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PROJECT STATUS REPORT III
Final technological solution & documentation

September 2005

Operational comment: Last status report in May 2005 announced the starting point of SW development. During summer months the software tools were successfully built up and all main databases were optimized to run under already defined regimes (see Project status report II, May 2005). For current period, the main goals can be defined as follows:

a) to arrange all separately developed databases and analytic software in just one, comprehensive tool, fully accessible for everyday clinical routine
b) to define final workspace for different type of users
c) to manage running case studies according to project proposal
d) to define scientific potential of the tools for future trials, registries, etc.

IA. General summary of period 16/01 – 30/9 2005

1. **Implementation of dose intensity standards** in general health technology assessment (HTA) principles /theoretical-general aim of the project/
    a. Dose intensity monitoring and its data model (inputs/outputs) were incorporated in official standards for health care assessment in oncology. These guidelines are prepared for official issue in October 2005.
    b. Dose intensity monitoring was prepared in the form of algorithms that produce parametric data suitable for benchmarking at the level of individual cases and health care institutes as well. In addition to dose intensity values, the HTA standards include:
        i. relevant risk stratification of cases based on diagnostic criteria
        ii. evaluation of therapeutic response
        iii. evaluation of basic safety measures (adverse events, scoring of toxicity)
        iv. measures of time-to-event survival and overall survival
        v. basic scoring of quality of life
        vi. cost-benefit analytic measures
    c. HTA standards will be described in planned DIOS Status Report IV (10/2005) and at the same time delivered in documents for Ministry of Health Czech Republic
    d. HTA standards will be reviewed by advisory board of Czech Society for Oncology, the process will be initiated in October 2005

2. **Direct implementation in routine operation of health care facilities** (model sub-project in Masaryk Memorial Cancer Institute, MMCI)
    a. Finished audit of data sources in MMCI; finished project documentation and initiated development of data warehouse and automated SW tools (see Status Report in May 2005)
    b. SW development is carried out according to plan; first automated reporting over records for health insurance companies can be expected in 10 – 11 /2005
    c. Dose intensity monitoring is hampered by unclear definition of therapeutic CHT standards in Czech Republic, that is why we adopted also educational aims in final DIOS solution (see paragraph II in this report)
    d. MMCI started model case study focused on audit of used CHT regimes and consequences for reached dose intensity (see paragraph IV in this report)

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3. **Development of DIOS software** as platform for all users and clients, that have no support from their hospital information systems
    a. Final decision (06/2005): **DIOS SW will be developed as internationally available web portal**, supported with functional databases and interactive SW tools
    b. The web portal was built up and currently is validated and designed; all available SW tools were aggregated in one comprehensive workspace

4. **Model case studies**, planned **a/** as studies verifying developed tools and **b/** as registration trials focused on clinically interesting topics that are related to dose intensity monitoring
    a. Model case study in Masaryk Memorial Cancer Institute has already been started on model diagnose C50; on-line gathering of data is carried out since 07/2005)
    b. SW tools were optimized for on-line gathering of data (ORACLE technology) and so called DIOS registry is now prepared for multi-centric retrospective collection of data
    c. The DIOS registry was proposed to leaders of Czech oncology as ready available tool for clinically relevant studies focused on dose intensity monitoring; up to now 3 suitable proposal were obtained

IB. Future perspectives and key goals

1. Official issue of health care assessment guidelines for oncology in Czech Republic, including dose intensity monitoring of chemotherapy
2. Proposal and optimization of educational tools that should increase the awareness of dose intensity monitoring and its role in the evaluation of treatment quality
3. Development of automated SW tools that can guarantee the dose intensity monitoring in Masaryk Memorial Cancer Institute (final phase)
4. Launch of official DIOS web portal both in Czech and English version
5. Review of up to now reached results of the project from the side of Czech Society for Oncology and subsequent nationwide acceptance of the outputs
6. Final proposal of model case studies based on planned collaboration with renown Czech health care institutes

II.
Implementation of dose intensity monitoring in model health care institute (Masaryk Memorial Cancer Institute)

Accomplished aims. Audit of data sources and proposal of patients' records, including dose intensity monitoring. Final proposal of automated software tools.
Problems to be solved. Optimization of software tools working with CHT/RT data and implementation of these automated procedures in everyday operational routines of clinical departments.

Comments. Reasonable dose intensity monitoring can not calculate only CHT data, it must be coupled with valid therapeutic regimes, recorded reasons of performed violation or delay and with toxicity scoring. It means that we strongly need to comprehend numerous data sources to ensure relevant dose intensity monitoring and reasoning of changes in therapeutic strategy. All these data sources were successfully defined and put into proposed clinical records. To conclude, theoretical concepts, data

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models and adequate documentation was completed and translated into form suitable for SW development.

The problem however occurred in operational aspects of clinical practice. There is relatively weak support in officially guaranteed guidelines and therapeutic standards in the Czech Republic. In fact, there is only one reviewed paper source of CHT regimes, and information is thus available only in written form, sometimes even unclear in definition of dosage of compounds. That is why we had to address this fact, otherwise standardization cannot be done in any hospital, regardless of software used.

-> As a solution, we proposed educational interactive tools that could increase the awareness of dose intensity as indispensable part of oncology standards:

1. educational version of patients' electronic record supplied with comments and tutorials
2. central standardized database of CHT regimes as commonly available pool of standards for optimization of therapy
3. educational version of DIOS registry with model case–specific records

-> all these tools will be available through main window if DIOS web portal

III.
DIOS web portal as comprehensive user-friendly platform

Main advantages and reasons for web portal:

1. **Widely and easily accessible platform**, without problems with locally specific operation. Portal with interactive SW tools can serve as background for multi-centric projects, on national or even international basis.
2. **Comprehensive and effective communication from marketing point of view**. All types of users (students, physicians, managers) can work in one workplace, with similarly designed graphics and logical arrangement of educational and analytic tools. This way surely increases awareness of the project and its "brand" image. This is necessary as the project is ambitiously aimed to change the evaluation of therapeutic regimes in CR. This cannot be done without generally accepted position (power) of the project itself.
3. **Effective management**. One team of experts and masters can guide thousands of users, all database tools can be optimized for all potential projects from one place.
4. **Safety guaranty and quality assurance**. All databases are centralized under strict standardized operational procedures and the whole project is supported by central data management team.
5. **Educational power**. All comments, remarks, results can be shared by international family of users in real time.

   We therefore decided to aggregate all planned tools of DIOS project under standardized web portal (to be launched in Czech and English language by the end of October 2005)

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Main components of web portal DIOS:

1. **Electronic patients' record**
   - parametric diagnostic and health care records for oncology, presented in text form, with comments
   - associated guidelines including necessary data standards for dose intensity monitoring

2. **HTA in oncology**
   - link to somewhat independent web portal (Health Technology Assessment in oncology) with official guidelines for health quality evaluation, data standards, rules for multi-centric benchmarking, educational tutorial, model case records
   - through this web news, the dose-intensity monitoring will be officially published as standard part of HTA rules (under the auspices of Ministry of Health, Czech Republic)

3. **Central library of CHT regimes**
   - specific software tool with potential to replace old-fashioned paper editions that are not fully functional
   - on-line accessible database (ORACLE technology) with capacity to comprehend all standard CHT regimes in model parametric templates
   - central library is designed to provide following functions:
     searching tools, filtering and aggregating functions
     templates for time schedule, that can be updated with respect to given period/week/day (interactive therapeutic calendar)
     data support for on-line registry (automated registration of standard CHT regimes: timing, dosage)
     filled in first line by CHT regimes available for breast carcinoma as model diagnosis

4. **DIOS registry: educational on-line tools**
   - complex parametric patients' records, available in on-line registry as educational tutorial (i.e. supported with map, comments, prepared model records, description of the parameters, …)
   - several sections that cover all key components of health care records in oncology (diagnostics, risk and prognostic factors, therapeutic plan, therapeutic results, safety measures, ….).

5. **Multi-centric DIOS registry**
   - Complex parametric patients' records, available in on-line registry with safety protocols for gathering of real clinical data in retrospective trials
   - Database tool optimized for multi-centric projects that follow important clinical topics related to dose intensity of CHT regimes

6. **Therapy organizer**
   - easily available SW tool that serve as therapeutic calendar with structured time-related protocol output; the software is accessible through portal both directly or as tool working with data of central library of CHT regimes

7. **DI calculator**
   - simplified calculator of dose intensity in CHT regimes; data input in the form of compounds, dosage and timing can be entered both by direct typing or as template of standard CHT regime (exported from central library of CHT regimes); software returns dose intensity parameters that were really reached (in the case of retrospective control of already completed therapy) or that would be reached (in the case of model simulation of changes in the examined CHT regime).

8. **DIOS protocols**
   - these tools require complex data from CHT (RT) regimes, dosage and timing during the therapy and results; they return numerical calculus of all dose-intensity parameters, their statistical processing and possible benchmarking of individual values.

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IV. Model case studies

Model case studies planned for Masaryk Memorial Cancer Institute have been initiated in 07/2005 (it means 3 months prior to project plan). The main reasons for such speed up approach were:

successful development of on-line database tools that could operate regardless of internal information system

serious demand to test proposed patients' record in system working out of the hospital prior very expensive changes of the internal information system

Two basic case studies have been initiated:

1. **Comparative study focused on health care data and detailed operational records on pharmacotherapy**
   - model operational registration of data searching for discrepancies between data records reported for reimbursement of health care (i.e. database that can be biased by the changeable reporting rules) and original records that belong to pharmacy department of the hospital
   - model study with extremely important goal, suitable also for the other hospitals in CR

2. **Model gathering of complex data on breast carcinoma as training diagnose**
   - plan for N > 300 fully parametric clinical and pharmaceutical records mapping therapeutic strategy, its reasoning, compliance with set standards and final results in term of health care quality indicators (including dose intensity monitoring)
   - on-line collection of data in DIOS multi-centric registry that serves simultaneously as model calibration for the other centers

Both studies are now carried out and reasonable data for complex analyses can be expected by the end of October 2005.

V. Publication and communication plan

Methodical background and introductory concept of web portal DIOS was successfully introduces in national conference BOD 2005, in Brno, May 2005. The ongoing development and its results has been announced to the advisory boards of Czech Society for Oncology and Czech Society for Haematology.

In near future, all the tools comprehensively aggregated under web portal DIOS will be opened for national discussion under the auspices of Czech Society for Oncology and Czech Society for Haematology. The discussion will be driven according to software plan with principal aim to initiate multicentric studies focused on dose intensity monitoring.

Comprehensive summary of the ongoing development and major results will be published in special issue of Czech journal "Clinical Oncology" that is to be prepared in 2006.