User/password authentication
  - User: any-doc
  - Password: any-doc

# GNUmed. Workspace

- Plugins are auto-discovered and loaded during startup
- Enviroment information on main window's title
- Plugins are activated from menu bar and notebook tabs
  - Allergies, request, vaccinations, BMI, BDC,  XDT, guidelines, STIKO, demographics editor

# GNUmed. Patient management

- Patient search and selection (by last names)
- Activate a particular plugin for that patient
- Import patient from German-style XDT file (BDT/GDT)

# GNUmed. Vaccination status

- Display indications, active regimes and missing vaccinations
- Display administered vaccinations for a selected indication
- Display details for an administered or missing vaccination
- Enter administered vaccination
- Generate vaccination status table (ascii exporter tool)

# GNUmed. EHCR

- Load and browse EMR tree
  - Health issue → episode → encounter
- Display information associated with the selected EMR element
- Pop up episode contextual menu with planned actions
- Export to text file (using ascii exporter tool)

# GNUmed. Progress notes

- Load multisash based notes input plugin
- Display patient's problem list
- Create progress note for an episode
- Create unassociated progress note
- Create progress note for issue
  - Episode selection
  - Episode creation

# GNUmed. Medical documents

- Scan from paper
- Import from disk
- Associate with a patient
- Display on screen

# GNUmed. Laboratory tests

- Create new lab request (German style)
- Display lab request history
- Import lab data result files (German style)
- Display import errors
- Sign off as – yet unreviewed lab results
- Display lab results for a patient

# GNUmed. On the WWW

- Project home
  - http://www.gnumed.org
- Community wiki (users and developers)
  - http://salaam.homeunix.com/twiki/bin/view/Gnumed/
- German community
  - http://www.gnumed.de