

**Consortium for studying, evaluating, and supporting the introduction of Open Source software and Open Data Standards in the Public Administration**

Project acronym: COSPA



## **Workpackage 2**

**Collection of requirements for OS applications and ODS in the Public Administrations creation of a catalogue of appropriate OS/ODS Solutions**

### **Deliverable 2.3**

## **Catalogue of Legacy Databases**

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Workpackage 2, Deliverable 2.3 Catalogue of Legacy Databases

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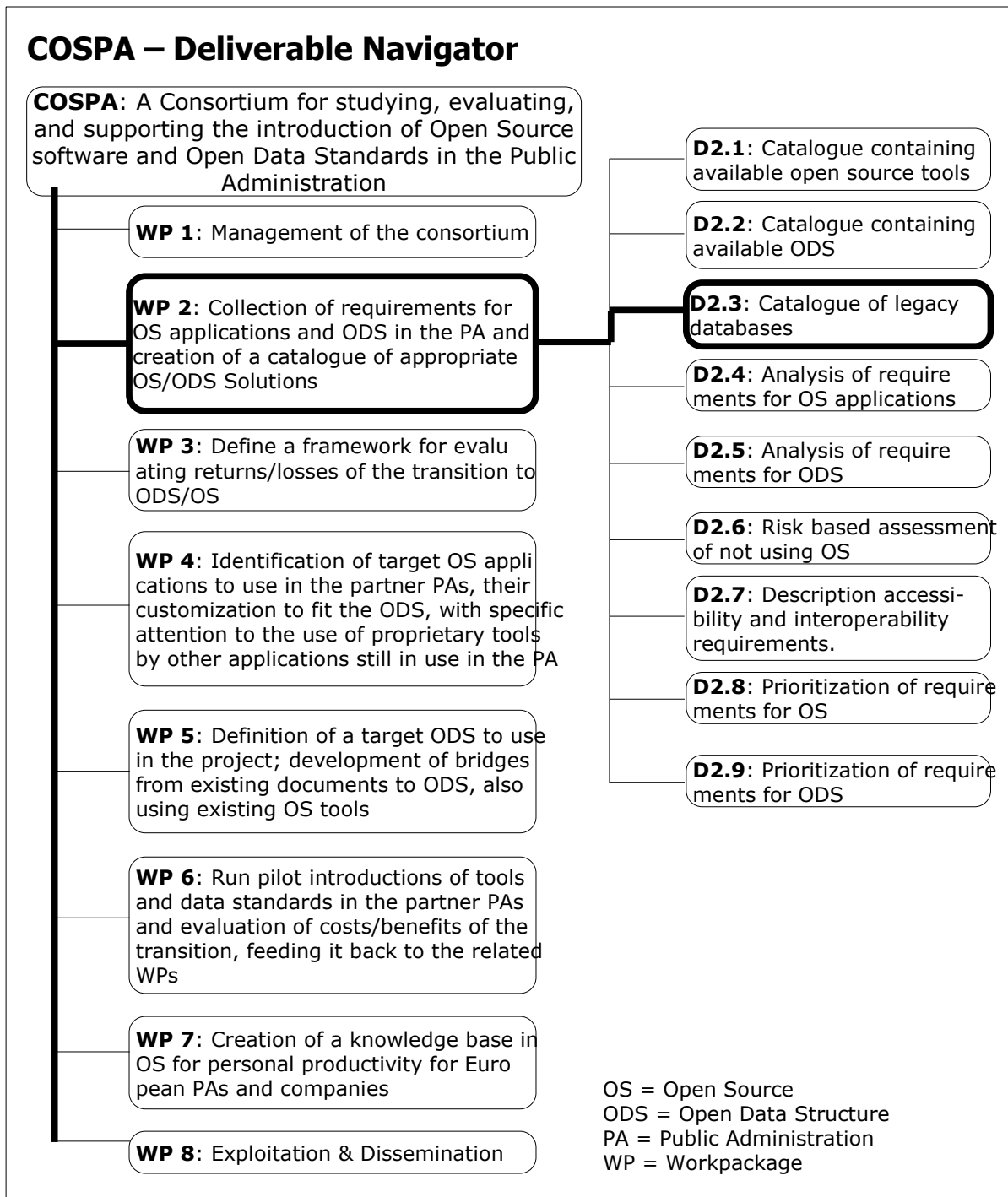
## **1 Executive Summary**

Database technology is commonly acknowledged as being mature, efficient and reliable, and databases are indeed found throughout Public Administrations (PAs). Almost every application in a PA relies on a database back-end, so many core PA services rely on database technology. Database technology may be robust, but it is expensive to maintain, and proprietary features yield poor standards of compliance. This is a key reason why PAs may wish to migrate their database technology to an open environment.

Successful migration to Open Source database technology, however, depends on a thorough knowledge of the contents and software environment of legacy databases. We therefore offer a detailed catalogue of the technical details of legacy databases used in eight PAs. To the best of our knowledge, this is the first attempt at gathering such detailed information in European PAs. The results can be used as a checklist by anyone wishing to understand the risks and potential costs associated with maintaining their legacy database in a PA.

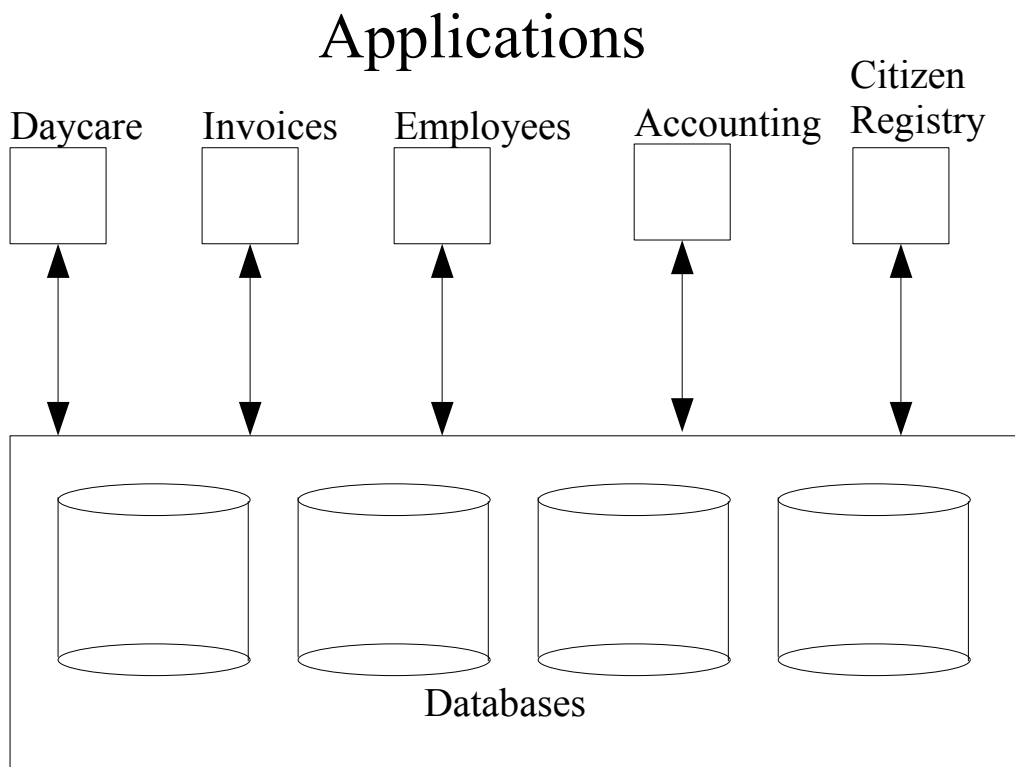
However, one key finding is that it is exceedingly difficult to gather the precise technical information desired on such shared legacy database characteristics. This is a strong indication that vital features are poorly understood, and that the data required for migrating databases is unavailable or well hidden.

The amount of data found in legacy databases is substantial and the cost of maintaining it is significant. There is a clear need for a feasible and systematic approach to database migration, following strict adherence to industrial standards. This is the only way to avoid future legacy problems.



## 2 Introduction

Database systems are an essential part of an efficient Public Administration. In fact, most critical applications found in a Public Administrations rely on a proprietary back-end database management system (DBMS). As an example consider the case of Hanstholm Kommune (HK) in the north of Denmark. Several years ago HK started developing an Informix-based municipal IT system in cooperation with a number of other Danish municipalities. Since the system is Informix-based, it is built on-top of a proprietary Informix DBMS. The system consists of applications for handling daycare, invoices, salaries, employees, citizen registry and accounting as illustrated in Figure 1 Thus, every core service of HK relies on the Informix back-end DBMS. Equivalent examples exist for the other PAs (cf. Section 4 and Deliverable 5.2).



## Informix Data Base Management System

*Figure 1 Hanstholm Kommune's Informix based system*

A defining property of a proprietary DBMS is the extent to which it adheres to existing standards. Strict adherence to existing standards, such as SQL92, facilitates and supports a transparent migration, since a strictly standards-compliant system can be replaced by another standards-compliant system. In contrast non-standard functionality and lack of adherence to standards prevent migration, since non-standard functionality cannot easily be replaced.

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Migration from a proprietary DBMS is often not even considered as an option due to the considerable difficulty and high financial cost associated with it. Avoiding or postponing migration worsens the problem of legacy databases and applications, i.e., operational solutions that have been inherited from languages, platforms, and techniques earlier than current technology. Typical characteristics of a legacy database include:

- (1) Old, outdated or non-standard hardware.
- (2) Old, outdated or non-standard software.
- (3) It is mission/business critical.
- (4) A large number of applications rely on it.
- (5) A lack of detailed specifications for the applications using it.
- (6) The cost or effort of migrating the database is perceived as high.

The extent and nature of legacy databases in PAs is poorly understood and has received little or no attention outside individual PAs. This is unfortunate, since it is a substantial problem which should be solved collectively. This document sheds some light on the problem of legacy databases in PAs.

The rest of the document is organized as follows: In Section 3 we define what database migration is, and then define what a legacy database is. In Section 4 we provide an overview of the survey results including a brief analysis and evaluation of the data. In Section 5 we conclude and discuss future work.

In addition, the document has three Appendices: Appendix A contains the data gathered in the survey, Appendix B contains a description of the fields found in Appendix A, and finally Appendix C contains a list of Open Source Data Base Management Systems (DBMSs).

### 3 Database Migration

Database migration is the process of creating a database in a database management system (DBMS), which is equivalent to a database in a different database management system, i.e., migrating a database DB from DBMS A to DBMS B is the process of creating a database DB' (target), which is equivalent to database DB (source).

A successful migration must ensure equivalence between database DB and database DB'. However, simply having the same data in each database is not sufficient, equivalence should also consider functionality and performance.

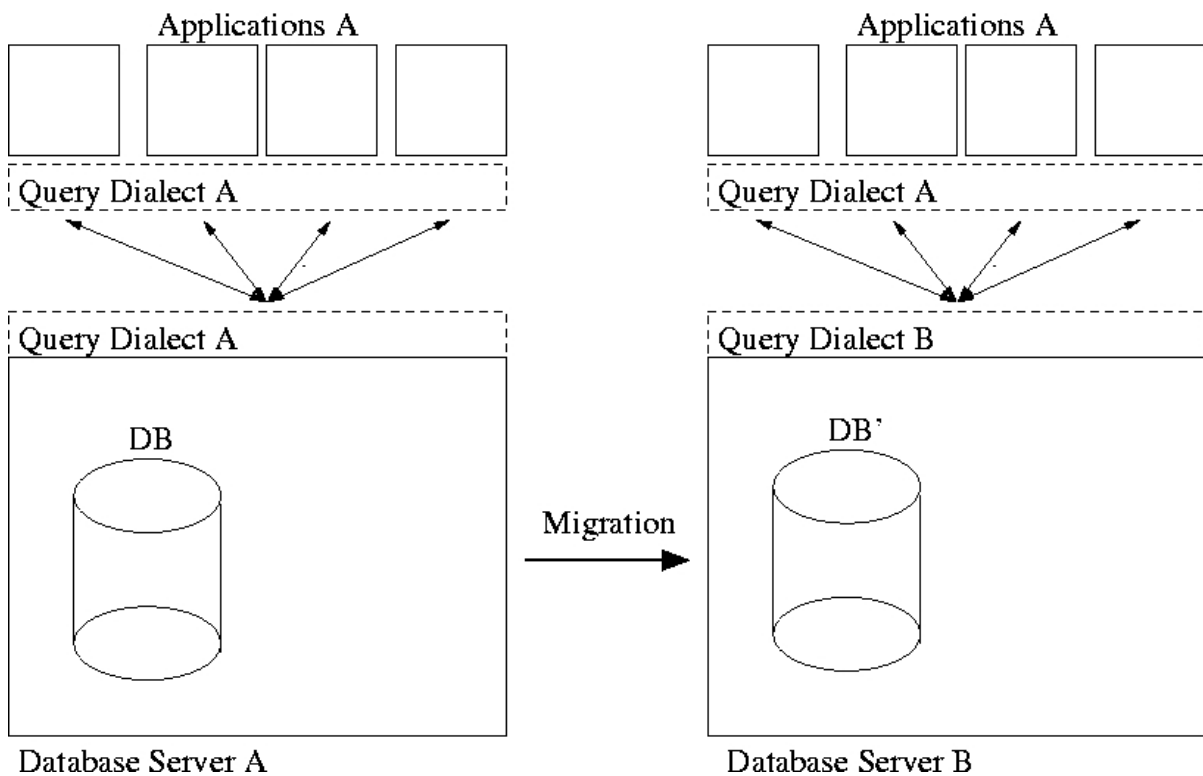


Figure 2 Query dialect mismatch following a migration.

Typically, every database server supports its own query language dialect (variant). A dialect is usually compliant with a certain level of the SQL standard and provides a set of non-standard extensions, e.g., procedural extensions like PL/SQL, Transact-SQL and SPL. These extra, non-standard extensions are however the main obstacle when it comes to database migration. As illustrated in Figure 2, all applications which rely on the database communicate with the database via the query dialect. After migration, the dialect which is understood by the database has changed. Thus, there is a mismatch between the language of the applications and the language of the database. Solving this mismatch is the core problem of database migration.

#### 3.1 Legacy Databases

Legacy databases and applications are those that have been inherited from languages,

platforms, and techniques earlier than current technology. Most PAs have legacy applications and databases that serve mission critical business needs.

Typically, the challenge is to keep legacy applications running while converting them to newer, more efficient code that makes use of new technology and programmer skills. Currently, many companies are migrating their legacy applications to new programming languages and systems that follow open or standard programming interfaces. This will make it easier in the future to update applications without having to rewrite them entirely. It will also allow PAs to become independent of specific vendors.

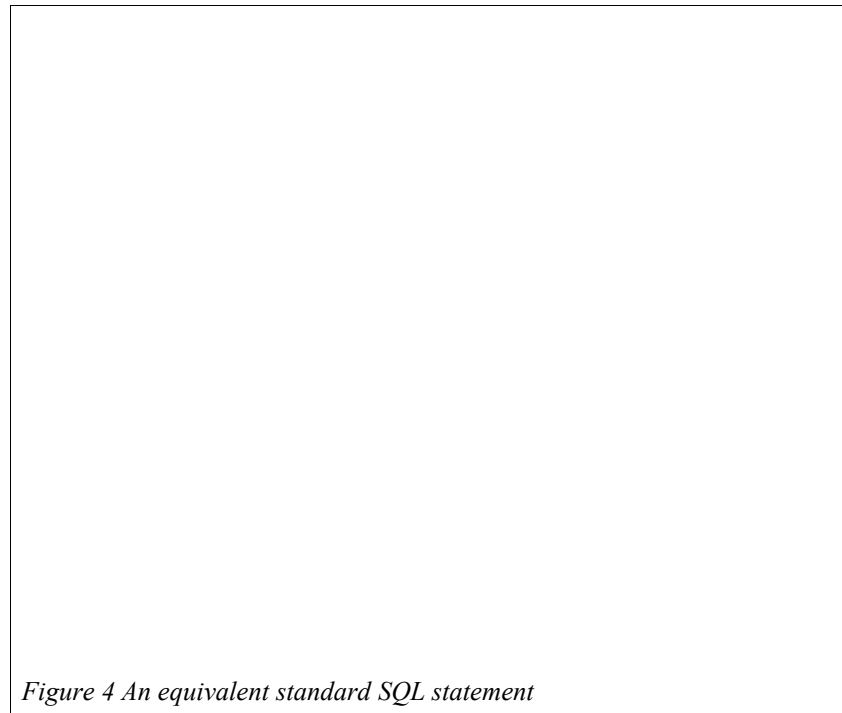
In the case of databases, a key problem of any migration is non-standard features. Non-standard functionality is not readily available in any other database management system, which means that databases and database applications that use non-standard features cannot be migrated easily.

As a simple example of non-standard functionality consider the Oracle SQL dialect functions **GREATEST** and **LEAST**, which are particularly useful for queries on interval data. They take an arbitrary number of arguments and return the greatest and the least value respectively, which simplifies the comparisons needed to establish the relationship between two intervals. Without these functions it is only theoretically feasible to determine the relationship between two intervals in the basic SQL standard as illustrated in Figure 3.

```
SELECT GREATEST(p.c1,q.c1), LEAST(p.c2,q.c2) FROM p, q
```

*Figure 3 An Oracle SQL statement using non-standard GREATEST and LEAST functions*

Using standard SQL, and ignoring NULL values, the statement must be formulated as illustrated in Figure 4



*Figure 4 An equivalent standard SQL statement*

### 3.2 Common Migration Problems

Below we list the most common migration problems originating from legacy databases.

- **Proprietary Applications:** A common problem when migrating a database is the proprietary applications which rely on it, since these applications do not expect any changes to the structure of the database. The logical solution is then to change the applications to fit with the structural changes. However, this is clearly problematic when the applications are proprietary, since the code is simply not available. Open Source applications, however, can be modified to meet the structural changes. Depending on the interface of the applications, this problem may be almost impossible to solve.
- **Query Dialect Mismatches:** Another common problem is the mismatch between the query languages of different DBMSs. The functionality of one DBMS may not be readily available in another. Even if two DBMSs both comply with the SQL standard, it does not necessarily mean that they support the same functionality. Since the SQL standard simply requires a certain subset of features to be supported for compliance. This may not be a problem depending on the applications. If applications simply use the database as a file system with transaction support, i.e., queries are of the type `SELECT * FROM TABLE`, then this is rarely a problem.
- **Performance Issues:** It may not be possible to migrate from one DBMS to another simply. due to a mismatch in the performance offered. Over the years vendors have developed their own specific DBMS architectures, often focusing on performance for certain features. So it is not uncommon to have applications depend on the special high performance of a certain DBMS, which cannot be achieved with a different DBMS. This type of problem is not commonly encountered when migrating from older DBMSs. Naturally hardware and software performance improve continually, so this particular problem is more often encountered with newer DBMSs or very specialized DBMSs.

## 4 Survey Overview

Essentially the survey examines four aspects of legacy databases:

- (1) The initial cost and yearly maintenance cost.
- (2) Database server software.
- (3) Server hardware.
- (4) Database contents.

The data gathered in the survey has been compiled into a catalogue, which appears in Appendix A.

The goal of the survey is to provide an insight into the existence of Legacy Databases in European Public Administrations and to identify common characteristics. Additionally, the data may serve as a source for the strategies and tools developed in Deliverable 5.2 and 5.3, which specifically deal with database migration strategies and bridging tools.

### 4.1 Initial Cost and Maintenance Cost

If we compare the total IT budget of each PA with the initial cost and yearly maintenance cost of their database servers (as illustrated in the table below). It is clear that the cost is not insignificant.

Table 1 illustrates the costs associated with the identified legacy database as specified by the surveyed PAs, where the **IT-budget** column contains the entire yearly budget for IT, the **Maintenance Cost** column includes both the yearly Software and Hardware cost of maintenance, the **Initial Cost** column also includes both the yearly Software and Hardware cost of maintenance.

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<b>Public Administration</b>	<b>IT-Budget</b>	<b>Maintenance Cost</b>	<b>Initial Cost</b>
Beaumont Hospital (BH)	2,200,000€	25,000€	95,000€
Törökbálint City Council (TO)	26,400€	80€	1,000€
Hanstholm Kommune (HK)	3,500,000DKR(Approx, 470,000 €)	93,000DKR (Approx, 12,500 €)	375,000DKR(Approx, 50,000 €)
Cork City Council (SWRA)	500,000€	15,000€	12,000€
Cork County Council (SWRA)	4,500,000€	65,000€	550,000€
Kerry County Council (SWRA)	1,800,000€	Approx, 25,000 €	20,000€
Provincia di Pisa (PP)	400,000€	23,800€	260,000€
Consorzio dei Comuni Alto-Adige (SGV)	-	40€/User	13,500€
Provincia di Genova (PROGE)	4.000.000,00 €	-	-

Table 1: IT-Budget, Maintenance Cost and Initial Cost of PAs

### 4.2 Database Servers

The most commonly encountered legacy database server in the survey is Oracle followed by SQL Server. Both support non-standard procedural extensions to SQL, specifically Oracle's PL/SQL and SQL Server's Transact-SQL. In some cases database server installations have been maintained since 1992. An overview of the legacy database servers identified in the survey is illustrated in the Table 2.

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<b>Public Administration</b>	<b>Oracle</b>	<b>Informix</b>	<b>FoxPro</b>	<b>DB2</b>	<b>SQL Server</b>	<b>Access</b>
Beaumont Hospital (BH)	X					X
Törökbálint City Council (TO)	X					
Hanstholm Kommune (HK)		X				
Cork City Council (SWRA)			X			
Cork County Council (SWRA)				X	X	
Kerry County Council (SWRA)					X	
Provincia di Pisa (PP)	X				X	
Consorzio dei Comuni Alto-Adige (SGV)	X					
Provincia di Genova (PROGE)	X			X	X	

*Table 2: Legacy database servers identified in the survey.*

The various legacy database servers identified in the survey have on average been maintained for approximately 5 years. In certain cases up to 12 years as illustrated in Table 3, which shows the date of purchase of the database servers identified in the survey.

<b>Public Administration</b>	<b>Date of Software Purchase</b>	<b>Date of Hardware Purchase</b>
Beaumont Hospital (BH)	2002	2002
Törökbálint City Council (TO)	April, 2000	July, 2001
Hanstholm Kommune (HK)	1992	July, 1999
Cork City Council (SWRA)	1998	2002
Cork County Council (SWRA)	June, 2004	June, 2004
Kerry County Council (SWRA)	2000	2001
Provincia di Pisa (PP)	1999	2000
Consorzio dei Comuni Alto-Adige (SGV)	1992	1997
Provincia di Genova (PROGE)	-	-

Table 3: Date of purchase for database server hardware and software.

### 4.3 Server Hardware

Highly non-standard hardware is one of the sources/characteristics of a legacy database. However, from the survey it is quite clear that the hardware in use is not particularly non-standard or even outdated, even if it in some cases is quite expensive. As illustrated in Table the hardware is in most cases up to date, in fact, the hardware has been kept up to date while the software has become outdated.

### 4.4 Database Contents

The contents of the legacy databases identified in the survey ranges from as few as 10 tables (Cork City Council) up towards 70,000 tables (See Appendix A for LOHN in SGV), and independent from the number of tables the actual amount of data ranges from as few as 30 MB up towards 90-100 GB.

Table 4 shows the number of tables and the amount of data identified in legacy databases in the survey. Due to the nature of the problem and the nature of the survey, it is not possible to consider these total or maximal numbers. It is, however, still reasonable to conclude that the amount of legacy data is quite substantial and both the structure and the nature of the identified databases is varied.

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<b>Administration</b>	<b>Number of tables</b>	<b>Amount of Data</b>
Beaumont Hospital (BH)	2500	30GB
Törökbálint City Council (TO)	-	401MB
Hanstholm Kommune (HK)	73	85GB
Cork City Council (SWRA)	10	100MB
Cork County Council (SWRA)	400	12GB
Kerry County Council (SWRA)	100	12GB
Provincia di Pisa (PP)	1800	34GB
Consorzio dei Comuni Alto-Adige (SGV)	See Appendix A	See Appendix A
Provincia di Genova (PROGE)	-	-

Table 4: Number of tables and amount of data identified in legacy databases.

## **5 Conclusion and Future Work**

We have provided a catalogue of legacy databases identified in and by PAs. The catalogue is compiled from a survey of legacy databases and it contains a profile of each of the legacy database systems identified in the survey.

It is clear that there is a significant amount of data stored in legacy databases, making them an increasingly critical issue for PAs. A solution must be found to prevent this issue from reappearing. One interesting strategy would be to migrate to Open Source database servers (See Appendix C for a list of Open Source database servers). The very nature of Open Source enables migration so it would effectively solve the issue of legacy databases. Future work will include defining and developing a feasible migration strategy. We are currently in the process of developing migration tools based on migration primitives and on the concepts of functional and performance equivalence between databases.

As far as the authors know, this represents the first attempt at gathering such information. It also is worth noting that what is presented here was gathered through two rounds of questionnaires and on-site interviews at HK. The first round provided us with a very rough idea of what type of database expertise was available in the participating PAs. This proved to be useful in the second round, where we received a much higher quality of answers. However, as could be expected, it is very difficult to acquire exactly the right information. This fits in well with our understanding of Legacy Databases - they are poorly understood and this is why they are difficult to migrate. Much of the information we need to know is simply unavailable or very well hidden. It would therefore be interesting (exceedingly time consuming) to dig deeper and follow up on the data gathered here, though.

Basing ourselves on the process of gathering the data for the catalogue and the actual data collected, we have identified test cases for the database strategies and bridging tools developed in Deliverable 5.2 and 5.3, working with the databases of the municipality of HK and SGV.

## 6 Appendix A: Survey Data - Catalogue

Here follows the results of the survey of legacy databases used by PAs partners of the project. It is essentially (there has been some minor format editing) a verbatim copy of the data provided by the PAs, as such it also serves as a resource on legacy databases in PAs.

PAs were asked to fill out a questionnaire for at least one of their legacy databases. A set of criteria for identifying legacy databases was provided:

1. The hardware/software is old or outdated.
2. The hardware is non-standard.
3. The software is non-standard.
4. The cost of migrating the database is perceived to be high.
5. The database is mission critical.
6. A large number of applications utilize the database.
7. No access to detailed specifications for the applications utilizing the database.

A brief description of each field of the catalogue can be found in Appendix B.

### 6.1 Beaumont Hospital (BH)

#### 6.1.1 Basic Information

<b>A.1 Public Administration</b>	<i>Beaumont Hospital</i>
<b>A.2 IT-Budget of PA</b>	<i>€2.2 million (2004)</i>

#### 6.1.2 Database Server Hardware

<b>B.1 ID</b>	<i>Oracle</i>
<b>B.2 Hardware</b>	<i>Linserver on LinOracle. 1GB RAM. Pentium 4 Clients.</i>
<b>B.3 Date of Purchase</b>	<i>2002</i>
<b>B.4 Initial Cost</b>	<i>95,000 €</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>€25,000</i>
<b>B.6 Shared</b>	<i>Only Oracle</i>
<b>B.7 Concurrent Users</b>	<i>Set up for 600 users</i>

#### 6.1.3 Database Server Software

<b>C. 1 Database Server</b>	<i>Oracle 8.17</i>
<b>C.2 Hardware ID</b>	<i>X86</i>
<b>C.3 Operating System</b>	<i>Linux Red Hat 7</i>
<b>C.4 Date of Purchase</b>	<i>2002</i>
<b>C.5 Initial Cost</b>	<i>95,000</i>
<b>C.6 Yearly Maintenance Cost</b>	<i>25,000</i>

### 6.1.4 Database Contents

<b>D.1 ID</b>	<i>ClinLive – Clinical Data RosLive – Rostering Data PtecLive – HR Data ClockwiseLive – Time &amp; attendance Data Roth - Theatre</i>
<b>D.2 Database Server</b>	<i>Oracle</i>
<b>D.3 Description</b>	<i>Clinical data, rostering data, human resources data, time &amp; attendance data, theatre data</i>
<b>D.4 Size</b>	<i>30GB</i>
<b>D.5 Number of Tables</b>	<i>2,500</i>
<b>D.2. Applications</b>	<i>PIPE (hospital system) – Proprietary NDS (nursing dependency system) – Proprietary Personnel System – Proprietary Time &amp; Attendance system – Proprietary Theatre System – Proprietary</i>
<b>D.3. Used Features</b>	<i>Transactions &amp; backups</i>
<b>D.4. Access Pattern</b>	<i>24x7x365</i>
<b>D.5. Update Frequency</b>	<i>Real-time</i>

## 6.2 Törökbálint City Council (TO)

### 6.2.1 Basic Information

<b>A.1 Public Administration</b>	<i>Törökbálint City Council</i>
<b>A.2 IT-Budget of PA</b>	<i>26400 €</i>

### 6.2.2 Database Server Hardware

<b>B.1 ID</b>	<i>Albacomp</i>
<b>B.2 Hardware</b>	<i>A Pentium 4 with 512 MB of RAM and 40 GB of disk space.</i>
<b>B.3 Date of Purchase</b>	<i>July, 2001</i>
<b>B.4 Initial Cost</b>	<i>600 €</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>40 €</i>
<b>B.6 Shared</b>	<i>Fileserver only</i>
<b>B.7 Concurrent Users</b>	<i>10 users</i>

<b>B.1 ID</b>	<i>Hewlett-Packard</i>
<b>B.2 Hardware</b>	<i>A Pentium 3 with 512 MB of RAM and 9 GB of disk space.</i>

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<b>B.1 ID</b>	<i>Hewlett-Packard</i>
<b>B.3 Date of Purchase</b>	<i>April, 2000</i>
<b>B.4 Initial Cost</b>	<i>400 €</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>40 €</i>
<b>B.6 Shared</b>	<i>Fileserver only</i>
<b>B.7 Concurrent Users</b>	<i>25 users</i>

**6.2.3 Database Server Software**

<b>C.1 Database Server</b>	<i>MSDE 97</i>
<b>C.2 Hardware ID</b>	<i>Albacomp</i>
<b>C.4 Operating System</b>	<i>MS Windows 2000</i>
<b>C.5 Date of Purchase</b>	<i>December, 2002</i>
<b>C.6 Initial Cost</b>	<i>400 €</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>-</i>

<b>C.1 Database Server</b>	<i>Oracle 8.0</i>
<b>C.2 Hardware ID</b>	<i>Hewlett-Packard</i>
<b>C.4 Operating System</b>	<i>MS Windows 2000</i>
<b>C.5 Date of Purchase</b>	<i>November, 2003</i>
<b>C.6 Initial Cost</b>	<i>200 €</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>-</i>

**6.2.4 Database Contents**

<b>D.1 ID</b>	<i>Population</i>
<b>D.2 Database Server</b>	<i>Oracle 8.0</i>
<b>D.3 Description</b>	<i>Main data of people, who live in village</i>
<b>D.4 Size</b>	<i>194 MB</i>
<b>D.5 Number of Tables</b>	<i>35 tables</i>
<b>D.6 Applications</b>	<i>Application written in MS Access</i>
<b>D.7 Used Features</b>	<i>Input from external source (from state government)</i>
<b>D.8 Access Pattern</b>	<i>Several times per day</i>
<b>D.9 Update Frequency</b>	<i>Monthly</i>

<b>D.1 ID</b>	<i>IMI</i>
<b>D.2 Database Server</b>	<i>Oracle 8.0</i>

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<b>D.1 ID</b>	<i>IMI</i>
<b>D.3 Description</b>	<i>Main data and salaries of human resources for city council</i>
<b>D.4 Size</b>	<i>207 MB</i>
<b>D.5 Number of Tables</b>	<i>50 tables</i>
<b>D.6 Applications</b>	<i>Application written in MS Access</i>
<b>D.7 Used Features</b>	<i>Data exchange with state government</i>
<b>D.8 Access Pattern</b>	<i>Hourly</i>
<b>D.9 Update Frequency</b>	<i>Each workday</i>

### 6.3 Hanstholm Kommune (HK)

#### 6.3.1 Basic Information

<b>A.1 Public Administration</b>	<i>Hanstholm Kommune (HK)</i>
<b>A.2 IT-Budget of PA</b>	<i>3,500,000 DKR</i>

#### 6.3.2 Database Server Hardware

<b>B.1 ID</b>	<i>CHR</i>
<b>B.2 Hardware</b>	<i>NCR 4300 Dual Pentium 200 Mhz with 768 MB RAM and 160 GB SCSI disk space.</i>
<b>B.3 Date of Purchase</b>	<i>July, 1999</i>
<b>B.4 Initial Cost</b>	<i>250,000 DKR (Approx. 34.000,00€)</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>25,000 DKR (Approx. 3.400,00€)</i>
<b>B.5 Shared</b>	<i>- Dpr1: Salary and economic system. - Debitordb: Accounting system.</i>
<b>B.6 Concurrent Users</b>	<i>Up to 32</i>

#### 6.3.3 Database Server Software

<b>C.1 Database Server</b>	<i>Informix Online v. 9.1</i>
<b>C.2 Hardware ID</b>	<i>CHR</i>
<b>C.3 Operating System</b>	<i>SCO OpenServer v. 5.0</i>
<b>C.4 Date of Purchase</b>	<i>Initially purchased in 1992 and maintained since.</i>
<b>C.5 Initial Cost</b>	<i>125,000 DKR (Approx. 17.000,00€)</i>
<b>C.6 Yearly Maintenance Cost</b>	<i>68,000 DKR (Approx. 9.000,00€)</i>

### 6.3.4 Database Contents

<b>D.1 ID</b>	<i>Samba</i>
<b>D.2 Database Server</b>	<i>Contained in the Informix server.</i>
<b>D.3 Description</b>	<i>Scanned copies of invoices, which must be kept available for a minimum of 5 years.</i>
<b>D.4 Size</b>	<i>85 GB</i>
<b>D.5 Number of Tables</b>	<i>45 Tables</i>
<b>D.6 Applications</b>	<i>Many applications through SambaFlow</i>
<b>D.7 Used Features</b>	<i>-</i>
<b>D.8 Access Pattern</b>	<i>Typically, each entry is accessed exactly 5 times.</i>
<b>D.9 Update Frequency</b>	<i>75 MB of data is added each day.</i>

<b>D.1 ID</b>	<i>Dprcli</i>
<b>D.2 Database Server</b>	<i>Contained in the Informix server.</i>
<b>D.3 Description</b>	<i>A local extract of the state's Central Person Registry (CPR).</i>
<b>D.4 Size</b>	<i>30 MB</i>
<b>D.5 Number of Tables</b>	<i>28 Tables</i>
<b>D.6 Applications</b>	<i>Accessed by all applications which deal with citizens of the municipality.</i>
<b>D.7 Used Features</b>	<i>-</i>
<b>D.8 Access Pattern</b>	<i>Accessed with a high frequency.</i>
<b>D.9 Update Frequency</b>	<i>Updated once per day.</i>

## 6.4 Cork City Council (SWRA)

### 6.4.1 Basic Information

<b>A.1 Public Administration</b>	<i>Cork City Council</i>
<b>A.2 IT-Budget of PA</b>	<i>€500,000</i>

### 6.4.2 Database Server Hardware

<b>B.1 ID</b>	<i>Gigabyte</i>
<b>B.2 Hardware</b>	<i>Dual P3 1Gigahertz 1Gigabyte Ram</i>
<b>B.3 Date of Purchase</b>	<i>2002</i>
<b>B.4 Initial Cost</b>	<i>€12,000</i>

<b>B.1 ID</b>	<i>Gigabyte</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>N/A</i>
<b>B.6 Shared</b>	<i>File and Print</i>

#### 6.4.3 Database Server Software

<b>C.1 Database Server</b>	<i>FoxProw 2.5</i>
<b>C.2 Hardware</b>	<i>Multiple</i>
<b>C.3 Operating System</b>	<i>Wint NT and 2000</i>
<b>C.4 Date of Purchase</b>	<i>1998</i>
<b>C.5 Initial Cost</b>	<i>unknown</i>
<b>C.6 Yearly Maintenance Cost</b>	<i>Database and Application €15,000).</i>

#### 6.4.4 Database Contents

<b>D.1 ID</b>	<i>Foxpro</i>
<b>D.2 Database Server</b>	<i>Foxpro</i>
<b>D.3 Description</b>	<i>Housing Information</i>
<b>D.4 Size</b>	<i>100Megabytes</i>
<b>D.5 Number of Tables</b>	<i>10</i>
<b>D.6 Applications</b>	<i>foxpro</i>
<b>D.7 Used Features</b>	<i>n/a</i>
<b>D.8 Access Pattern</b>	<i>Continually</i>
<b>D.9 Update Frequency</b>	<i>Continually</i>

### 6.5 Kerry County Council (SWRA)

#### 6.5.1 Basic Information

<b>A.1 Public Administration</b>	<i>Kerry County Council</i>
<b>A.2 IT-Budget of PA</b>	<i>EUR 1.8 Million</i>

#### 6.5.2 Database Server Hardware

<b>B.1 ID</b>	<i>DB Server</i>
<b>B.2 Hardware</b>	<i>Dual Xeon Processor 2 GB Ram</i>
<b>B.3 Date of Purchase</b>	<i>2001</i>
<b>B.4 Initial Cost</b>	<i>Part of Tender (Approx EUR 20,000)</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>Under Warranty</i>
<b>B.6 Shared</b>	<i>No</i>

### 6.5.3 Database Server Software

<b>C.1 Database Server</b>	<i>SQL Server 2000 Enterprise Edition sp3a</i>
<b>C.2 Hardware</b>	<i>Dell Poweredge 2650</i>
<b>C.4 Operating System</b>	<i>Windows 2000 Adv Server</i>
<b>C.5 Date of Purchase</b>	<i>2000</i>
<b>C.6 Initial Cost</b>	<i>Part of Enterprise Agreement</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>Part of Enterprise Agreement and Onsite DBA costs (Approx EUR 25k)</i>

### 6.5.4 Database Contents

<b>D.1 ID</b>	<i>KerrySQL</i>
<b>D.2 Database Server</b>	<i>SQL Server</i>
<b>D.3 Description</b>	<i>File Management System</i>
<b>D.4 Size</b>	<i>12 GB</i>
<b>D.5 Number of Tables</b>	<i>100 +</i>
<b>D.6 Applications</b>	<i>Bespoke (Agresso)</i>
<b>D.7 Used Features</b>	<i>Analysis Service, Data Transformation Services, Cost Centre, General Ledger,</i>
<b>D.8 Access Pattern</b>	<i>Continually,</i>
<b>D.9 Update Frequency</b>	<i>Continually</i>

## 6.6 Provincia di Pisa (PP)

### 6.6.1 Basic Information

<b>A.1 Public Administration</b>	<i>Provincia di Pisa</i>
<b>A.2 IT-Budget of PA</b>	<i>400.000 Euro</i>

### 6.6.2 Database Server Hardware

<b>B.1 ID</b>	<i>RAGONERIA</i>
<b>B.2 Hardware</b>	<i>MONOPROCESSOR 600 MHZ RAM..... DISK SPACE 56GB – RAID 5</i>
<b>B.3 Date of Purchase</b>	<i>2000</i>
<b>B.4 Initial Cost</b>	<i>0</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>0</i>
<b>B.6 Shared</b>	<i>YES- DATA CONCERNING ACCOUNTING</i>

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<b>B.1 ID</b>	<i>RAGONERIA</i>
<b>B.7 Concurrent Users</b>	<i>OVER 200</i>

<b>B.1 ID</b>	<i>ALICE</i>
<b>B.2 Hardware</b>	<i>BIPROCESSOR 486</i> <i>RAM 128MB</i> <i>DISK SPACE 9GB</i>
<b>B.3 Date of Purchase</b>	
<b>B.4 Initial Cost</b>	<i>4.000,00 euro</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>0</i>
<b>B.6 Shared</b>	<i>NO</i>
<b>B.7 Concurrent Users</b>	<i>UP TO 20</i>

<b>B.1 ID</b>	<i>PERSONALE</i>
<b>B.2 Hardware</b>	<i>MONOPROCESSOR 600 MHZ</i> <i>RAM 256 MB</i> <i>DISK SPACE 50 GB – RAID 5</i>
<b>B.3 Date of Purchase</b>	<i>2000</i>
<b>B.4 Initial Cost</b>	<i>20.000 Euro</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>0</i>
<b>B.6 Shared</b>	<i>YES-MONITORING OF EMPLOYEE WORKING TIME</i>
<b>B.7 Concurrent Users</b>	<i>OVER 50</i>

6.6.3

<b>B.1 ID</b>	<i>PERSONALE</i>
<b>B.2 Hardware</b>	<i>MONOPROCESSOR 600 MHZ</i> <i>RAM2 56 BM</i> <i>DISK SPACE 56GB – RAID 5</i>
<b>B.3 Date of Purchase</b>	<i>2000</i>
<b>B.4 Initial Cost</b>	<i>5.000 Euro</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>0</i>
<b>B.5 Shared</b>	<i>YES-DATA CONCERNING EMPLOYEE MANAGEMENT</i>

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<b>B.1 ID</b>	<i>PERSONALE</i>
<b>B.5 Concurrent Users</b>	<i>UP TO 12</i>

<b>B.1 ID</b>	<i>SERVER PROT2</i>
<b>B.2 Hardware</b>	<i>BIPROCESSOR 333 RAM 256 MB DISK SPACE 50 GB – RAID 5</i>
<b>B.3 Date of Purchase</b>	<i>2000</i>
<b>B.4 Initial Cost</b>	<i>25.000 Euro</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>0</i>
<b>B.5 Shared</b>	<i>NO</i>
<b>B.5 Concurrent Users</b>	<i>UP TO 20</i>

<b>B.1 ID</b>	<i>RAGONERIA</i>
<b>B.2 Hardware</b>	<i>MONOPROCESSOR 600 MHZ RAM 256 MB DISK SPACE 50 GB – RAID 5</i>
<b>B.3 Date of Purchase</b>	<i>2000</i>
<b>B.4 Initial Cost</b>	<i>25.000 Euro</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>0</i>
<b>B.5 Shared</b>	<i>YES- ADMINISTRATIVE DOCUMENTS</i>
<b>B.5 Concurrent Users</b>	<i>UP TO 50</i>

<b>B.1 ID</b>	<i>SQLSERVER</i>
<b>B.2 Hardware</b>	<i>PROCESSOR PENTIUM 1.4 GHZ RAM 1 GB DISK SPACE 7 GB</i>
<b>B.3 Date of Purchase</b>	<i>2001</i>
<b>B.4 Initial Cost</b>	<i>6.000 Euro</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>0</i>
<b>B.5 Shared</b>	<i>NO</i>
<b>B.5 Concurrent Users</b>	<i>ALL</i>

#### 6.6.4 Database Server Software

<b>C.1 Database Server</b>	<i>ORACLE 7.3.4</i>
<b>C.2 Hardware ID</b>	<i>RAGONERIA</i>
<b>C.4 Operating System</b>	<i>SCO UNIXWARE 7.1</i>
<b>C.5 Date of Purchase</b>	<i>2002</i>
<b>C.6 Initial Cost</b>	<i>20.000 Euro</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>4.000 Euro</i>

#### 6.6.5

<b>C.1 Database Server</b>	<i>ORACLE 8.1</i>
<b>C.2 Hardware ID</b>	<i>ALICE</i>
<b>C.4 Operating System</b>	<i>MS WINDOWS NT 4</i>
<b>C.5 Date of Purchase</b>	<i>1999</i>
<b>C.6 Initial Cost</b>	<i>10.000,00 Euro</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>5.000 Euro</i>

<b>C.1 Database Server</b>	<i>ORACLE 7.3.4 – ORACLE 8.1</i>
<b>C.2 Hardware ID</b>	<i>PERSONALE</i>
<b>C.4 Operating System</b>	<i>SCO UNIXWARE 7.1</i>
<b>C.5 Date of Purchase</b>	<i>2000</i>
<b>C.6 Initial Cost</b>	<i>30.000 Euro</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>4.400 Euro</i>

<b>C.1 Database Server</b>	<i>ORACLE 7.3.4</i>
<b>C.2 Hardware ID</b>	<i>PERSONALE</i>
<b>C.4 Operating System</b>	<i>SCO UNIXWARE 7.1</i>
<b>C.5 Date of Purchase</b>	<i>2000</i>
<b>C.6 Initial Cost</b>	<i>5.000 Euro</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>2.600 Euro</i>

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<b>C.1 Database Server</b>	<i>ORACLE 7.3.4</i>

<b>C.1 Database Server</b>	<i>ORACLE 7.3.4</i>
<b>C.2 Hardware ID</b>	<i>SERVER PROT2</i>
<b>C.4 Operating System</b>	<i>SCO UNIXWARE 7.1</i>
<b>C.5 Date of Purchase</b>	<i>2000</i>
<b>C.6 Initial Cost</b>	<i>50.000 Euro</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>3.400 Euro</i>

<b>C.1 Database Server</b>	<i>ORACLE 7.3.4</i>
<b>C.2 Hardware ID</b>	<i>RAGONERIA</i>
<b>C.4 Operating System</b>	<i>SCO UNIXWARE 7.1</i>
<b>C.5 Date of Purchase</b>	<i>2000</i>
<b>C.6 Initial Cost</b>	<i>35.000 Euro</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>4.400 Euro</i>

<b>C.1 Database Server</b>	<i>MS SQL SERVER</i>
<b>C.2 Hardware ID</b>	<i>WEB SITE</i>
<b>C.4 Operating System</b>	<i>MS WINDOWS 2000 SERVER</i>
<b>C.5 Date of Purchase</b>	<i>2001</i>
<b>C.6 Initial Cost</b>	<i>25000 Euro</i>
<b>C.7 Yearly Maintenance Cost</b>	<i>0</i>

**6.6.6 Database Contents**

<b>D.1 ID</b>	<i>ADWSTD</i>
<b>D.2 Database Server</b>	<i>ORACLE</i>
<b>D.3 Description</b>	<i>DATA CONCERNING INSERTION, RETRIEVAL OF OFFICIAL DOCUMENTS</i>
<b>D.4 Size</b>	<i>250 MB</i>

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<b>D.1 ID</b>	<i>ADWSTD</i>
<b>D.5 Number of Tables</b>	<i>150</i>
<b>D.6 Applications</b>	<i>WEB (MS I.E.)</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, REPLICATION, BACKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

<b>D.1 ID</b>	<i>ALICE</i>
<b>D.2 Database Server</b>	<i>ORACLE</i>
<b>D.3 Description</b>	<i>DATA CONCERNING IMANAGEMENT OF ROADS CONSTRUCTIONS AND MANTAINANCE</i>
<b>D.4 Size</b>	<i>685 MB</i>
<b>D.5 Number of Tables</b>	<i>200</i>
<b>D.6 Applications</b>	<i>MS CLIENT SERVER</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, BACKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

<b>D.1 ID</b>	<i>P00</i>
<b>D.2 Database Server</b>	<i>ORACLE</i>
<b>D.3 Description</b>	<i>DATA CONCERNING EMPLOYEE MANAGEMENT</i>
<b>D.4 Size</b>	<i>9,8 GB</i>
<b>D.5 Number of Tables</b>	<i>700</i>
<b>D.6 Applications</b>	<i>WEB (MA I.E.)</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, REPLICATION, BACKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

<b>D.1 ID</b>	<i>R00</i>
<b>D.2 Database Server</b>	<i>ORACLE</i>
<b>D.3 Description</b>	<i>DATA CONCERNING MONITORING OF EMPLOYEE WORKING TIME</i>
<b>D.4 Size</b>	<i>2 GB</i>
<b>D.5 Number of Tables</b>	<i>100</i>
<b>D.6 Applications</b>	<i>CLIENT SERVER</i>

Workpackage 2, Deliverable 2.3 Catalogue of Legacy Databases

<b>D.1 ID</b>	<i>R00</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, REPLICATION, BACKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

<b>D.1 ID</b>	<i>PROTOCOLLO</i>
<b>D.2 Database Server</b>	<i>ORACLE</i>
<b>D.3 Description</b>	<i>DATA CONCERNING I/O DOCUMENT PROTOCOLLING</i>
<b>D.4 Size</b>	<i>16,2 GB</i>
<b>D.5 Number of Tables</b>	<i>200</i>
<b>D.6 Applications</b>	<i>MS WINDOWS AND ORACLE CLIENT</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, REPLICATION, BACKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

<b>D.1 ID</b>	<i>F00</i>
<b>D.2 Database Server</b>	<i>ORACLE</i>
<b>D.3 Description</b>	<i>DATA CONCERNING ACCOUNTING</i>
<b>D.4 Size</b>	<i>5,6 GB</i>
<b>D.5 Number of Tables</b>	<i>600</i>
<b>D.6 Applications</b>	<i>WEB (MS I.E.)</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, REPLICATION, BACKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

<b>D.1 ID</b>	<i>WEB SITE</i>
<b>D.2 Database Server</b>	<i>MS SQL SERVER</i>
<b>D.3 Description</b>	<i>WEB CONTENT MANAGEMENT SYSTEM (INTERNET)</i>
<b>D.4 Size</b>	<i>3 GB</i>
<b>D.5 Number of Tables</b>	<i>400</i>
<b>D.6 Applications</b>	<i>WEB</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, BACKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

## 6.7 Consorzio dei Comuni Alto-Adige (SGV)

### 6.7.1 Basic Information

<b>A.1 Public Administration</b>	<i>SGV</i>
<b>A.2 IT-Budget of PA</b>	

The hardware infrastructure in all the municipalities served by SGV is the same. In particular, each municipality has:

- a HP-UX server running Oracle 7.3.4;
- a Linux on Intel server running Oracle 8.1.7 (10 of these run also MySQL).

The software setup found on all the servers is exactly the same.

### 6.7.2 Database Server Hardware

<b>B.1 ID</b>	<i>D220</i>
<b>B.2 Hardware</b>	<i>HP D220 Workstation</i>
<b>B.3 Date of Purchase</b>	<i>1997</i>
<b>B.4 Initial Cost</b>	<i>7.000,00 €</i>
<b>B.5 Yearly Maintenance Cost</b>	<i>0,00 €</i>
<b>B.6 Shared</b>	<i>ASCOT System Sendmail</i>
<b>B.7 Concurrent Users</b>	<i>Up to 40 Users</i>

<b>B.1 ID</b>	<i>INTEL</i>
<b>B.2 Hardware</b>	<i>Intel Linux System RAID 5</i>
<b>B.3 Date of Purchase</b>	<i>2003</i>
<b>B.4 Initial Cost</b>	<i>6.500,00 €</i>
<b>B.5 Yearly Maintenance Cost</b>	
<b>B.6 Shared</b>	<i>Serfin (Economic System) Samba Squid Named (Nameserver) IMAP Server Apache Web Server</i>
<b>B.7 Concurrent Users</b>	<i>Up to 40 Users</i>

### 6.7.3 Database Server Software

<b>C.1 Database Server</b>	<i>Oracle 7.3.4</i>
<b>C.2 Hardware ID</b>	<i>D220</i>
<b>C.4 Operating System</b>	<i>HP-UX 9.10</i>
<b>C.5 Date of Purchase</b>	<i>1992 maintained since</i>
<b>C.6 Initial Cost</b>	
<b>C.7 Yearly Maintenance Cost</b>	<i>40 € / User</i>

<b>C.1 Database Server</b>	<i>Oracle 8.1.7</i>
<b>C.2 Hardware ID</b>	<i>INTEL</i>
<b>C.4 Operating System</b>	<i>Linux SuSE 8.2</i>
<b>C.5 Date of Purchase</b>	<i>2001 maintained since</i>

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<b>C.1 Database Server</b>	<i>Oracle 8.1.7</i>
<b>C.6 Initial Cost</b>	
<b>C.7 Yearly Maintenance Cost</b>	40€ / User

<b>C.1 Database Server</b>	<i>MySQL</i>
<b>C.2 Hardware ID</b>	<i>INTEL</i>
<b>C.4 Operating System</b>	<i>Linux SuSE 8.2</i>
<b>C.5 Date of Purchase</b>	<i>2003</i>
<b>C.6 Initial Cost</b>	<i>Contained in the SuSE system</i>
<b>C.7 Yearly Maintenance Cost</b>	0,00 €

6.7.4 Database Contents

<b>D.1 ID</b>	<i>ASCOT</i>
<b>D.2 Database Server</b>	<i>Oracle 7.3.4</i>
<b>D.3 Description</b>	<i>Financial Accounting (Contabilità finanziaria), Tax (Tributi), Registry Office (Anagrafe), Marital status archive (Stato civile)</i>
<b>D.4 Size</b>	<i>see Table 'Size and Number of Tables'</i>
<b>D.5 Number of Tables</b>	<i>see Table 'Size and Number of Tables'</i>
<b>D.6 Applications</b>	<i>Accessed by Reflection</i>
<b>D.7 Used Features</b>	<i>Transactions, Backup</i>
<b>D.8 Access Pattern</b>	<i>Continually</i>
<b>D.9 Update Frequency</b>	<i>Continually</i>

<b>D.1 ID</b>	<i>Serfin</i>
<b>D.2 Database Server</b>	<i>Oracle 8.1.7</i>
<b>D.3 Description</b>	<i>Accounting (Contabilità a partita doppia)</i>
<b>D.4 Size</b>	<i>see Table 'Size and Number of Tables'</i>
<b>D.5 Number of Tables</b>	<i>see Table 'Size and Number of Tables'</i>
<b>D.6 Applications</b>	<i>Accessed by a Client/Server program called Serfin (accounting)</i>
<b>D.7 Used Features</b>	<i>Transactions, Backup</i>
<b>D.8 Access Pattern</b>	<i>Continually</i>
<b>D.9 Update Frequency</b>	<i>Continually</i>

**Size and Number of Tables(1)****Server HP, Database 7.3**

<b>Municipality</b>	<b>Nr of Tables</b>	<b>Tables size (Byte)</b>
ABTEI	4172	938291,2
AHRNTAL	4580	1.110.882.304
ALDEIN	2733	574.263.296
ALGUND	2257	548.927.488
ALTREI	2636	362.600.448
ANDRIAN	2182	352.808.960
AUER	2898	649.555.968
BARBIAN	2386	423.559.168
ORAB.BOZEN	703	2.359.289.856
BRENNER	2175	479.801.344
BRIXEN	4251	2.503.952.384
BRUNECK	4519	5.582.305.280
BURGSTALL	2208	457.398.272
BZGBOZ	2468	3.165.788.160
BZGBRU	1328	779.444.224
BZGEIS	3294	1.455.355.904
BZGMER	1491	475.357.184
BZGSAL	2141	543.877.120
BZGVIN	1312	327.782.400
BZGWIP	2732	986.611.712
CORVARA	3289	591.792.128
DEUTSCHNOFEN	5863	1.247.846.400
ENNEBERG	2672	509.462.528
EPPAN	3072	2.306.371.584
FRANZENSFESTE	2718	424.910.848
FREIENFELD	2705	599.685.120
GAIS	2215	476.858.368
GARGAZON	2794	509.091.840
GLURNS	4369	671.305.728
GRAUN	2237	522.768.384
GSIES	3670	599.939.072
GVSERV	3649	1.028.360.192
HAFLING	2267	401.115.136
HP2	3678	1.443.641.344
INNICHEN	3703	712.765.440
JENESIEN	2852	625.827.840
KALTERN	2822	983.212.032
KARNEID	2946	628.535.296
KASTELBELL	3253	568.651.776
KASTELRUTH	2229	931.477.504
KIENS	4107	754.450.432
KLAUSEN	2757	963.377.152
KURTATSCH	2709	563.159.040
KURTINIG	2224	411.770.880

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LAAS	2865	848.138.240
LAJEN	3878	738.971.648
LANA	2204	1.119.223.808
LATSCH	2869	799.180.800
LAUREIN	2177	318.726.144
LEIFERS	4500	3.382.943.744
LOHN	68207	15.697.543.168
LUESEN	2262	427.501.568
MARGREID	2767	504.614.912
MARLING	2297	622.954.496
MARTELL	2680	401.979.392
MERAN	4214	11.587.584.000
MONTAN	2723	448.735.232
MOOS	2257	507.013.120
MUEHLBACH	3121	634.208.256
MUEHLWALD	2266	374.470.656
NATURNS	3715	1.030.516.736
NATZ	4856	652.240.896
NEUMARKT	2913	1.133.545.472
NIEDERDORF	3297	625.162.240
OLANG	2194	561.901.568
OPENV	1966	710.641.664
PARTSCHINS	3693	791.537.664
PERCHA	2167	385.687.552
PFALZEN	2201	441.372.672
PFATTEN	2178	355.700.736
PFITSCH	2218	439.932.928
PLAUS	2303	382.117.888
PRAD	2655	623.251.456
PRAGS	3103	468.658.176
PRETTAU	2647	394.704.896
PROVEIS	2223	352.155.648
RASEN	4942	897.914.880
RATSCHINGS	2252	572.145.664
RIFFIAN	4757	725.084.160
RITTEN	2824	1.223.305.216
RODENECK	2696	432.873.472
SALURN	2865	793.802.752
SAND	2203	695.232.512
SARNTAL	3113	1.192.331.264
SCHENNA	2807	663.197.696
SCHLANDERS	2311	782.323.712
SCHLUDERNS	3921	843.749.376
SCHNALS	2159	413.665.280
SEXTEN	2809	562.006.016
STCHRISTINA	2857	640.000.000
STERZING	2356	891.289.600
STILFS	3967	651.909.120

## Workpackage 2, Deliverable 2.3 Catalogue of Legacy Databases

STLEONHARD	2944	681.791.488
STLORENZEN	2434	692.414.464
STMARTINP	5004	1.069.441.024
STMARTINT	2213	409.419.776
STPANKRAZ	2188	370.520.064
STULRICH	2726	669.667.328
TAUFERS	2296	441.729.024
TERENTEN	3148	456.988.672
TERLAN	2197	508.448.768
TIERS	2924	457.820.160
TIROL	2254	553.175.040
TISENS	2340	417.316.864
TOBLACH	3704	906.031.104
TRAMIN	2260	571.770.880
TRUDEN	3107	509.196.288
TSCHERMS	2261	419.667.968
ULFRAU	2219	369.182.720
ULTEN	2274	544.387.072
VAHRN	2511	694.777.856
VILLANDERS	3416	542.627.840
VILLNOESS	3949	811.036.672
VINTL	2253	518.764.544
VOELS	3197	694.431.744
VOERAN	2258	404.117.504
WAIDBRUCK	2188	309.338.112
WELSBERG	3431	748.955.648
WELSCHNOFEN	3049	901.779.456
WENGEN	2219	384.860.160
WOLKENSTEIN	2276	644.833.280

**Size and Number of Tables(2)***Server INTEL Linux, Oracle 8.1*

<b>Municipality</b>	<b>Nr of Tables</b>	<b>Tables Size (Byte)</b>
ALDEIN	1536	843.186.176
ANDRIAN	1200	541.392.896
ALTREI	763	417.792.000
HAFLING	1194	571.932.672
ABTEI	1979	992.018.432
BARBIAN	1197	537.198.592
PRAGS	1193	517.537.792
BRENNER	763	479.592.448
BRANZOLL	974	559.480.832
KALTERN	1154	938.934.272
FREIENFELD	866	557.162.496
SAND	847	624.361.472
KASTELBELL	1538	849.281.024
KASTELRUTH	1137	869.367.808
TSCHERMS	1191	548.667.392
KIENS	760	438.108.160
KLAUSEN	1193	730.529.792
KARNEID	1192	672.923.648
KURTATSCH	762	491.978.752
KURTINIG	812	494.469.120
CORVARA	764	456.589.312
GRAUN	1206	636.616.704
TOBLACH	773	526.188.544
NEUMARKT	1184	743.964.672
PFALZEN	1239	578.887.680
VOELS	762	568.066.048
FRANZENSFSTE	693	398.917.632
VILLNOESS	1201	631.963.648
GAIS	1240	602.472.448
GARGAZON	1192	642.711.552
GLURNS	817	483.983.360
LATSCH	813	618.332.160
ALGUND	1242	677.052.416
LAAS	1216	781.582.336
LAUREIN	761	411.041.792
LUESEN	1201	572.850.176
MARGREID	1532	832.962.560
MALS	822	588.251.136
ENNEBERG	761	442.499.072
MARLING	1103	602.669.056
MARTELL	1250	569.114.624
MOELTEN	1195	578.486.272
WELSBERG	808	553.910.272
MONTAN	763	465.960.960

## Workpackage 2, Deliverable 2.3 Catalogue of Legacy Databases

MOOS	810	503.709.696
NALS	1326	629.145.600
NATURNS	1146	888.012.800
NATZ	760	492.961.792
WELSCHNOFEN	1225	741.212.160
AUER	763	594.608.128
STULRICH	1199	721.616.896
PARTSCHINS	1199	727.318.528
PERCHA	763	433.455.104
PLAUS	811	465.043.456
WAIDBRUCK	813	414.646.272
BURGSTALL	1193	596.574.208
PROVEIS	811	450.625.536
RATSCHINGS	1198	730.333.184
RASEN	1301	810.745.856
RITTEN	1163	787.144.704
RIFFIAN	1521	851.968.000
MUEHLBACH	1528	894.828.544
RODENECK	763	421.265.408
SALURN	1726	1.067.843.584
INNICHEN	810	539.951.104
JENESIEN	1195	598.605.824
STLEONHARD	1199	656.408.576
STLORENZEN	766	499.777.536
STMARTINT	1195	540.409.856
STMARTINP	781	528.908.288
STPANKRAZ	1199	584.974.336
STCHRISTINA	763	452.067.328
SARNTAL	1193	873.029.632
SCHENNA	1217	717.881.344
MUEHLWALD	1242	550.699.008
WOLKENSTEIN	764	517.537.792
SCHNALS	1201	584.056.832
NONAME	1240	590.020.608
SCHLANDERS	1221	908.345.344
SCHLUDERNS	768	488.701.952
STILFS	771	469.368.832
TERENTEN	1241	610.074.624
TERLAN	1214	687.472.640
TRAMIN	761	515.702.784
TISENS	761	456.916.992
TIERS	793	472.317.952
TIROL	761	593.494.016
TRUDEN	781	471.793.664
TAUFERS	818	492.175.360
ULTEN	780	509.739.008
PFATTEN	1191	537.919.488
OLANG	875	560.185.344

## Workpackage 2, Deliverable 2.3 Catalogue of Legacy Databases

PFITSCH	772	468.910.080
GSIES	761	454.950.912
VINTL	1238	652.476.416
VAHRN	1196	760.217.600
VOERAN	1505	789.839.872
NIEDERDORF	808	479.592.448
VILLANDERS	1193	571.539.456
STERZING	1141	960.823.296
FELDTHURNS	1240	652.197.888
WENGEN	763	428.998.656
ULFRAU	1193	551.419.904
BZGEIS	1088	845.414.400
BZGSAL	1407	895.614.976
BZGUEB	1105	749.535.232
GEMINFO.GEMINFO	189	382.148.608
TALFER	46	21.037.056
BBOZEISACK	351	265.936.896
GEMBBOZVENETSOZ	352	515.178.496
BVINMALS	353	145.874.944
GEMBEISKLAUSEN	346	129.425.408
BZGBRU	1155	919.601.152
PRETTAU	809	411.598.848
BZGWIP	1353	738.369.536
PRAD	1971	1.073.545.216
BZGMER	1120	734.199.808
BZGVIN	1060	540.737.536
LANA	1157	995.098.624
BRIXEN	1361	1.207.541.760
AHRNTAL	1205	799.440.896
MERAN	1389	1.711.562.752
UHURA	2383	1.974.075.392
LEIFERS	1801	1.276.100.608
BRUNECK	1232	1.611.005.952
LAJEN	1245	651.755.520
AWEBZID	7714	3.270.008.832
EPPAN	1217	1.389.166.592
SOZDB1.ZID	1344	1.340.039.168

### 6.8 Provincia di Genova (PROGE)

#### 6.8.1 Basic Information

<b>A.1 Public Administration</b>	<i>Provincia di Genova</i>
<b>A.2 IT-Budget of PA</b>	<i>400.0000 Euro</i>

### 6.8.2 Database Server Hardware

<b>B.1 ID</b>	<i>PERSONALE</i>
<b>B.2 Hardware</b>	<i>Olivetti NETSTRADA 7400 512MB DISK SPACE 35 GB - SCASI</i>
<b>B.3 Date of Purchase</b>	
<b>B.4 Initial Cost</b>	
<b>B.5 Yearly Maintenance Cost</b>	
<b>B.6 Shared</b>	<i>YES-MONITORING OF EMPLOYEE WORKING TIME</i>
<b>B.7 Concurrent Users</b>	<i>OVER 30</i>

<b>B.1 ID</b>	<i>SERVER SEDE2K10</i>
<b>B.2 Hardware</b>	<i>Quickdata Superserver 8042 Intel Xeon™ mp CPU 1,50 ghz at/at compatible RAM 2096620 KB DISK SPACE 340 GB SCASI E RAID</i>
<b>B.3 Date of Purchase</b>	
<b>B.4 Initial Cost</b>	
<b>B.5 Yearly Maintenance Cost</b>	
<b>B.6 Shared</b>	<i>NO</i>
<b>B.7 Concurrent Users</b>	<i>UP TO 600</i>

<b>B.1 ID</b>	<i>IBM AS400 RAGONERIA</i>
<b>B.2 Hardware</b>	<i>8.7 RPR RAM 128 MB DISK SPACE 6 GB RAID</i>
<b>B.3 Date of Purchase</b>	
<b>B.4 Initial Cost</b>	
<b>B.5 Yearly Maintenance Cost</b>	
<b>B.5 Shared</b>	<i>YES ADMINISTRATIVE DOCUMENT</i>
<b>B.5 Concurrent Users</b>	<i>UP TO 400</i>
<b>B.1 ID</b>	<i>IBM 150/2269 BUSTE PAGA</i>
<b>B.2 Hardware</b>	<i>8.7 RPR RAM 128 MB</i>

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<b>B.1 ID</b>	<i>IBM 150/2269 BUSTE PAGA</i>
	<i>DISK SPACE 8 GB RAID</i>
<b>B.3 Date of Purchase</b>	
<b>B.4 Initial Cost</b>	
<b>B.5 Yearly Maintenance Cost</b>	
<b>B.6 Shared</b>	<i>NO</i>
<b>B.7 Concurrent Users</b>	<i>4</i>

**6.8.3 Database Server Software**

<b>C.1 Database Server</b>	<i>Oracle 7</i>
<b>C.2 Hardware ID</b>	<i>PERSONALE</i>
<b>C.4 Operating System</b>	<i>WINDOWS N.T. 4.0</i>
<b>C.5 Date of Purchase</b>	
<b>C.6 Initial Cost</b>	
<b>C.7 Yearly Maintenance Cost</b>	

<b>C.1 Database Server</b>	<i>SQL 2000</i>
<b>C.2 Hardware ID</b>	<i>SERVER SEDE2K10</i>
<b>C.4 Operating System</b>	<i>WINDOWS 2000 SERVER</i>
<b>C.5 Date of Purchase</b>	
<b>C.6 Initial Cost</b>	
<b>C.7 Yearly Maintenance Cost</b>	

<b>C.1 Database Server</b>	<i>DB2</i>
<b>C.2 Hardware ID</b>	<i>IBM AS400 RAGONERIA</i>
<b>C.4 Operating System</b>	<i>OS400</i>
<b>C.5 Date of Purchase</b>	
<b>C.6 Initial Cost</b>	
<b>C.7 Yearly Maintenance Cost</b>	

<b>C.1 Database Server</b>	<i>DB2</i>
<b>C.2 Hardware ID</b>	<i>IBM 150/2269 BUSTE PAGA</i>
<b>C.4 Operating System</b>	<i>OS400</i>
<b>C.5 Date of Purchase</b>	
<b>C.6 Initial Cost</b>	

<b>C.1 Database Server</b>	<i>DB2</i>
<b>C.7 Yearly Maintenance Cost</b>	

#### 6.8.4 Database Contents

<b>D.1 ID</b>	<i>WINRAP</i>
<b>D.2 Database Server</b>	<i>ORACLE</i>
<b>D.3 Description</b>	<i>DATA CONCERNING EMPLOYEE MANAGEMENT</i>
<b>D.4 Size</b>	<i>9 GB</i>
<b>D.5 Number of Tables</b>	
<b>D.6 Applications</b>	<i>MS CLIENT SERVER</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, BAKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

<b>D.1 ID</b>	<i>PROTOCOLLO/DELIBERE</i>
<b>D.2 Database Server</b>	<i>SQL</i>
<b>D.3 Description</b>	<i>DATA CONCERNING I/O DOCUMENT PROTOCOLLING AND DETERMINAZIONI/DELIBERAZIONI DIRIGENZIALI</i>
<b>D.4 Size</b>	<i>7 GB</i>
<b>D.5 Number of Tables</b>	
<b>D.6 Applications</b>	<i>MS CLIENT SERVER</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, REPLICATIONS, BAKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

<b>D.1 ID</b>	<i>CIELO</i>
<b>D.2 Database Server</b>	<i>DB2</i>
<b>D.3 Description</b>	<i>DATA CONCERNING ACCOUNTING</i>
<b>D.4 Size</b>	
<b>D.5 Number of Tables</b>	
<b>D.6 Applications</b>	<i>CLIENT ACCESS/NEXUS</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, BAKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>

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<b>D.1 ID</b>	<i>CIELO</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

Workpackage 2, Deliverable 2.3 Catalogue of Legacy Databases

<b>D.1 ID</b>	<i>PAGHE</i>
<b>D.2 Database Server</b>	<i>DB2</i>
<b>D.3 Description</b>	<i>DATA CONCERNING BUSTE PAGA</i>
<b>D.4 Size</b>	
<b>D.5 Number of Tables</b>	
<b>D.6 Applications</b>	<i>CLIENT ACCESS</i>
<b>D.7 Used Features</b>	<i>TRANSACTIONS, BAKUPS</i>
<b>D.8 Access Pattern</b>	<i>CONTINUALLY</i>
<b>D.9 Update Frequency</b>	<i>CONTINUALLY</i>

## 7 Appendix B: Description of Catalogue Fields

This appendix contains a description of the fields in the catalogue.

**A. Basic information:** This part of the survey contains the basic information of the PA.

<b>A.1 Public Administration</b>	Name of the PA.
<b>A.2 IT-Budget of PA</b>	The total IT-budget of the PA.

**B. Database Server Hardware Survey:** This part of the survey focuses on the hardware on which the database server runs.

<b>B.1 ID</b>	An identifier for the hardware.
<b>B.2 Hardware</b>	Specify the hardware of the database server.
<b>B.3 Date of Purchase</b>	When did the PA purchase the database server hardware?
<b>B.4 Initial Cost</b>	How much did the PA initially pay for the database server hardware?
<b>B.5 Yearly Maintenance Cost</b>	How much does it cost, year by year, to maintain and update the database server hardware?
<b>B.6 Shared</b>	The hardware is used by other applications than the database server? Additionally, what type of applications are these?

**C. Database Server Software Survey:** This part of the survey focuses on the actual database server.

<b>C.1 Database Server</b>	Specify the database server including version number.
<b>C.2 Hardware</b>	Specify the hardware on which the database server runs, i.e., the hardware ID.
<b>C.4 Operating System</b>	Specify the operating system(s) on which the server is running including version number.
<b>C.5 Date of Purchase</b>	When did the PA purchase the database server software?
<b>C.6 Initial Cost</b>	How much did the PA initially pay for the database server software?
<b>C.7 Yearly Maintenance Cost</b>	How much does it cost to maintain the database server software?

**D. Database Contents:** This part of the survey focuses on the contents of the databases contained in the database server.

<b>D.1 ID</b>	The identifier of the database in the database server.
<b>D.2 Database Server</b>	Specify the database server containing this database.
<b>D.3 Description</b>	What does the database contain?
<b>D.4 Size</b>	What is the size of the database?
<b>D.5 Number of Tables</b>	How many tables does the database consist of?
<b>D.6 Applications</b>	Specify the desktop applications utilizing the database and if they are open source or not.
<b>D.7 Used Features</b>	Specify the advanced database features which are used in connection with the database.
<b>D.8 Access Pattern</b>	Specify approx. how often the database is accessed. Alternatively, specify how often a row is accessed.
<b>D.9 Update Frequency</b>	Specify approx. how often the database is updated. Alternatively, specify how often new rows are added or updated.

## **8 Appendix C: Open Source Database Servers**

Here follows a non-exhaustive list of Open Source Database Servers:

- PostgreSQL - <http://www.postgresql.org/>
- MySQL - <http://www.mysql.com/>
- MaxDB (Formerly SAP DB) - <http://www.mysql.com/products/maxdb/>
- Firebird - <http://firebird.sourceforge.net/>
- Fyrracle ('Oracle-mode' Firebird) - [http://www.janus-software.com/fb\\_fyrracle.html](http://www.janus-software.com/fb_fyrracle.html)
- Berkley DB - <http://www.sleepycat.com/>
- SQLite - <http://www.sqlite.org/>

## 9 Appendix D: Glossary

<b>Term</b>	<b>Description</b>
<b>Structured Query Language (SQL)</b>	<i>SQL is the standard database query language. It allows you to define, modify and query databases. There exists numerous versions of the SQL standard, e.g., SQL86, SQL87, SQL89, SQL92, SQL2, SQL1999, SQL3 and SQL2003.</i>
<b>Data Base Management System (DBMS)</b>	<i>A database management system is a database server. It allows you to maintain and access one or more databases.</i>
<b>Data Definition Language (DDL)</b>	<i>This is the language used to create and define a database. For SQL it consists of statements such as CREATE TABLE, DROP, DELETE and ALTER.</i>
<b>Stored Procedure Language (SPL)</b>	<i>Informix' non-standard procedural language extension.</i>