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Reporting Process Standardization in B2B System

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Reporting Process Standardization in B2B System

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Reporting Process Standardization in B2B System

JEL Classification: M 15

Keywords: reporting, business process standardization, B2B system, data management

Abstract: Reporting understood as a process provides the output in a form of data and information presentation, which is one of the important aspects of a business management system. The effectiveness of processes and decision making by a management depends on the access to actual and relevant data, provided in the form of transparent reports. This also has an impact on the effectiveness of cooperation with business partners in the B2B model.

Therefore, the challenge for most companies is to convert unstructured data to understandable information that can later be used in the process management. There is little reporting tools, which functionality not only allows to download data from the relevant systems, but also for their conversion to a format suitable for users. As a result, enterprises are often forced to make quickly reports based on data imported from a variety of applications.

The aim of this paper is to present the results of analysis the possibilities of standardizing the data reporting process in the B2B system, which was carried out in one of the stages of a project "Development of a modern and advanced B2B system based on Internet technologies as a result of R&D." As a result, it was recommended the reporting tool for the B2B system optimal for the user. The basic analytical criteria for the development of process standards were: tool efficiency, facility for a user, data formats for which the tool exports data.

Introduction

In the current economic circumstances the demand for non-standard information in enterprises resulting from the complexity and dynamics of the processes, changes in the model of doing business activities, market needs of organizations and influence of the environment on their activity has definitely risen. The research done by SAS Institute (<http://bi.pl/publications/art/10-business-intelligence-skad-przyszedl->

dokad-zmierza) indicate, that in the few next years the importance of practical application of advanced analytics in business processes is going to grow up.

A large number of data managed by companies requires complex cross-sectional analyses. Managers expect reports presenting a given issue from many perspectives, and at the same time, in a clear and comprehensible manner. Moreover, the decision-makers want to receive analytical reports prepared in a short time and on the basis of the most recent data. Automation and virtualization of business processes allows to easily and quickly access data, and then, transform them into management information by means of business intelligence tools, which use the resources coming from integrated databases. Business practice shows, that the managers are interested in data, which come either from internal enterprise resource planning system, or other systems supporting external processes based on B2B relations.

The analysis of reporting tools, which functionality allows not only to extract data from internal systems of an enterprise, and external ones used by business partners, but also transform them into format suitable for users, shows that availability of those tools is limited. As a result, enterprises are often forced to prepare partial reports on the basis of data imported from various applications.

Taking into account the above, the aim of the paper is to present the results of analysis of reporting process standardization possibilities in B2B system, which was made as one of the stages of "The development of state of the art and advanced B2B system based on Internet technologies as a result of research and development works" implemented by OPTeam SA under the Regional Operational Programme of the Lubelskie Voivodship in 2007-2013". On the basis of the analysis, a recommendation in order to design a reporting tool in B2B system optimal for a user was prepared. The paper is structured as follows: Section 2 introduces and justifies the research method, Section 3 gives some background on Business Analytics (BA), Business Intelligence (BI) and data reporting in the enterprise management based on B2B model, Section 4 presents eXtensible Business Reporting Language, Sections 5 and 6 discusses the results of the study and recommendations for B2B system created in the project, Section 7 provides conclusions.

Methodology of the Research

The main aim of the paper allowed to define the following objectives:

- identification of reporting tools' functionalities;

- identification of technological solutions used in reporting tools available in the market, which may be applied in establishing standard for “reporting” functionality in B2B system designed in ASP.NET environment.

A comparative analysis of functionalities and reporting tools technologies, which allowed to choose the optimal tool for designed B2B system, was applied as a research method. The reporting tools analysis was based on the following criteria:

- access to data through Internet browser
- range of specialized tools for report’s designing
- data export formats
- simplicity for end-user
- access to reports through a browser
- supported browsers
- available programming interfaces
- best practice support
- licence cost and terms.

The methodology of research allowed making conclusions and recommendations, which were used as input data in designing of reporting functionalities in the B2B system.

Meaning of Business Analytics and Data Reporting in Enterprise Management in B2B Model

Changing market, more and more aware, demanding and better informed clients, complexity of processes, enterprises operating on the basis of integrated management systems, implementation of new business models based on B2B relations – all of these contribute to growing importance of analytics, and the competitive advantage of enterprises becomes more and more determined by quick use of data and information through relevant business analyses and providing managers ready reports in a short time.

Literature research show (Bartlett, 2013; Davenport & Jeanne, 2007; McDonald & Tina, 2007; Stubbs, 2011; Ranadive, 2006; Zabin & Gresh, 2004, Davenport, 2006; Pfeffer & Robert, 2006; Davenport & Jeanne, 2005; Bonabeau, 2003, pp. 116-123; Davenport et al, 2001, pp.117-138) that Business Analytics (BA) has been known for many years. Supported by Business Intelligence (BI) tools, it is focused on modeling, analyzing and interpreting data by using quantitative and computational techniques for finding solutions to very complex problems, leading to a rational decision making. It has to be understood as the process supported by

various applications in the enterprise management includes exploring many ways for tackling problems faced by managers. It helps in the clarification of objectives and priorities, suggesting and defining the alternative strategies for the optimization of benefits. This involves the various professional tools for the business decision making, which are becoming very important for better returns in the modern rapidly changing markets, constantly facing the increasing competition. These tools are based on the computing power to study the available data, and to achieve right results, optimum performance, and a high degree of success.

In the recent years Gartner started promoting Business Analytics (BA) term instead of Business Intelligence (BI), which based on its own definition, should comprise aspects related to providing comprehensive analytical tools (BI and Data Warehousing), and their methodological and effective use in order to better implement strategies in actions and performance management (<http://www.gartner.com/it-glossary/business-analytics>).

According to A. Januszewski, BA and BI terms are currently used interchangeably. IT companies use BA in order to define various types of tools (data warehouse platforms) and analytical applications used for corporate performance management (Januszewski, 2008, p. 14).

Business Analytics based on BI has the following importance in the enterprise management:

- assessment of enterprise's past activity and using it as a basis for making suggestions allowing to effectively use internal resources and opportunities appearing in the environment,
- preparing data in order to make decisions improving enterprise's activity and its results in the future. (Rostek & Witek, 2010, p. 82).

According to Davenport, competent usage of business analysis in enterprise management process, allows the company to better recognize its potential and limitations, and simultaneously gain advantage over competitors. He classifies core conditions of effective competitiveness as a result of BA use (Davenport & Harris, 2007):

- using results of business analysis in making decisions by the managers at different management levels (strategic, tactic and operational),
- applying not only methods of descriptive statistics, but first of all, forecasting and optimization methods in organization management,
- using business analysis in carrying out processes and business functions of a company,
- permanent development of used tools, methods, techniques and analytical data in every area of the company management.

From the company perspective operating in the B2B model, the process of carrying out business analysis meets the same criteria. The range and

meaning of BA are extended, because the enterprise needs to take into account other data resulting from external processes carried out in cooperation with business partners. As a result, the company assesses activity in terms of resources and benefits which may be achieved through cooperation with partners. Owing to this, the synergy effect achieved by applying B2B system is high, which has a significant meaning in the market.

BA results are presented in reports, which currently also get a new dimension and meaning. To a great extent, it is conditioned by changes of business models, evolving towards B2B. Therefore, data reporting transforms from a communication and monitoring tools of internal management into a tool of knowledge, observation and experience exchange used in managing external processes, carried out in cooperation with business partners. Reporting coming from B2B model influences the company's image. It makes company's activities transparent in the eyes of customers and cooperating partners. Thus, appropriately targeted reporting process becomes an element of company's strategy and its business partners.

The classification of reports depends on such factors as: possibility to introduce changes, range of report's application and the way in which data are presented (Rostek, 2008, pp. 31-42). The same classification of reports is also applied in B2B systems.

According to the first criterion, reports are divided into:

- static - comprising standard documents, made available to a user to be printed out automatically or generated and sent automatically by IT system. A user is only their reader;
- dynamic – created for individual needs of a user. Depending on user's skills and granted authorisations, dynamic reports are created by them on their own or delegated to their employees. If a dynamic report is available in standard reports set, it will be automatically found in static reports set.

According to their application range, reports are divided into:

- functional, which include all reports documenting operational activity of an enterprise,
- updating reports allowing to collectively introduce and update data directly in data base structures. The most common application of this type of reports are: editing and adjusting data groups and clusters, introducing rates and parameters values, defining size and value of aims, data correction;
- technical reports, generated by IT division in order to: monitor the IT system's work, servers performance, controlling disc space usage,

monitoring activity of users in the system, supervising data quality in the system.

Taking into consideration the data presentation manner, reports are divided into:

- two-dimensional – they are documents instances, which document presented phenomena in flat tables. They usually provide standard information with low level of details. These are reports created by the developer, generated at one's request or refreshed automatically, the most frequently shared through web browser;
- multi-dimensional - based on pivot tables structures, giving a user a possibility of interaction based on drilling-down, rotating, cutting and sorting presented data. They appear in static and interactive form, they are rich in graphic, charts and diagrams. (Rostek, 2008, pp. 31-42)

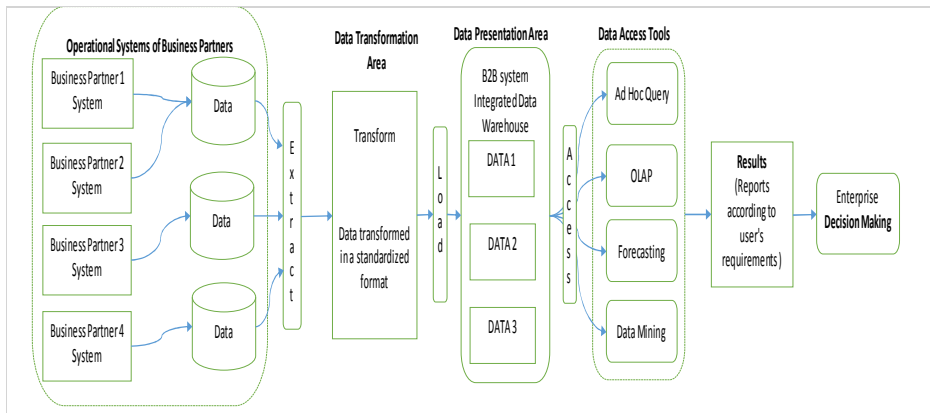
The above division is significant when developing B2B system, because from the perspective of IT specialists, the information on needs of end-users influences developing reporting functionalities in the system.

Data Warehouse and Analytical Transformation

In B2B system, the data warehouse has a special meaning because it is considered as the “heart” of the Business Analytics and the data reporting. It is based on combining data from all business systems cooperating in B2B platform. The B2B data warehouse is a source of relevant, up-to-date resources that after the analytical transformation become the valuable information for the company in a process of creating a competitive, market, economic strategy and making decisions.

Figure 1 shows the logic and basic elements of an analytical transformation process for the purpose of reporting in B2B system.

Figure 1. Analytical transformation process in B2B system



Source: own conception based on Inmon, 2002; Kimball & Ross, 2002.

From the B2B model point of view, operational systems are used by collaborating companies to run the business processes. They provide all necessary data for the purpose of electronic transformation. In enterprises, data are usually in wide range of sources:

- related, object, hierarchical and net data bases,
- text files,
- calculation sheets,
- XML, HTML, SGML files.

Some of the data can come from outside and open sources, e.g. Internet, commercial data warehouses, as well as sophisticated sources, e.g. photos, maps, written documents, recordings, etc.

Integration, one of the most important and most difficult aspects of data warehouse, is based on removing contradictions and excess information from data coming to warehouse from operational environment, what allows to achieve a uniform image of data stored by an institution (Jarke et al., 2003)

The data staging area consists of both a storage area and a set of processes that work on this data. These processes are called extract-transform-load (ETL) and consist of:

- data extraction, in which data is copied from the operational source systems into the staging area,
- transformation, in which the data from the various sources is combined and transformed in a common format,
- loading, in which the data is loaded in the presentation area that is responsible for organizing, storing, and making these data available to be accessed by other systems.

Data access tools are the applications that actually use data stored in the presentation layer in order to deliver the information for which Business Analytics system has been built. The type and complexity of data access tools can vary. Examples are reporting tools, which process standardized reports, forecasting tools, which use the data to identify trends, and online analytical processing (OLAP) tools, which quickly provide answers to analytical queries.

In data warehouse tools provide services, which allow users to access data stored in it. Most opinions of users and their assessment of experience of working with data warehouse will be shaped by the fact how well those mechanisms meet their needs. Users are significantly varied in terms of their technological skills. Data warehouse should support a full range of technical skills and analytical complexities of users.

Type of users determines a category of informational needs. It occurs, that the same person needs to gain information coming from a few categories, however, there are cases, that a given person plays one role for most of the time. In present business environment, roles are often swapped due to great dynamics of changes occurring in it.

XBRL as a standard of reporting in business

Business information is created on the basis of data generated in different forms, in terms of content, structure, as well as a medium. In the B2B cooperation model there is a necessity of setting a standard, which will ensure:

- simplicity of processing data into information in IT system,
- transparency and unambiguity of data;
- possibility to collect and compare data coming from different enterprises and different IT systems.

It has been proven, that first requirement is met by most systems, because they create data in electronic form. Transparency and unambiguity is not easy to achieve. When analyzing reports from different systems, which contain figures equipped with similar word label, it cannot be clearly stated that a given value was calculated in the same way and means exactly the same in both cases. In order to achieve this, reports should be provided with numerous comments clarifying their context and computation method. Data formats, even if many of them use XML, are entirely incomparable. Reports received by enterprise's system may be at most stored in shared repository, engaging a person for every content-related analysis. A solution commonly used so far has been imposing one specific format by a recipient of data. This way a certain level of data comparability is achieved.

Taking into consideration the above factors, XBRL (eXtensible Business Reporting Language) was created, which is an open standard, designed to exchange business information contained in reports.

XBRL is currently dedicated to reporting data contained in financial statements, used mainly by companies listed on stock exchange. Accuracy of created taxonomies in comparison with prevailing specification may be checked through validation by means of the XBRL validator, which has a documented conformance with XBRL 2.1. Conformance Suite specifications.

The basic feature of XBRL is unambiguous identification of report elements semantics through relating every of them to a certain dictionary called an XBRL taxonomy. The language is based on XML and similar technologies and owing to this, it is not related to any hardware or software platform. The XBRL standard extension means:

X for eXtensible: flexible, easily adjustable. According to this rule, extending means adjusting the standard to one's needs;

B for Business: XBRL relates to economic life. At first it was meant to have been applied only in financial reporting, however with time it turned out that it may be successfully applied in a wider range;

R for Reporting: a standard is created to report business facts. More precisely, XBRL language can identify economic facts and events – such as net sales, net revenue, entertainment expenses – in such a way, that they can be unequivocally interpreted by diverse group of information recipients;

L for Language: XBRL is a standardized language comprehensible to computer processes (<http://www.xbrl-pl.org>).

XBRL is composed of two parts:

- dictionary – XBRL taxonomy, containing references to other available dictionaries,
- facts – XBRL instances, that is a set of proper information.

In XBRL report every fact is accompanied by an XML tag, which meaning is described in attached dictionary, created according to XBRL specification. XBRL taxonomy based on XML schema describes not only formal features of particular tags, but also expresses their semantics. Apart from specifying attributes of particular tags, it is necessary to define relations between them. Knowledge of XBRL taxonomy report ensures a possibility to check syntax and semantics by verifying e.g. whether summaries are obtained through summing up particular components.

According to law regulations of different countries, taxonomies include up to more than ten thousand interrelated concepts, and often expanded by enterprises which create their own taxonomies. XBRL is an XML dialect

using XML Schema and XLink technologies. Owing to this, some concepts may derive from and relate to others. Type of relation is defined by XBRL specification, which allows greater unambiguity. Simple relations act similarly to previous references tags in HTML, while extended ones allow defining relations.

XBRL report is composed of an instance containing reporting of facts and taxonomy, which constitutes a dictionary defining concepts, to which information and classifications of relations between the concepts are related and which may also include rules necessary for calculating data.

Dictionary concepts are placed in XSD (XML Schema Definition) (<http://www.w3.org/TR/xmlschema11-1>). So-called linkbases are used to fully describe them. In XLink specification there were defined (Reimschuessel-Was, 2009):

- Labels Linkbase – defines labels of concepts to be used when visualising report instances. Provides support for taxonomy language versions;
- Reference Linkbase– defines references to external sources, defining a given concept, e.g. legal acts in force;
- Definition Linkbase– defines relations between concepts such as: „general-special” (relations of generalisation), „essence-alias” (indicating a different meaning of the same concept), „requires-element” (indicating that one element requires appearance of the other);
- Presentation Linkbase – describes how concepts are made, that is their hierarchy, order and organisation in a form of e.g. table rows. It allows formatting a report later on. It is composed mainly of parent-child relationship defined by means of extended references with a proper ‘xlink:arcrole’ attribute;
- Calculation Linkbase – defines summaries and simple computations by assigning to every concept a weigh attribute value “+1” (a value is added) or “-1” (subtraction) and indicating an upper level concept that the lower elements should sum up to;
- Formula Linkbase – describes more complex computations and business rules, based on the latest recommendation of XBRL International on formulas.

XBRL distinguishes two types of concepts: an item and a tuple. The difference is in appearance of child elements, which happens in case of complex concepts. Every concept has attributes:

- Substitution Group - attribute used to distinguish types of concepts;
- Name –unequivocally defines a concept in terms of a scheme. Moreover, concepts may have identifiers (id);

- Type – defines type of value which may be adopted by a given concept. XBRL specification defines available types;
- Period type –obligatory for simple concepts, it takes the following values: instant and duration. It allows to classify concepts into those having a value as of date (e.g. stock balance) or during a certain period of time (e.g. costs);
- Balance – additional attribute applied for concepts originating from accounting, such as Monetary Item Type and defines debit or credit nature of accounting;
- Label – names of concepts significant to the recipient of reports are used to visualise reports. They are stored in a separate Labels linkbase, what allows to create language or multi-language versions of taxonomy without disturbing their basic content.

Creating XBRL is organised into a few steps:

- 1) Defining a dictionary (a taxonomy)
- 2) Mapping – every concept of a report has its counterpart in taxonomy
- 3) Modelling one's own taxonomy.
- 4) Tagging – attributing tags. It is the most important part of doing a report. It consists in mapping internal sources of data onto dictionary tags. Attributing tags may be conducted manually (using spreadsheet), by means of specialized software, which will create and save attributing by linking taxonomy tags with our data, taking into consideration sources of these data, or even directly in IT systems which are to generate data.
- 5) Report generating – means instances' creating. With mapping at one's disposal, an instance may be generated automatically.

To conclude, XBRL reports are documents built by means of XML language of flat structure, and tags labels, which are quite complicated and not always clear for their user. At present, they are usually meant to be processed by software. Taking into account needs of enterprises and managers, they should be also available directly to interested and competent recipients.

Reporting Tools Overview

There are many tools available in the market. Reporting modules are an inseparable part of web systems. Reports are varied in terms of their nature due to users' needs, e.g. market analysis, financial, sales or manufacturing-related statements. Many systems include standardized report packages. However, it turns out that the complexity and individuality of business

processes in enterprises and between them generates a need for creating ad hoc reports by the users themselves.

Traditional IT tools allow to design simple statement, however, they are not useful in multidimensional analysis. That is why special applications have been created, dedicated to data analysis such as e.g. Oracle Discoverer, which use the idea of pivot table. Multidimensional analyses are usually conducted in an interactive way. Tools dedicated for it are usually interactive to such extent, so that they could come in handy to users who have no IT experience. Except for reading data, they also generate formatted results, ready to be printed out.

Choice of a tool, which was recommended to be applied in the designed B2B system, was preceded by analysis of IT solutions for data reporting available in the market, and its results are presented in the table below.

Table 1. Analysis of reporting tools available in the market from the perspective of their usage in B2B system

	Oracle BI Publisher	XtraReport Suite DevExpress	Microsoft SQL Server Reporting Services (SSRS)	SAP Crystal Reports
Structure	<p>The tool is built of three separated layers:</p> <ul style="list-style-type: none"> • data- are directly retrieved from the format or transformed into XML. The same data representation may serve to create reports in various arrangements and national languages; • graphic layout – in a form of a scheme defining appearance, containing tabs related to elements of XML data representation, many layouts may be created for one data representation; • languages – fixed text elements may be automatically extracted from report’s definition, saved in standard format 	<ul style="list-style-type: none"> • A tool working in .NET environment, which simplifies the process of designing reports and delivering them to an end-user. • XtraReports Suite platform is composed of suites for the following environments: • WinForms - fully integrated with MS Visual Studio development solutions suite for Windows Forms; • ASP.NET - a set for developing reports in ASP .NET AJAX and ASP .NET MVC environments; • WPF - a set of solutions for 	<p>Based on a three-level architecture composed of the following layers:</p> <ul style="list-style-type: none"> • database – database layer is composed of bases of report server and data source. During native installation of Reporting Services two databases of report server are created (for metadata of reports and parametrization of report server); • Report Server - it plays the key role in the structure of the tool. As a proxy layer it is responsible for handling customer requests and managing the environment. The main function of Report Server 	<p>An advanced report generator, optimized for working in business environment. The most recent versions have common architecture of access to data, reporting and delivering information. Crystal Reports tool has been designed to be integrated with already existing functions related to data, networks and applications. It has an open and multilayer architecture, composed of:</p> <ul style="list-style-type: none"> • database layer • tool layer • presentation layer.

	<p>and submitted for translation into other languages. For every defined layout, a report can be created in every language into which translation has been made.</p>	<p>developing reports in WPF environment;</p> <ul style="list-style-type: none"> • Silverlight – a set of solutions for developing reports in Silverlight technology. 	<p>component is: communication and programming interface (API) in a form of Web Service .NET;</p> <ul style="list-style-type: none"> • user’s interface (Report Builder) – built similarly to MS Excel or PowerPoint interface. Report Builder is a ClickOnce application implemented through web browser. 	
<p>Functionality</p>	<ul style="list-style-type: none"> • Separating data definitions from report layout definitions; • A wide range of predefined types of data sources; • Aast possibilities of formatting report layout (PDF, HTML, MHTML, RTF, Ppt); • Availability of a handy customer tool <i>Template Builder for Word</i> supporting 	<ul style="list-style-type: none"> • Switchable thematic motives; • Lingualism; • Document preview on order; • Searching for a text in report document; • Registering events of user interaction, except for ASP.NET environment; • Applying Watermarks in text and/or images, 	<ul style="list-style-type: none"> • Using ready tools to create reports • A possibility to place designed reports in ASP.NET applications and Windows Forms • Creating simple and advanced reports on the basis of a vast access to data sources; • Reports may be created by end-users • Handy formatting and clear data presentation 	<ul style="list-style-type: none"> • Creating reports in different layouts with interactive implementation function; • Applying cross tabulation in order to create reports in a faster and better way; • Standard data fields and fields defined by a user; • Modelling scenarios „what happen if’ directly in reports; • Browsing and exporting

	<p>formatting in RTF, MS Word, Adobe Acrobat , MS Excel;</p> <ul style="list-style-type: none"> • It has a complete system for creating, initiating and scheduling reports. • It manages rights and analyses report results online in a way similar to work with pivot tables in Excel; • A built-in functionality of delivering reports through most frequently used channels by electronic mail or fax; • Bursting, that is division of one file (or other form) of result report in order to distribute it among many recipients; • Handling multiple languages and currencies; • Availability of 	<p>except for ASP.NET environment;</p> <ul style="list-style-type: none"> • Map of the document (list of tabs) • Extended panel of report's parameters. 	<ul style="list-style-type: none"> • Data visualisation by means of charts and graphics • Data access from the web browser's level • Remote and easy access to important information • Export of data that a report is composed of into files of different formats, including MS Excel, MS Word, PDF Acrobat Reader 	<p>reports to Adobe PDF, MS Word, MS Excel, RTF, XML formats;</p> <ul style="list-style-type: none"> • Reliable visualisation and interactivity due to embedded Adobe Flash (SWF) files; • Sorting, filtering and formatting inside a report without a necessity of renewed search in database; • A possibility to drill-down to transactional data level while keeping safety at report's and user's level; • Publishing reports on the Internet; • Conveying reports in a company by means of an e-mail, fax, electronic files transfer or as a print-out; • Access to files at any time or place due to a browser dedicated to Crystal Reports software,
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	<p>preparing and then modifying report layers by decisive persons on their own;</p> <ul style="list-style-type: none"> • Report implementation process is approximately 2 to 3 times quicker when compared to tools requiring coding in Java language; • Using common J2EE architecture; • A wide range of choice in terms of system software for an implemented project • High flexibility in building reports, efficiency, scalability and reliability of the tool. 			<p>also without Internet connection;</p> <ul style="list-style-type: none"> • Assigning access rights to users and groups of users.
Report designing	<ol style="list-style-type: none"> 1. Defining of data model 2. Specification of report's parameters with an option to define values 	<ol style="list-style-type: none"> 1. Modeling data with usage of grouping, filtering and sorting options 2. Defining report's parameters. Report 	<p>There are two possible paths of developing reports:</p> <ol style="list-style-type: none"> 1. Report Builder is destined for a user. It allows a user to 	<ol style="list-style-type: none"> 1. Choice of data source (a broad access to databases, sheets and files in different formats). Most of data sources may be

	<p>acceptable for these parameters</p> <ol style="list-style-type: none"> 3. Defining report's layout templates 4. Determining definitions of language versions 	<p>may be initiated after conveying all parameters or with usage of default values for input parameters.</p> <ol style="list-style-type: none"> 3. Defining report's appearance. Every element of XtraReports report has its own set of properties defining its appearance. 4. Saving reports. XtraReports reports placed in web applications may be converted into many popular formats, without any components of outside companies. 	<p>perform the following tasks on their own:</p> <ul style="list-style-type: none"> • formatting reports and filling them in with captions • defining new fields and computations defined with usage of a model • previewing, printing and publishing reports • exporting data constituting a report into files of various formats, including i.e. MS Excel, MSWord, PDF Acrobat Reader formats. <p>A user chooses report layout template, containing predefined data sections (tables, arrays or graphs). Then, a user places chosen data elements in a project's view and defines limits allowing to filter report's</p>	<p>configured by means of Database Expert dialog box, which allows to choose how tables are connected including relations between them.</p> <ol style="list-style-type: none"> 2. Defining the form of constructing a report (by means of a creator, basing on the model of another report, from scratch); 3. Defining objects' features (fields presenting data) 4. Formatting objects 5. Defining operations on data
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			<p>source data. A model contains all information, needed by Report Builder tool to automatically generate a query and collect required data.</p> <p>2. Server Data Tools is destined for developers. Its key element is Report Designer, which facilitates developers defining sets of data for a report on the basis of various data sources, designing report's layout, and then displaying report's view directly in development environment before placing it on a report server. Developers may quickly and easily create reports using Report Wizard or build more complex reports using Report Designer. After</p>	
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			finishing working on a report, a developer may display its view and place it on report server directly from Report Designer tool level.	
Access to data	<ul style="list-style-type: none"> • Relational data are collected by means of SQL queries • Data in XML format • Data from Web Services; • It is possible to buffer data sources. It allows to create a report on the basis of various graphic layout templates without the necessity of renewed data collection from a source. 	<ul style="list-style-type: none"> • Collecting many sources data • Depending on a type of a source there are different ways of connecting data. • A report may be linked to data from database, XML file or any kind of structure created while making a report. • Irrespective of type of data and a source, report's object is related to data source by DataSource properties. 	<ul style="list-style-type: none"> • Versatile functionality for different data sources, which may be defined at server's level (Shared Data Sources) or may be contained in a report. • One may create reports using relational and multidimensional data from databases of SQL Server, Oracle, Hyperion software and others. • Due to data processing extension in XML format, data from any XML data source may be collected. 	<ul style="list-style-type: none"> • Databases: PostgreSQL, Sybase, Ingres, IBM DB2, Microsoft Access, Microsoft SQLServer, MySQL and Oracle • transactional database Btrieve • spreadsheets, • text files • XML, HTML files • Lotus Notes, Microsoft Exchange and Novell GroupWise databases <ul style="list-style-type: none"> • SAP: BW, Info Sets, Tables and Business Objects Universes • any other data source available

			<ul style="list-style-type: none"> • In order to develop non-standard data sources, functions with values kept in a table may be used. 	through web services.
Programming interface	<p>Reports may be initiated interactively by using websites of XMLP Enterprise server. Due to available interfaces, a developer of an IT system, by using XMLP, may fit reporting into their system while keeping the full control of this mechanism.</p>	<p>Reports development is made in MS Visual Studio environment. The creation process is standard, as when building Windows Form application or web application. Reports' creator is built in Visual Studio environment. It ensures a fully integrated edition of reports similarly to developing applications with usage of forms.</p> <p>Reports may be embedded in applications and web sites built in ASP .NET environment. A report published on the web or web application is available to preview and print-out on the</p>	<p>It has two types of interfaces: simple for users (Report Builder) and advanced for developers (Report Designer), which allows developers to create highly dynamic reports, giving users a possibility to interact with data and analyse them thoroughly. Each of the interfaces has influence on report development process.</p>	<p>Reports are designed in MS Visual Studio environment. It ensures a possibility of creating interactive data compilations stored in different bases. Reports related to web and desktop applications may be made available from Crystal Reports for MS Visual Studio. NET. The tool allows to develop an application with drilling functions and filtering information according to a user's needs. Instead of coding, Crystal Report Designer interface may be used, which will ensure quick and professional creating and formatting reports.</p>

		customer's part – a user initiating a report.		In order to use full scope, reports should be built by means of Crystal Reports software, and then definitions of reports in .rpt files should be placed in web application.
Web browser support	<p>Reports may be initiated:</p> <ul style="list-style-type: none"> interactively by using XMLP Enterprise web server; directly by giving a URL address, and conveying mandatory parameters; programme-based by means of API interfaces (Application Programming Interfaces) for Java language. 	<p>XtraReports supports browsers:</p> <ul style="list-style-type: none"> Internet Explorer 7+ Firefox 2+ Chrome 1+ Safari 3+ Opera 9+ 	<p>Only Internet Explorer ensures a full functionality. The other browsers give only a limited set of options, not allowing e.g. to print or zoom a document. An administrative tool Report Manager also initiated through a browser works only with Internet Explorer 7+.</p>	<p>Crystal Reports available on the web applications preserve availability of full functionality in browsers:</p> <ul style="list-style-type: none"> Internet Explorer Safari Firefox Chrome Opera.
Comments	<ul style="list-style-type: none"> Lack of dedicated documentation for system's administrators; Lack of dedicated monitoring tools available in the system 	<ul style="list-style-type: none"> Scaling documents only in WinForms environment. According to present licencing rules reporting components XtraReports for ASP 	<ul style="list-style-type: none"> Ensures high interactivity of reports; Equipped with cache memory; It is free of charge when works on SQL 	<ul style="list-style-type: none"> Developer's version of Crystal Reports for Microsoft Visual Studio ensures a function of direct development of reports in .NET applications.

	<p>itself.</p> <ul style="list-style-type: none"> • Business Intelligence Publisher is acquired according to Oracle licencing rules. 	<p>.NET may be acquired in a dedicated platform or in one of many available DevExpress toolboxes.</p>	<p>database server. Using Reporting Services requires having SQL Server licence.</p> <ul style="list-style-type: none"> • Many organisations use SharePoint solutions to improve cooperation between employees, partners or even customers. When Reporting Services services are configured to work in SharePoint Integrated mode, users may publish or upload to SharePoint library reports, model reports, resources or shared files of data sources. This allows to build a reporting function in intranet SharePoint solution. 	<ul style="list-style-type: none"> • Web application is a server application, which allows many users to simultaneously access reporting tools directly or indirectly from application layer. • Web applications, which are distributed outside require additional licences. Depending on Crystal Reports version, there may be differences in licencing rules. • In case of B2B solutions which work in outside environment licencing method is expensive.
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Source:

own

research

Traditional and interactive tools are suitable for creating documents or data summaries. In case of the B2B system, this type of reporting tools turn out to be little useful because they enable making mistakes. B2B system generates a need for creating more advanced and extended studies, being a compilation of many different summaries, related by text and graphics. It is from the fact, that it is used by various users from enterprises cooperating in the B2B model.

Recommendations for standardization of reporting in B2B system through websites

B2B web application as an IT tool allowing to work using web browser operates on enterprise's data, shares and exchanges data online with IT systems of other enterprises, which act as business partners. In order to take decisions quickly, managers need quick access to these data, which are initially registered by means of ERP systems. Managers having vast skills and knowledge need an intuitive, and at the same time powerful tool, enabling them to browse through data and find answers to critical questions, without the necessity to have detailed technical knowledge of data sources. Making a prepared report available in an effective and easy way is a task for software, which allows to distribute reports through web browser. B2B web application would be incomplete if it was not equipped with reporting functionality. The evaluation results in terms of applying reporting tools in B2B system are presented in the Table 2.

Table 2. Evaluation of usability of applying reporting tools in B2B system

Evaluation criterion	Oracle BI Publisher	XtraReport DevExpress	Microsoft SQL Server Reporting Services	SAP Crystal Reports
Access to data	*****	*****	*****	*****
Range of specialised tools for developing reports and its potential	***	*****	*****	*****
Compatibility with browsers	*****	*****	**	*****
Efficiency	****	****	****	****
of data export formats	***	*****	*****	*****

End-user experience and interface	****	*****	*****	****
Costs	*	*****	***	*
Programming interfaces and their flexibility	****	*****	*****	*****
Best Practices support	*****	*****	****	*****

Source: own research.

Legend:

- ***** - very good
- **** - good
- *** - satisfactory
- ** - low
- * - very low

Analysis of reporting tools in terms of their usage for designing and sharing reports in the B2B system allows to recommend XtraReport DevExpress solution due to its:

- optimal set of tools for designing reports
- full integration with project environment .NET
- wide range of data resources
- variety of export formats
- optimal communication with user and interaction
- compatibility with web browsers
- attractive licensing manner when taking into consideration price/quality relation.

Conclusions

To make right decisions in a dynamic business environment, organizations must access at the right moment exact and complete information from various domains of their activity, in the right format for the specific purpose. The operational systems are not the adequate environment for obtaining all this information. Essentially, Business Analytics (BA) or Business Intelligence (BI) tools are very useful because they enable data mining generated from the different sources and their presentation in the form of reports tailored to the needs of users. They depend on a complex data warehouse that collects all required data.

Reporting understood as the process of which the output provides data and information presentation is one of the most important aspects of process management. Creating reports is an important sphere of activity for many enterprises. The effectiveness of the work of managers, business analysts and employees depends largely on access to current and relevant data, provided in the form of clear reports.

The B2B system supporting business processes also must have a reporting functionality. The research made for this purpose show that on the IT market there are a few professional reporting tools useful for creating advanced business reports. For the B2B system created in ASP.NET environment, the core analytical criteria for making the reporting standards were tool's productivity, ease of use by the user, data formats for which the tool exports data. The best reporting tool was XtraReport Suite DevExpress.

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