

## **REVIEW OF SOFTWARE TOOLS FOR LOGISTICS SUPPORT AND USE OF ALTERNATIVE FUELS FROM COMMUNAL SYSTEMS**

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**Abstract:** In our transport organizations still is present a relatively low level of work processes formalization. This level is characterized by individual effort and a small number of defined processes. In most organizations of road transport for example, automatic data processing includes only a basic processing of travel orders and maintaining mother database of vehicles. In some organizations, there is also developed a level which enables process repetition. There are also formed basic processes of managing the project in order to observe the movement of costs, deadlines, as well as functionality. Almost there is no logistics support of unique software system for processing and database, organization, communication and observing all the processes and flows in an enterprise, i.e. Intranet system. Current situation in most of our communal systems is such that communal waste is only being collected and transported to the locations for its disposal and there is no complete and renovated database for communal waste.

### **1. INTRODUCTION**

Everyday use of mobile computers is more and more present in business activities of domestic economy, primarily in big companies which have a need for adopting new technologies and observing world trends in the field of automation and business improving. Whether it is about storage, production, goods ordering, mobile sale or observing everyday changes on the market, automation with the help of mobile computers brings added value and increases competitiveness everywhere. Transfer of data collected in the field has especially evolved with GPRS application. Hence, mobile computers integrate inside themselves both the possibilities of modern forms of communication, and they provide necessary hardware support in the field. What is missing for the business automation to be successfully performed, with the help of mobile computers, is the appropriate software package which suits specific needs of the users. Big companies invest a lot of money in buying or developing their own software for business automation, while small and medium companies are in unenviable position because they do not have a developed IT sector and because of finished software's high prices. Thereby, small companies often do not need a sophisticated software, full of different options, and thus complex for use, but a simple application that will enable them to apply, in the simplest and fastest way, modern technologies of automatic identification and automatic inclusion of data and thus improve their business processes.

On the other hand, expansion of economic growth has led to big ecological problems that threaten to jeopardize man's living and working environment. Today, one of the greatest problems is "production" of enormous amounts of waste. Collecting communal waste in Serbia is performed by public utilities whose founders are the municipalities. Waste implies materials, products or by-products and energy, which are rejected into living environment as a final landfill. However, communal waste may also be a source of useful raw materials and energy. Solid waste disposal is one of the dominant problems in the field of environmental protection. Simultaneously with the development of society, both specific and total amounts of waste are also growing. At the same time its structure changes with the growth of industrial and dangerous waste share. Main problem is the absence of the process of any kind of separation, sorting, transport and disposing communal solid waste i.e. the absence of responsible procedure of managing the waste [4, 18, 21].

## **2. MODERN SOFTWARE TOOLS FOR LOGISTIC SUPPORT AND IMPROVING COMMUNAL SYSTEMS**

Analyses show that in the last few years, in most of our companies, the least investments were made in logistics. On the other hand, market globalization and other trends, which cannot be avoided in business, demand that our logistics functions perfectly. When we speak about logistics, we imply logistics inside the enterprise, i.e. the logistics of our storage systems, which we also call intralogistics. Development of intralogistics is more than complex today, solutions are largely innovative and varied, and, what is the most important, business largely depends on those solutions.

Information that the percent of logistics costs from 1987 to 2003 has been halved, tells how quickly the logistics is being developed. From 12%, of total sales value, which was the amount of logistics costs some twenty years before, it was reduced to 6% in 2003. Storage and storage system of each company has to be an unavoidable part of business because the biggest material value is precisely in those stored goods. Each production company has to store its goods somewhere, goods must “stand” during one period of their life cycle before they are further distributed. Very rarely the goods can be transported directly from the production process to mean of transport and directly delivered to buyer. More precisely, there is a very small number of enterprises that can do business according to principle *Just in Time*. Also, there is a small number of enterprises that can apply *cross-docking* system (from entrance ramp goods are immediately being transported to exit ramp, without standing in storage), in which there is no need for big storage space.

Former storage systems and storages (buildings, forklifts and workers' equipment in storages) were very simple. People stored goods manually; using papers, observed the situation in storage by manual methods. Modern storages, according to rule, considering the high price of land, go to height, they are of futuristic appearance, and people who work in them are equipped with modern devices, bar-code scanners, mobile computers, and not rarely *wireless* (RF) communication, as well as earphones and microphone on the head. Forklifts are equipped with modern touch screen terminals, label printers and radio link.

What is, in such situations, for any company, an essential moment? That is **the choice of an appropriate software-logistic solution** and, but not least important, **the choice of partners for implementation and introduction to work**. Main dilemma is whether to make its own solution, by “its own measure”, with its own forces or by engaging an *outsource* company, or to choose the tested, proved in practice, specialized software-logistic solution and an appropriate partner for implementation of that solution and, finally, an appropriate, **experienced and verified partner for that solution's integration in business information system**.

Not rarely, partner for integration may precisely be the one to help you choose the software system and partner for implementation. Why are we stressing the significance of the partner for integration? Precisely because successful software companies, and even the makers of logistics solutions, are specialized for their, software part of work (analysis of state, functionality, customization, implementation, users training). However, in logistics system, technological solutions, application of technologies of automatic identification and automatic inclusion of data, specialized hardware and software equipment (bar-code scanners, mobile computers, *wireless* infrastructure, bar-code printers, softwares for managing mobile equipment, special interfaces that link heterogenous users systems) have a significant place on one hand, and software companies, deliverers of logistic solution, on the other hand. Those are the tasks for the system of integrator specialized for mobile computing, with high competences for that field [17].

### **3. REVIEW OF SOFTWARE TOOLS FOR LOGISTICS SUPPORT AND IMPROVEMENT OF COMMUNAL SYSTEMS**

In this paper, there are presented fifteen, already finished software tools, which we consider easy to be adapted to specificities of communal systems functioning.

#### **3.1. BELWMS SISTEM (Belgrades Warehouse Management System)**

Engineering for logistics and software, LOGISOFT Ltd from Belgrade, that realizes logistics systems on West-European market, has successfully put into operation the first system for managing and controlling materials and information of one logistics centre in Serbia. Package of that solution under the name **BELWMS** (*Belgrades Warehouse Management System*) is based on standardized platform and it is supplemented with work processes that are precisely made to cover the need of users (realization on the principle *build to order*) [1, 22].

**BELWMS** system is realized with the latest technology as well as the most modern aspects of logistics that are present in the most developed countries of West Europe.

**BELWMS** system is designed in such a way to support simultaneous presence of more owners (mandanates) in the system. Since LTS works with a lot of mandanates, it was necessary to make a package of functions for the access of external owners to their data in the system. External clients (mandants) may without problems and according to their own will, unlimitedly take care of their data i.e. to insert new data, change the existing or erase the same.

#### **3.2. BLUEBOX**

Solutions package bluebox contains a series of modular solutions for managing documents and enables the companies to implement various business processes tied to the flow, processing and storing the documents inside the organization.

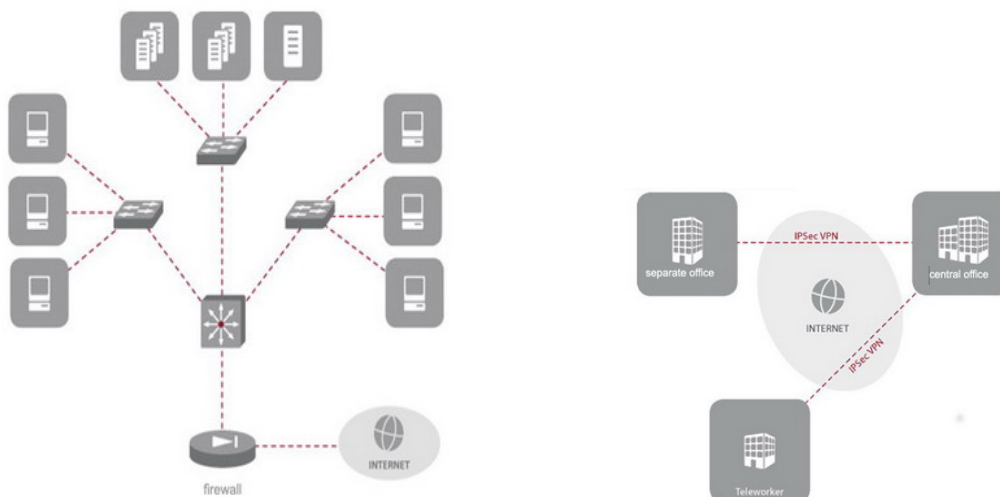
- ◆ Bluebox package contains a series of different functionalities [2]:
- ◆ BlueboxHigh Volume Server – system for long-term storage, view and search of a big amount of archived documents and records.
- ◆ Bluebox Archive – system for automation of documentation processing inside the company, such as Contracts, Employees, Property.
- ◆ Bluebox Invoice – system for automation of output accounts processing, which enables a faster and more effective output accounts processing.
- ◆ Bluebox Registry – solution for office work of state administration body
- ◆ Bluebox Transformer – system for mass production of documents based on templates (forms) and records in database.

#### **3.3. CORE NETWORKS**

Core Networks is the core network and that is the essence of every network solution and as such, they are the base for providing network and applicative services.

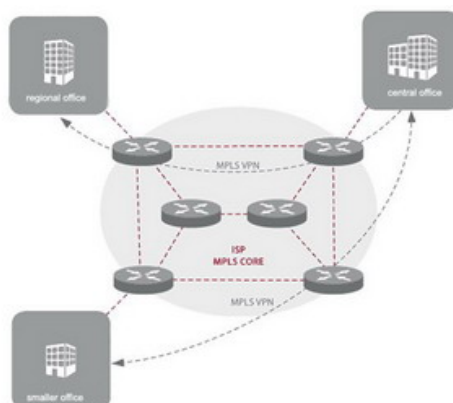
Core networks enable rapid and efficient directing IP traffic to final devices and thus they represent a unique solution for the transfer of data, sound, images, video and control signals [3].

Pictures 1 and 2 show the review of networking the offices, safety of network (offices) and linking remote locations with head office through the protected VPN using public network (Internet) – IPSec VPN.



**Picture 1 and 2: Networking the offices, network safety and linking remote locations with head office [3]**

Design and implementation of MPLS core networks (*enterprise and telco solutions*) is shown in picture 3.



**Picture 3: Design and implementation of MPLS core networks (*enterprise and telco solutions*) [3]**

### 3.4. DATA COLLECTOR

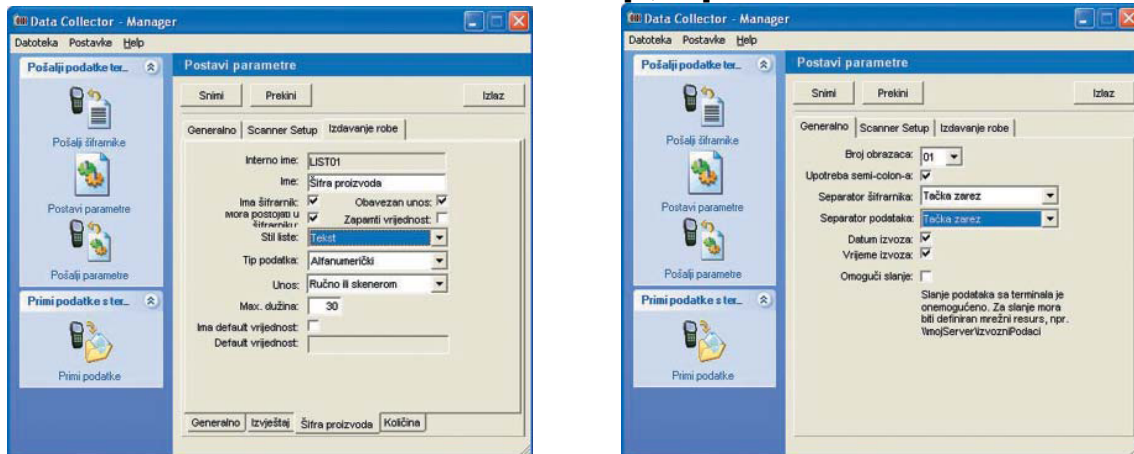
In the firm ŠPICA, there was developed a software and hardware solution known under a commercial name DATA COLLECTOR, which was checked so far in numerous installations on domestic and foreign market. Using this solution, we eliminate manual data input, which represents the source of errors and the slowest part in the chain of data processing. Automatic data input is faster, more accurate and completely reliable. In mobile computer, there is a bar-code reader integrated, which enables simple bar-code scanning, while additional information on articles can be entered using keyboard. Entered data are reliable and accurate, ready for automatic transfer and available for review and further processing.

Program DATA COLLECTOR on mobile computer is most frequently used for:

- ◆ regulation,
- ◆ taking over and issuing the articles in storage or trade,
- ◆ review of stocks or article prices,
- ◆ including the data in the field.

For all work settings of the program, DATA COLLECTOR Manager is used, a program which is installed on a classic PC computer (Picture 4). Result of data transfer is recorded

in TXT data file with predefined look (appropriate CSV format, (Picture 5)). Also, the input coders are recorded in the form of TXT data file. [5, 24].



**Picture 4 and 5: Setting the work of programs and formats of output data files - DATA COLLECTOR [5, 24]**

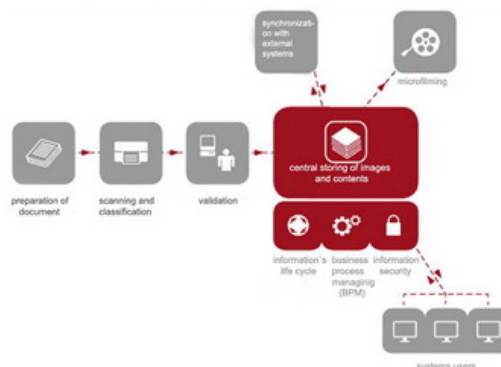
### 3.5. ECM (Enterprise Content Management)

**ECM (Enterprise Content Management)** is a solution for managing business content, i.e. it enables companies to unite the content and belonging business processes through a unique platform. ECM is a software category that helps in managing with all unstructured information, i.e. content in organization (Picture 6) [6].

ECM as an integrated system supports the fields such as managing documents, web content and records, document imaging, support to document-centric collaboration and also the workflow.

ECM supports the following fields of [6]:

- ◆ Document Management.
- ◆ Web Content Management.
- ◆ Records Management.
- ◆ Document Imaging.
- ◆ Document-Centric Collaboration.
- ◆ Workflow.



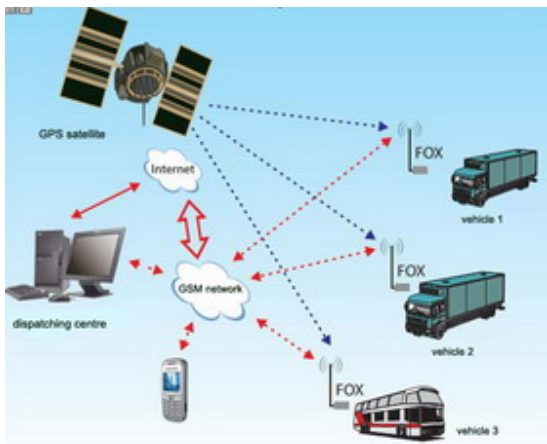
**Picture 6: ECM – Software platform for web content management [6]**

### 3.6. FOX FMS system

Company *Geneko* from Belgrade has developed new AVL system *Fox*, which in many aspects exceeds common satellite tracking of vehicles. *Fox* has united all good characteristics and advanced features of modern AVL systems necessary for efficient car park management. Besides tracking vehicles and intelligent sending of vehicle position



through GPRS (for the reduction of transfer costs), this system enables voice communication, navigation, state surveillance and detection of events inside vehicle through 15 channels and current information. Fox FMS system (Picture 7 and 8) for managing car park consists of AVL devices *Fox* installed in the vehicles, FMS server computer located at monitoring centre, PC computers, i.e. client workstations and communicational infrastructure that is provided by mobile network (GSM) and Internet. FMS server in control centre receives permanently the data sent by *Fox* devices through GSM network, processes data and records them in data base. The user accesses the data through FMS client application or *web* site and tracks vehicle movement on detailed maps and controls vehicles' state. Monitoring centre for surveillance of vehicles can be installed in any company with bigger car park [7, 8, 16].



**Picture 7: FOX FMS system review [7, 8]**



**Picture 8: Review of connecting FOX FMS server applications [7, 8]**

### 3.7. Geanium™

**Geanium™** - **interactive chronological visualization developed in KING ICT**, represents a new approach to presentation and analysis of data, which are spacially and temporally defined [9, 10].

Geanium™ is internet-oriented application which uses, for primary users' environment, Adobe Flash™ technology and can be used on every computer platform that supports it. Geanium™ Player can also be configured for off-line use and distribution through digital media such as CD or DVD. A part of the system is also a detailed world chart that is completely vectorized and on which user may smoothly be moved.

### 3.8. GRID computing

GRID computing is an information system for data base, which is characterized by availability, integrity, data durability, scalability and reliability and those represent basic requirements to data bases of today.

Modern data bases functionalities are [11]:

- ◆ *Possibility GRID computing-a* – Providing the highest level of data availability with a higher level of managing and automatization.
- ◆ *Optimization of system performances at all levels* - On-line data compression and base participation at all levels, in order to increase the speed of entering and reading the data.
- ◆ *Data security* – Selective user approach in all segments of data base, revision and applying security policies and procedures, and satisfying business regulations.

- ◆ *Architecture modularity* – Applicability of products in all market verticals for any business entity (small, medium, big), and increased scalability.
- ◆ *Compatibility with leading producers of applicative solutions* – Close cooperation with leading ERP, BI, CRM, SCM, BPM producers.

### 3.9. HazAs .Net

HazAs .Net – software for managing the risks to health and workplace safety and aspects that influence the environment. Provides the efficient identification and analysis of hazard and the aspects in accordance with the requirements of standard [OHSAS 18001](#) and [ISO 14001](#) systems, i.e. in accordance with positive legal regulations that regulate this field. Integration of software tool HazAs .Net with a system for managing human resources in organization, OPISys™ .Net HRM, provides for the users a simple and systematic evaluation of workplaces risk, which is defined as an obligation in positive legal regulations. Also, a complete integration with a series of other tools and quality methods has been provided, such as with [Visual Processes .Net](#), communication through a data base of integrated quality tools [12].

### 3.10. HotSpot

Wireless networks are the solutions that enable connecting computer networks for data transfer in outdoor locations (*outdoor* installations) and in indoor locations (*indoor* installations). Outdoor installations refer to covering a broader area with wireless networks (e.g. WiFi signal for tourist locations). These installations are divided into two types: HotSpot installations i Building-to-building installations [13].

Using WiFi wireless technology in organization makes storage business easier as well as the integration with ERP and WMS software solutions, altogether with technologies such as BAR CODE and RFID.

*Wireless* systems are more and more based on „Wireless controller“ technology that enables centralized surveillance and managing the whole local and remote wireless infrastructure. Such technology makes managing the big number of devices in one place simpler, and at the same time adds new advanced possibilities of roaming through a whole network at LAN, MAN and WAN level [13].

### 3.11. HRplus

Modular application HRplus ensures total managing the human potentials through a unique system [14].

Basic modul consists of the following functionalities [14]:

- ◆ Managing and tracking the organization (one or more companies),
- ◆ Defining the workplaces catalogue,
- ◆ All the data on the staff (employees, family members, potential candidates in selection process, temporary employees etc.),
- ◆ Tracking the employees fluctuation,
- ◆ Managing competencesu,
- ◆ User defined (ad-hoc) reports.

### 3.12. KING ICT

Passive network infrastructure base is the one on which each computer system is based and represents a basic part of each network's work in the aspect of security and reliability, represents a cable network system of multiple purposes, for computer, multimedia and telephone world.

KING ICT is put on structured cabling i.e. network system derived as a unique system or set of systems connected into one group of connected systems, which can be upgraded in each segment.

KING ICT offers solutions and technologies of building passive network infrastructure, adapted to majority of users [15]:

- ◆ **LAN (Local Area Network)** – It is used when building a local network of small, medium and big users.
- ◆ **MAN (Metropolitan Area Network)** – Networks in urban local areas that are mutually connected by using DTK infrastructure.
- ◆ **WAN (Wide Area Network)** – Geographically big areas that connect MAN networks through optical lines.

### 3.13. OHS&EMS .Net

**OHS&EMS .Net** – software for managing jobs of security and health at work and environment protection.

Besides compliance with legal regulations, keeping records on dangerous materials and life environment indicators , which is complied to standard [ISO 14001:2004](#) is also provided by the program.

Software options OHS&EMS .Net are grouped into four work centres [19]:

- ◆ OHS – keeping record on health and safety at work;
- ◆ EMS – keeping record on environmental protection;
- ◆ Statistics – work centre serves for tracking statistic data that are related to results of medical examinations, injuries at work, training of employees, professional diseases and sick leaves;
- ◆ **Administrator** - Administrator OHS&EMS.Net performs creation of data on own company, external organizations, creation of necessary coders and other settings necessary for efficient work.

### 3.14. OPISys™ .Net CRM (*Customer Relationship Management*)

Software tool OPISys™ .Net CRM (*Customer Relationship Management*) represents an efficient way of organizing business processes through which one company manages contacts and datas on its buyers, deliverers, their needs and all the relevant information on appearances on the market [20].

OPISys™ .Net CRM consists of the following modules [20]: Companies; Relationships with buyer; Relationships with deliverer; Reportings; Obligations; Settings.

### 3.15. VoIP

VoIP is the process of digitization and transfer of voice through Internet protocol. Depending on the existing infrastructure, there are only two ways of implementation of VoIP services [23]:

- ◆ Using PBX head office – Packetization of speech itself in IP packages is performed by routers that are connected to head office.
- ◆ Replacement of classical PBX head office and applying the solution of Cisco IP telephony – In that way IP telephones themselves perform packetization of speech, and instead of classical head offices software based head office is used.

Using VoIP solutions enables the realization of significant savings in the business and that at a few levels:

- ◆ Free conversations between networked locations
- ◆ Free calls towards mobile VPN network
- ◆ Free audio conferences and video-calls between networked locations



- ◆ Integration with the existing ERP solution, CRM solution, voice mail, fax2email, email2fax, Call centers and such.
- ◆ centralized WEB based administration
- ◆ one centralized software PBX telephone head office
- ◆ one cost place-complete costs control.

#### **4. CONCLUSION**

Software tools such as: BELWMS sistem (Belgrades Warehouse Management System) for management and control of material and information of logistics head office; Bluebox package contains a series of solutions of various functionalities for document managing; Core Networks is the core network; DATA COLLECTOR that enables automatic input and eliminates manual input of data that is always a source of errors and the slowest part in the chain of data processing. In that way, entered data are reliable and accurate, ready for automatic transfer and available for review and further processing; ECM (Enterprise Content Management) is a solution for managing business content; Geanium™ is a unique solution for an interactive chronological visualization; GRID computing is an information system for data base; software tool HazAs .Net provides the system for identification and evaluation of hazard and aspects; HotSpot installations are solutions for wireless network covering; modular application HRplus ensures overall managing human potentials through a unique system; KING ICT offers solutions and technologies of building passive network infrastructure; OHS&EMS .Net – software for managing jobs of security and health at work and environmental protection; Software tool OPISys™ .Net CRM (Customer Relationship Management) represents an efficient way or organizing business processes through which one company manages contacts and data on its buyers, deliverers, their needs and all relevant information on appearing on the market; VoIP is process of digitization and voice transfer through Internet protocol. Thereafter, there is also BELWMS which provides an insight into the state of its stocks, orders, invoices to a bigger number of external users. FOX FMS system for tracking and surveillance of vehicles provides for the users to be able to determine, at any moment, whether one of the vehicles is near the destination and such.

From the above said, software tools provide numerous advantages for system development and they are easy to classify according to importance, but they athogether contribute to quick paying off of investment into automation of system work. Also, application of these tools leads to the increase of system efficiency, because in that case, enterprise management is in the situation to identify, track and manage all the assets which participate in business process. Collecting information which are necessary for that is provided by application of above-mentioned software solutions in such a way that it does not have to be a burden for organization and employees any more.

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