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A RESEARCH AGENDA FOR THE AGILE AND BI INTERSECTION

UMA AGENDA DE PESQUISA PARA A INTERSEÇÃO ENTRE ÁGIL E BI

ALAMIR COSTA LOURO

https://orcid.org/0000-0002-5489-4551 / http://lattes.cnpq.br/0483054166927267 / alamirlouro@gmail.com

Universidade Federal do Espírito Santo, UFES, Brasil.

RESUMO

O objetivo deste artigo é identificar e analisar a literatura de Business Intelligence (BI) e metodologias ágeis para estabelecer sua posição atual nos Sistemas de Informação Gerenciais (MIS) de forma a criar contextos robustos e propor uma agenda para pesquisas futuras. Uma revisão sistemática da literatura foi empregada para analisar a literatura e sintetizar os resultados de forma a esclarecer a relação entre esses subcampos. Usando a Análise de Clusters, forneceu um esquema para rastrear essa literatura para iniciantes e pesquisadores experientes. A partir da definição de Ágil, propomos tendências objetivas para entrelaçar a abordagem ágil do mercado com o desenvolvimento de software e a área de BI. O artigo conclui com uma discussão sobre os caminhos a serem seguidos em diferentes tradições acadêmicas com o objetivo de desenvolver estudos futuros da emergente abordagem Ágil em Sistemas de Informação Gerenciais, ao mesmo tempo em que fornece uma abordagem para interações entre Agile e BI, buscando auxiliar pesquisadores e gestores que desejam aprofundar o conhecimento sobre esta intersecção.

Palavras-chave: Ágil. Inteligência de Negócios. Sistemas de Gerenciamento de Informação. Gerenciamento de projetos.

ABSTRACT

The purpose of this paper is to identify and analyze Business Intelligence (BI) and Agile methodologies literature to establish its current position in Management Information Systems (MIS) to create robust contexts and propose an agenda for future research. A systematic literature review was employed to analyze literature and synthesize findings to clarify the relationship between these subfields. Using Clusters Analysis, it provided a scheme to track this literature for beginners and experienced researchers. From the definition of Agile, we gave objective trends to intertwine the agile market approach with software development and the BI area. The paper concluded with a discussion of pathways to be followed in different academic traditions aiming to develop future studies of the emerging Agile approach in Management Information Systems, while providing an approach for interactions between Agile and BI, seeking to help researchers and managers who wish to deepen the knowledge about this intersection.

Keywords: Agile. Business Intelligence. Management Information Systems. Project Management.

1 INTRODUCTION

Within the main activities that comprise the processes of an organization, the Management Information Systems literature observed an emerging interest in the areas of Business Intelligence

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(BI) (Grublješič & Jaklič, 2015); Hader, Roberson, & Smith, 2023) and Agile methodologies (Hong, Chan, Thong, Chasalow, & Dhillon, 2013; Hron & Obwegeser, 2022). The concept of BI gained strength in the last decades since it serves as a value proposal that helps organizations in obtaining information for the decision-making process in a way that routine reports do not provide (Singer, 2001). In their turn, the Agile methodologies are useful for dealing with the constant changes in scope, new client necessities, and technology innovation (Larson & Chang, 2016).

BI, in general, can be defined as a set of tools, applications, and technologies that allow the collection, storage, retrieval, manipulation and analysis of information that aid in decision making (Sangari & Razmi, 2015; Grublješič, & Jaklič, 2015). BI can process and transform collected data sets into useful, meaningful, and business-critical information, sharing information, adding value, and intelligence to the business (Chang, 2014). Therefore, BI Provides insights and trends for managers so they can create effective and efficient guidelines to achieve the desired business results.

Beck et al. (2001) outlined the central ideas regarding agile methodologies such as individuals and interactions over processes and tools; working software with efficient documentation; customer collaboration; and responses to change. These ideas resulted in the process of developing software in a less formal, more dynamic, customer-focused, and continuous improvement process for teams and processes. Agile methodologies, in this research, was conceptualized as an agile delivery model based on iterative and incremental cycles, which offer flexibility and adaptability (Larson & Chang, 2016).

Larson & Chang (2016) pointed out that Agile addresses many of the problems present in the BI world because of its characteristics, which we will explore. Agile has a robust social aspect as well, explored by Fernández-Sanz et al. (2016). The current research seeks to address those interactions between Agile and BI, becoming a reference not only for researchers but for managers that wish to learn from this intersection more deeply as well.

In the intersection context, it is essential to mention some previous works. It is highlighted by Conboy (2009), Krawatzeck and Dinter (2015), Chen, Chiang, and Storey (2012) and Larson & Chang (2016). Conboy (2009) proposed a centralized concept for agility based on other agile-oriented articles. Krawatzeck and Dinter (2015) addressed a more practical point of view for agility, generating a catalog that suggests which actions are suitable for improving the agility of an organization. Chen, Chiang, and Storey explore the challenges and opportunities brought with

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BI&A (Business Intelligence and Analytics) and linked it to the concepts of BI, Business Analytics, and Big Data. Finally, Larson & Chang (2016) studied the benefits of applying Agile concepts to the BI world.

The extant literature does not have a single definition of agility, and this makes it more laborious the process of searching for other articles that address agility (Conboy, 2009). This fact is presented in the work process of Krawatzeck and Dinter (2015), in which the catalog of actions refers to agility from different points of view. Agility and BI also have different approaches to be studied. For example, there is a strong connection with the commercial purpose of implementing Agile and BI practices (Krawatzeck & Dinter, 2015). A less exploited approach is the project management aspects of these practices, as in the framework developed for the delivery process of BI projects (Chen, Chiang, & Storey, 2012).

Considering the difficulties and opportunities mentioned, the objective of this research is to perform a systematic review, linking Agility and BI in a way that we can identify and suggest opportunities for future research. The motivation for this paper comes from the need for contextualization in management information system theorizing (Hong et al., 2013). It contributes to other researchers, serving as a point of reference to give context for studies on the topic at hand.

Our findings clarify the relation between BI and Agile approach encompassing four dimensions (data gathering and processing, information analysis and agility (C1); Business Intelligence, Information usage and decision making (C2); Data Integration and Project Management of BI (C3); competitive intelligence (C4)) underpinned by the cluster analysis and the necessity of processing large volumes of data, complicated communication processes, and constant changes in scope, making the BI project delivery a complex management task. The paper proceeds with an explanation of the systematic literature review method, followed by the presentation and discussion of findings, proposed agenda for future research, implications for practitioners, limitations of the method, and a conclusion.

2 SYSTEMATIC REVIEW

Systematic literature review methods are used to manage the diversity of academic thinking and knowledge, synthesize existing evidence, create new knowledge, and generalize findings. The method provides rigorous and transparent means to examine and

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integrate ideas from the relevant literature in a way that allows replication and overcoming the generalization limitations associated with isolated studies (Saenz and Koufteros, 2015). The method was applied to several aspects of Business Intelligence, but not in the intersection with agile methodologies, because it is a relatively new topic.

For the development of this research, we performed a bibliometric study from a known journal hub, the Scopus base. To confirm that the extracted articles are adherent to our research scope, a search based on titles, abstracts, and keywords were performed, resulting in a sample metadata file analyzed in R (R Core Team, 2016). Also, It utilized VosViewer (van Eck & Waltman, 2010) to build clusters of related keywords from the sample articles. These clusters provided us with a more robust understanding of the concepts mentioned in each article and built the bridge between the proposed ideas of the intersection literature.

Table 1–Bibliometric results - general description

Main Information about data			
Articles (from Scopus)	99	Authors of single-authored articles	11
Sources (Journals, Books, etc.)	80	Authors of multi-authored articles	209
Journal Keywords	609	Articles per Author	0.45
Author's Keywords	291	Authors per Article	2.22
Average citations per article	2.899	Co-Authors per Articles	2.62
Authors	259	Collaboration Index	3.22
Author Appearances	1992	Period	2015 – 2021

Source: Prepared by the authors using the R software

Table 1 describes the descriptive information from this sample to the association between BI and Agile. It is essential to highlight that only journal articles and conference papers were included, excluding revisions and workshops, editorials, and tutorials.

The bibliometrix package (Aria & Cuccurullo, 2017) utilized by the software R calculates that there is positive annual growth, demonstrating an increasing interest in the topic. From the 99 articles in the sample of 2015 until 2021, three were highlighted as most cited (see Table 2).

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Table 2–Mostly cited articles (belonging to the sample), cited outside the sample

Paper	Local Citations	Global Citations
Cohen, J., Dolan, B., Dunlap, M., Hellerstein, J. M., & Welton, C. (2009). MAD skills: new analysis practices for big data. *Proceedings of the VLDB Endowment*, *2*(2), 1481-1492.	2	
Sangari, M. S., Hosnavi, R., & Zahedi, M. R. (2015). The impact of knowledge management processes on supply chain performance. *International Journal of Logistics Management*, 26(3), 603–626. https://doi.org/10.1108/IJLM-09-2012-0100	2	73
Ghasemaghaei, M., Hassanein, K., & Turel, O. (2017). Increasing firm agility through the use of data analytics: The role of fit. *Decision Support Systems*, *101*, 95-105.	1	118

Source: Prepared by the authors using the R software

Table 2 highlights the research conducted by Cohen et al. (2009), which delves into the emerging practice of Magnetic, Agile, Deep (MAD) data analysis. This approach marks a significant departure from traditional methods like Enterprise Data Warehouses and Business Intelligence. The study explores the design philosophy, techniques, and practical experiences of implementing MAD analytics for Fox Audience Network, one of the world's largest advertising networks, using a parallel database system.

The research uncovers valuable insights into database design methodologies that support the agile working style of analysts in such settings. It also presents data-parallel algorithms for sophisticated statistical techniques and database system features that facilitate agile design and flexible algorithm development. Notably, this involves the use of both SQL and MapReduce interfaces across a variety of storage mechanisms.

Additionally, the discussion addresses the impact of knowledge management processes on supply chain performance and how these processes can enhance agility in responding to changes in demand. In this context, business intelligence tools and techniques, including data mining and analytics, play a crucial role in identifying patterns

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and insights within supply chain data. These insights enable companies to make more informed decisions and respond rapidly to shifts in demand, which is a key aspect of agile supply chain management.

Secondly, Sangari, Hosnavi, & Zahedi (2015) discuss the impact of knowledge management processes on supply chain performance, and how these processes can be used to improve agility in responding to changes in demand. BI tools and techniques can be used to support knowledge management processes to identify patterns and insights in supply chain data. This can help companies make more informed decisions and respond more quickly to changes in demand, which is a key aspect of agile supply chain management.

Finally, Ghasemaghaei, Hassanein, & Turel (2017) suggest that the use of data analytics is considered a lower-order dynamic capability that enables higher-order capabilities at the organizational level, such as agility. Data analytics use can enable firms to quickly sense and interpret business challenges and opportunities, and hence help firms respond faster and become more agile.

Table 2 gives us information about the primary papers in the sample, but it is less critical than table 3, which represents the most cited references of the sample and the number of citations by the sample. Completing the top 10 papers, Table 3 presents seven elementary papers that a beginner needs to read before energy disposal about the intersection of Agile and BI sub-fields.

Table 3–Mostly cited references – First step for beginners

Cited References	Citations
Chen, H., Chiang, R.H.L., Storey, V.C., Business Intelligence And Analytics: From Big Data To Big Impact (2012) *Mis Quarterly*, 36 (4), Pp. 1165-1188	14
Sambamurthy, V., Bharadwaj, A., Grover, V., Shaping Agility Through Digital Options: Reconceptualizing The Role Of Information Technology In Contemporary Firms (2003) *Mis Quarterly*, 27 (2), Pp. 237-263	11

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Eisenhardt, K. M., & Martin, J. a. (2000). Dynamic capabilities: what are they? *Strategic Management Journal*, 21, 1105–1121. https://doi.org/10.1002/1097-0266(200010/11)21:10/11	8
Overby, E., Bharadwaj, A., Sambamurthy, V., Enterprise Agility And The Enabling Role Of Information Technology (2006) *European Journal Of Information Systems*, 15 (2), Pp. 120-131	7
Collier, K. (2012). *Agile analytics: A value-driven approach to business intelligence and data warehousing*. Addison-Wesley.	6
Hair, Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–152. https://doi.org/10.2753/MTP1069-6679190202	5
Larson, D., Chang, V., A Review And Future Direction Of Agile, Business Intelligence, Analytics And Data Science (2016) *International Journal Of Information Management*, 36 (5), Pp. 700-710	5

Source: Prepared by the authors using the R software

Among the articles highlighted in Table 3, the predominant theme revolves around enhancing an organization's market presence and strategic decision-making process. This is achieved through various approaches, including strategy development, resource management, agile-based management, business intelligence, analytics, and information systems. Notably, agile methods are often not directly mentioned, but rather referred to in applied areas such as business intelligence and analytics. These areas play a crucial role in providing essential information for positioning the organization in the market and gaining a competitive edge.

Eisenhardt & Martin (2000) is a classic about dynamic capabilities, Collier (2012) is a book about agile analytics and Hair's papers and books are focused on PLS methods, thus we will not comment here.

We highlighted the articles of Sambamurthy, Bharadwaj, and Grover (2002) and Chen, Chiang, and Storey (2012) that show the strategic aspect of organizations, mainly on how strategic improvement (strategic decision making, positioned in the market) can be achieved. Sambamurthy, Bharadwaj, and Grover (2002) approach decision-making by examining how valuable IT (and its investments) are, in order to improve the organization's performance, while also exploring the themes of IT competence, flexibility and other

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elements that influence the organization's performance. However, Chen, Chiang, and Storey (2012) approach strategic improvement in a more practical way, using BI&A as a broader definition for BI, in other words, gathering significant volumes of data (mostly unstructured) and processing it in order to generate useful information, and thus helping in the decision-making process of the organization using the description, prediction and prescription unified process (Holsapple, Lee-Post, & Pakath, 2014).

Overby, Bharadwaj, and Sambamurthy (2006) discuss the enterprise agility and the enabling role of information technology. In this paper, the authors define and explore the concept of enterprise agility, its underlying capabilities, and the role of IT in supporting it. They also propose a method for measuring enterprise agility. They generally explain that Business intelligence can help firms improve their sensing capabilities by providing market intelligence and other relevant data. This can help firms identify changes in the environment and respond quickly to new opportunities or threats. Finally, Conboy (2009), which seeks to solve the lack of a profound logic foundation to connect many concepts of agility that appear in its literature review. Its review is useful also for other articles that explore the concept of agility as a kind of capability.

The information in Table 4 represents the journals referenced by the sample. All five journals are connected with the Management Information Systems literature and/or Management and/or Information Systems. The JCR column is the most famous citation index used ultimately.

Table 4–Most relevant research sources – Second step for beginners (where to search)

Sources	JCR (2021)	Articles
MIS QUARTERLY	8.513	84
INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	4.407	48
STRATEGIC MANAGEMENT JOURNAL	7.815	42
DECISION SUPPORT SYSTEMS	3.565	32
EUROPEAN JOURNAL OF INFORMATION SYSTEMS	9.001	27

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Source: Prepared by the authors using the R software

From table 3 and table 4, we can extract the information that from the five most cited articles, two of them belong to MIS Quarterly, the leading MIS-focused journal with a Journal Citation Reports (JCR) notably high. Additionally, it can be extracted from tables 2 and 3 that from the eight most important articles, five are from table 4 journals.

3 CLUSTER ANALYSIS

The data was segmented into classes, according to the connection between the keywords to determine contextual differences in the study trends. This categorization was done through the statistical technique of cluster analysis, using the VosViewer function. In short, a cluster consists of a collection of objects that have some similarity to each other, according to some criterion of similarity. The procedure is indicated for the identification of relatively homogeneous groups among the available documents.

The central assumption from the literature review is the context of agility covered by definition provided by Conboy (2009):

> “the continual readiness of an ISD (Information Systems Development) method to rapidly or inherently create change, proactively or reactively embrace change, and learn from change while contributing to perceived customer value (economy, quality, and simplicity), through its collective components and relationships with its environment" (Conboy, 2009)

The study conducted a network analysis to evaluate the conceptual structure of the intersection between sub-fields, based on clusters of keywords co-occurrence. Figure 1 displays the top 100 vertices, or keywords, which resulted in four distinct clusters. This complexity prompted the creation of Figure 2, illustrating the intersections between these clusters, allowing for a more comprehensive analysis of connected keywords and contextual differences in study trends.

Cluster C1 (Blue) serves as the foundational context, representing agile manufacturing systems, information systems, information analysis, decision making, and agility. The other clusters are linked to C1 in various ways. By analyzing the keywords and information obtained from the sample articles, researchers were able to provide clearer

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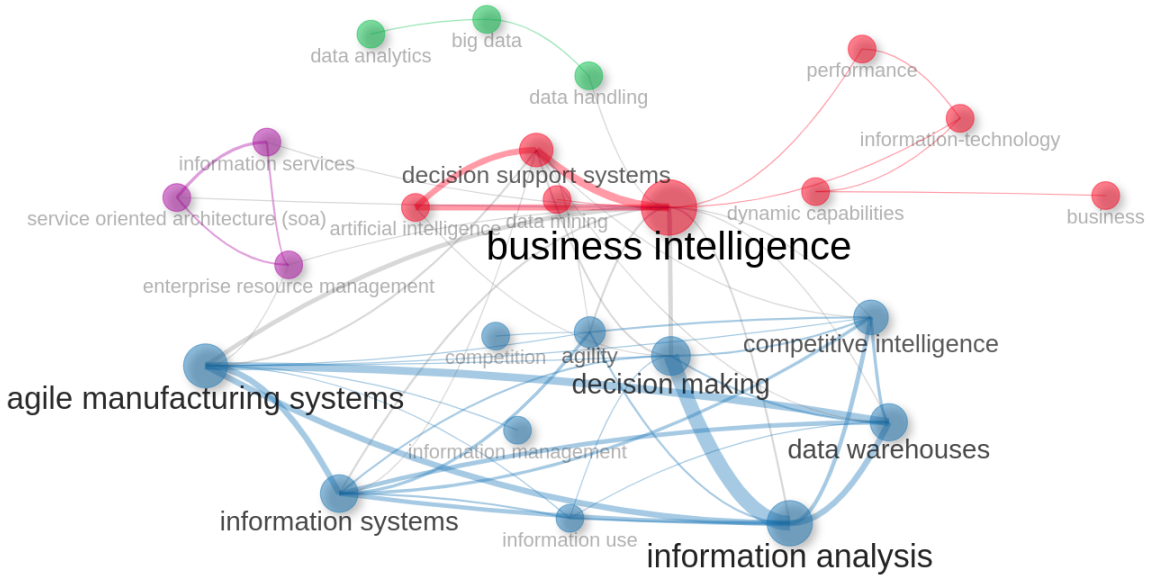
contextualization for each cluster.

Overall, Figure 1 reveals that the clusters are interconnected differently, with C1 forming the base context for the others. This network analysis sheds light on the relationships between the sub-fields and highlights the interconnectedness of the various concepts under study.

Figure 1 - Keywords Co-occurrence



Source: Prepared by the authors using the R

The connections between BI project management, information services and enterprise resource management in Cluster C3 (purple) suggests the applicability of Agile concepts in data and BI project management, as pointed out in the article of Larson & Chang (2016). In his article, the suggested techniques that contribute to BI Projects Delivery relate to our own findings, such as Agile Data Warehousing, Extreme Scoping (a data-driven Agile Methodology), and Scrum (an Agile form of Project Management) (Hughes, 2008). Larson & Chang (2016) again relates some useful Agile concepts in context with BI Delivery, such as Business Strategy Alignment, User Collaboration, and Flexibility. These concepts contribute to the reaction to change, learning from change, and

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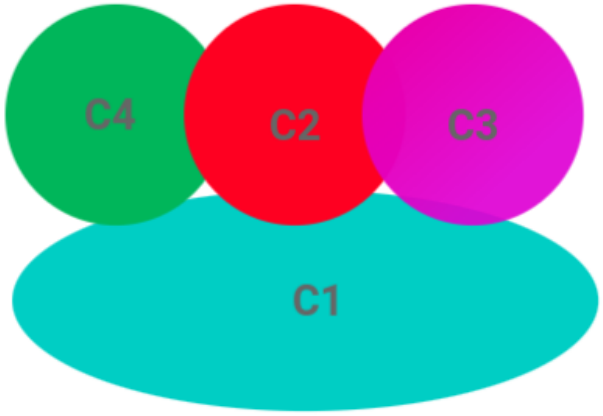
the perceived quality of the delivered products. This, according to Conboy's definition, generates agility.

Figure 2 - Keywords co-occurrence clusters scheme



Source: Prepared by the authors using Venn Diagram Maker (Visme.co)

A similar context of agility, related to Business Intelligence and Decision Support Systems by Cluster C2 (red), is given in the article of Krawatzeck and Dinter (2015), which provides us with guidance regarding which Agile business intelligence actions are suitable to improve an organization's agility. Some of the concepts present by Larson & Chang (2016) are also present in Krawatzeck and Dinter (2015) recommendations, such as Agile Data Warehousing and Scrum.

The last cluster, C4(green), is related to Big Data and analytics that can help organizations identify environmental changes to acquire more competitive advantage and performance using data-driven decision-making (Wedel & Kannan, 2016). This Cluster C4 can be associated with the Marketing discipline that is the first choice for data-driven decision-making easing market dynamics, for example, using BI&A in customer

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segmentation, in customer behavior analysis for online campaigns or cross-selling recommendation systems (Provost & Fawcett, 2013).

Chen, Chiang, and Storey (2012) approached BI&A (Business Intelligence and Analytics), analyzing the way data is gathered and processed presently. A big part of data is now obtained through mobile and sensor-based devices, generating unstructured data (Wedel & Kannan, 2016), mainly, it needs to be addressed in a way that it can be used to generate useful information, making some of the keywords in clusters analysis essential points of interests for organizations, such as Big Data, Data Warehouses, Business Intelligence Systems, and Analytics, basically represented by the cluster C1 and C2.

Organizations deal with large volumes of data, complicated communication processes, and constant changes in scope, making the BI project delivery a complex management task, while Agile projects present an exciting approach for changes in scope (especially in the case of a not established communication process). By observing these interactions between Agile, BI and the subcontexts presented in the clusters, it is possible to presume that by applying Agile techniques such as Agile Data Warehousing, Scrum and Extreme Scoping alongside BI practices we can generate similar, and possibly better benefits to the BI delivery of an organization.

Aside from measurement issues for Agile BI, the main BI difficulties regarding complicated communication processes and changes in scope may be resolved by Agile's characteristics of constant interaction with stakeholders, adaptive planning, business strategy alignment, user collaboration, and flexibility.

4 DISCUSSIONS

Kisielnicki and Misiak (2017) present an interesting case study on the effectiveness of agile compared to waterfall implementation methods in IT projects. They explore latest market trends in BI systems implementation and how agile methods can help organizations better handle Big Data. The main differences between agile and traditional methods in BI systems implementation are as follows:

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- In agile methods, cooperation with the customer takes place during the entire project on a regular basis, whereas in traditional ones, it is performed only at selected stages of the project.
- In the agile approach, changes are taken into account regardless of the stage of the project, whereas in the traditional approach, changes are made only after the final acceptance of the solution concept.
- The agile project is divided into parts. Each section is treated as a final distinct product that can be used by the customer, and it can deliver ROI already.
- Agile concentrates on business values, using them to determine quality levels and possible technology constraints, whereas traditional methods concentrate on project scope, using them to determine cost and time schedule.

Kisielnicki and Misiak (2017) present a pilot research conducted in media, digital, and insurance companies comparing the effectiveness of agile and traditional methods in implementing BI systems. The findings revealed that the media company, which adopted agile methods, achieved faster return on investment (ROI) and higher end-user satisfaction in terms of functionality and the actual assistance provided by the BI system. In contrast, the digital company and the insurance company, both implementing BI using traditional methods, faced challenges such as lengthy solution delivery time and a less flexible final product.

The same authors describe the survey and interviews conducted with 65 BI end-users further supported the superiority of agile methods. Among the respondents, 15 had experience with agile implementation, while 50 had experience with the waterfall method. The data indicated that the agile approach led to more successful outcomes. Based on these case study, it can be concluded that agile methods are more effective in the implementation of BI systems, as evidenced by the positive outcomes observed in the media company compared to the digital and insurance companies. But we found on literature some possible challenges and limitations of the intersection between agile and BI:

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- Lack of data governance: Agile BI projects can rely on self-service data access, which can lead to data quality issues and security risks.
- Inexperienced users: Agile BI projects often involve business users who are not familiar with data analysis or visualization tools. This can lead to frustration and decreased adoption of the BI solution.
- Technical challenges: Agile BI projects can be complex and require a variety of technical skills. This can make it difficult to find and retain qualified BI developers.
- Integration with existing systems: Implementing Agile methodologies for business intelligence and data science projects can be challenging when existing systems and processes are not designed to support Agile. This can lead to conflicts and delays in project delivery.
- Data quality issues: Agile methodologies require a high level of collaboration and communication between IT and business stakeholders. However, data quality issues can create mistrust and make it difficult to work together effectively.
- Security and privacy concerns: As more organizations move to the cloud and rely on Big Data, security and privacy concerns become more important. Ensuring that data is maintained with integrity and confidentiality can be a challenge, and organizations need to take a risk-based approach to security.

These six BI agile challenges also come with other difficult inherent to agile process like:

- Poor resource planning: Agile projects often have short timelines and tight budgets, which can make it difficult to plan for resource needs. This can lead to problems such as missed deadlines, scope creep, and low-quality deliverables.
- Limited documentation: Agile projects often emphasize working software over comprehensive documentation. This can make it difficult to track changes and ensure that everyone on the team is on the same page.
- Fragmented output: Agile projects are often divided into small, self-contained increments. This can lead to a fragmented user experience and make it difficult to get a complete picture of the data.

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- No finite end: Agile projects are often ongoing, with new features and functionality being added on a regular basis. This can make it difficult to determine when a project is truly finished.
- Difficult measurement: Agile projects are often measured by the number of features delivered or the amount of time saved. These metrics can be misleading, as they do not take into account the quality of the deliverables or the impact of the project on the business.
- Resistance to change: Agile methodologies require a shift in mindset and culture, which can be difficult for organizations that are used to traditional software development practices. This can lead to resistance to change and a lack of buy-in from stakeholders.
- Lack of understanding: Agile methodologies can be complex and require a deep understanding of the principles and practices involved. This can be a barrier for professionals who are not familiar with Agile or who have not received adequate training.

Using a practical point of view, Larson and Chang (2016) explores the application of Agile methodologies and principles to business intelligence delivery and how Agile has changed with the evolution of business intelligence. It also discusses the Big Data phenomenon and how it has altered the use of Agile principles and practices.

Some of the challenges of applying Agile methodologies to business intelligence delivery include the need for short-cycle Agile to produce faster results, the impact of Big Data on BI and the use of information, and the need to align Agile principles with fast analytics and data science (Larson & Chang, 2016).

The evolution of business intelligence has impacted the use of Agile principles and practices by altering how organizations and individuals use information. The amount of data generated through the internet and smart devices has grown exponentially, leading to the Big Data phenomenon, which has impacted business intelligence and the use of information. As a result, the practice of business intelligence delivery with an Agile

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methodology has matured, but Agile principles and practices have also evolved to align with fast analytics and data science (Larson & Chang, 2016)

5 CONCLUSIONS AND RESEARCH AGENDA

Although we can clarify the relation between BI and Agile, and our findings may lead to the impression that Agile may truly be the solution for the challenges brought by BI practices, the project aspect of these practices have a limited literature, making the process of developing a method of measuring the effectiveness of Agile techniques in the BI world very difficult, as we do not possess an acceptable amount of contributions to create an effective method based solely on the work of other researchers.

The creation of measurement methods is probably the hardest point of interest for research in this area, as the themes that circulate between Agile and BI are numerous, and some focus is needed to determine a starting point for this measurement, a good approach for future studies are Agile's proposes like Content Agility, BI Functional Agility, and BI Scale Agility

The landscape for future research is vast, the concepts and techniques discussed here such as Adaptive Planning, Agile Data Warehousing, Extreme Scoping, and Scrum, and their applicability in the BI scenery present promising results in improving the performance of the delivery of BI Projects, since Agile addresses many problems found in BI projects, focusing on what is possible instead of spending time attempting to determine information requirements, and promoting interaction and collaboration between stakeholders (Larson & Chang, 2016).

Another aspect of the mentioned relations we did not explore is the social one, regarding Agile Project Development, mainly. As Fernández-Sanz et al. (2016) pointed out, the influence of human and organizational factors (HOF) may impact many aspects of Software Development, such as quality, maintenance, and management, presenting yet another point that could potentially influence in the outcome of the BI Project delivery. While focusing on the project aspect, studying the practical influences of HOF (Human and

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Organizational Factors) and the social aspect of software development, may prove itself to be a fruitful endeavor on improving the BI Project delivery, giving more focus on the development teams themselves, and paving the way for further research on this area.

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