Enterprise Information Systems of new Generation

Elena Serova
St. Petersburg State University of Economics and Finance, St. Petersburg, Russia
serovah@gmail.com

Abstract: In the today's rapidly changing competitive business environment, only flexible and dynamically developing companies are able to meet competition, companies that have managed to reduce costs and improve business efficiency through the introduction of advanced information technologies (IT). The use of information technologies is an essential component of a company's strategy to succeed in a rapidly changing world. Contemporary information technologies make it possible for companies to create information systems for effective communication and mutual understanding among staff members, as well as to support the decision making process at all levels of management. In the future the solutions in the sphere of information technologies, should allow uniting people, information and business processes into an integrated information system as a single complex of technological solutions more effectively. This paper aims at considering the new concept of EIS: transition from traditional internal business process management optimization to the Enterprise Information System which is opened for the all business partners operating in common business interests. Also the main goal of this work is determination of the main tendencies of enterprise information systems development.The paper contains the examples and analysis of the current practices of Enterprise Information Systems (EIS) development and implementation in Russian companies. It is the research based on study and analyzing the contemporary business solutions of the enterprise application software market leaders and the author's own experience.

Keywords: enterprise information systems, enterprise recourse planning systems, customer relations management systems, supply chain management systems

1. Introduction

Nowadays, in order to make your business competitive and prosperous, it is not enough to rely on one's bright mind, intuition or luck. Modern business is a complex multicomponent system, one of the primary elements of which are Information and Communication Technologies (ICT). Although each enterprise is unique in its financial and economic activities, there are a number of problems common to all enterprises. These include the management of material and financial resources, procurement, marketing and much more. One possible solution to these problems is the implementation and use of Enterprise Information Systems which have been rapidly developing in recent years. Enterprise Resource Planning systems provide comprehensive management of key aspects of financial, industrial and commercial activity of enterprises. These systems also provide managers with complete and timely information for management decisions and ensure effective data exchange with business partners.

In industrialized countries, despite much more favorable options for ICT application, issues of choice and implementation of modern information systems and tools, that meet market requirements and strategic business objectives, are also in the spotlight. It should also be noted that the focus has shifted towards the development of external information infrastructure of a company and continue to improve the class of intelligent information technologies and knowledge management systems.

Today in the publications on the topic of business efficiency and competitiveness of enterprises, many names and acronyms are mentioned, such as PLM, SCM, CRM, and ERP. These names come after the concepts and management techniques used by successful companies. Interest in them is growing in Russia. Leaders of Russian companies are increasingly turning to the experience of the use of solutions that help integrate the people, information and business processes to effectively manage all areas of business. The term ERP — Enterprise Resource Planning, is one of the key issues in this series of current concepts. What is ERP today, what place it occupies in a number of other corporate information systems, the basic purpose and functionality, the introduction specifics and development trends - these are the main topics examined in this study.

2. New concept of EIS

2.1 Up-to-date tendencies of enterprise information systems development

Recent trends in the development of enterprise information systems are associated with the intention to use information generated within the company, in the external environment to ensure cooperation

with other enterprises, customers and partners. Today we should take into account the new concept of Enterprise Information System: the emphasis is placed on the EIS which is opened for the all partners operating in common business interests instead of on traditional internal business process management optimization (Figure 1). This concept includes five new tendencies:

- *Change the role of ERP system.* Automation the internal business processes as well as external, counteragent relationships: customers, suppliers, banks, tax authorities;
- *The system technologies move towards an openness and transparency.* Internal processes are becoming more open. Information and data about activity of an enterprise can be available for business society member. Use of Web-technologies.
- *Structural changes of system architecture*. Instead of closed monolithic platform – open multilevel applications built on concepts of service-oriented architecture (SOA). Use E-SOA;
- *Expansion of system implementation.* Adaptation for enterprises of different kinds and sizes;
- *Deepen the system functionality.* All enterprise business processes should be automated;

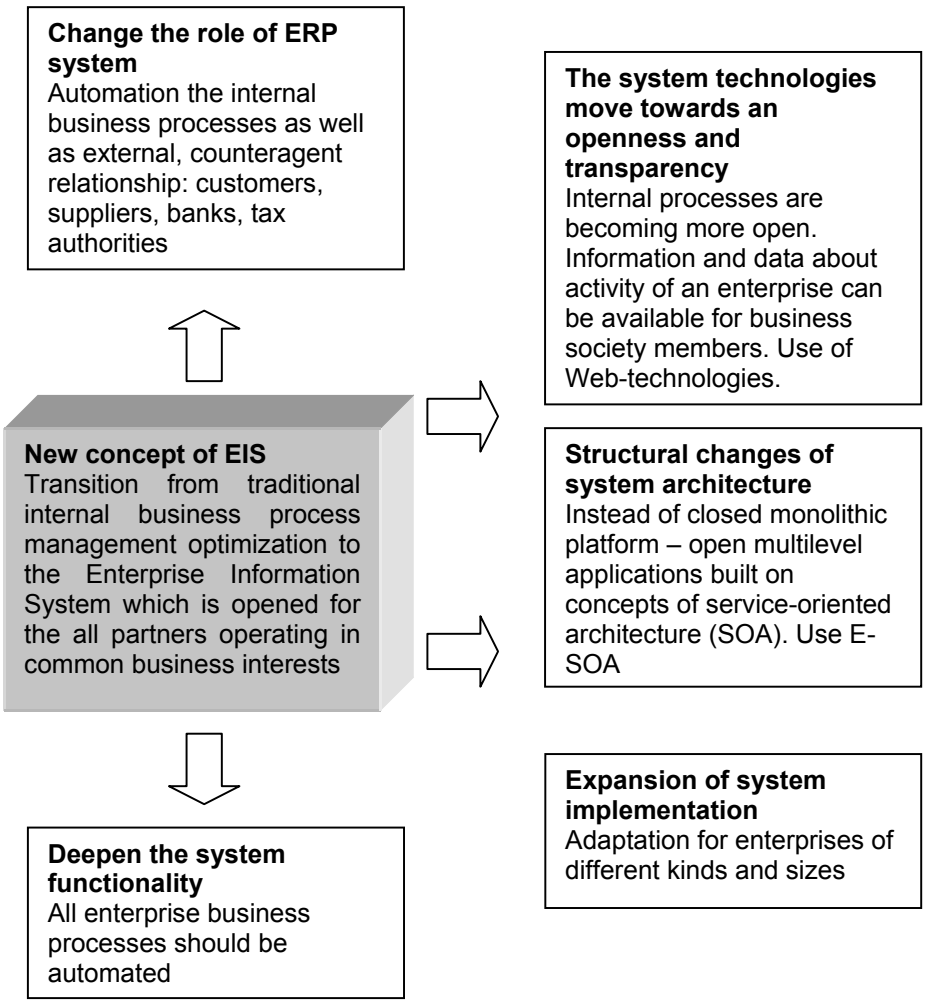

Figure 1: The main trends of development from traditional ERP to EIS of new generation

There has been a separation of notions: the traditional ERP management framework is called back-office, and external applications, which appeared in the system, front-office. One can distinguish the following five major areas that define the development trends of modern enterprise information systems:

- Deepen the functionality of ERP.
- Develop industry-specific solutions.

- Create new and improve existing modules of B2B (Business-to-Business) processes management.
- Use service-oriented architecture (SOA - Service Oriented Architecture).
- Use new platform solutions.
- Apply technologies for knowledge management.

As a rule, when the functional (system software and hardware) of up-to-day EIS is mentioned, the following components are kept in mind:

- ERP in the usual sense of the term,
- System of Customer Relation Management (CRM)
- Supply Chain Management System (SCM),
- Analytics and decision support, i.e. Business Intelligence (BI),
- Data management system, i.e. Information Management System (IMS), to integrate all components,
- ECommerce and collaboration via the Internet.

So a complex SAP Business Suite incorporates four solutions (Figure 2):

- For Customer Relation Management - SAP CRM;
- For managing Supplier Relation Management - SAP SRM;
- For Product Lifecycle Management - SAP PLM and
- For Supply Chain Management (SAP Supply Chain Management - SAP SCM).

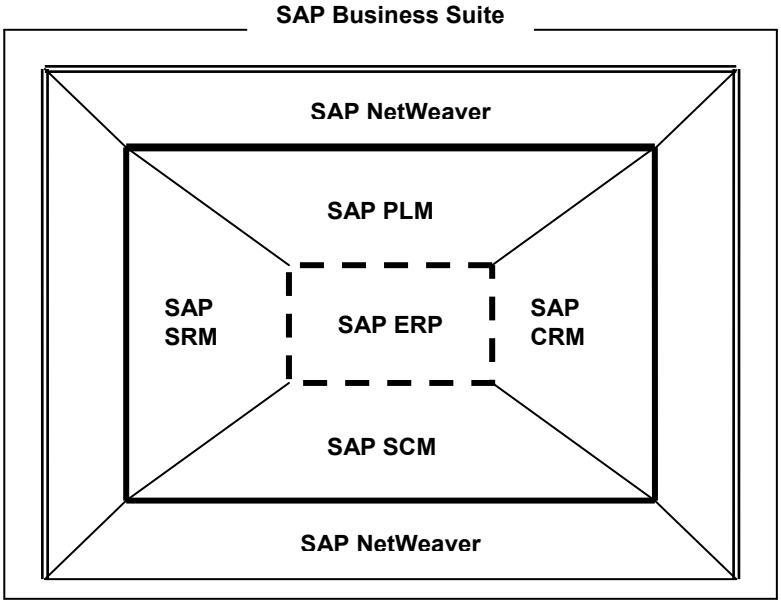

Figure 2: SAP Business Suite SAP NetWeaver – SAP platform solution

2.2 eCommerce and collaboration via the internet

The development of eCommerce and establishment of interactive communication among companies and their partners, suppliers and customers via the Internet, gave rise to shift in the emphasis on B2B sector in the development of the concept of enterprise information systems. Therefore, the ERP systems of new generation receive Web-based architecture, which was a significant difference from the previous generation of EIS. EIS corporate data storage of new generation is designed for use in geographically dispersed Web-based community. EIS can be fully integrated into the Internet and work with data placed not in the proper repository, as well as support the publication or subscription, initiated by the client and communicate with other applications using EAI-adapters (EAI - Enterprise Application Integration) and the language of XML.

The integration of ERP-systems with eCommerce B2B (Business-to-Business) and B2C (Business-to-Customer) is a natural and logical step in the development of enterprise resource planning systems. Creating and maintaining the systems of Internet commerce, especially B2B systems sector, is most effective when those systems are integrated into enterprise-wide business processes and integrated into the ERP-system.

B2B integration at the level of the relationship among ERP-systems suppliers and customers is provided through the following B2B eCommerce, i.e. e-distribution, e-procurement and e-marketplace. As eCommerce sector, B2B allows direct communication between market players - producers and consumers, then we say that eCommerce becomes an element of the integration among ERP-systems of interacting firms. Thus, enterprise information systems of new generation are becoming part of a large, rapidly growing electronic market.

2.3 Software as a Service (SaaS)

Software as a Service (SaaS) or Software on Demand (SoD) is a business model, which offers the software to consumers, in which the supplier develops web-based application, installs it and manages it by giving customers access to software via the Internet. Customers pay not for owning the software itself but for using it (through the API, accessible via the web and frequently used web-services). It is the service and interface that are purchased (user or program interface), i.e. some functionality without a rigid adherence to the method of its implementation.

Although any paid-for web-service can be classified as SaaS, often this term refers to software for business, and, as a rule, software on demand is positioned as a cheaper and simpler alternative to internal corporate systems (back-office).

Along with such obvious advantages, such as economic feasibility, the use of common software core, which allows planning the computing power and reducing the overall amount of resources, there are several constraints that limit the use of this model.

In the first place, these are the problems associated with information security. The possibility of information leakage virtually eliminates the use of the concept of SaaS for mission-critical systems, which are handled as strictly confidential data.

Secondly, the concept of SaaS is ineffective for systems that require a deep individual adaptation for each customer, as well as innovative and customized solutions.

Thirdly, the use of software on demand means being tied to a single developer that hosts the software on its site and carrying out its administration and support.

And finally, the limiting factor is the need for SaaS permanent connection to the high speed Internet. It is worth noting, that with the development of the Internet, the significance of this factor is reduced and in many developed countries it should not be considered.

Currently, in many functional classes of EIS one can find systems that support a SaaS model. For example, for CRM and HCM (Human Capital Management) systems, the concept of SaaS fits particularly well, and is being actively enforced.

3. Enterprise Resource and Relationship Processing

3.1 The CRM concept and its role in the corporate strategy

3.1.1 Evolution of the Customer Relationship Management concept

At present time, it is typical for companies with established client network-oriented services and sales, to have an advanced external information infrastructure. It is generally accepted that CRM technologies are most appropriate for such enterprises. Yet, manufacturing enterprises are also interested in selling their products and can use such technologies as well, although resource planning and improvement of quality naturally are of a high priority.

The CRM concept is based on the CSRP (*Customer Synchronized Resources Planning*) methodology that covers the full manufacturing cycle from customized design to guarantee maintenance and after-sale service. CSRP's major goal is to integrate customers into the enterprise management system, it is a production management paradigm founded on the ERP concept, but focused on customer relations (Figure 3). The CSRP methodology has added external environment to the ERP concept and solutions. With the CSRP technology, information of customers, products and services is an integral part of the basic component of information support for an organization's operations.

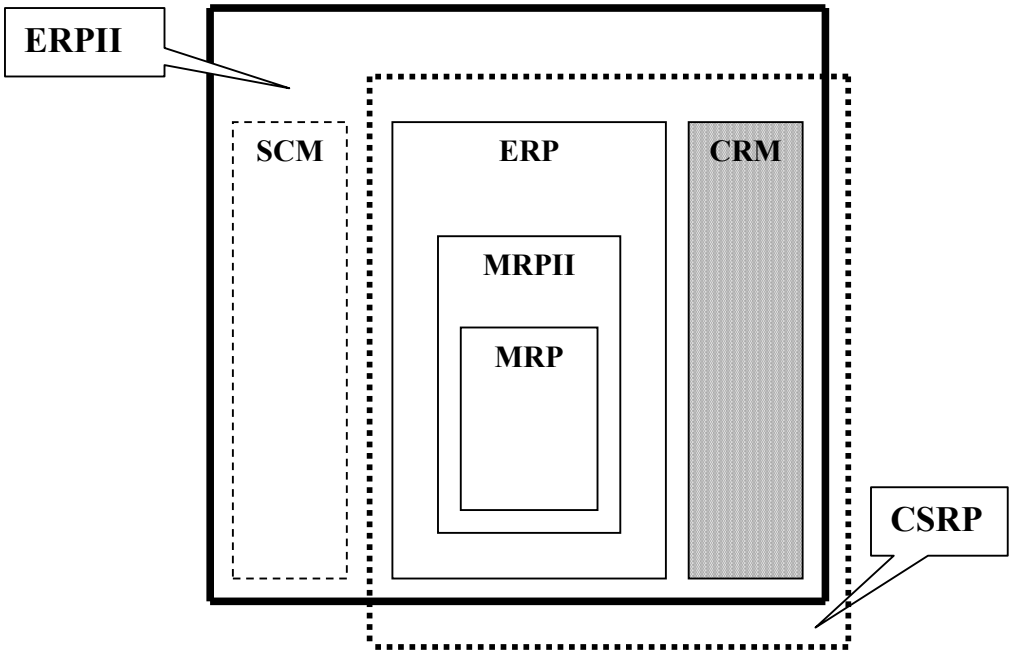

Figure 3: EIS evaluation: from MRP (Material Requirements Planning) to ERP II (Enterprise Resource & Relationship Processing)

Thus, the CSRP concept is a module to plan enterprise operations according to customers' needs that uses analysed marketing research results as input data. The CRM technology, in its turn, appeared to meet the demand for monitoring trends of customers' changing needs. This is what makes these technologies different from each other.

The CRM concept has passed several development stages each of which was a technology (system) aimed at improving a certain area of customer relations:

- Contact Management,
- Sales Force Automation,
- Customer Support,
- Quality Management.

Then all the systems were integrated into the CRM concept.

CRM is a blanket term covering all aspects of customer relations from contract monitoring to marketing, efficiency measurement and customer support.

Today there are many definitions for CRM. In terms of IT, it is considered special software to automate and improve business processes in marketing, sales, customer service and support. Procedurally, CRM can be a business process. It's very concept—customer relationship management—defines major business functions of such systems. According to PricewaterhouseCoopers, "the changing behaviour and expectations of consumers today demands constant monitoring, measuring and managing through a highly effective Customer Relationship Management strategy". In terms of the enterprise management, it is a front office organization system oriented to proactively find customers' needs. Unlike ERP systems aimed at improving back office operations, CRM helps improve sales, not production. Such well-known ERP software developers as

SAP AG, Microsoft, Baan have included CRM modules in their complexes and are trying to catch up with Siebel by Oracle that occupies over a half of the CRM software market.

CRM systems are divided into operational, analytic and ability to collaborate.

CRM's major task is to increase efficiency of business processes aimed at attracting and retaining customers: marketing, sales, service and maintenance.

3.1.2 CRM Concept Implementation Strategy and Major Development Trends

Implementing a client-oriented enterprise strategy, CRM should not be considered simply a tool set. This is because software is just one of the components. First of all, CRM concept implementation is a systemic approach to organizing a company's operations. To increase business efficiency by implementing a CRM system, the company should start with analysing and, if needed, reengineering its business processes.

Analysts believe that most CRM system implementation projects fail because of insufficient integration of communication channels, no reengineering of processes and inability to offer customers real advantages and benefits.

In general, CRM implementation strategy should be based on the following correlated provisions:

- Client-oriented policy should underlie implementation and further adaptation of the system;
- Technological support is defined by business goals;
- Structure and implementation stages of IT resources are assigned by detailed business problems with time-spaced solutions.

A developed CRM system may include various modules and use information from other applications and databases the company has. Yet, each customer's value is maximized mostly by three marketing strategy elements: organizing a system of integrated marketing communication channels; developing demand stimulation programs; and creating products according to customers' needs. Thus, a CRM system's most important technological components are subsystems to interact with customers and monitor current operations, as well as product databases and analytic modules.

One of the major trends in the CRM concept development is that most CRM products are being considered an additional element to the enterprise information structure, integrated in it, and to fulfil a certain function. Another important point is that CRM should not be approached as simply an IT implementation project. Underestimating the role of correctly organized business processes and altered cultural environment unavoidably fails the implementation. The company should investigate what needs to be done to bring business processes in compliance with CRM principles.

Another CRM development trend in terms of functionality is drifting from operational towards analytic or even collaboration software. Demand for analytic features in CRM systems, such as marketing analytics—consumer profile analysis, customer behaviour simulation modelling, advertising campaign planning, etc.—is growing.

Among the major *advantages* a company gets from choosing CRM as its major business strategy:

- *Sales volume increase*. An average of 10% annual sales increases per salesperson for the first three years upon implementation. A more efficient sales system that gives salespeople more time to spend with customers, and spend it more efficiently, as well as improves the supervision system.
- *More effective deals*. An average of 5% annually for the first three years upon implementation. With the system (e.g., with the standard client qualification procedure) unwanted deals can be screened at earlier stages.
- *Margin increase*. An average of 1 to 3% per deal for the first three years upon implementation. Customers' needs are better understood, and are more satisfied. This lowers the demand for extra discounts.

- *Higher customers' satisfaction.* An average of 3% for the first three years upon implementation. Customers believe the company is willing to solve their specific issues and more attentive to their needs.
- *Cutting administrative costs of sales and marketing.* An average of 10% annually for the first three years upon implementation. First, routine processes are automated. Second, better defined target segments, better understood customers' needs allow customizing products and services for the segments. There is no need to distribute information of all services to every customer anymore.

3.1.3 CRM Technology in the Information Infrastructure for Distributed Client Network Management

The networks started early in 1980s, to a large extent spontaneously. Now they are becoming a tool to purposefully coordinate efforts of all their participants. Thus, there is an urge to study theoretical principles of their formation and find a set of specific managerial skills needed for their efficient operations by developing a strategy to manage relations with other network participants [Kouchtch, 2002].

The major client network management principles are as follows:

- *Systemic approach to customer relationship*;
- *Constant attraction of new clients and relations with potential ones*;
- *Project approach to building and developing customer relations*;
- *Technology aspect in building customer relations*, *primarily segmenting customers, their needs, potentials and expectations; defining and reconsidering customer status, planning individual work with customers; timely transferring information, which underlies customer relationship and successful operations*.

It seems most relevant to consider features of external infrastructure for client network management exemplified by an IT company. The IT market has three kinds of distribution: project-oriented, classic and component.

The *project-oriented distribution* is based on the VAD (Value Added Distribution) business model. It ensures a developed, flexible and efficient logistic chain, project financing and vertical integration with partners and suppliers, reliable supply chains and strict observance of contract deadlines, and full technical support at every stage of partnership. As a result, every partner's and customer's problems are solved individually, with an opportunity to carry out large-scale, expensive projects.

The *classic distribution* focuses on wholesale (resellers) and retail companies specializing in IT products with forecast demand. This type of distribution ensures a wide variety of in-stock products by leading manufacturers of computer, network and telecom equipment; thereby resulting in a quick reaction to market price changes. The classic distribution sells hardware and software through wholesale or retail, with distributors supplying equipment that is technologically ready to go to the end-user market. A classic distributor deals with an end product.

The following major distribution schemes can be found in the IT market.

- Vendor-Distributor-Reseller

This is a traditional distribution scheme for the IT industry. A *Vendor* is a supplier of branded products and services under its own trademark (e.g., Intel, Compaq, 3Com). A *Distributor* stores the vendor's products in its stock, ensures its timely refill, participates in the vendor's marketing programs and works with partners to promote the vendor's products. The margin between the vendor's and the distributor's prices is low and rarely exceeds 5% (3 to 12% depending on products). A *Reseller* buys the vendor's products from distributor's stock and sells them.

- OEM Channel

OEM (Original Equipment Manufacturer) is a company that uses a vendor's products as a component of its own product or solution. For example, Compaq manufactures computers under its own trademark and uses Intel's processors. Intel's supplies of technologically packed processors are called '*OEM supplies*' and the channel through which manufacturers sell components to assemblers is called the '*OEM channel*'. The vendors' pricing policies for OEM partners differs from those for other distribution channels.

- System Integrators

System integrators are suppliers of comprehensive solutions that use a vendor's products to carry out their projects. Big system integrators enjoy direct supplies from vendors (thus, Compaq's partner Lanit works with it directly).

- Retailers

Another distribution channel for a vendor's products is retailers. Big retailers (such as Vobis and CompUSA) buy directly from the vendors and sell to retail customers.

The Internet plays a significant role in developing distribution. 92% of distributors' and direct partners' orders are processed through the Web, and there is only one partner that sends faxes. The Internet has led to quantum leaps in distribution ability. It is a new promotional tool that is available to existing players while at the same time creates new ones. Yet, until the Internet is spread throughout the whole of Russia, sales through distributors is the most efficient.

As mentioned above, service- and sales-oriented companies that are in constant contacts with their customers have an external information infrastructure more developed than the internal one. Thus, CRM is an intermediate technology between companies and their customers that helps improve the external information infrastructure. With CRM, the following steps to form a client network management system can be made and simplified:

- maintaining an extended client database with a history of contacts that allows for classifying and grouping customers;
- getting sales statistics, reports, and sales history;
- interactive customer support, giving them access to certain information they need;
- opportunity to work with customers grouped by region, industry, etc.; work jointly with remote or regional divisions;
- Managing relations with potential clients: collecting initial information, distributing contacts between employees, and monitoring efficiency of initial contact sources.

3.2 Supply Chain Management

SCM (Supply Chain Management) systems are designed for planning, coordination and fulfillment of network-wide supply chain of an enterprise. They allow one to automate and manage all stages of the company supply to control all movement of goods in the company to better meet the demand for the company's products and significantly reduce the costs of logistics and procurement.

Typically the following areas, on which Supply Chain Management is focused, are identified:

- demand planning;
- supply planning;
- procuring;
- manufacturing;
- storing;
- implementing of orders;
- Transporting.

As part of SCM-systems the following two subsystems can be distinguished:

- SCP (Supply chain planning). In addition to operational planning, SCP-systems allow to carry out strategic planning of supply chain structure, i.e. develop plans for the supply chain, to simulate different situations, to evaluate the level of operations, to compare planned and actual values.
- SCE (Supply Chain Execution) - execution of supply chains in real time.

SCM-systems can move from the concept of a linear supply chain management to the management of an adaptive supply network. In the current EIS, they can improve the competitiveness of

enterprises, providing access to partners data and resources on supply chain and enabling intellectual adaptation to changing market conditions.

3.3 3.3 Relationship management with suppliers

Many companies try to reduce costs through proper selection of suppliers. SRM (Supplier Relationship Management) systems are designed to control the entire cycle of supply: from strategic planning to implementation. They allow one to optimize the process of selecting suppliers and shorten procurement cycles. Using the SRM-system, companies can build a stable and effective relationships with suppliers on a long term basis. Combining extensive capabilities for analysis, evaluation and ranking of suppliers, taking into account all of the procurement of goods and services, aligning of strategies and forecasts of the effectiveness of interaction with suppliers through traditional and electronic channels of SRM systems in the EIS next generation, help to identify the best partners, the most relevant to business requirements.

4. Enterprise Information System Development and Implementation in Russian Company

4.1 Singularities

In modern Russia, using information and communication technologies (ICT) in management, including up-to-date methods, tools, and new platform solutions is a key driver of business efficiency. They do this by: helping improve quality of products and services, save labour and material costs, increase productivity, and improve production management. In industrially developed countries, despite a much higher degree of IT penetration in businesses, issues of choice and implementation of modern information systems and IT tools that would meet the market demand and business strategies are also vital. Development of companies' external information infrastructure and improvement of customer and supplier relations management are growing in importance, with intellectual information technologies developing.

It is very difficult to define typical Russian EIS. First of all we should bear in mind that quite frequently under "Russian EIS" we mean the information system which is installed and implemented in Russian company, but developed by such well-known software market leaders as SAP AG, Microsoft, and Oracle (Figure 4).

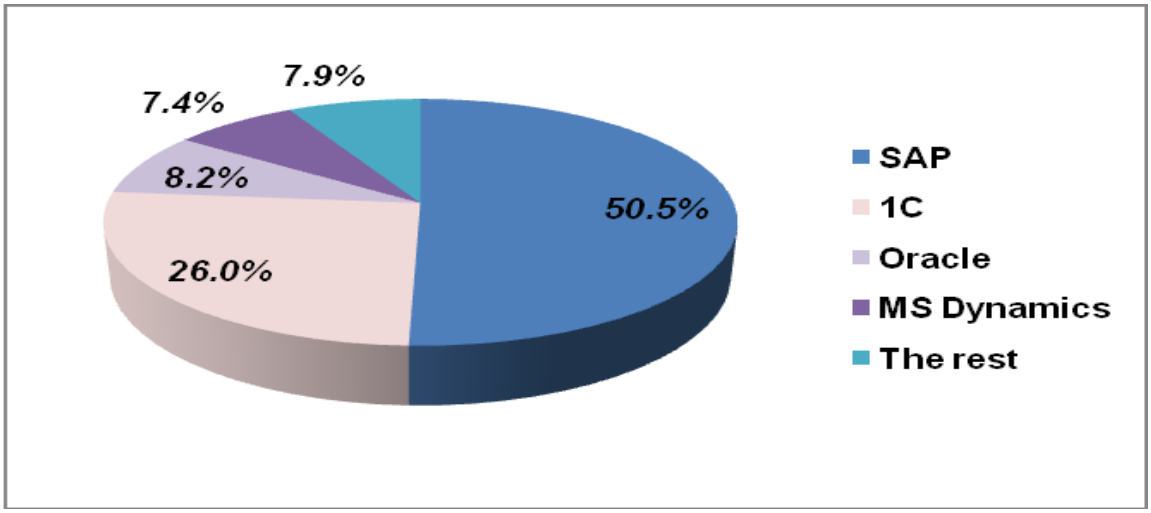

Figure 4: Russian ERP Market, 2010 (According to IDC)

1C is one of the largest domestic enterprise management system providers. The company's total revenues are estimated at 18,4 billion roubles in 2010. Over 50% of the company revenues cover the share of its own products. 1C: Enterprise is 1C Company's accounting and ERP software most popular not only in Russia, but also in CIS formed countries. It's targeted towards small to medium business. More than million organizations work with 1C: Enterprise while performing their everyday routines. 1C: Enterprise is directly competitive with SAP and Microsoft Dynamics. In contrast to them 1C: Enterprise has open price policy, better rapid application development and inexpensive solutions. In Russia 1C: Enterprise has wide fully configurable set of applications implementing:

- customer relationship management (CRM);
- private/public sector accounting and accounting in non-profit organizations;
- accounting and reporting for private entrepreneurs;
- payroll calculation and HR management;
- sales and warehouse;
- manufacturing;
- financial planning;
- report consolidation;
- And other.

Most organizations don't run on 1C: Enterprise alone. They use several ERP systems. In the real world all of these systems need to work together.

In comparison with Western Europe the functionality of the Russian ERP is still much less developed. We can explain it of appreciable differences in economic resource-limited on system development. The other specific of the Russian EIS is that quit often companies prefer to implement its own software products which are developed in their own IT department.

Some of the Russian enterprises take advantage of information systems based on principals of SOA (service-oriented architecture) as a set of integrated Web-services.

On the application side, the most frequently implemented ERP modules on the Russian market are financial, logistics and control modules although CRM and BI solutions are also becoming popular. As for ERP services, this market is currently evolving better than the ERP applications market, since many companies, despite drastic cuts in IT spending, continue to allocate budget to maintain the functionality of the core modules of previously implemented ERP solutions. The main goals of implementation of the corporate IT solutions in Russia are automation of accounting, finance and human resource management.

4.2 The Russian ERP market

All major ERP players are already presented on Russian Market. Four companies controlled more than 90% of the Russian ERP market in 2010, SAP accounting for 50.5%, Oracle having 8.2%, Russian 1C having 26% share and Microsoft Dynamics controlling 7.4% of the market (Figure 4). SAP became the market leader in 2006 and continues to expand its market share from 40% to more than 50% within several years. On contrary, Oracle, being on the second place, strongly reduced its market share. The Russian 1C, which in 2006 controlled 12% of the market, is on second position and shows the stable growth. IDC forecasts that 1C will reach the market share (Table 1).

Table 1: Dynamics and segmentation of ERP market in Russia

	2010, %	2009,%	Changes
SAP	50,5	50,1	0,4
1C	26	22,3	3,7
Oracle	8,2	9,6	-1,4
Microsoft Dynamics	7,4	7,1	0,3
The rest	7,9	10,9	-3

According to IDC, the leading Russian industries for ERP implementation is continuous production, on the second place is retail, than goes discreet manufacture and energy sector. The major part of market is concentrated in Moscow and St. Petersburg, but there is increasing demand on ERP solutions in other regions, for example in Ural region.

5. Conclusion

At present, business technologies, along with information and communication technologies, overlap more and more closely. In Russia, as well as worldwide IT became a critical element of the chain of the product or service design and profit. Earnings of companies are growing not only due to a

significant cost reduction and management optimization, but also due to the implementation of modern information technologies and systems.

Although each enterprise is unique in its financial and economic activities, there are a number of problems common to all enterprises. These include the management of material and financial resources, procurement, marketing and much more. ERP-systems provide comprehensive management of key aspects of financial, industrial and commercial activity of enterprises. These systems provide managers with complete and timely information for management decisions and ensure effective data exchange with business partners.

Strengthening of integration processes in the business world leads to the fact that companies are now involved in the environment that combines inner sphere of the company's business, all business partners and customers. In the future the decisions in the sphere of information technologies, should allow integrating people, information and business processes into a unified information system in a single complex of technological solutions more effectively.

More and more Russian companies realize their business need in automation of their processes by implementation of contemporary Enterprise Information Systems and expert forecasts the stable growth of Russian ERP market.

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