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A PERSPECTIVE ON THE ELEMENTS THAT PROMOTE AN AGILE BI SOLUTION

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ABSTRACT. *In a rapidly changing economy, Business Intelligence and business are evolving: real-time information, high data volume, information importance. In this context, organizations need flexible BI capabilities to meet changing analytical requirements. Business Intelligence solutions have to become more agile. This paper focuses on the key elements that together promote an agile BI solution. Also, this paper briefly looks at technologies that can be used for enabling an agile BI solution.*

KEY WORDS: agile BI, agile development, agile information infrastructure, in-memory technology, data virtualization

JEL Classification: C82

REL Classification: 4A, 14A

1. Introduction

Most enterprises have hundreds of internal and external data sources such as: databases, e-mail archives, file systems, spreadsheets, digital images, audio files and more. 80% of the organizational data is unstructured and semi-structured data. Traditional Business Intelligence systems use a small fraction of all the data available. Also, traditional BI systems use only structured data. The core components of a traditional BI architecture are: ETL tools, an enterprise data warehouse with metadata repository and business analytics. Organizations use data warehouses to aggregate cleaned and structured data. Business analytics/BI tools include enterprise reporting tools, ad hoc query tools, statistical analysis tools, OLAP tools, spatial-OLAP analysis tools, dashboards, scorecards and advanced analytics. Advanced analytics typically refer to: data mining tools, text mining tools, predictive analytics, artificial intelligence, and natural language processing. But this architecture is unable to get adapted to change. This characteristic of traditional BI is in contradiction with frequently changing business requirements and “*big data*”. *Big data* typically refers to the following types of data: semi-structured data (XML and similar standards), unstructured data, Web data (social data, Web logs) and real-time data (event data, spatial data, machine-generated data). Table 1 briefly summarizes the main disadvantages of traditional BI systems.

Table 1. The disadvantages of traditional BI systems

Disadvantages	Problems
huge amount of duplicate data	<ul style="list-style-type: none"> - every change already made requires an extra change of duplicate data - data inconsistencies - data quality risks
use different tools for different tasks	<ul style="list-style-type: none"> - non-shared metadata specifications - inconsistent results

rigid relational or multidimensional data models	- limited flexibility to changing - limited support for analysis on unstructured and external data
waterfall approach	- the long development lifecycle and less visibility to user - users are not involved in the development cycles - inflexible to analytical requirements modifications - testing at the end of the development cycle

How to eliminate these problems? By building an agile BI solution. The next section presents briefly the concept of agile BI and the key elements that together promote an agile BI solution.

2. Agile BI

Agile means the ability to be adaptable. Agile BI has been defined in different ways. The Forrester Research defines agile BI as *"an approach that combines processes, methodologies, organizational structure, tools and technologies that enable strategic, tactical and operational decision –makers to be more flexible and more responsive to the fast pace of changes to business and regulatory requirements"* (Boris Evelson, 2011:pp.5).

According to Data Warehousing Institute agile BI *"addresses a broad need to enable flexibility by accelerating the time it takes to deliver value with BI projects. It can include technology deployment options such as self-service BI, cloud-based BI, and data discovery dashboards that allow users to begin working with data more rapidly and adjust to changing needs."*(tdwi.org/portals/agile-bi.aspx).

In conclusion, an agile BI solution should provide access to accurate information in the right format to the right person at the right time. Below it identifies the key components that together promote an agile BI solution:

- 1) Agile development;
- 2) Agile business analytics;
- 3) Agile information infrastructure.

2.1 Agile development

An agile BI solution must be implemented quickly. According to Forrester Research the purpose of agile BI solution: *"is to 1) get the development done faster and 2) react more quickly to changing business requirements"* (Boris Evelson, 2010: pp.1-18).

Two distinct approaches are relevant in the context of development of BI solutions: waterfall development and agile development. But waterfall methodology is poorly suited for BI. The main problems of this methodology are: 1) the long times between the system request and the delivery of the BI solution; 2) users are not involved in the development cycle; 3) is inflexible to analytical requirements modifications; 4) testing at the end of the development life cycle. So a different approach is needed to make BI applications more flexible and able to react much faster to changing business requirements. The way to achieve agility in BI development is the usage of agile development methodologies. Agile development methodologies refer to a group of software development methodologies based on the following principles: collaboration between cross functional teams, iterative development and tolerance for changes (Kent Beck, et. at, 2001). There are different agile development methodologies such as: Scrum, Extreme Programming, Crystal, Dynamic Systems Development, Lean and others. Many of agile software development principles can be applied to BI projects from team structure, project management, BI system design, BI system development and analytical techniques. The most popular agile development methodologies for BI projects are: Scrum, Extreme Scoping and Agile Data Warehousing.

The main concepts of Scrum (Sutherland, 2010: pp.1-67) are: user story, product backlog, sprint backlog, sprint and daily scrum. In this methodology the BI requirements are divided into small “user stories”. An agile BI project consists of a collection of “user stories”. Each story is then designed, developed, tested and released to the users. One sprint is a full life cycle of understanding the BI requirements, analysis, design, development and user testing. Each sprint lasts for 1-2 weeks. Users are involved in sprint steps. User stories need to be categorized in one of two ways: product backlog and sprint backlog. Sprint backlog is a list of tasks the team expects to do during the sprint. At the end of each sprint, the business has a deliverable such as a new report or dashboard. Product backlog is a list of all requirements ordered by highest priority of what is needed. The user is responsible for prioritizing the features on the product backlog. Another concept is the daily scrum that is a short meeting in which every member of the team answers three questions: What did you do yesterday? What will you do until our next meeting? Do you have any problems?

Extreme Scoping and Agile Data warehousing are well suited if BI solution includes a data warehouse. Agile Data warehousing is defined as “*the application of two agile development approaches –Scrum and Extreme programming – to the specific challenges of data warehousing and BI*” (Hughes, 2008: pp.1). Extreme scoping is an agile enterprise data warehousing approach that includes the business integration activities. Also, this approach uses agile principles. The BI solution is separated into multiple releases for iterative development (Moss, 2012: pp. 1-9).

A typical agile BI cycle is illustrated in figure 1.

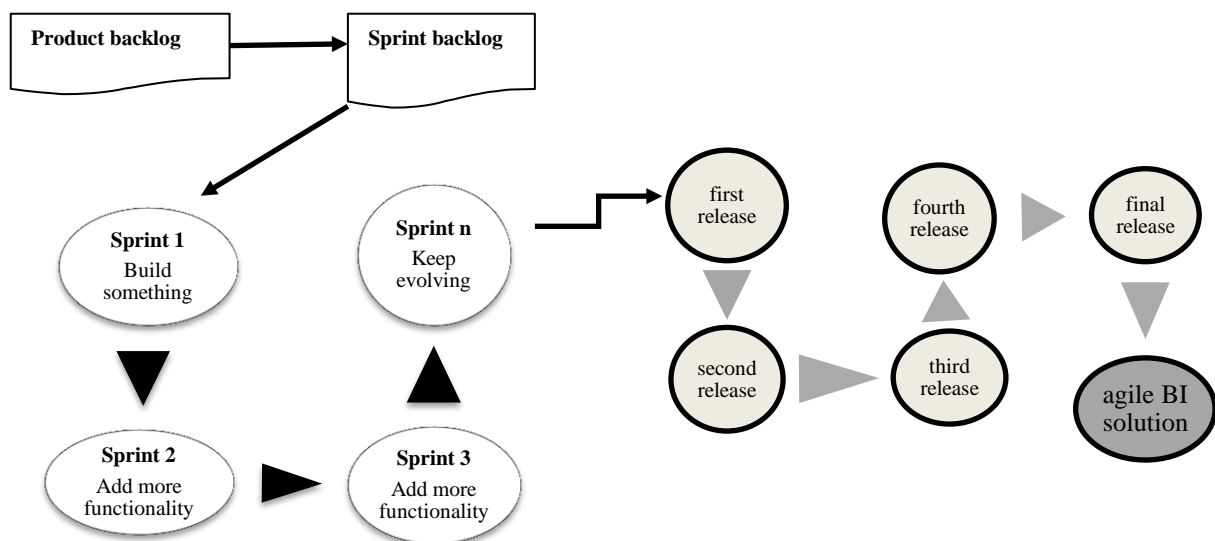


Figure 1. A typical agile BI cycle

Agile business analytics (BA).

Besides developing a business intelligence system with agile design methodologies, it's also recommended adopting agile BA. Both the design methodology and the tools have to be agile. Agile BA must enable BI users to become less dependent on IT. Also, agile BA must be easier to be used by all types of users. So agile BA should provide at least office suite integration, a business glossary and advanced visual features such as interactive dashboards and drill-down capabilities. A recent study by Forrester showed that agile BA should be integrated with all parts of the “*information workplace*” such as spreadsheet, presentation, word processing software, email, search portals, collaboration platforms and social

communities. (Boris Evelson, 2012: pp.1-8). There are several technologies to support agile BA such as: SaaS (Software-as-a-Solution) BI and in-memory technology. SaaS BI includes: 1) packaged software-as-service BI applications that can be deployed in a cloud environment; 2) SaaS BI tools that can be used to develop BI applications for deployment in a cloud computing; 3) on-premises environment and data warehousing in the cloud.

The primary goal of the in-memory technology is to eliminate traditional disk-based BI solutions which are relational or OLAP-based. In-memory technology can save significant development time by eliminating the need to store pre-calculated data in OLAP cubes or aggregate relational tables. The common characteristics of in-memory BI approaches are: easy to use, visual interface, dashboards, self-service, in memory processing, speed of response, low costs, quickly to deploy. In-memory technology has the potential to help BI systems to become more agile. There are different in-memory BI approaches such as: in-memory OLAP (for example IBM Cognos TM1), in-memory ROLAP (MicroStrategy), in-memory spreadsheet (Microsoft PowerPivot) and in-memory associative model. QlikView and Tibco Spotfire load and store all data in an associative data model that runs in memory.

Agile information infrastructure.

True agility is reached by making all parts of a BI system agile. An agile BI solution can be seen as consisting of two layers: an agile information infrastructure layer and an agile analytic layer. Information infrastructure addresses how the data architecture and data integration infrastructure ensure agility to react to changing business requirements. An agile information infrastructure must be able to extract and combine data from any data sources, internal and external sources including relational, semi-structured XML, multidimensional and “*Big Data*”. How to get an agile information infrastructure? By using data virtualization.

Data virtualization is an approach that can simplify the process of integrating information from disparate sources and help improve data quality. Data virtualization can be implemented in many different ways such as: using a data virtualization server or placing data sources in the cloud. A data virtualization server is a dedicated product designed specifically to present multiple heterogeneous data sources as one logical data source to users. Many data virtualization servers are currently available such as: Composite Information Server, Denodo Platform, IBM InfoSphere Federation Server, Informatica Data Services, and so on.

Traditional BI systems use ETL tools for extracting data from multiple sources and temporarily storing those datasets at a staging area. As opposed to ETL tools, data virtualization:

- a) allows the source data to remain in their original locations;
- b) abstracts source data, resolving structural and semantic issues;
- c) generates virtual business views and Web data services that provide data required.

A virtual business view is conceptually equivalent to a relational view. The views can read data from multiple data sources including: RDBMS, multidimensional databases, text files, XML documents, spreadsheets, HTML pages, NoSQL databases, and so on. Applications access source data through the virtual business views using languages such as SQL and XQuery or through Web data service.

In conclusion, an agile BI solution requires: an agile development methodology, agile BA and an agile information infrastructure (figure 2). Also, figure 2 briefly summarize strengths of an agile BI solution.

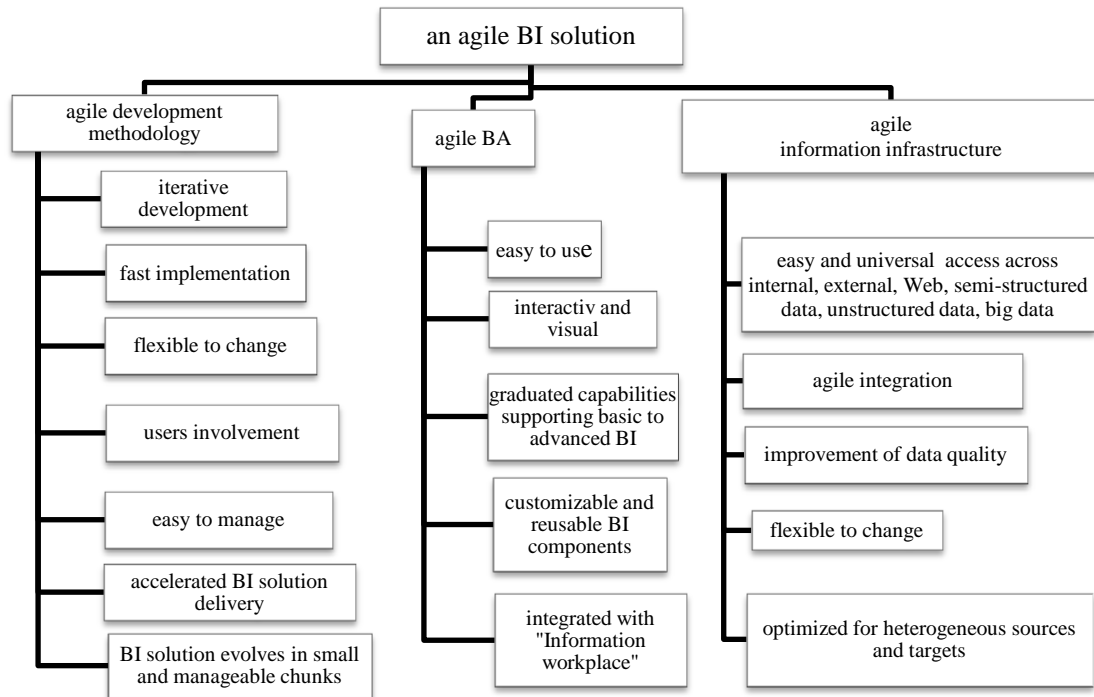


Figure. 2. The key components that promote an agile BI solution

Conclusion

In conclusion, the main reasons for implementing agile BI are: 1) constantly changing business requirements; 2) inability of IT to meet business user demands; 3) slow access to information. Agile BI solutions enable organizations to anticipate and adapt to changing market conditions.

This paper has identified the key elements that together promote an agile BI solution. There are plenty of technologies that can make an agile BI. This paper briefly looked at technologies that can be used for enabling an agile BI solution such as: in-memory technology and data virtualization.

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