IT Infrastructure Components to support clinical care and translational research projects in a comprehensive cancer center.
... was for many years driven by

- **Clinical Cancer Registries**
  - Organized within the ADT
    (= Arbeitsgemeinschaft Deutscher Tumorzentren
    = Consortium of the German Clinical Cancer Registries)

- **Epidemiological Cancer Registries**
  - Organized within the GEKID
    (= Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.
    = Association of the German Epidemiological Cancer Registries)

- the joint definition of the
  ADT minimal oncological (basis) documentation data set
Traditional Sources for Cancer Data Registration
(Situation at the Erlangen Clinical Cancer Registry in 2008)
Comprehensive Cancer Centers in Germany funded by the German Cancer Aid since 2007

... have been established
- to provide centers of excellence for interdisciplinary cancer care,
- medical education, as well as
- clinical and translational cancer research

... in a rapidly changing environment:
- massive growth in data, especially requiring linkage of molecular, genomic and clinical data
- need for faster processes from “bench to bedside“ (translational research)
- dramatically increasing documentation requirements in the clinical care context (billing, quality insurance, benchmarking, certification, ...)

Dokumentation in der gynäkologischen Onkologie, Der Gynäkologe 43 (2010), 400–410.
What are the IT Infrastructure Components required to support Clinical Cancer Documentation and Clinical Research in Oncology?

How can those be implemented without putting additional burden on physician’s workload?
Similar work in US projects


- .......
Erlangen University Hospital IT Infrastructure in 2008

- **Central EHR**
  - SAP IS-H (MPI, Billing)
  - Soarian (EHR)

- **Communication**
  - eGate (Comm. Server)

- **Ancillary Systems**
  - Swisslab (Lab, ...)
  - WebRIS, SynoVIA (RIS, PACS)
  - Meierhofer, QIMS (Surgery)
  - Amondis, ZENZY (Pharmacy)
  - Paschmann (Patho)

- **Cancer Registration**
  - only patient demographics;
  - no clinical data
  - No webbased interface for external communication

- **Planning and freetext documentation of tumorboard conferences**

- **TransDB (Finding Repository)**

- **Cognos DataManager, Talend OpenStudio (ETL)**

- **Cognos ReportNet (Routine reporting)**

- **DWH**

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H.U. Prokosch / MIE 2011

Chair of Medical Informatics / CCC Erlangen-Nuremberg
Erlangen University Hospital IT Infrastructure in 2008
 Problems:

- no tool web-based communication with external partners for direct acquisition of follow-up data
- no comprehensive cancer documentation yet in clinical care
- only unstructured documentation of pathology findings
- only project specific (typically homegrown) developments of study database systems (Excel, MS Access, SPSS)
- no IT support for chemotherapy planning
- no user-friendly clinical data warehouse for explorative research
- no professional IT support for biobanking (only freezers and Excel-Files)

No data reuse for multiple purposes
migrate to a new cancer registry system with a web-based interface to communicate with external partners (GTDS®)

stepwise establish a comprehensive cancer documentation in clinical care, starting with a structured documentation of cancer conference decisions (within the Soarian® electronic health record system)

establish a faculty wide GCP-certified database system for clinical trials (secuTrial®)

establish an integration platform/clinical data warehouse for explorative research (i2b2®)

establish a commercial biobanking management system (Starlims®)

apply the single source concept as much as possible
Results:
Erlangen University Hospital IT Infrastructure in 2011

IT Infrastructure Components in a Comprehensive Cancer Center ::

Cognos DataManager, Talend OpenStudio (ETL)

DWH

Cognos ReportNet (Routine reporting)

TransDB (Finding Repository)

Central EHR
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- Swisslab (Lab, Patho...)
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- Meierhofer, QIMS (Surgery)
- Amondis, ZENZY (Pharmacy)
- ... ...
- OnkoDat (Chemotherapy)

Cancer Registration
- GTDS (Cancer Registry)

... patient demographics and clinical data...
Results:
Erlangen University Hospital IT Infrastructure in 2011

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- . . . . .
- TransDB (Finding Repository)
- OnkoDat (Chemotherapy)

Cancer Registration
- GTDS (Cancer Registry)

Structured documentation of cancer data

Cognos DataManager, Talend OpenStudio (ETL)

DWH
- Cognos ReportNet (Routine reporting)

To be stepwise established for all chemotherapy planning units
Results:
new documentation modules within our EHR system

- planning and standardized structured documentation of 10 tumorboard conferences (incl. automatic tumorboard letter creation)
- complete ADT-based interdisciplinary cancer documentation extended with study-specific documentation for prostate and colon cancer
- documentation forms for melanoma outpatient followups
- documentation of psycho-oncological and psycho-social care
- generation of „cancer patient diary“ for quality assurance purposes
- documentation of informed consent (for cancer registry & biobanking) in the electronic medical record
- study participation documentation within the EHR
Results:
Erlangen Research IT Infrastructure in 2011

- Central EHR
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  - Soarian (EHR)

- Communication
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  - TransDB (Finding Repository)

- Ancillary Systems
  - Swisslab (Lab, Patho, ...)
  - WebRIS, SyngoVIA (RIS, PACS)
  - Meierhofer, QIMS (Surgery)
  - Amondis, ZENZY (Pharmacy)
  - OnkoDat (Chemotherapy)

- Research Platform
  - SecuTrial (Trial Data Capture)
  - StarLIMS (Biobank)
  - GTDS (Cancer Registry)

- EHR data reuse

- DWH
  - Cognos DataManager, Talend OpenStudio (ETL)
  - Cognos ReportNet (Routine reporting)
  - i2b2 (Scientific reporting, explorative analysis)

- multi center clinical trials
- multi center research data integration
Results:
Usage of the GCP certified database for clinical trials

- four oncological multicenter clinical trials (phase II – IV), in
  - gynecology
  - radiotherapy
  - surgery

  are currently running based on SecuTrial

- pseudonomized documentation
  of patient/relatives counseling sessions
Results:
Reuse of EHR data for cancer research

Single Source for

- **Colon Cancer Documentation**
  - with data transfer into GCP-certified clinical trials database (SecuTrial)
  - with data transfer into research data warehouse for explorative analysis (i2b2)
  - (linked to biospecimen documentation of the biobank mgmt. system)

- **Prostate Cancer Documentation**
  - with workflow support and „reminders“ for missing documentation
  - generating reports for prostate cancer center audits
  - local research database (pseudonymized) for explorative data analysis (i2b2)
  - anonymized data transfer into the nationwide prostate cancer research database (i2b2)
Results:
Web-based Query Interface for Patient Populations

Select all prostate cancer patients who had a digital rectal examination and have undergone nerve-preserving surgery?

27 patients found
Results:
Integration Platform for the two hospitals cooperating within the CCC

- The Comprehensive Cancer Center Erlangen – Nuremberg comprises
  - University Hospital Erlangen
    - 1,302 beds
    - 65,660 inpatients and 356,611 outpatients in 2008
  - Hospital Nuremberg
    - 2,184 beds
    - 90,411 inpatients and 93,300 outpatients in 2008

- I2b2 as integration platform for cancer data from
  - more than 5,000 cancer patients from University Hospital Erlangen
  - about 6,000 cancer patients from Hospital Nuremberg
IT Infrastructure components of the CCC Erlangen-Nuremberg in 2011

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  - Amondis, ZENZY (Pharmacy)
  - ......
  - TransDB (Finding Repository)
  - OnkoDat (Chemotherapy)
  - Cognos DataManager, Talend OpenStudio (ETL)

- Research Platform
  - SecuTrial (Trial Data Capture)
  - StarLIMS (Biobank)
  - GTDS (Cancer Registry)

- DWH
  - Cognos ReportNet (Routine reporting)
  - i2b2 (research database, explorative analysis)

Multi center research data integration

Chair of Medical Informatics / CCC Erlangen-Nuremberg

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