Current issues with BI Tools and an evaluation of Business Intelligence tools with regard to Methodology and Frameworks

Abstract

Many of the current problems in Business Intelligence tools are technical in nature, but these problems whilst complex already have technical solutions or are likely to be solved with technical solutions in the near future. More difficult and less likely to ever be solved comprehensively are the non-technical problems centered around business processes, people and methodology. Incorporating the fuzzy, human-centric aspects of business into an all encompassing Business Intelligence architecture is an illogical, emotional challenge that presents no simple framework or IT solution and is more akin to psychology, management theory and leadership although frameworks do exist.

Current issues with Business Intelligence Tools

Far from being a one way extraction of data process, developing a successful Business Intelligence (BI) system is an opportunity to feed back into business processes to refine and improve them. BI should try to be tailored to current practices, but keep in mind the goals of Business Intelligence are centered around reporting & analysis to provide competitive advantage. In reaching those goals it makes equal sense to tailor existing business processes to be as efficient as possible at funneling data, knowledge & wisdom into the Business Intelligence system.

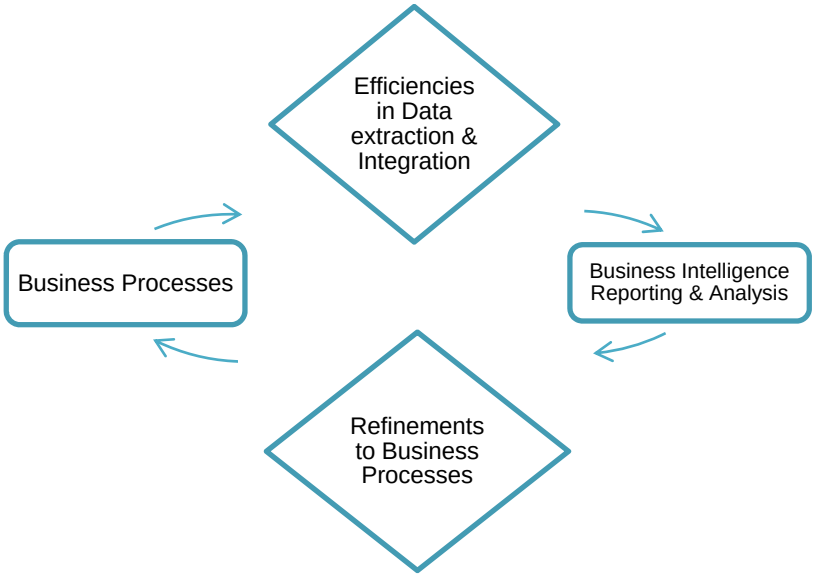

Diagram 1: 2-way feedback between Business Intelligence & Business Processes

Technical Challenges

The current (2010's) technical challenges in BI include Big Data, Collaboration & Social Networking Integration and Mobile platforms, however, "technical integration is no longer considered to be an issue" (Marjanovic 2010). The reason for this is that technical problems lend themselves to technical solutions which are something that IT workers are both capable of evolving and deploying. Connected to this are the expectations of both the core business and the IT function of a business as well as the eternal question and lofty goal of development without specialists, something which still proves elusive despite various endeavors to the contrary.

Big Data

Vast amounts of data storage are now affordable and practical and from this vastness of stored data arises many complications collectively referred to as "Big Data". This is becoming less of a problem because many technical solutions are being implemented to tackle these issues including "Map Reduce", "Column Store" and "In Memory"

(Campbell 2012) which are various ways of compressing, optimising storage and speeding up processing time of data.

Hadoop and other "NoSQL" database technologies make use of Map / Reduce functions as an alternative to Cod's Relational Database theory. Modern versions of Microsoft's Excel use PowerPivot and it's xVelocity engine and this is a direct implementation of a "Column Store" compression algorithm that solves this immediate need.

These techniques enable the integration of non-structured data such as that in text documents and webpages. These techniques also solve slowness complaints by allowing rapid processing and aggregation of vastly more data than has ever been possible before. This is further evidence that the technical problems in BI are being solved.

Collaboration & Social Networking Integration

Collaboration & Social networking in BI tools is another area that presents mainly technical hurdles besides the non-technical challenge of uptake and engagement. Arguably though, uptake will follow effective implementation where there is vested interest as well as simplicity and ease of usage.

Compared to BI of the past where paper reports and then later emailed reports were delivered individually to knowledge workers, "today the norm for BI involves “zero footprint” Web-based delivery of reports" (McKnight 2011). This is certainly a first step towards the heralded "democratisation" of BI but while there is a lot more work to be done in this field there are no fundamental roadblocks in the path of this progression. Those next steps stem from the Web 2.0 trends of the late 2000's particularly the concepts of crowd-sourcing and interactive collaboration.

Techniques such as "write back" to OLAP systems such as in Microsoft's SSAS allow the use of what-if analysis in the spreadsheet tool Excel where BI consumers can enter and "write back" KPI targets and other figures and text into the cube.

Intranet and Content Management System (CMS) BI Integration allows annotation, commenting and re-sharing of knowledge such as in Microsoft's SharePoint with PowerView tools (PowerView previously known as Project Crescent, the spiritual successor to PerformancePoint). Integration of the features of Social networking tools such as Yammer and Twitter into corporate intranet systems alongside interactive BI reports is happening and becoming easier to implement. The concept of a Management Portal for C Suite managers (CEO, CIO ,CFO, COO etc) centered around Dashboards and summary reports is an effective delivery mechanism for collaborated and annotated business results and wisdom.

Mobile Platforms for BI

Mobile platforms include Mobile phones, Tablets, Netbooks and other hybrid devices. Achieving successful BI delivery systems in this area is crucial in the next phase of computer era evolution which is likely to be a mobile dominated era. From mainframes to minicomputers to microcomputers (PC's) to internet connected desktops, the next phase is predictably going to be internet connected mobile devices. Success in this area will result in saved effort:

> *"Achieving real-time business mobility helps information flow like water through the path of least resistance. It facilitates less hunting and gathering on the part of the information consumer by delivering summarized information, supported by detail by BI systems."* (McKnight 2011)

Companies such as Microstrategy (2012) have targeted solutions for these platforms including provision of iOS app development tools for visually creating iPhone BI reports.

Other BI technology vendors have similar offerings or are following suit. Complex Event Processing (CEP) alerts are well known, for example they are not new to mission critical system monitoring and provide a ready solution to mobile BI consumption where decisions can be aided by information delivered upon "the immediate occurrence of a trigger event" (McKnight 2011).

These solutions to Big Data, Collaboration & Social Networking Integrations and Mobile platform BI delivery challenges have come about very quickly and prove the reasonably achievable nature of technical solutions.

From the technical point of view the "focus is not on the process itself, but on the technologies, algorithms and tools" (Ghazanfari et al 2011). From the non-technical point of view the issues revolve around the tricky, more demanding and possibly unsolvable emotional human-centric challenges faced by professional BI practitioners.

Non-Technical Challenges

Most importantly, the often overlooked area of BI system development and the BI roadmap is that of the process and methodology of the non-technical aspects. Whilst the technical aspects of BI solutions and particularly standardisation and automation in ERP systems that feed BI solutions have been well discussed and dissected, "less considered in literature is the main cause of these systems' failure in meeting managers' expectations" (Ghazanfari et al 2009).

Part of the reason why some BI solutions fail to deliver their expected outcomes for an organisation may well be due to the choice of tools or in technical implementation failures. Technical errors, however, can reasonably be expected to have solutions; even though technical solutions may be difficult they are certainly not impossible to achieve where they don't contradict the laws of physics or are impractical.

On the other hand, "efforts to meld BI with business processes must include significant input from business users" (Havenstein 2006). This involvement and input from the key

players in the business, those people that know the data, is vital not only for the success of an ongoing BI project but without it can lead to the inevitable and irrevocable failure of the entire effort. The business users as "data stewards" (Havenstein 2006) must be involved in the BI project because they have a vested interest in the data and are best placed to both see and understand the value of their organisation's data in context with their daily work activities. In contrast to technical challenges such as connecting systems together with services or other forms of APIs, "connecting the various players is more complex than opening data flows" (Sriram 2008).

In successful systems integration projects, the "benefits were directly related to the actions of management in regards to the development and evolution" of the system (Hawking 2011). This points the responsibility for sponsorship and patronage of BI efforts squarely in the domain of management and not IT. Project managers and business analysts will and should play a key role as intermediaries between IT and the core business units 'profit centers', but as is the same for technology and innovation efforts generally, a cross functional cooperative team is the key to achieving a successful outcome.

Taking Action on the Non-Technical Challenges

Whilst it is acknowledged that ground up BI development, including project management, data governance and assessment of the business analysis scope are complex challenges, the pure IT components of these are merely technical integration challenges to be overcome. The majority of the work of project management, data governance and business analysis is done at the human interface. The conversations are human to human, with all of the misunderstanding and ambiguity that goes along with that endeavor. The difficult part of aligning the business and IT or effectively aligning Business Processes with Business Intelligence is the alignment of the project

with people and strategy. It also requires conservative goals and innovative use of tools, models and methodology. The benefits of investing in the wider scope of key personnel involvement and assessing their behaviour is that "new insights and opportunities are created when the integration problem is extended beyond technology." Marjanovic (2010).

People

Programmers, DBA's, Architects, Report Writers, Testers and Support staff in IT are equally as necessary as operations staff but are also assumed to be necessary without question whereas involvement from the knowledge workers and other operations staff in an organisation is often cut out in budgeting. Even if they are committed to the project, without management support at all levels, their involvement can be compromised by their day to day involvement in profit generating activities that are not part of the BI project.

Strategy

Hawking (2011) advises BI professionals and patrons to "align business processes to the overall corporate strategy through the utilisation of embedded 'best practices' processes with the ERP system". The challenge is how to embed those best practices in the first place. An effective way to do this includes using application level checks and controls to prevent bad practice in the first place. If in using the software it is not possible to enter bad or dirty data for example, this flows on through the ERP or other source system all the way to the BI implementation. By determining the organisation's strategic goals and embedding reward mechanisms the users will naturally be guided to following best practice as defined and in line with the strategy. Following on from enforcement of best practice, the BI system will then be able to "extract ‘strategic’ business knowledge and support managerial unstructured decisions" (Ghazanfari et al 2011).

Conservative goals

In a project to apply an effective BI layer to a secondary school, Piedade et al (2010) found that "due to the huge complexity and diversity of processes related with the students that occurs in this context and having in attention that the “students academic success promotion is the main issue underlying this project, the application case implementation was limited to the teaching-learning process." Limiting the project to essential components and reducing complexity can help to ease both the difficulty and the financial cost of business involvement. Minimizing the time contribution required by the organisation staff, in this case teachers and school administrators, allows some valuable BI objectives be met in a reasonable time frame.

Tools: Semantics and Ontology

Semantics in the BI context relates to the usage of words and terminologies to describe objects and processes of importance for reporting & analysis. Semantic definitions are not only a vital part of BI Metadata systems but their discovery is part of the interrogation and investigation phase very much at the human level. Business Intelligence Semantic Models (BISM) are one way of addressing these concerns.

Ontology is related to semantics in that it is about concepts, that is the knowing or knowledge of concepts. In the BI context it refers similarly to the concepts and understanding of what objects and processes are and why they are important. de Castro et al (2009) devised an ontological model of determining and applying business rules & requirements to a BI system by layering a user ontology (the understanding of processes as defined by the operational staff), a Parochial Ontology (the understanding of processes and objects as defined by cross divisional staff and IT developers) and at the lowest level a schema ontology (system naming understood by the computer systems and the DBA's, Developers and Architects). The methodology for discovering

these ontological models and applying them is harmonious with human interaction and determination of business rules from the most difficult source, inside people's heads.
The process is defined as follows:

> *"first the source schema is leveraged into its respective ontology and later this ontology is enriched to better express the source schema. The second step is to add the concepts from users, by creating their own ontology. User's ontology has concepts the users know about business. Finally, we have to add the concepts of the organization business model. These concepts are extracted from the business rules"* Castro et al (2009).

Tools: Business Process Modeling (BPM)

Business process modeling has been well defined and discussed and can prove effective in the formalisation mainly of well established business processes, but can be less effective for hidden or unknown business processes. Aligning both the Business Process model as well as the Business Intelligence model can then help to eliminate discrepancies between the understanding from a top down perspective and understanding from a bottom up perspective.

An effective use of BPM involves " the use of business process models for the conceptual (high level) design...[and] provides a unified formalism for modeling both production (operational) processes ... as well as the processes that populate the data warehouse" Dayal et al (2009). If done well it can kill both birds with one stone.

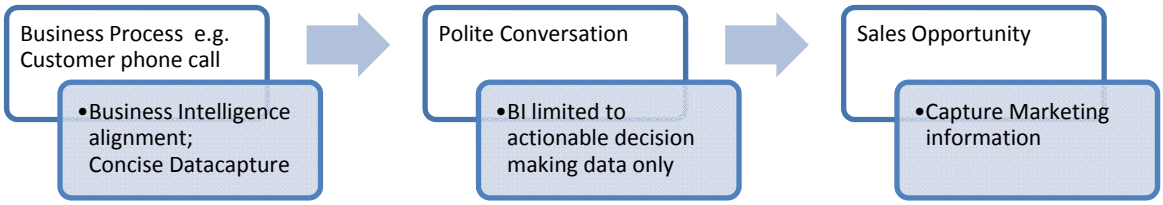

Chart 2. Business Intelligence and Business Processes should be closely aligned and should feed back improvements to each other, although the BI must be limited to capturing concise and practical information.

Tools: Business Process Mining

Business Process Mining is a growing field of exploration born out of the study of data mining as applied to business system data. It is actually a technical solution to eliciting and inferring the behaviour of system users that collective form business processes, by a most unlikely source. Most ERP or other source operations systems have audit trails or event logs or other low level records of user actions built into them.

> *"Business process mining or process mining, for short, aims to automate the construction of models by explaining the behavior observed in the event log. For example, based on some event logs, one can construct a process model" (Ghazanfari et al 2011).*

By piecing together each action a user takes and using algorithms to group and rate collections of actions it therefore becomes possible to infer hidden and unknown business processes even where interrogation and interviewing of users proves fruitless. A side effect of this is that secret or 'bad practice' processes are also uncovered, however, this technique should not be used as an end unto itself but rather as a means of uncovering potentially important business processes and opportunities to streamline best practice.

Conclusion

As technical challenges arise in the BI field they quickly receive attention and often elegant solutions as is the case for Big Data, Social networking BI Integration and Mobile technology BI delivery & consumption. Less attention is paid to Non-technical aspects of an ongoing BI project, however, many tactics, methodologies and frameworks have been attempted with varying degrees of success. Whilst some of the non-technical challenges may ultimately not be completely solvable, some headway can be made into reducing negative impacts. Initial business involvement, particularly sponsorship and support from all levels of management along with ongoing concerted effort towards minimising their disruptive impact can result in additions to BI value realisation and the prevention of untimely project failure. By paying adequate attention to the non-technical challenges and organisation can move closer to achieving the goal of strategic competitive advantage derived from the wisdom and insight created by the BI system.

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