Theory and Practice in Business Intelligence

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Abstract: - The debate is developed based on the following considerations: 1 - Business Intelligence (BI) is unanimous considered the art of gaining business advantage from data; therefore BI systems and infrastructures must integrate disparate data sources into a single coherent framework for real-time reporting and detailed analysis within the extended enterprise; 2 - Business Intelligence can be described as a value proposition that helps organizations in their decision-making processes; 3 – the Business Intelligence Value Chain represents a „From DATA To PROFIT“ approach and is recommended to ground any performance management program. Different aspects, including theoretical considerations and practice examples, regarding location intelligence, mobile BI, cloud-based BI, social BI and collaborative Business Intelligence will be treated, pointing out some of the author's contributions.
Nowadays, organizations have adopted more prudent policies requiring a financial justification for nearly every IT initiative, including Business Intelligence system implementations. A business-driven methodology is recommended in any BI project management approach, project scoping and planning being vital for the project success. A business-driven approach of a BI project implementation starts with a feasibility study. The decision-making process for large projects is very complicated, and will not be subject of this paper. Having in mind a middle-sized BI project, a feasibility study based on the Monte Carlo simulation method will be conducted.

Key-Words: - Business Intelligence (BI), BI value chain, BI project, Location Intelligence, Social BI, Mobile BI, Cloud BI, Collaborative BI

1 Bringing Together BI Concepts

„Business Intelligence“ is an umbrella term for various business managing approaches based on well-informed decisions, which lead to a high performance level within organizations (Brohman, D.K., 2000; McKnigts, W., 2004; Melfert, F., Winter, R., Klesse, M., 2004; Mukles, Z., 2009; Hatch D., Lock M., 2009; Borysowich, C., 2010; Jamaludin, I. A., Mansor, Z., 2011; Mircea M. (ed.), 2012).
Only optimizing performance a company can survive and remain a competitor in a changing market, being flexible to new demands (Muntean, M., Cabău, L., 2011). Corporate data represents a valuable asset, total indispensable for decision makers.

DEFINITION (D1): Business Intelligence (BI) can be defined as the art of gaining business advantage from data.

Fig 1. D1.Business Intelligence

Corporate data, like customer information, supply chain information, personnel data, manufacturing data, sales and marketing activity data as well as any other source of critical information, need to be brought together into a single coherent framework for real-time reporting and detailed analysis within the

(extended) enterprise. With the help of a BI approach, data is transformed into a high-value insight.

DEFINITION (D2): Business Intelligence (BI) can be described as a value proposition that helps organizations in their decision-making processes (Muntean, M., 2012).

Fig. 2 D2.Business Intelligence

According to Porter, M. E. (1980), a value chain is a systematic approach to examine the development of competitive advantage, consisting of a series of activities that create and build value. All the stages and relationships in this approach will add value to the decision support process. Based on the introduced value chain, tasks like Business Analysis, Enterprise Reporting and Performance Management are possible.

DEFINITION (D3): The BI Value Chain represents a „From DATA To PROFIT“ approach and is recommended to ground any performance management program (Muntean, M., Cabău, L., 2011).

Fig. 3. D3.Business Intelligence

Business data is transformed into relevant and useful information. Further, the obtained valuable knowledge supports any decision-making processes in order to achieve profit.

Succesful BI initiatives are possible with the support of technologies, tools and systems that are capable to sustain the introduced value chain.

DEFINITION (D4): BI Systems, based on data aggregation, analysis, and reporting capabilities, are tools that facilitate all kind of business analysis, relevant enterprise reporting and performance management specific tasks.

DEFINITION (D5): BI Architecture (BIA) is a concept that corespond to the approach introduced in Figure 2, decribing also the main funtionalities of any BI tool.

IT professionals, develop BI approaches on the „Data Warehouse Environment” concept, supposing the BI value chain (Inmon, W. H., 2000; Borysowich, C., 2010).

DEFINITION (D6): A Data Warehouse Environment (DWE) is considered to consist of four main elements: 1 - source systems: they provide the raw material for the data warehouse and business intelligence systems; 2 - extraction, transformation and load systems; 3 - data warehouse repository: most are built on relational database management systems and advanced users combine them with OLAP systems as well; 4 - reporting tools and portals.

Despite the dominant technological perspective included in D6, business performance is not neglected.

Analyzing the BI market at the end of 2011, key forces like cloud, mobile, social and big data will play key role in future BI initiatives. Based on the fact that most of the data (80% of the data) stored in corporate databases has a spatial component, a Business Intelligence approach for spatial enablement is recommended to be developed (IDC, 2011).

DEFINITION (D7): Location Intelligence (LI) is the capacity to support spatial data and to map geographic contexts to business data.

The spatial effect will be having consequences along the whole BI value chain; technology should be able to model this behaviour (Figure 4). Spatial BI has become a top priority for organizations of all sizes and industries that are seeking location-based insight, either to gain a competitive edge, improve organizational performance management or both.

The popularity of mobile devices conducted to the spread of the BI mobile phenomena.

DEFINITION (D8): Mobile BI is the ability to place reporting and analytics in the hands of decision-makers, wherever they are via their mobile devices.

According to Dresner Advisory (2012) the iPad

has been identified as a dominant platform for Mobile BI.

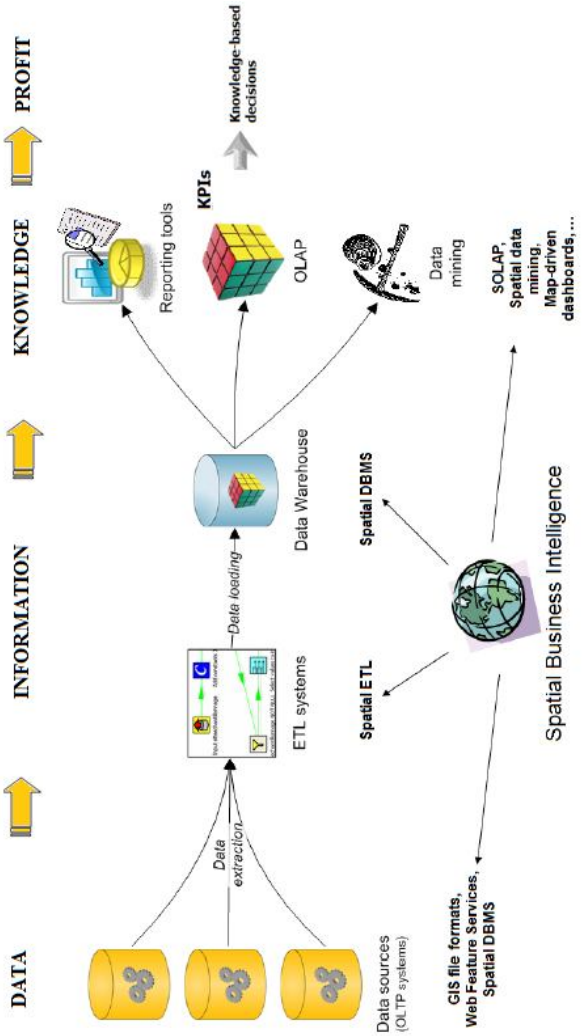

Fig. 4 D7. Location Intelligence. Spatial BI (Badard, T., Dube, E., 2010)

Commonly, using IBM Business Intelligence mobile apps for Apple, BlackBerry and Android, decision-makers can interact with reports, analysis, dashboards and more on smart phones, tablets and notebook computers. Similar, Microsoft's mobile BI support strategy for the Apple iPad inched forward slightly for those using SharePoint 2010. More than 33% of BI functionality will be consumed via handheld devices by 2013 (Gartner, 2011). Three approaches have been identified: 1 - Device-specific BI applications; 2 - Mobile Interfaces to Existing BI platforms (many companies expand their existing BI platforms with the ability to display fixed-form business data – charts or tables – through a BI client installed on a mobile device); 3 - Mobile BI created with Graphical Development Tools.

Software as a Service (SaaS) is a model of software delivery that allows companies to deliver solutions to its customers in a hosted environment over the Internet (Joha A., Janssen M., 2012). All major analysts, including IDC, Garnter, and Forrester, predict for the SaaS BI market a major growth through 2013 (Neubarth, M., 2011). Nowadays, various Cloud BI initiatives, in fact SaaS approaches, are gaining advantage over the traditional ones, lower costs being the main reason for this phenomena (Reyes, E.P.,2010).

DEFINITION (D9): Cloud-Based BI is a BI software solution that runs in the cloud and is accessible via any web browser in a so-called SaaS model.

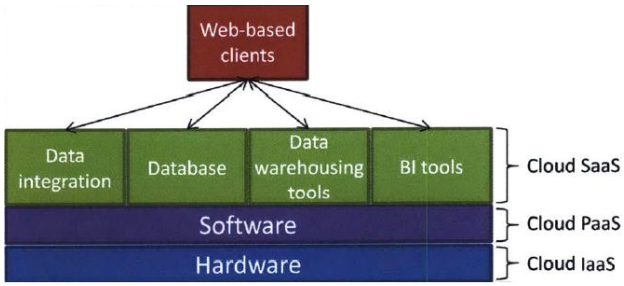

Fig. 5 D9. Cload-Based BI (Reyes, E.P., 2010)

According to D9, Cloud-Based BI is the full offer of the cloud computing provider. But, as shown in Figure 5, two subset variants are also possible: Cloud Platform as a Service (PaaS); Cloud Infrastructure as a Service (IaaS).

As social networking has becoming a popular environment, also an enabler for businesses to interface with the public in new ways, decision makers found it useful to take into consideration consumer feedbacks send via these social media.

DEFINITION (D10): Social BI is the process of collecting social data, analyzing it in order to make better decisions.

A theoretical approach is subject of (Muntean, M., 2012), concrete implementation details will be subject of a future debate (Muntean, M., Cabau, L, 2012). New ways of collecting and analyzing social data are being discovered as quickly as new software and technologies galvanize the imagination of the public. Still

business executives and business analysts want to ensure that the feedback data they incorporate into critical decisions is of comparable quality to the internal data they've been using.
Beyond analyzing feedbacks and seeking for advice, companies are interested to develop a collaborative environment to ensure that decisions made have consensus at approval at the same time.

DEFINITION (D11): Collaborative BI (CBI) = Location Intelligence + Social BI (either traditional BI or SaaS BI/Cloud BI); additionally mobile features.

Also the solution to a business problem is a process that includes business intelligence, BI, by itself, is rarely the complete solution to the problem. Therefore, BI tools must understand the process and how to be part of it.

2 Practice Examples

2.1 Establishing the DW Architecture

It is obvious that, establishing a proper Data Warehouse (DW) architecture is a good start for any BI approach (McKnights, W., 2004). The efficacy of having a centralized data store with quality, integrated, accessible, high performance and scalable data can't be denied, but short term business needs can conduct to a data mart oriented BI solution. DWs are not a once off implementation; they are a medium/long term investment (Cope, D., 2007).

PRACTICE EXAMPLE (PE1): One of the author's contributions represents a BI system proposal capable to monitor and count the web traffic from both the visitor prospective, as well as from the website prospective. The DW proposal (Figure 6) sustains the whole BI approach presented in (Muntean M., Târnăveanu, D., Paul, A., 2010).

PRACTICE EXAMPLE (PE2): As Social BI becomes quit a phenomena, a conceptual schema for a DW proposal was subject of a research demarche (Muntean, M., 2012). The social perspective represents in fact an add-on of a traditional BI system (Figure 7). The integration of the social view into a classical BI schema is possible by transforming a fact table of the traditional BI model into a dimension of the new extended approach (Muntean, M., Cabău, L., 2012).

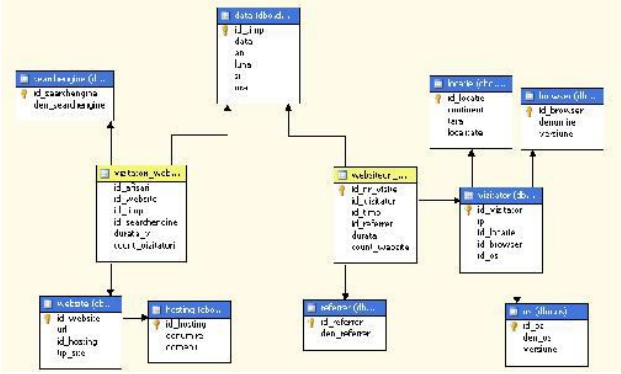

Fig. 6 PE1. Data warehouse proposal (Muntean, M., Târnăveanu, D., Paul, A., 2010)

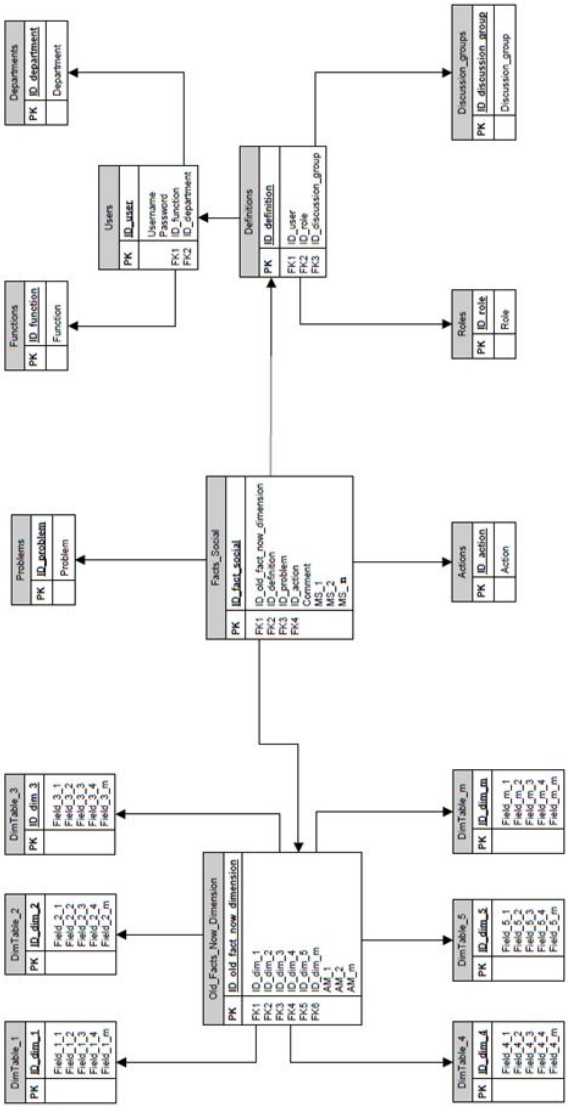

Fig. 7 PE2. Data warehouse proposal (Muntean, M., Cabău, L., 2012)

2.2 BI Reporting. Introducing QR Codes

Despite their usage in advertising and on-line shopping, Quick Response (QR) codes can be placed in BI reports, for example associated with some totals/subtotals of the displayed detail information.

PRACTICE EXAMPLE (PE3): A BI tool proposal for monitoring the total sales evolution was subject of (Muntean, M., Mircea, G., Băzăvan, S., 2012). The report in Figure 8 contains relevant information for analyzing the performance of the sales agents.

2.3 Evaluating a BI initiative

The theoretical approach of this research demarche is subject of an author's current working paper (Muntean, M., Muntean, C., 2012). Without any doubts, a rigorously feasibility analysis should be performed before starting any BI initiative.

The in (Muntean, M., Muntean, C., 2012) introduced general framework appeals to the Monte Carlo simulation techniques for deploying pessimistic, probable and optimistic scenarios.

PRACTICE EXAMPLE (PE4): A feasibility analysis for a middle-sized BI project has been conducted. The approach took into consideration the theoretical designed demarche. With the help of a popular Monte Carlo simulation based tool, predictions for the inputs have been established, results (like Return of Investment (ROI) and Internal Rate of Return (IRR)) have been analyzed (Figure 9).

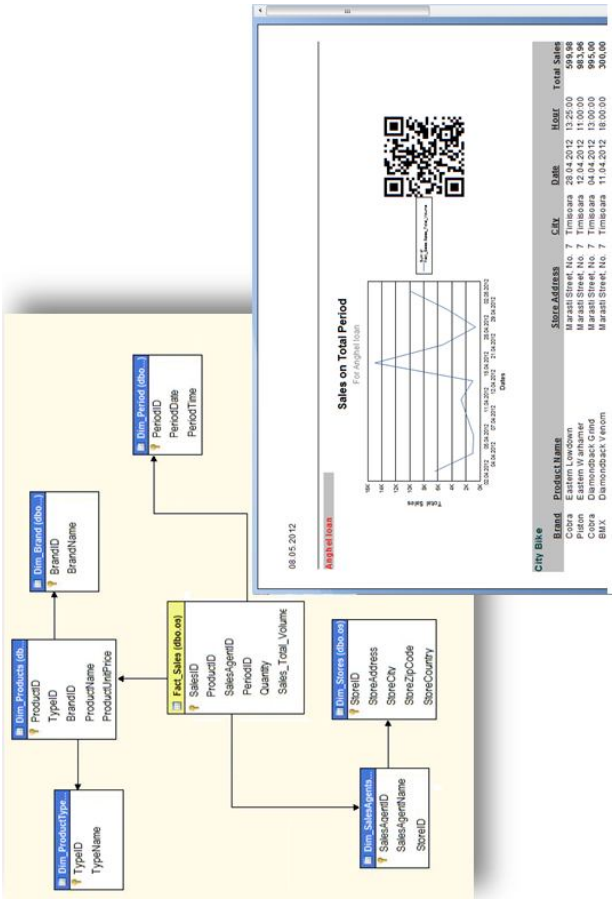

Fig. 8 PE3. From data warehouse to reporting (Muntean, M., Mircea, G., Băzăvan, S., 2012)

			Min	Base	Max
	Personnel costs savings	9,67%	5,00%	10,00%	14,00%
		Year 1	Year 2	Year 3	Year 4
	Sales growth rate	*109,33%*	*108,50%*	*107,50%*	*107,33%*
	Min	100%	99%	98%	98%
	Base	109%	108%	107%	107%
	Max	120%	120%	119%	118%
	Implementation year	**Year 1**	**Year 2**	**Year 3**	**Year 4**
	(lei)	(lei)	(lei)	(lei)	(lei)
Net sales	13.462.650,00	14.719.164,00	15.970.292,94	17.168.064,91	18.427.056,34
Other operational revenues	238.871,00	238.871,00	238.871,00	238.871,00	238.871,00
TOTAL OPERATIONAL REVENUES	13.701.521,00	14.958.035,00	16.209.163,94	17.406.935,91	18.665.927,34
Raw stock and consumable material cost	529.160,00	578.548,27	627.724,87	674.804,23	724.289,88
Other material costs	4.084.396,00	4.465.606,29	4.845.182,83	5.208.571,54	5.590.533,45
Personnel costs	4.365.971,00	3.943.927,14	3.943.927,14	3.943.927,14	3.943.927,14
Costs regarding foreign services	1.591.727,00	1.591.727,00	1.591.727,00	1.591.727,00	1.591.727,00
Costs regarding the implementation and maintenance of the BI solution (TCO - Total cost of ownership)	1.260.000,00	385.000,00	385.000,00	385.000,00	385.000,00
Other operational costs	1.165.538,00	1.052.869,33	1.052.869,33	1.052.869,33	1.052.869,33
TOTAL OPERATIONAL COSTS	12.996.792,00	12.017.678,02	12.446.431,16	12.856.899,24	13.288.346,80
distributed profit/loss		-	-	-	-
OPERATIONAL PROFIT/LOSS	704.729,00	2.940.356,98	3.762.732,78	4.550.036,67	5.377.580,54
OPERATIONAL PROFIT WITHOUT SAAS	1.964.729,00	2.156.459,37	2.337.275,86	2.429.492,27	2.507.107,74
INCREMENTAL PROFIT	- **1.260.000,00**	**783.897,61**	**1.425.456,92**	**2.120.544,41**	**2.870.472,80**
ROI (Return on Investment)	5,71				
IRR (Internal rate of Return)	95%				

Fig. 9 PE4. BI initiative. Feasibility analysis based on Monte Carlo method (Muntean, M., Muntean, C., 2012)

3 Conclusions and Future Work

Based on a selective literature review and some of the author's recent papers, a unifying theoretical approach of the most relevant Business Intelligence specific concepts has been initiated. The eleven introduced definitions (D1-D11) are describing the actual BI phenomena, establishing the domain coordinates.

Based on these considerations, four practice examples (PE1-PE4) have been introduced, closing the gap between theory and practice. Data warehouse proposals, an innovative use of QR codes in BI reporting and a feasibility analysis for BI initiatives are the debate subject. Detailed implementation aspects have been treated by the author in the indicated references, and further research perspectives are established: 1 - finalizing an implementation of the data warehouse model presented in Figure 7 (BI social); 2 – going deeper with QR codes in BI mobile; and 3 – applying the Monte Carlo method in further BI project initiatives, project management approaches.

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