



1 User interface EurocryoDB.

2 Fraunhofer-Cryostorage-Technology (FCT).

eurocryoDB and eurocryoPortal ICT for Integrated Biobanking

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General Description

eurocryoDB and eurocryoPortal represents Fraunhofer IBMT's non-commercial information system platform for operators of biobanks and their customers that manages the acquisition, preparation, storage, retrieval and provision of biospecimens and their data under quality controlled conditions. eurocryoDB and eurocryoPortal have been designed as part of IBMT's patented Fraunhofer Cryostorage Technology (FCT) for high quality bio-banking. The fundamental components of FCT represent electronic cryo-vials containing low temperature memory chips. FCT further comprises completely new, self organizing, semi-automated cryo-storage containers and cryo-work benches that ensure maintaining the cool chain in sample logistics. eurocryoDB and eurocryoPortal enables partitioning biobanks in different project or study specific biorepositories, each with its own sample portal for external collaboration.

Architecture

Storage and provision of specimens are centrally managed by the central biobank information and administration system eurocryoDB, which can handle conventional storage inventory as well as seamlessly interact with Fraunhofer's intelligent Cryostorage Technology in combination with the cryo-LIMS <LabOS>. eurocryoDB is a web-based solution that administrates and manages all business processes and workflows in the biomaterial logistics of the biobank and their external partners. It administrates samples/aliquots, donors/subjects, customers and the inventory.

The Data Model

The data model of eurocryoDB allows managing different sample collections with different characteristics independently from each other in so-called virtual sample repositories. So far three different types of



virtual repositories are supported with their own specific data sets. For each repository an own user group can be specified according to the sophisticated roles and right concept of the system. The data sets of each repository include a shared minimum data set in addition to a fixed repository specific data set and are described through an XML schema with specific nomenclature. The schema simplifies import and export filters to other related LIMS or biobank information systems. Attributes could be set that indicate the legal status of a sample with respect to patient consent and ownership in order to indicate availability of the sample for research.

Virtual repositories and Web Portals

Each virtual repository of eurocryoDB is optionally associated with a web portal that is the »window« of the repository for external partners and the community. The

web application includes respective search and order mechanisms for biomaterial through a specific specimen catalog. It is also possible to register samples that are collected by external partners with their data prior to shipping to the biobank and to provide these partners an overview about their individual biomaterial stock in the repository. Orders and registrations are forwarded to the core system eurocryoDB, where they are processed by the biobank staff. Several portals can operate in parallel on one eurocryoDB instance and synchronize their data with it. Each web portal has its typical functional and editorial characteristics and corresponds to a specific repository in the eurocryoDB.

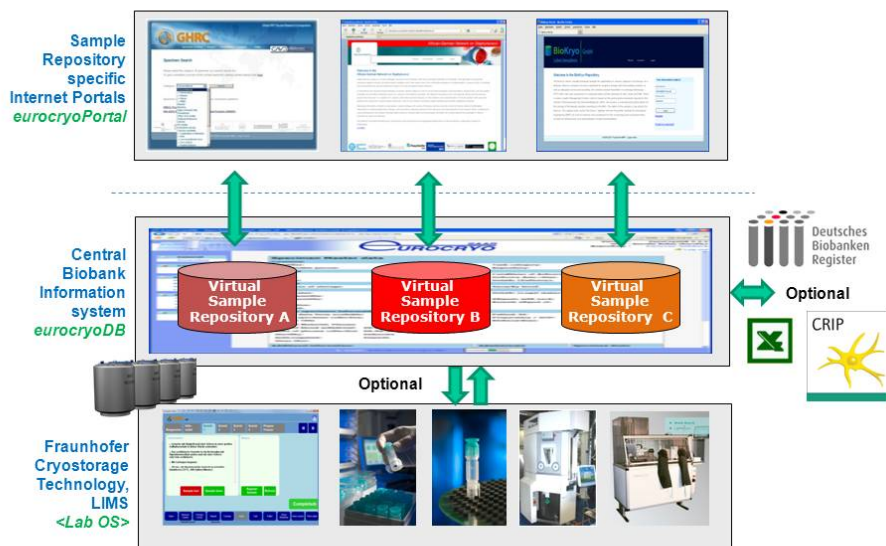
Implementation and Interfaces

The eurocryo Web Portals run in an Apache Tomcat servlet container with a PostgreSQL database. The central eurocryoDB web

application runs also in an Apache Tomcat servlet container. But the data are stored in an Oracle database.

Data exchange with the other components or external systems is realised through web services technologies. Secure web service is available to download the biomaterial data set of a sample after proper authentication. This service is used by <LabOS> to write the data on a 'smart' sample's memory chip (FCT). In the opposite direction eurocryoDB can receive the storage location of a smart sample in a self-organizing storage system from <LabOS>. In addition to that, eurocryoDB provides an import interface that allows the automatic integration of specimen data and its storage position on the basis of tabular files. Reports can be generated and exported as CSV files. eurocryoDB also provides an interface to Germany's »Projektportal im Deutschen Biobanken-Register« that lays the ground for a central national German biobanking infrastructure.

Through its web service technology based secured import- and export interfaces, the concept of virtual repositories and the planned ontology-based flexible data extension and annotation capabilities eurocryoDB and eurocryoPortal will be perfectly suited to serve as IT infrastructure for integrated biobanking with distributed local repositories and for further integration with hospital and laboratory information systems and clinical data registries.



Management concept eurocryoDB and eurocryoPortals.

- 1 Eurocryo Saar-building in Sulzbach/Saar, Germany.
- 2 Cryo-storage containers and cryo-work bench.