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Business Intelligence and Agile Methodologies for Knowledge-Based Organizations: Cross-Disciplinary Applications

Mouhib Alnoukari

Business Intelligence (BI) is a set of tools and techniques that can help organizations collect, clean and integrate all their data. Organizations can then analyse, mine and dig deeper into their data in order to make the right decisions at the right time. In this article the author sums up the knowledge and experience gained while preparing the book "Business Intelligence and Agile Methodologies for Knowledge-Based Organizations", one of the first books that focuses on the use of agile methodologies for building business intelligence applications, highlighting the integration of process modelling, agile methods, business intelligence, knowledge management, and strategic management¹.

Keywords: Agile Methods, Business Intelligence, Knowledge Management, Process Modelling, Strategic Management.

1 Introduction

In 1996, the Organization for Economic Cooperation and Development (OECD) redefined "knowledge-based economies" as "*economies which are directly based on the production, distribution and use of knowledge and information*". According to this definition, data mining and knowledge management, and, more generally, Business Intelligence (BI), should be the foundations on which the knowledge economy is built.

However, Business Intelligence (BI) applications still face failures in determining the process model adopted. As the world becomes increasingly dynamic, traditional static modelling may not be able to deal with it. Traditional process modelling requires a great deal of documentation and reports. This prevents traditional methodology from meeting the ever changing dynamic requirements in our rapidly changing environment.

One solution is to use agile modelling, which is characterized by flexibility and adaptability. On the other hand, Business Intelligence applications require greater diversity in technology, business skills, and knowledge than typical applications, which means they may benefit from features of agile software development.

This field is addressed in the book cited in Footnote 1, which aims at providing added value for its readers for the following reasons:

- Because most organizations are using business intelligence and data mining applications to enhance strategic decision making and knowledge creation and sharing.
- Because data mining is at the core of business intelligence and knowledge discovery.
- Because most current business intelligence applica-

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“ In 1996, the OECD redefined "knowledge-based economies" as '*economies which are directly based on the production, distribution and use of knowledge and information*' ”

¹ This book, edited by Prof. Asim A. El Sheikh and Dr. Mouhib Alnoukari, will be published by IGI Global in September 2011. <<http://www.igi-global.com/requests/details.asp?ID=829>>.

“ Business Intelligence (BI) applications still face failures in determining the process model adopted ”

tions are not able to meet the ever changing dynamic requirements of our complex environment.

■ Finally because knowledge is the result of intelligence and agility.

2 Agile Modelling for Business Intelligence

Traditional process modelling are characterized by rigid mechanisms with a heavy documentation process, which make it difficult to adapt to a high-speed, high-change environment.

The manifesto and practices of agile methods were published in 2001². The core ideals of the manifesto are: individuals and interactions over processes and tools; working software over comprehensive documentation; customer collaboration over contract negotiation; and responding to change over following a plan. Ultimately, by following these ideals, software development becomes less formal, more dynamic, and more customer-focused.

Agile methods share the same properties by focusing on people, results, minimal methods, and maximum collaboration. Agile approaches are best fit when requirements are uncertain or volatile; this can happen due to business dynamism and rapidly evolving markets. It is difficult to practise traditional methodologies in such unstable evolving markets [1].

Business Intelligence applications require greater diversity in technology, business skills, and knowledge than typical applications; this means it may benefit greatly from features of agile software development.

To successfully implement Business Intelligence applications in our agile and knowledge-based arena, different areas should be examined in addition to the consideration of the transition to knowledge-based economy. This book tackles the following business intelligence areas: methodologies, architecture, components, technologies, agility, adaptability, tools, strategies, applications, knowledge and history.

Applying agile methods to Business Intelligence applications is the core idea of our book. Different chapters raised the importance of using such methods by addressing the alignment between Agile principles and BI applications, analysing Agile methodologies and addressing the applicability of BI, reviewing the components and best practices

of BI applications, proposing different Agile frameworks for BI applications (ASD-BI, BORM, Agile BI Delivery, etc), and applying the proposed frameworks in various areas, including higher education, e-government, regional management systems, risk management, e-marketing, IT governance, and web engineering.

3 The Knowledge Dimension in Agile Business Intelligence applications

Most experts confuse Knowledge Management (KM) with Business Intelligence. According to a survey conducted by OTR, 60 percent of consultants do not know the difference between the two [2]. We may clarify this confusion by explaining the difference between these two terms. Business Intelligence is a set of all technologies that gather and analyse data to improve decision making. Intelligence in BI notation is often defined as the discovery and explanation of hidden, inherent and decision-relevant contexts in large amounts of data. Whereas Knowledge Management is defined as a systematic process for finding, selecting, organizing, presenting and sharing knowledge in a way that improves organizations' comprehension in a specific area of interest, KM helps organizations gain insight and understanding from their own experience. This means that Business Intelligence is just one of the tools of KM which help organizations extract and share knowledge in order to enhance their competitive position in the market.

Agile methods concentrate on human-based techniques of communicating knowledge such as on-site customers, customer focus groups, daily short meetings, and post mortem sessions. The main focus when applying agile methods is to maximize the knowledge transferred and shared among various stakeholders of business intelligence applications. Knowledge capturing happens informally through the use of principles such as on-site customers and customer focus group. Knowledge sharing among all project stakeholders happens through social activities, such as short meetings and post mortem sessions.

4 Business Intelligence Government Framework

One of the main contributions of this book is a proposed business intelligence governance framework within an e-Government system. The proposed framework is based on an empirical study which demonstrates the importance of

² The manifesto is available at <<http://agilemanifesto.org/>>.

“ Traditional process modelling requires a great deal of documentation and reports. One solution is to use agile modelling, which is characterized by flexibility and adaptability ”

“ Business Intelligence applications may benefit greatly from features of agile software development ”

of using business intelligence in e-Government systems. It also demonstrates that using BI helps close the gap between business and IT people. This in turn can help planners and policy makers at all levels of government increase e-Government success rates.

5 Business Intelligence in Higher Education

The need for BI to achieve a competitive advantage in higher education has gained momentum in recent years. This is due to many reasons as universities are facing huge competition and they need a better understanding of business forces in order to respond effectively to the already dynamic industry. They also require tools to predict student performance, employment paths, course selection, and need to do cost-benefit analyses, trend analyses, value chain analyses, and so forth, which could be supported by BI applications.

Our main focus was the application of agile methods to a business intelligence application in higher education. One of our book's contributors presents an ontology-based knowledge management system developed for a Romanian university. The system proves that ontology usage could improve the competency gap analysis at an individual, project and organizational level for project-oriented organizations.

Agile business intelligence has been presented in the Syrian private universities. Different models were proposed to enhance the universities' competencies. One of the models is built on system theory, by visualizing universities as a system with input, processing, output, and feedback. Other models prove that applying agile business intelligence in higher education would help universities to dig deeper into their various data sources, thereby enhancing their decision-making process, enhancing knowledge sharing, and finally helping them implement and achieve their strategies.

They also propose a BI framework within e-Government systems, which helps facilitate and improve the delivery of e-Government services.

6 e-Government Systems

e-Government systems can benefit from business intelligence by allowing them to deal with heterogeneous and silo systems. This can enable such systems to avoid the use of sophisticated tools in order to obtain the information needed to build stronger government strategies. BI applications can also help e-Government systems by reducing the involvement and dependence of IT staff [3]. Business Intelligence can offer many advantages to e-Government sys-

tems such as: a deep understanding of citizens' needs, increased operational effectiveness, the availability of multiple resources to government planners and decision makers, and the provision of extensive resources to support e-Government projects [4].

7 Knowledge Discovery Process Models

Business Intelligence applications ultimately depend on data mining algorithms. The data mining component is also one of the main steps of knowledge discovery from data. The book provides a detailed discussion on the knowledge discovery process models that have innovative life cycle steps including: Knowledge Discovery in Databases (KDD) Process by Fayyad et al. (1996) [5], Information Flow in a Data Mining Life Cycle by Ganesh et al. (1996) [6], SEMMA by SAS Institute (1997) [7], Refined KDD paradigm by Collier et al. (1998) [8], Knowledge Discovery Life Cycle (KDLC) Model by Lee and Kerschberg (1998) [9], CRoss-Industry-Standard Process for Data Mining (CRISP-DM) [10], Generic Data Mining Life Cycle by (DMLC) by Hofmann (2003) [11], Ontology Driven Knowledge Discovery Process (ODKD) by Gottgroy (2007) [12], and Adaptive Software Development-Data Mining (ASD-DM) Process Model by Alnoukari et al. (2008) [13].

We also propose a categorization of existing knowledge discovery models. The following are the proposed categories for Knowledge Discovery Process (KDP) modelling: traditional KDP approach, ontology-based KDP approach, web-based KDP approach, and agile-based KDP approach.

The book provides an in-depth analysis of the strengths and weaknesses of the leading knowledge discovery process models, with their supported commercial systems and reported applications, and their matrix characteristics. The main metrics used when evaluating previous KDP models are data, process, people, adaptive, knowledge, and strategy.

8 Risk Management in Knowledge-Based Organizations

Risk management plays a crucial role in our rapidly changing environment. Many projects, especially software projects, have faced serious failures due to not knowing how to deal with the causes of failures. During the last decade, many tools and techniques were used to manage projects risks effectively. Decisions were needed to be made faster in order to address project failures in matters of minutes and sometimes seconds.

We underline the importance of using business intelligence and agile methodologies for managing risks effectively and efficiently.

9 Agile Web Engineering and Business Intelligence

Web-based systems involve "a mixture between print publishing and software development, between marketing and computing, between internal communications and external relations, and between art and technology". [14].

“ Business Intelligence is just one of the tools of Knowledge Management which help organizations extract and share knowledge in order to enhance their competitive position in the market ”

Web-based applications are different from traditional applications as they need to have special features such as usability, loyalty, accessibility, and context.

Most web development methodologies such as OOHDM and WebML focus on designing approaches rather than understanding requirements.

This issue can be addressed by the adoption of Agile methodologies such as eXtreme Programming (XP). These methodologies allow systems to be built incrementally, thereby facilitating feedback from the client as the system develops.

The book highlights the main issues related to agile web engineering practices, the need for web engineering, and the agile development methodologies used in web engineering. The book also covers important topics of Web Engineering, including requirements analysis, design, architectures, technologies, test, operation and maintenance; this is complemented by in-depth knowledge about Web project management and process issues as well as important quality aspects of Web applications such as usability, performance and security.

10 Conclusion

In this article we have briefly summarized the main ideas developed in the book "Business Intelligence and Agile Methodologies for Knowledge-Based Organizations: Cross-Disciplinary Applications" (see Footnote 1), one of the first attempts to highlight the importance of using agile methodologies in business intelligence applications. Although, the research orientation is new, the book's chapters produce very important research outcomes in different areas.

The ideas described in the book create an added value to the field because most organizations are using business intelligence and data mining applications to enhance strategic decision making and knowledge creation and sharing, and data mining is at the core of business intelligence and knowledge discovery. Also, most current business intelligence applications are not able to meet the ever changing dynamic requirements of our complex environment and, finally, knowledge is the result of intelligence and agility.

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