

METROLOGICAL DATABASES AS MAIN ELEMENT OF THE FEEDBACK LOOP FOR MONITORING THE NATIONAL METROLOGY SYSTEM

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Abstract: Monitoring the metrology system in a country with distributed metrological facilities is impossible without appropriate informational infrastructure. Many parties are interested in clear and transparent information (i.e. national testing, calibration and verification facilities and capabilities, legally approved measuring instruments and their metrological status, metrological regulations and certificates) In the following paper the system of metrological databases for monitoring the metrological system of the Republic of Slovenia is presented.

Keywords: metrological databases, distributed metrology system, monitoring of metrology system

1. MOTIVATION FOR THE PROJECT

Analysis of existing means and tools for monitoring key processes under responsibility of the Metrology Institute of the Republic of Slovenia (MIRS) within different departments, which was performed several years ago gave very interesting results. Almost every department had some mean for monitoring its work, but there were no connections between different databases/lists. Every department had its own list of customers, some customers had several names. Metrological surveillance department used only paper versions of text of regulations and type approvals during their in-situ inspections. It was not easy to reach data about costs for maintaining of traceability for national standards or about errors of particular instruments before calibration or legal verification was performed. Necessary public information was not easily available as well. Programming tools used were i.e. MS Access™, MS Excel™, MS Word™ and Borland Paradox™. Persons who programmed these databases were different and sometimes not employed at MIRS any more.

Obviously, it was necessary to do some radical steps in order to prepare some more consistent and transparent solution.

2. DEFINITION OF THE PROJECT

The decision was to build the common database system for monitoring all key processes under the responsibility of MIRS and to build it from the scratch using web-enabled technology [4]. The project was defined according to the project management literature

[1]. The first step was the global definition of the project, followed by project breakdown in manageable steps, including definition of the schedules of particular phases, allocating the necessary resources, defining means for measuring the project benefits and success and communication the results of particular phases with main customers and stakeholders.

It was not easy to start the project, because not all the people within MIRS understood the project and its benefits. Lot of efforts were invested in clarification of needs of particular departments, optimisation of amount of gathered data and making co-workers aware that such a project may succeed only if people understand it as a common project and not something that is the task of IT department.

One of the main dilemmas was whether to outsource the implementation of the database system or to build it by own resources. Two major problems in case of outsourcing were identified: building and maintaining of such a system requires lot of domain – specific knowledge and MIRS employees responsible for particular areas would need to spend lot of time in interactions with developers, which is almost comparable with the time they spend for building the system. Other problem is cost of building and especially maintaining the system. Since certain knowledge of databases building already existed in MIRS, the decision was to build system within house, after some necessary training courses.

3. REALISATION OF THE PROJECT

The project was realised using web technology with centralised database. This approach has many benefits and one deficiency (it is inoperative if the network is down). Such databases are much easier to maintain since there is no need for distribution of databases and updates. The selected technology is open source, The technology of realisation is open source, web-based, using Linux, APACHE, MySQL, PHP and PERL ([9], [8], [7], [5], and [6]). The central point is LINUX/APACHE server with MySQL database and web pages for user access programmed in PHP.

The central database of the system is the database of customers. All databases and applications communicate with this database, with different access rights. Identification and authentication of customers is assured by digital certificates, username and password. In

continuation, users and applications are organized in groups with specific access rights on particular tables in databases.

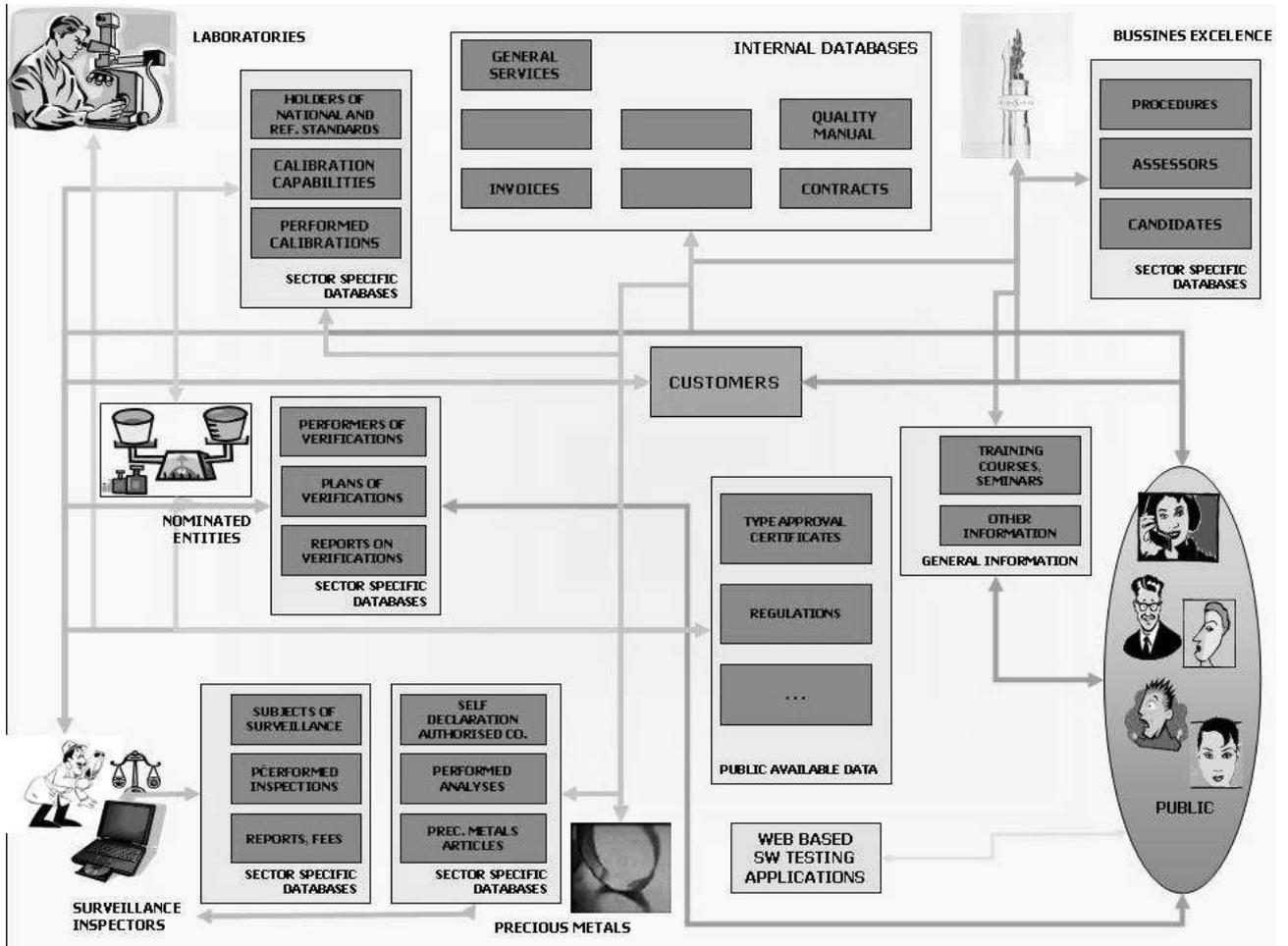


Fig. 1. Structure of the database system

4. LEGAL METROLOGY DATABASES

As an example the part of database system that is devoted to legal metrology is presented [2], [3]. National metrology authority has to protect interests and to serve to different user groups. Variety of user groups and their need for different information reflect in construction of the databases and related applications and the complexity of access rights for particular database tables and applications. Figure 2 illustrates variety of relations in legal metrology on the example of taximeters.

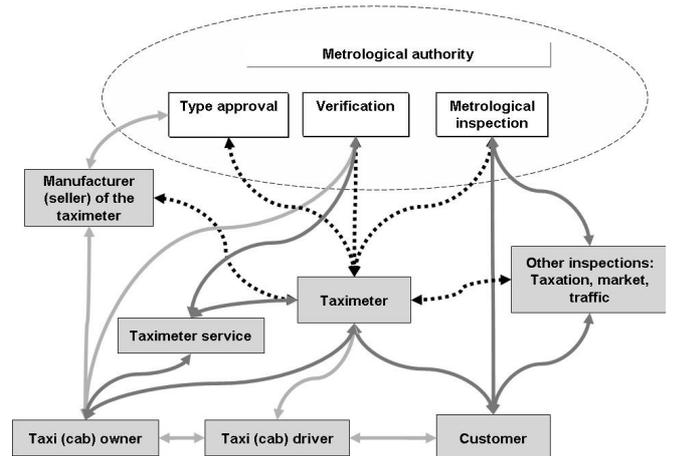


Fig. 2. Relations between parties involved in use of taximeters

The building blocks of this part of system are:

- Database of metrological regulations and guidance documents (national metrological regulations, WELMEC and OIML documents)
- Database of type approval certificates and test reports (national and European)
- Database of verification performers (national bodies nominated for verification of particular kinds of measuring instruments)
- Database for announcing plans for verifications and reporting about performed verifications. Nominated verification performers are obliged to send that data to MIRS.

Those databases are used by:

- General public (public information like metrological regulations, approved types of instruments, metrological marking of instruments like seals and stickers, ...)
- MIRS departments dealing with legal metrology (details on type approvals, calibrations, verification, location of use, verification performers)
- Metrological and other inspections

- MIRS partners in the legal metrology system (nominated verification performers, laboratories)

One aspect of the benefits of use of such a system may be illustrated from the point of view of metrological surveillance. According to the old praxis, after seeing the measuring instrument at the place of use, inspector had to go to the office to get the documentation about the measuring instrument (type approval certificate, verification marks, information about nominated verification performers), which sometimes required several days for digging the archives. After that inspector was able to go back to the place of use of the instrument and to check its compliance. Efficiency of the inspection and optimisation of the expences are therefore significant (minimised travelling costs, men-hours). This tool facilitates both inspectio n of the measuring instuments in use and survailance the work of he nominated performers of verifications.

An example of the screen intended for searching the type approval certificate is given on the figure 3.

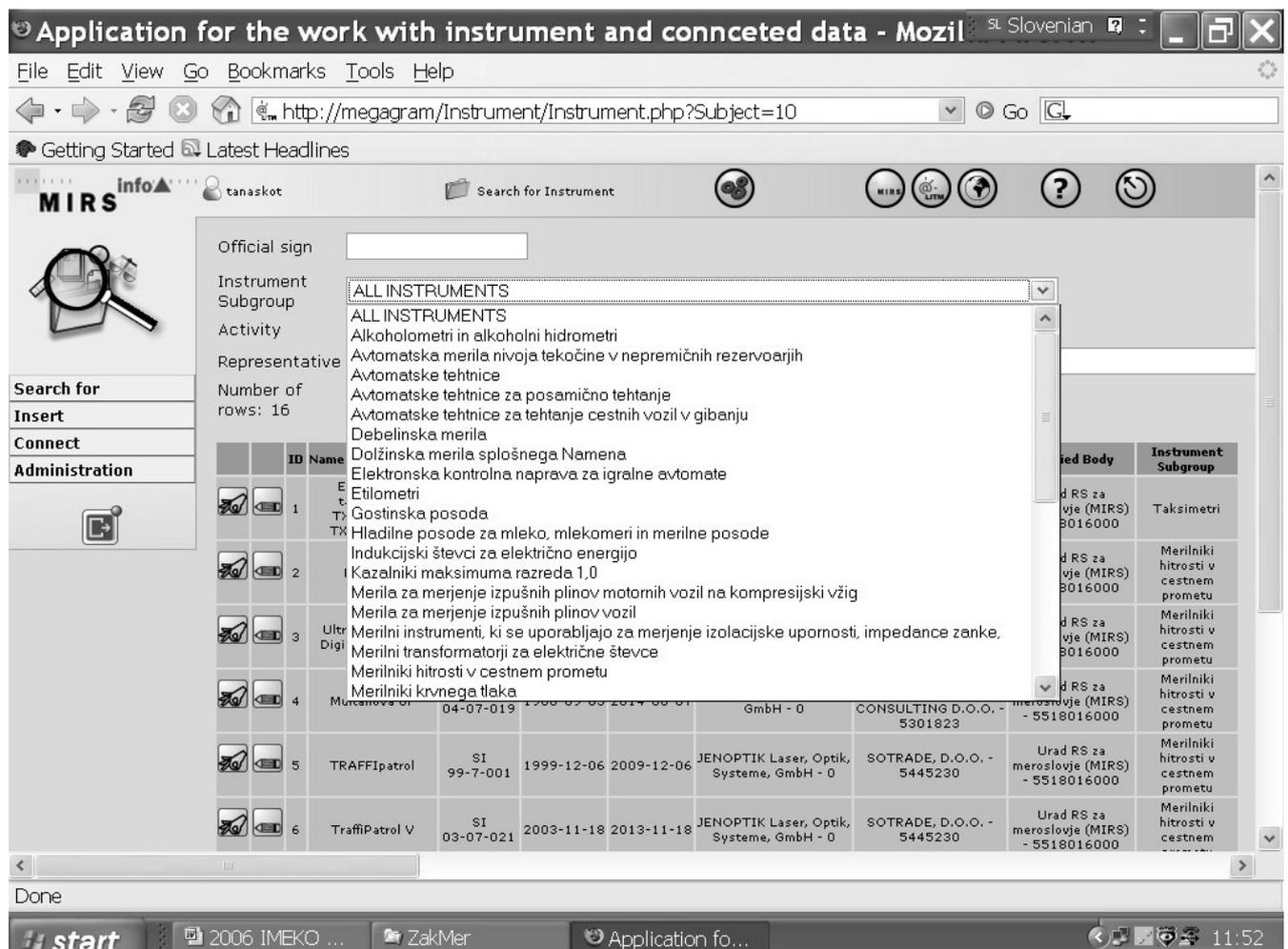


Fig. 3. Searching for the type approval certificate – an example of use of the databases

5. CONCLUSION

Presented solution is proposal that may be useful for other parties wanting to build similar system. Besides offering huge amount of instant information to variety of customers, it is also a powerful tool for management such a complex system, including preparation of reports and analysis. With having collected significant data of the system it is much easier to get information about number of performed calibrations, verifications or surveillance checks of particular kind.

Consideration of the project management experiences is inevitable for success of such a project, especially identification of real needs and problems, definition of project goals and objectives, identification of stakeholders, discussion of solutions and appropriate presentation of achievements.

Certainly, implementing such a system is accompanied with several problems. Such a database system needs careful filling with documents, which are not always easily available (especially for legacy systems that are still in function or in case when copyrights are hold by third or even unknown party). Not all documents fit in these systems, i.e. calibration or verification procedures are proprietary know-how of the laboratories as a rule.

Similar database system on an international level may be very useful in many aspects. The most appropriate area for such an approach is the legal metrology – the international database of legally approved measuring instruments may be of great advantage for especially if the approvals are done according to harmonised procedures. This will be a powerful tool for minimisation the barriers to trade.

However, building such a system requires lot of efforts and resources, starting with definition of the structure, gathering of initial information, definition and implementation of the system for continuous influx of information from document generators and of course, for

system maintenance. Since these information should be made public, this which will require some stable source of financing, rather than left to the market. Some examples for narrow range of measuring instruments already exist (like EMETAS database of certificates and test reports for non-automatic weighing instruments and modules [] issued according to the European directive 90/384/EEC on the harmonization of the laws of the Member States relating to non-automatic weighing instruments, so called NAWI directive).

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