Leveraging Experiences in Analytics Between Companies Fostering Accelerated Digital Transformation

Guilherme A. S. Surek[1], Wellington R. Monteiro[1], Leandro dos S. Coelho[1]

[1]Industrial and Systems Engineering Graduate Program (PPGEPS) – Pontifícia Universidade Católica do Paraná (PUCPR)
Rua Imaculada Conceição, 1155, zip code 80215-901, Curitiba, PR, Brazil

{guilherme.surek,wellington.monteiro,leandro.coelho}@pucpr.edu.br

Abstract. *Having a competitive advantage puts a company ahead of its competitors and information technology (IT) through analytics has increasingly shown itself to be a competitive advantage. However, achieving full use of this tool is not an easy task and there is no simple recipe that works for all companies, which leads us to seek the exchange of experiences. Knowledge transfer is the key to evolving as a company and promoting an innovation ecosystem. In this article, the authors present two scenarios of large companies, in one of them the company is starting to implement an analytics framework and the other one it has already implemented and has greater maturity in the process of implementation, and then knowledge transfer application is demonstrated.*

1. Introduction

From the point of view of organizations, it is known that competitive advantage is what positions a given organization ahead of its competitors. In the context of Information Technology (IT) it is worth highlighting the relevance of two specific resources: knowledge and computationally stored data. Both could be understood as non-imitable resources since they have this characteristic compared to their competitors – that is, competitors would not be able to have the same database and knowledge (Cool, 2002).

Still, it is noted that the sharing of knowledge with external actors is endowed with a positive contribution in terms of fostering innovation within organizations (Caloghirou, 2004). This sharing – hereinafter referred to as knowledge transfer – is also understood as an event in which an organization learns from the experiences of another. This type of inter-organizational knowledge transfer depends on factors such as, for example, the absorption capacity of the company which receives the knowledge; the learning motivation; power relations and geographic (Easterby-Smith, 2008).

Furthermore, it is noted that the university environment acts as a potential catalyst for the exchange of knowledge and the formation of connections between members of different organizations since such an environment promotes a context which is psychologically capable of engaging and motivating the formation of such connections (Thomas, 2019).

In this context, this article presents a knowledge transfer application, between two non-competitors industries, in the field of cloud computing and data infrastructure for an analytics team. One company has the challenge of adapting its technical architecture to implement an analytics framework, which will be called company A, while the other

organization had already implemented one and it is at a more mature stage with a myriad of lessons learned, hereinafter called company B.

The remainder of this paper is organized as follows. Section 2 presents the current situation of company A. After, Section 3 describes the company B's journey of implementing an analytics framework. The, Section 4 presents the knowledge transfer application followed by Section 5 with the conclusion.

2. Company A Current Situation

Company A (fictitious name) is in the early stages of adopting cloud computing. Its IT infrastructure is fundamentally on premises, and it is the responsibility of the internal IT team to manage this structure. The company does not adopt a cutting-edge technology strategy and waits for products and services to be on a productivity plateau to start a mass implementation (Dedehayir, 2016).

The SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis matrix is a way of analyzing the current state of the technical architecture of company A (which would be the recipient of knowledge) to understand the company's internal and external contexts (Porter, 1980). It is shown in Table 1.

Table 1. SWOT analysis of company A.

STRENGTHS	WEAKNESSES
• Years of experience and operational excellence; • Large volume of data; • Business areas have professionals with some skills in analytics; • Consolidated and stable industry.	• There are old factories and lack of IT infrastructure; • Culture resistant to changes; • Main focus in operations and engineering; • Low risk appetite and rigid hierarchy.
OPPORTUNITIES	**THREATS**
• Analytics is a hot topic; • Support from large cloud providers.	• Competitive pressure; • Entry of stringent data protection and privacy laws.

Given this context, its different internal departments assumed their respective digital transformations in a way disconnected from the IT department, investing in new systems and technological resources that meet their needs. As a result, the data architecture is segmented into silos which are managed by the respective areas.

In Figure 1 a), a part of the current IT architecture "as is" of Company A is presented, demonstrating the division of data and systems into large corporate silos, and highlighting the difficulty in interconnecting different data sources in Analytics projects.

a) b)

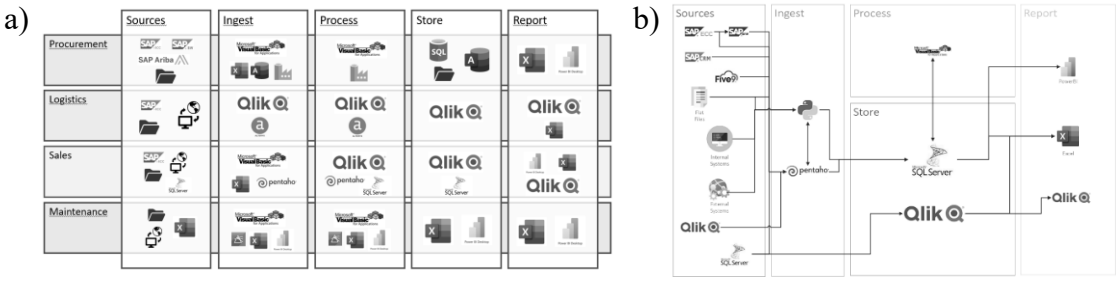

Figure 1. a) In use solution by company A in both levels: Department and Process. b) Technical architecture of part of the commercial department of company A. Source: The Authors.

Each department has found its way to build an architecture and manage its data. This fact has created a complexity of different types of data sources, systems and platforms in the company. Due to this complexity, this article will delve into an area within Company A's business structure, whose “as is” IT architecture is shown in Figure 1 b). This area works with different systems and data sources in which structured, semi-structured and unstructured data exist. The main data ingestion and processing tool is Pentaho, which designs and schedules the execution of this flow.

After processing, Pentaho loads the data into a SQL Server database on premises. Some of this data is reprocessed through VBA and returned to SQL Server. Finally, they are consumed by reports and dashboards in Power BI or Excel spreadsheets. There is another flow running in parallel which loads the data into Qlik Sense and which is then consumed by its dashboards and reports.

3. Company B's Journey

Company B (fictitious name) is at a more mature stage of adoption of cloud computing and its entire technical architecture is mostly adopting cloud solutions. It has a structured IT department and includes specific teams for cloud service architecture, license and contract management, Advanced Analytics, among others.

There is the presence of a unified technical architecture adopted for any other departments in the organization. Contracts related to IT services are also managed centrally by the department, thus mitigating the risks of the areas independently adopting technical solutions. The analytics team has grown organically since the late 1990's and provides services related to data engineering and data visualization. Since 2018, it has also started to support data science projects with different professional profiles. In this way, there is a synergy between the activities between engineers and data scientists, and a guarantee of standardization and data governance and best practices.

The fact that the team has experienced organic growth and has access to vendors to adapt its technical architecture over time has led to cost and performance optimization and a set of lessons learned over time.

4. Knowledge Transfer

Lessons learned include, for example, which solutions were redundant and/or cost too much compared to their proposed benefits, which solutions were more adaptable and/or which would have better stability and performance, and which costs not initially foreseen could occur in the medium and long term.

The university where the authors conducted their studies served as an opportunity for knowledge transfer, as provided in (Thomas, 2019). Understanding the scenario of the participating author from Company A and his challenge, the author from Company B began to analyze the current technical architecture of Company A and, with knowledge transfer sessions with experienced professionals from Company B, presented the current architecture as well as the aforementioned lessons learned. Together, they sought to outline a future model that made sense for Company A and, at the same time, incorporated the lessons learned from Company B. An example of this type of rationalized architecture and seeking synergy with other departments is shown in the Figure 3. This drawing was prepared together by the authors according to their exchanges of experiences.

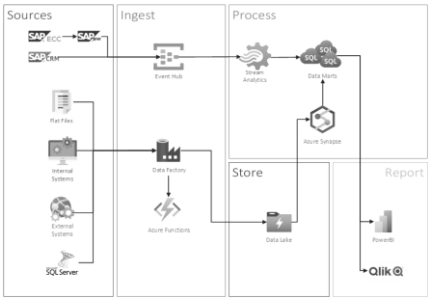

Figure 3. Suggested future technical architecture for the commercial department of company A. Source: The Authors.

5. Conclusion

This manuscript described the process of knowledge transfer considering two organizations with the objective of sharing Analytics technical architectures in a cloud-first approach considering two characteristics: 1) one company was starting to develop said architecture while the other company had adopted it and it is in a more mature stage and 2) the university acting as a medium of communication and contact enablement between professionals. It is important to highlight each architecture has its own particularities and there is no “one-size-fits-all” approach. Having that said, architecture examples commonly available by IT vendors might not cover use cases with the best cost-benefit in mind or not be optimized to the reality of the stakeholders. The knowledge transfer held between by the members of organizations presented in itself as a good kickstart for the donee organization to draw a better architecture as well to the donor organization by fostering a critical analysis over its own architecture.

As a proposal for a continuation of this work, it is suggested to define performance metrics to assess the implementation of the proposed architecture and an analysis of the implementation and operation of it.

References

Caloghirou, Yannis, Ioanna Kastelli, and Aggelos Tsakanikas. "**Internal capabilities and external knowledge sources: complements or substitutes for innovative performance?**". Technovation 24.1 (2004): 29-39.

Cool, Karel, L. Almeida Costa, and Ingemar Dierickx. "**Constructing competitive advantage**". Handbook of Strategy and Management (2002): 55-71.

Dedehayir, Ozgur, and Martin Steinert. "**The hype cycle model: A review and future directions**". Technological Forecasting and Social Change 108 (2016): 28-41.

Mark Easterby-Smith, Marjorie A. Lyles and Eric W. K. Tsang, "**Inter-Organizational Knowledge Transfer: Current Themes and Future Prospects**". Journal of Management Studies (2008): 677-690.

Porter, Michael E. "**Competitive strategy**". New York, NY, USA, The Free Press, 1980.

Thomas, Asha, and Justin Paul. "**Knowledge transfer and innovation through university-industry partnership: An integrated theoretical view**". Knowledge Management Research & Practice 17.4 (2019): 436-448.