

## BEST PRACTICES IN DESIGN OF DATABASE OF BROWNFIELD REVITALIZATION PROJECTS

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### ABSTRACT

The article informs about best practices for the development of database of brownfield revitalization projects created based on experience in implementing database during the solution of the European Union project “COBRAMAN”. At the beginning there is a brief introduction into Cobraman project. Criteria that have a decisive influence on the data structure and also the recommendations for a user interface and for presentation of information are described. The article explains what should be done and what data must be available so that the developed database may form a starting structural element for modeling in the area of information systems for landscape restoration and for developing an expert system also. Expert system would be able, in accordance with the knowledge base and analogies with already realized successful as well as unsuccessful revitalization projects, recommend the most suitable project and solution for specialists and project managers concerned with revitalization projects.

**Keywords:** brownfield, COBRAMAN, database, revitalization project

### INTRODUCTION

Utilization of information technologies and technologies for modelling to handle landscape affected by industrial activity, raw material gaining and mining particularly, is a part of long term research activities of Faculty of Mining and Geology, VŠB – Technical University of Ostrava. The issue was gradually dealt with in several projects. Information systems for planning of revitalization and modelling of after mining areas were created [5]. In this article we want to present design and implementation of database which summarizes existing brownfield revitalization projects. The database was created as a part of the European Union project “Manager Coordinating Brownfield Redevelopment Activities” (“COBRAMAN”, European Union project 1CE014P4 – Central Europe Programme co-financed by the ERDF), homepage <http://www.cobraman-ce.eu>, which has been solved from 2008 to 2012.

### THE COBRAMAN TRANSNATIONAL PROJECT

Project COBRAMAN deals with revitalization and redevelopment of the post-industrial areas, so-called brownfields (industrial sites, military sites, mining sites, railway land sites, waterfront sites, former city service sites, agricultural sites, etc.).

The OECD (Organisation for Economic Co-operation and Development) defines urban brownfield sites as "vacant, derelict, underused lots in urban areas, with actual soil contamination or risk of soil contamination". CABERNET (The Concerted Action on Brownfield and Economic Regeneration Network) defines brownfield as "sites that have been affected by the former uses of the site or surrounding land, are derelict or underused, are mainly in developed urban areas, require intervention to bring them back to beneficial use and may have real or perceived contamination problems" [1].

The COBRAMAN project is a result of extensive international collaboration of many subjects - universities and municipalities such as City of Bydgoszcz (Poland, Lead Partner), City of Stuttgart (Germany), The University of Economy in Bydgoszcz (Poland), City of Most (the Czech Republic), VŠB – Technical University of Ostrava (the Czech Republic), City of Kranj (Slovenia), Statutory City of Ústí nad Labem (the Czech Republic), SIPRO Country Board for Development Ferrara (Italy) and Urban Planning Institute of the Republic of Slovenia (Slovenia).



Fig. 1 COBRAMAN Project Partner location: 1, 7 – Poland (Bydgoszcz), 2 – Stuttgart; 3, 4, 8 – the Czech Republic (Ústí nad Labem, Most, Ostrava); 5, 9 – Slovenia (Kranj, Ljubljana); 6 – Italy (Ferrara) [2]

Cobraman project essential objectives are:

- Preparation of concept of managing post-industrial areas
- Establishing a new working position of "Manager Coordinating Brownfield Redevelopment Activities"
- New European Master Course with the practical transfer, exchange and evaluation on the pilot realized on different local project sites
- Preparing a publishing the "Guide of Brownfield Management"
- Setting the frame for a new Europe wide profession which will help to reach a more balanced urban development in all cities and regions in Central Europe hence contributing to restructure declining industrial areas
- All results public available for free as printed reports or via the web
- Appointing pilot areas in the cities participating on the project; preparing key documents/plans of management for the appointed areas; carrying out local pilot activities
- Preparation of a complex program of trainings manager for "Brownfield Redevelopment Management".

One of the project key outputs is design and implementation of the database of brownfield revitalization projects. Certainly it is not the first attempt to create the brownfield database. For example: brownfield databases managed by municipality of Ústí nad Labem or Stuttgart exist but they were built on different philosophy. The concentration on specific region and the fact that databases are built in local languages cause that they are not usable for international public. Mentioned above databases are mainly specialized in collecting of foundational descriptive information extended with GIS (Geographic Information System) layer.

The Cobraman database within the scope of project should meet following objectives:

- Collection of relevant information about considerable revitalization project Brownfield in the central European countries.
- An information background for scientific public and offices, which are concerned with the brownfield redevelopment.
- Study materials for students of subject fields which contain brownfield issue, including master course "European School for Brownfield Redevelopment", which accreditation at VŠB-TU Ostrava (the Czech Republic) is defined as one of the key objectives of Cobraman project.
- Public access to brownfield project description and solution.
- All information is being stored using English; therefore the database is open to international scientific public. [4]

## **INFORMATION SUPPORT FOR BROWNFIELD MANAGERS**

Brownfield managers need the overview of all project related topics and activities and they need to access fast and easily the relevant data. Information must be stored somewhere, and for these purposes are built the databases. The greatest need for information in the process of redevelopment occurs in stages of preparation and planning, when are undertaken the key decisions. The appropriate amount of data reduces the risk associated with them. Between the information needed at this stage include:

- Information on the subject of revitalization
- Information concerning the processes of redevelopment, where you can find a similar problem areas and goals.

The database becomes a promotional tool that increases the chances of obtaining investor. At the same time it can offers inventorial and statistical data for individuals which have the investment areas. The second group of information is a significant support during the planning of specific activities carried out in the process of revitalization. It allows you to find the common elements, some analogies, and then select and use actions and tools that have been successfully applied in other projects. These databases can also be used for educational purposes in the process of training personnel for revitalization. One of the results of the COBRAMAN project is the database that belongs to the second group, with aim to gather information on redevelopment projects implemented in Central Europe. Therefore databases are crucial, but due to the large sources of data and for the internal and external communication managers needs tools for visualisation and calculation. This can be combined in a GIS system. Huge amount of data can be analysed and summarized easily by a GIS system. Different information can be combined and new conclusions can be drawn.

## **THE COBRAMAN DATABASE**

The database was started to be built in 2009. On the beginning of the project the facilities for information support – high-powered servers with Windows Server 2008 operating system, disc arrays of 6 TB capacities were acquired. Microsoft SQL Server 2008 was selected as a database server (possibility of using mirroring technology for on-line data replication). Servers were integrated into VŠB-TU Ostrava IT infrastructure, which enables operation within secure environment and it also enables to be a part of university data backup solution. Note: servers are used within the project for additional activities, such as web interface implementation or storage for students data.

The database structure design was based on study of existing data sources, future users demand analysis and survey of potential users. ERD diagram of the database is described in [3].

The database fundamental block is “Brownfield card”. It contains basic information about brownfield type, brownfield area and topology, its location and essential characteristics. Information about significant revitalization project (objectives, budget, deadlines, the most important experience, the owner at the time of the project, the owner of the project after the implementation of it, funding sources, the stages of the project) is

connected with brownfield card. Additional Brownfield information, such as transport accessibility and condition of infrastructure, are registered. Data on pollution type and level are available for each locality. The projects are complemented with pictures of site, external information sources, illustrations and contact information. This allows us to read the full characteristics of projects with similar conditions [4].

A keyword search and the project filtering using Areas, Specific Tools, Brownfield Types or Best Practices Criteria are available. There is the ability to search for the keywords in various categories of the descriptions of the project, it's possible to search for information using the project description (region, city, name, idea, description, context, objectives, key experiences, stages) and the different areas of design tools and best practices [2].

The tools used in projects were divided into the following categories:

- Environmental - mainly related to environmental protection, its regeneration;
- Economic and Financial - tools to support financing projects;
- Management - designed to overcome the organizational barriers;
- Legal - mainly the specific regulations related to the project;
- Society - a group of tools serving the achievement of social objectives of regeneration;
- Heritage - associated with the protection of cultural property;
- Technical solutions - specific, innovative technical solutions applied in the project;
- Law
- Marketing - responsible for the market success of the project and its promotion.

The same groups were separated in the area of "best practice" where we can be familiarized with the model implementations of specific solutions. They represent a more general category than project tools, making it easier to refer them to new projects. The activities described in the unit called "best practice" can be proven elements of the classical approach to the process of revitalization, as well as highly innovative [2].

The database also contains spatial information (geographic coordinates), so it is possible to visualize the deployment of the projects on the map. This allows users to analyze easily the projects with respect to individual countries, regions or cities [2].

## **DATA COLLECTION**

Data collection about the brownfield projects is provided by project partner PP3 - University of Economy in Bydgoszcz, Poland with cooperation from PP5 (VŠB Technical University of Ostrava). An Excel form was used for data collection from individual localities during the first project phase (beginning of 2010). Uncontrolled form filling, additional data insertion by individual users and user failure to abide designed form structure made deployment of automate form processing impossible to execute. Therefore a web interface (PHP application) using forms for data insertion has been created during spring of 2010. Not only the interface enforced users to abide a form structure, it also enabled input data verification. Interface also provides a possibility to insert figures, photos and related documents. The brownfield card additionally provides an access to eventual locality website.

At the end of 2011, the database web interface has been complemented by “Guide to Brownfield Management”. This electronic guide is directly connected to the example solution of the revitalization projects in database.

**COBRAMAN** Cobraman home page | Search | Logout User: pp3

About Cobraman Project

Database of Brownfield Projects

Guide to Brownfield Management

List of Projects

Brownfield Sites

Links

Postgraduate Studies

E-learning

Master Studies

Database User

XML Export

GPS Location List

## GUIDE TO BROWNFIELD MANAGEMENT

### KNOWLEDGE BASE AND DECISION SUPPORT - INTRODUCTION

Tools catalogue - introduction

In recent years, a number of various projects have been carried out in Western and Central Europe. The experience and best practices stemming from these projects provide knowledge and lessons learned that are useful when making decisions related to post-industrial area development.

When it comes to effective post-industrial land regeneration management, it is important to utilise information concerning the identification of area/process conditions and knowledge about previous project completion experience (diagram). Process completion can also be supported by specialist knowledge in the fields of environmental protection and cultural heritage, marketing and management, communication, economy and finance as well as spatial and urban planning. The diagram below illustrates connections and relations between information (knowledge) resources and their sources/recipients at different stages of the regeneration process.

PHASE	INFORMATION RESOURCE	SOURCE OF INFORMATION AND DECISION SUPPORT	RECIPIENT
BROWNFIELD IDENTIFICATION	Location, indicators, infrastructure, ownership, planning conditions	OUT: Database of investment areas – brownfield, brownfield card	Commune, local government
DEVELOPMENT POTENTIAL	Process actors, stakeholder, ownership inventory brownfield location potential sources of financing market conditions of the area – demand, supply	IN: Database of investment areas – brownfield, brownfield card	Investor, commune
PLAN MAKING	Objectives and priorities, integrated plan of actions, ideas bank, guidelines and recommendations	IN: Database of projects, inspirations, tools, best practices, stakeholders feedback	Project manager, brownfield manager, stakeholders
LAND PREPARATION AND DEVELOPMENT	Remediation potential, methods of land and public space development, social participation and information	IN: Database of projects, inspirations OUT: Media	Investor, stakeholders

Fig. 2 Guide to Brownfield Management available at the COBRAMAN database website [2]

The database and Guide to Brownfield Management is designed for:

- Institutions
  - Municipalities – method of brownfield treatments and operations
  - Regional Authorities – professional inputs to strategic planning
  - Universities – educational service
  - Business and Research Institutions – benefit from realization of projects

- Individuals
  - Professionals – sharing knowledge and experience
  - Students – learning source

For using the database is important to ease of data retrieval and clarity of information presented.

The database of revitalization projects and Guide to Brownfield Management created during COBRAMAN project is accessible at <http://database.cobraman-ce.eu>.

## THE BEST PRACTICES

Within experiences with working in the COBRAMAN project and further similar projects considering collection of data, we put together the following recommendations.

The recommendations for database design:

1. Using the relational database model
  - a. suitable for this type of data
  - b. clear to design and administration
  - c. functionality leads to search relevant data is more important than handling huge amount of data
2. We recommend use standard software tools and database servers (such as Microsoft SQL Server, Oracle, MySQL, PostgreSQL,...) – easy to solve any problem due to large use – there are a lot of information sources available.
3. Collecting data due Excel form is not recommended – users have a tendency to expand and complement the form. This makes difficult to process the form. Solution is to prepare web interface for store data directly into database with necessary checks of input.
4. Interface should have public and non-public part. Non-public part is designed for project partners to administrate the brownfield projects.
5. Web interface must be user friendly, easy to control and with an appropriate graphics.
6. Language of the interface depends on target group: English for international audience while local language is more suitable for professional form business.

The recommendations for GIS layer of database solution are:

1. Splitting GIS layer into two layers – public and non-public (managerial) – a reason for this is, that data collecting is very expensive and this saves data from misuse or resale.
2. Linking the GIS with cadastral database is very effective (if the cadastre is publically open, this is possible for example in the Czech Republic, but not in Germany).

3. The public layer should have attractive appearance and should be easy to use, user friendly, intuitive navigation.
4. The information of the GIS layers need to be readable, printable and extractable so that a brownfield manager can use data of the GIS data system to create his own project files with his special visualization needs.
5. GIS is also important for the web-based visualization of data for citizens, investors and other interested stakeholders. This helps to get in contact with the responsible brownfield manager at the municipality.

## CONCLUSION

Brownfield projects database, web interface for data access and search and electronic guide for brownfield managers has been started to work during 2011 as one of the results of transnational project so-called COBRAMAN. It's result of cooperation of the experts with different specialization from several countries. This is a first step of expected final solution that is essential for next two parts. Second part of information support for brownfield specialist is GIS layer with the models (model of the landscape restoration, model of the contamination, cadastral information etc.). The final part is an expert system based on database and models, which could analyze the demand and according the knowledge base gives recommendations for best solution on issue connected with brownfield revitalization projects.

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