Technology Transfer

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Outline of the presentation

- Objectives and issues surrounding the implementation of the BIRO system in Romania, Malta and Cyprus
- Understanding, characteristics, and transformation of data for implementation of the BIRO system
- Retrieve and map data through BIRO Software
- Activities of the three BIRO clinical sites in adaptation, implementation, set-up and use of medical applications in new EU countries networks
- What have we learned from Technology Transfer
- Conclusions and Perspectives

The broad scope of the BIRO project

- BIRO was concerned with the collaborative creation of documents and software tools, to extract and sharing data from multiple sources

Objective Technology Transfer

- To evaluate the BIRO scientific achievements to unidirectional migration of data, from various local data sources to regional data warehouses (aggregated data) and from there to the central Shared European Diabetes Information System (SEDIS), where data analysis is performed to obtain a set of N=72 internationally comparable healthcare quality indicators for EU Reports

Situations in the collection and management of diabetes data

- For each of the three countries we discuss details about:
  - The diabetes health care management
  - How is data defined (data dictionary, items, minimum dataset, standards), Information systems
  - Users in the collection and management of diabetes data

Data type

- For data request we have drafted a summary of BIRO Dataset
  - BOOLEAN for true/false or yes/no answers also allows NULL values
  - DATE for dates
  - IDENTIFIER for handling IDs and other identifiers
  - QUANTITY which handles real numbers to various levels of precision and units
  - COUNT which handles integer values

The problem

- Despite of efforts in diabetes ICT innovations for diabetic informatics in Romania they did not result in the broad adoption of electronic healthcare record based on standards due to *an unfavourable environment for sustainability of free software innovative systems and services for the aim of systems interoperability*

Today's EHCR for diabetes

- The result is poor use of health data because health information systems in diabetes tend to be fragmented, inaccurate, cumbersome, untimely, and isolated a barrier for BIRO implementation extensively.

The challenge

- The vast majority of software development tools used in the diabetes sector today do not inherently support data exchange mechanisms.

Minimal criteria

- There are implicit business incentives for limiting the interoperability of different health information systems leading to a major barrier for BIRO implementation.

How to implement BIRO technology?

- We analysed the process steps for set-up and execution of the BIRO software tools to create and deliver structured data in XML format (exchange of aggregate data) from local data sources and to further query and process these data with BIRO statistical reporting engines.

Specific Activity

- This specific activity has explored the practice of querying data and identifying obstacles, risks and incentives of the dissemination of sharing data.

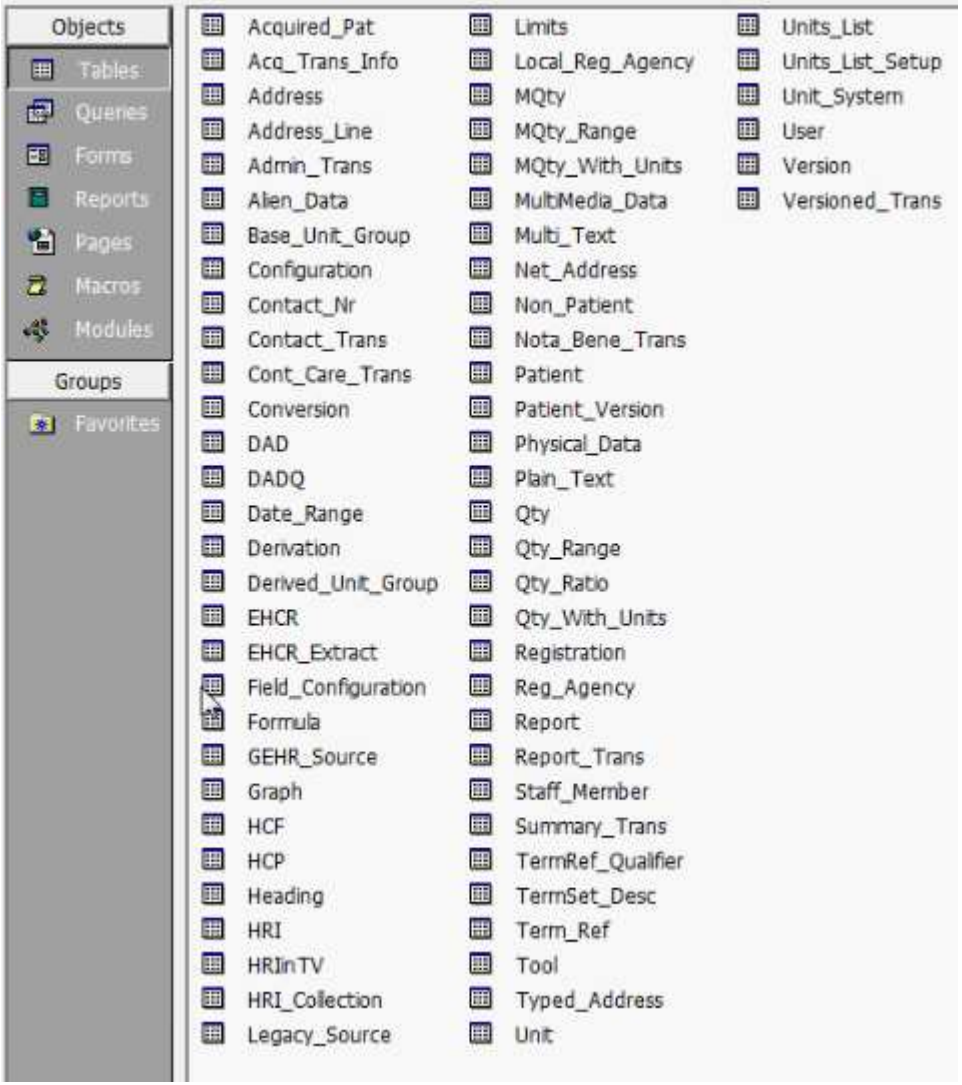
The steps in exporting of data from a database to XML

1. Connect to the database
2. Specify the SQL to run to retrieve the data
3. Specify the location of the flat file (XML)
4. Export the data

Merge table requirements

- “Probably each Participant would have to run some SQL queries on the local database in order to obtain a single big table with the desired format”.

Real clinical databases



SQL Command

```
SELECT eyeid, FROM_UNIXTIME( `dateCreated` ,
    '%Y-%m-%d' ) as date_created, FROM_UNIXTIME(
    `dateOfExam` , '%Y-%m-%d' ) as date_exam,
    eyeexam.exm_ly,
eyeexam.va_l, eyeexam.retina_l, eyeexam.macula_l,
    eyeexam.focal_ex_macula_l, patient.diabType,
    patient.hypertension, patient.renalFailure,
CONCAT( patient.zi,'-' , patient.luna, '-', patient.an ) AS
    DOB  FROM eyeexam RIGHT JOIN patient ON
    eyeexam.eyeid = patient.patid;
```

The CSV option export

Server: localhost ▸ Database: tele_diab ▸ Table: eyeexam

```
"93";"2008-02-21";"2006-12-09";"true";"0.6";"false";"false";"false";"Type 2";"Yes";"No";"
"94";"2008-02-21";"2008-02-21";"true";"0.6";"false";"false";"false";"Type 2";"Yes";"No";"
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"98";"2008-02-21";"2004-04-29";"true";"0.1";"false";"true";"true";"Type 2";"Yes";"No";"01
"99";"2008-02-21";"2005-10-21";"true";"2/50";"false";"true";"true";"Type 1";"Yes";"No";"1
"100";"2008-02-21";"2007-10-18";"true";"pmm";"false";"true";"true";"Type 1";"Yes";"No";"1
"101";"2008-02-21";"2008-02-21";"true";"pmm";"false";"true";"true";"Type 1";"Yes";"No";"0
"102";"2008-02-21";NULL;"false";"0.7";"false";"false";"false";"Type 2";"Yes";"No";"01-01-
"103";"2008-02-21";"2008-02-21";"true";"0.6";"false";"false";"false";"Type 2";"Yes";"No";
"104";"2008-02-21";NULL;"false";"0.4";"false";"true";"true";"Type 1";"Yes";"No";"11-05-19
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"106";"2008-02-21";"2005-07-26";"true";"0.5";"false";"true";"true";"Type 2";"Yes";"No";"1
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"109";"2008-02-22";"2008-02-22";"false";"0.6";"false";"false";"false";"Type 1";"Yes";"No"
"110";"2008-02-22";"2006-09-18";"false";"3/50";"false";"false";"false";"Type 2";"Yes";"No
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```
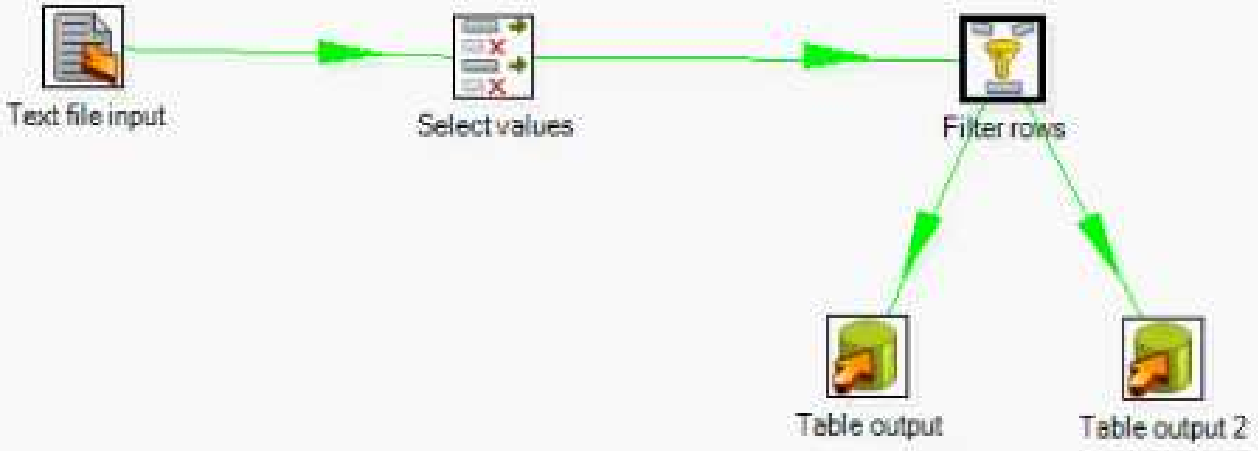

Free software for ETL



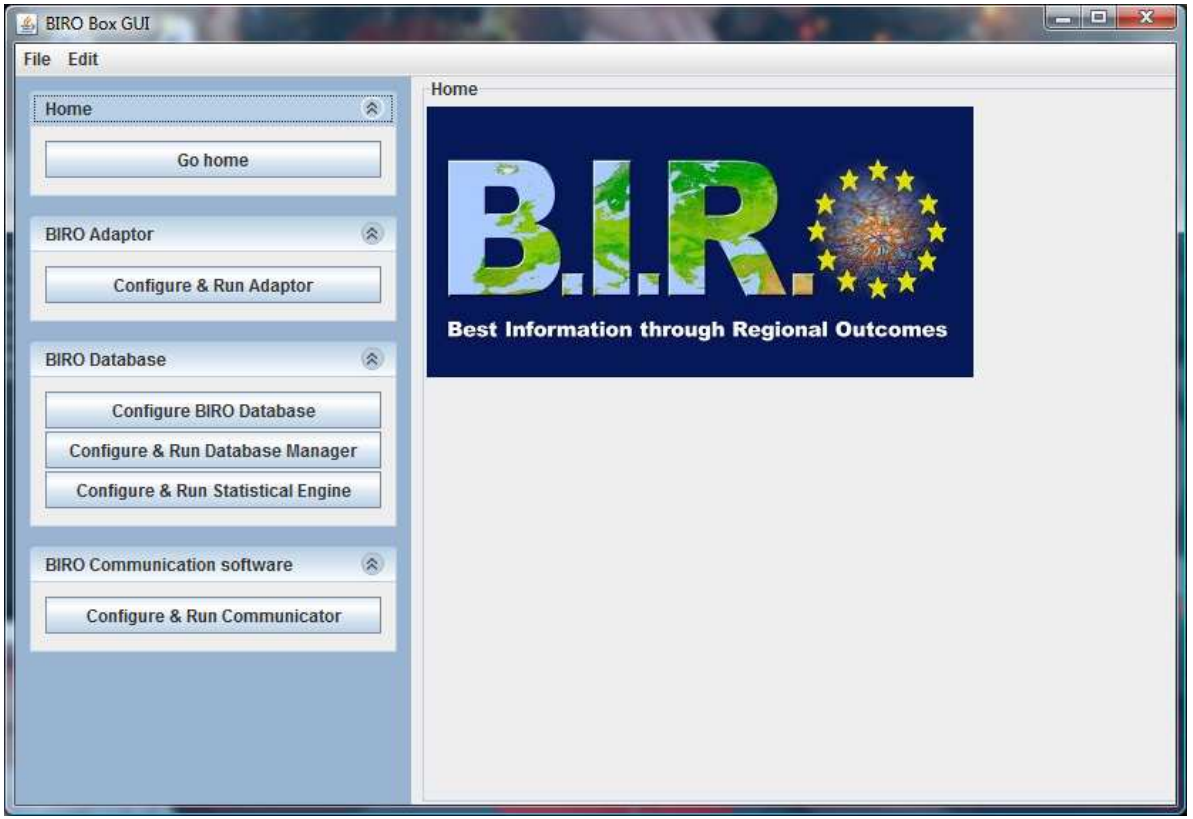
Pentaho is an Open Source ETL tool which gives the user a standard set of functions, database connections and error handling rules.

BIRO implementation

- We have used a sample of real data from Romania
- You must have the latest version of BIRO Box GUI installed on your computer.
- Open Computer.
- Open your Local Disk drive, usually named C:.
- Locate the BIRO folder and open it.

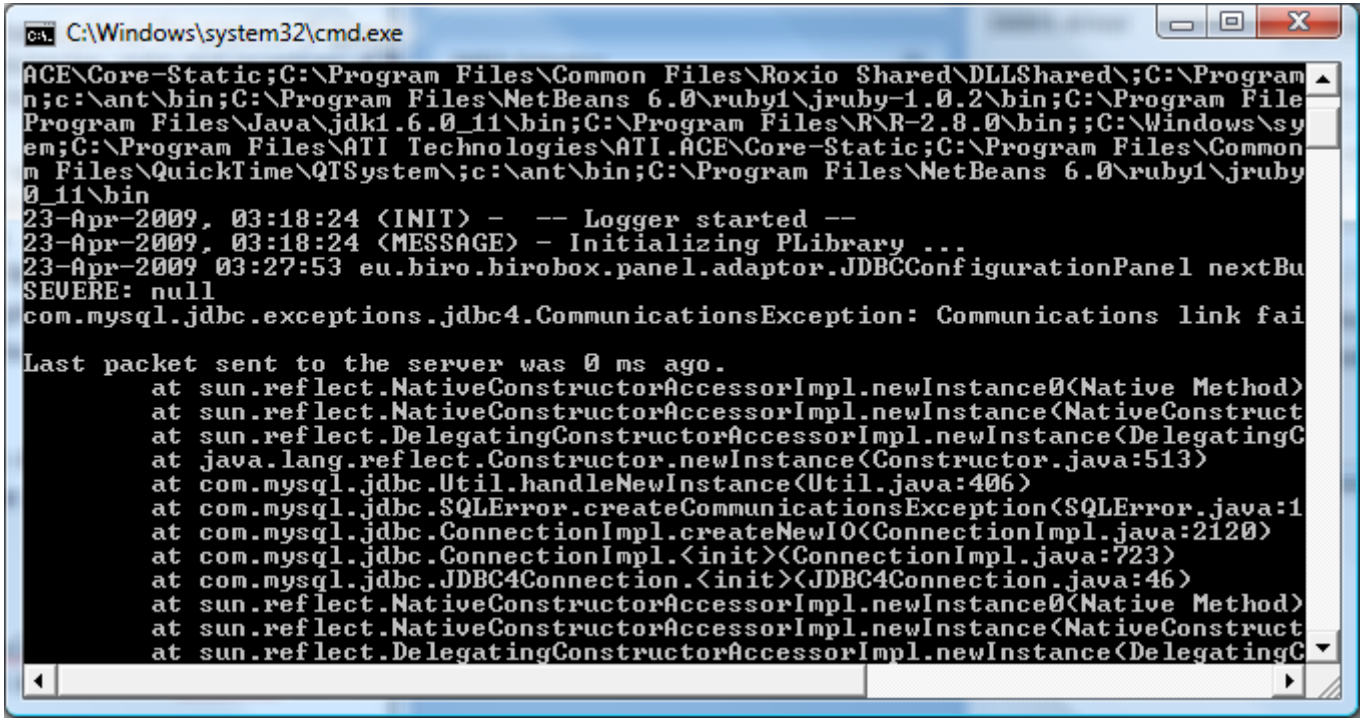
BIRO Box GUI

- To open the BIROBoxGUI double click on "runBIROBoxGUI " file and the main BIROBox GUI screen opens
- This is basic BIROBox screen



The changed lines in real time

- This utility is used to monitor changes to BIRO Box displaying the changed lines in real time.



The changed lines in real time

- It allows user to see the entries in Adaptor's error log in a readable and understandable format during the software test process.
- Connected successfully to MySQL server
- Could not find database: Unknown database 'xxxxx'

BIRO BOX GUI

- As is shown in the main screen of the BIRO BOX there are three major work areas in a graphical user interface with a few mouse clicks:
  - BIRO Adaptor
  - BIRO database
  - BIRO Communication software.

What have we learned from Technology Transfer

- No special programming knowledge is needed for use BIRO BOX GUI
- Structured information (XML format) can be generated by non-technical personnel.
- BIRO offers strong stimuli for attractive research careers (such as PhD students with skills in the healthcare applicative sector of informatics).

Specifically gains

- Specifically gains were made in knowledge and ability in the areas of data preparation, which was encapsulated in the BIRO Box Application.

Real world entities

- Real world entities such as Clinical contact, Clinical contact email address, Country of origin, people, etc. may all be assigned identifiers (for handling various data source identifiers).

Difficulties and pitfalls

- The practical problems encountered during installation and use of BIRO software by real users was given.
- The aim of this effort was to document all difficulties and pitfalls to create a knowledge base of solutions, which is going to be implemented in an extended scope in Europe.

Open Source technologies

- BIRO takes advantage of new Open Source technologies (free license and access to the source code) and involves the unidirectional migration of data, from diabetes care locations to the BIRO local data warehouse and from there to the central SEDIS for BIRO data analysis with various reporting tools and statistical applications developed through the project.

Conclusion

- The BIRO project not only created an infrastructure to make data from national or regional registers available for international comparison of health indicators, it also provided valuable tools and information to set up these registers.

Conclusion (2)

- In a collaborative and interdisciplinary effort of the project has to be continued for further implementation in other European countries.
- Pilots to demonstrate BIRO innovative ICT solutions
- Raising awareness about the possibilities in structured reports of BIRO services perceived as "business intelligence" applications

Conclusion (3)

- At national level the availability of health indicators for comparison and benchmarking at an European level must be an integral part of the national health information strategies. For this reason, it will be vital to directly involve national health care management (e.g. Ministries of Health, Diabetes Associations, etc.) in the follow-up project EUBIROD for further successful implementation

Thank you!