Just-in-Time Business Intelligence and Real-Time Decisioning

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Abstract: - Enterprise agility often may be the difference between organizational success and failure. The changing conditions in which businesses operate might be from customers, competitors, partners, market forces, regulatory forces, or world events. In these circumstances, decisioning is playing a critical role and must also be made in real time. Real-time decisioning (RTD) is an analytic approach that allows organizations to automate the ‘next best actions’ based upon their goals and objectives. It embeds real-time analytic capabilities into business processes and substitutes traditional Business Intelligence (BI) which is oriented dominantly towards analyzing historical data coming from processes that are already accomplished.

Key-Words: - Information technology (IT), business intelligence (BI), business agility, decision-making, real-time decisioning (RTD)

1 Introduction

Seeing, understanding and acting in real time is what defines the ‘Agile Enterprise’. Enterprise agility – the ability to change business and adapt quickly to changing conditions – often may be the difference between organizational success and failure [1].

The changing conditions might come from customers, competitors, partners, market forces, regulatory forces, or world events. Whatever the cause, not being able to adapt quickly has caught many a company flat-footed and unable to respond to an innovation by a more agile competitor.

In the past, enterprise agility has been exceedingly difficult to achieve because viewing all the critical data streaming through the systems, applications, and processes that make up an enterprise’s transaction and information data flow, could not be done in cost effective manner [2].

But, things are changing dramatically. Now business information that can be understood in its business context is flowing between applications – and even between our organizations and those of our business partners, customers, and suppliers. We can now observe in real time any critical piece of business data within these flowing business messages and we can probe for deeper understanding by asking “what if” kinds of questions.

This means that for the first time, IT and Line of Business Managers will have deep visibility to business data in real-time. This will have a dramatic impact on an enterprise’s ability to be agile. This promises to make organizations more competitive, more responsive, more secure, more compliant, and more profitable [3].

In these circumstances, decisioning is playing a critical role and must also be made in real time.

2 Characteristics of Real-Time Decisioning when Applied to Business Management

Business transactions happen in real time. All of them generate data – customer data, product data, sales data, even meta-data, i.e. data about data. People's as well as businesses' expectations lie in the real time world. We are impatient. We expect everything to be ‘always on’, always up to date. It would be unacceptable now for any of these transactions or services to be delivered in batch. People couldn’t bid on auctions, or book flights. Nobody wants current account that shows yesterday’s balance.

The point is clear: in an ‘always on world’ where we run our lives minute by minute, wirelessly connected to a wide variety of information sources, we cannot afford to run our businesses based on out of date information.

Customers expect instant results, and don’t want to wait for answers. We are already struggling to make sense of the data we have, and data volumes are growing significantly faster than processor capability. If we carry on doing the same things each year, we are going to have a problem: ever more data and ever less insight into our businesses.

Almost every business practice has adapted to shortening business cycles, except for the Business Intelligence world. Why do we run our business operations disconnected from the insights that could make us more money and reduce costs? Why should we...
use out-of-date information all the time? Clearly something has to change in the way that we (human beings) use technology to process and analyze data.

Businesses that can use this data to provide faster, better, cheaper, individually personalized services will be the inevitable winners of the next information age – the age of intelligent business.

3 Real Power of Today’s Business Intelligence

Almost every major business or organization the world over uses some form of Business Intelligence (BI) to run their business. BI enables us to plan and budget, control costs, figure out how to acquire new customers, and understand how to retain our existing ones; how to comply with regulators and ultimately to report results to shareholders. In short, BI is the eyes and ears checking the performance of our businesses [4].

There is no doubt that BI has helped to publish information, held in static databases, to many middle and senior business managers effectively. It has enabled us to move from consolidating financials monthly, to daily. We can now view data onscreen in published reports, nicely formatted, in place of the continuous computer paper printouts inches thick delivered on a trolley. But simply because you can now automate the distribution of data to users doesn’t mean that in every case you should. Clearly you can generate an ROI that shows how much money you’d save compared with doing it manually, but users constantly complain of information overload.

Distributing reports out to the field doesn’t change people’s behavior. If the goal is to get them to manage their budgets more effectively, then training might be in order. Just sending a report, where the only indication that they’re heading for an overspend is one number buried somewhere in the report, is not effective at decision making and driving change.

The frustration by business users is most often stated as ‘information arrives just too late to be really useful’. While at first blush this appears to be a timing problem, it’s clear that information needs to be acted upon in order to be useful. Business people universally agree that they don’t need more reports. What’s lacking is real insight.

This insight is needed at the front line in business operations where it can be used to improve performance. There is too much information that lacks real insight and not enough time to make sense of it all.

To put it short: more reports faster, isn’t the answer. But it’s the answer that today’s BI comes up with most frequently.

4 Problem of Latency

Without getting too technical, the real problem is ‘Latency’. Latency is the time taken from something happening or changing to the moment when we can do something about it. It is the root cause of the problem in the architecture used today for BI. Latency, of course, is not a simple concept, but it is critical to BI.

A study of BI latency [5] shows that there are three types of latency:

- data latency,
- analysis latency, and
- decision and action latency.

Fig. 1 – Types of Latency

Fig. 2 demonstrates consequences of shortening the overall latency in a distributed manner.

Fig. 2 – Shortening the overall latency

So the major problem with current BI is only partly the data latency; just as critical is the manual analysis process, and the time taken for real decisions to be made which can positively affect the business.
5 Real-Time Decisioning

Real-time decisioning (RTD) is an analytic process that allows organizations to automate the ‘next best actions’ based upon their goals and objectives. It embeds real-time analytic capabilities into business processes. It analyzes events as they happen, and recommends actions that will most likely influence those events to achieve a set of defined performance goals.

RTD captures the result of every event and recommendation, and learns from experience. This allows the solution to self-correct and significantly affects the operation of processes in real-time which can lead to more informed business decision making and more agile business management [6].

This kind of decisioning is an active participant in business processes. Because it can be embedded in virtually any process, it is uniquely positioned to observe all process parameters. Those can include contextual information, such as time of day and purpose for a customer’s phone call, and profile data about the actors, such as the customer making the call and the agent answering the call.

To better understand the main features of RTD, let us think for a moment about how, for example, customer experiences are analyzed and operated by one person. The owner has a very good view of all company activities; therefore he or she can take good care of his/her customers. If there is a problem with one of his/her products, he or she will personally and quickly discover the issue and react to it. He or she can optimize his/her inventory against what he or she knows about the buying habits of his/her customers and also shortcut unnecessary processes and react quickly whenever he or she learns something new.

In large companies, processes are distributed across many participants, including systems and people; there is no one person capable of learning from the many interactions and activities that pertain to each customer [7]. When problem or opportunities arise, they may be noted and analyzed later – sometimes weeks or even months after-the-fact. Rarely is a person or system able to react to the problems or opportunities as they occur.

In general, there is a three-step process that typically takes place before directed, insightful action can be taken in response to a problem or opportunity, as illustrated in Fig. 3.

The lag time between the event (e.g., defective product being sold to customers) and insight can be several more days or weeks to execute the appropriate response (e.g., proactively contact customers with recall notice). Again, the organization assumes a significant liability in terms of service costs and customer dissatisfaction during this lag time.

![Event Insight Action](image-url)

Fig. 3 – Event-Insight-Action cycle

The lag problem illustrated above can cause a direct and substantial impact to both sides of the business’ profit and loss.

6 Limitations of Traditional Decisioning Approaches

6.1 Offline Analytics

Some organizations attempt to identify and react to key events by using offline analytics such as traditional business intelligence (BI) tools. Once insights are gained, a reactive plan is set into motion to address the problem or opportunity [9]. But, this approach has some severe limitations.

In terms of the simple three-step process described above, the singular purpose of offline analytics is to identify important insights. The automations of actions must be pushed to another system that is discontinuous with the overall decisioning process. This creates a capability gap between insights and recommended actions.

As a result, organizations must make up for this capability gap by spending more time and money on manual steps such as integration between the offline analytics and processes. Additionally, offline analytics are not capable of ‘learning’ whether their prescribed recommendation was successful or not because there is...
no feedback from processes to analytics. Organizations relying on offline analytics for decisioning have to query manually the system to determine recommendation effectiveness.

While offline analytics play an important role within every organization, it has inherent limitations that restrict its ability to make decisions and influence events as they take place. These limitations include [10]:

- An inability to define key performance goals that the analytics are designed to support.
- An inability to monitor processes and results in real-time.
- Time lag issues from the time an event takes place until the problem/opportunity insight is queried.
- High costs issues associated with the highly skilled, manual analyses (and people) that is needed to extract new knowledge.
- A narrow focus on a small number of important analyses due to their manual nature.
- A complicated infrastructure that makes analyses fragile as well as prone to a high degree of administration.
- An inability to recommend and/or automate appropriate actions in real-time based on key insights.

Today, companies waste a lot of money by taking the wrong actions with their customers [11]. Traditional offline analytic tools are not designed to identify key events in real-time and take appropriate action automatically.

6.2 Rule-Based Systems

Some organizations try to use rule-based systems to predict scenarios that trigger specific actions to take place [12]. While this approach seems to provide a high degree of control, organizations cannot predict every unique scenario that must be defined in a rule-based system. In reality, rule-based systems actually provide a limited amount of control to help organizations achieve their performance goals.

In terms of the simple three-step process described earlier, the purpose of rule based systems is to execute specific actions when certain conditions exist.

Whereas rule-based systems play an important role within some organizations, these systems have inherent limitations that restrict its ability to make the right decisions to achieve performance goals and objectives. These limitations usually include:

- Scalability problems that result from the number of rules that must be manually written to predict every unique situation that should receive a predefined response. Even simple rule-based system implementations can have multiple-thousands of rules.
- Complexity problems that result from the nested functions that must be written to address the granular details of segmentation schemes and unique scenarios.
- Administration problems that arise from the complexity and scalability problems; one or more administrator must make changes throughout hundreds or thousands of rules contained in the system.
- Flexibility problems that result from the inability to quickly adapt the system to changing customer or market conditions.
- A lack of closed-loop insight that would be able to show the effectiveness of the rules-driven recommendations.

Whereas rule-based systems are able to take action automatically, the recommended action is not always the best action to achieve performance goals. Additionally, rule-based systems provide a limited amount of control that quickly gets over-complex as the number of rules increases.

To avoid limitations of traditional rule-based systems, they are evolving to so-called Business Rule Engines (BREs). BRE technology intends to traverse the enterprise, interacting with disparate data sources and applications and executing the decision-making process [13].

Limitations of business intelligence offline analytic tools and traditional rule-based systems as compared to real-time analytics and Business Rule Engines are shown in Fig. 4.
7 BI and Decision-Making Typology

When the BI community speaks about supporting better business decisions, it traditionally does so from the perspective of strategic decision-making. However, as the BI space matures in terms of technique and technology (and user demands grow), BI continues to evolve. Today, there is significant attention and interest in supporting tactical decision-making as well. Yet, strategic and tactical are not the only types of decisions made in an organization. Many argue that there is a third type: operational decision-making. Table 1 shows definitions and examples for the three categories.

<table>
<thead>
<tr>
<th>Decision Category</th>
<th>Examples</th>
</tr>
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<tbody>
<tr>
<td>Strategic</td>
<td>Broad decisions affecting the entire organization (for example, mergers and acquisitions, market expansion, and new product development)</td>
</tr>
<tr>
<td>Tactical</td>
<td>Managed determination of process, customers, products, and so on (for example, defining the acceptable level of risk for new applicants)</td>
</tr>
<tr>
<td>Operational</td>
<td>Transactional decisions (for example, approving or declining a specific application, detecting fraud, etc.)</td>
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Table 1 – Decision-Making Categories

The end game for BI is not simply exposing actionable information and insight. It is also to ensure that action is taken to improve business performance. The challenge for BI is not only to determine what information is combined with what knowledge but also to ensure appropriate action is taken. The challenge for BI is to become lean, i.e. Just-in-Time.

For strategic and tactical decisions, any action taken requires human intervention. Curiously, there may be considerably less effort on the BI team to service these types of decisions. The BI team may need to build a data store and install tools that allow users to perform their own research for insight. An Online Analytical Processing (OLAP) cube, for example, is implemented for a subject matter expert to interrogate data. The BI team often focuses only on providing the cube and tools, and the user is tasked with finding any actionable insight, making these types of decisions less difficult to implement than projects focused on operational decisions. Operational decisions can be, and often are, automated [14].

Fig. 5 shows the direct relationship between the decision category and the amount of human intervention required. Since they are often automated, considerably more research and implementation work rests on the shoulders of the BI team. Since they are often automated, considerably more research and implementation work rests on the shoulders of the BI team.

Fig. 5 – Decision types and automation level

Strategic decisions (such as those regarding expansion) have broad implications for the direction of the organization as a whole. Answers to these types of questions are rarely derived from a purely automated environment. Even when building simulation models, subject matter experts must still evaluate the results and formalize actions taken.

Tactical decisions are focused on managing processes, such as evaluating and establishing the level of risk the organization is willing to assume for specific loan products (for example, mortgages).

Operational decisions, however, are the most fundamental. They address individual business transactions (such as whether a loan is approved or not). In addition, they likely represent the highest number of decisions made on a routine, day-to-day basis. It is precisely for that reason that operational decision making can and should be targeted for a high degree of automation.

In order to provide BI value, business architects must understand the types of decisions made in organizations, including strategic, tactical, and operational. Each category provides clues as to the type of action process that is feasible. Strategic and tactical decisions are often best suited with some human intervention. Once a decision has been made, it is possible that the action process is a composite of several disparate adjustments to operations. On the other hand, operational decisions can often be fully automated and the subsequent actions can be a part of an inline process.
8 How Can Just-in-Time Business Intelligence Provide Support to Real-Time Decisioning?

Just-in-Time (JIT) Business Intelligence (BI) can help organizations to proactively and consistently take the best actions with their customers, and in turn achieve their desired performance and effectiveness goals [15].

There are few characteristics of JIT BI platforms that make it uniquely suitable for operation within processes:

- First, it can look at a broad array of data; unlike humans, an automated system can look at hundreds or even thousands of pieces of data, checking all of them for correlations, in parallel and within the time period that that data is still relevant to customer interaction.
- Second, the analysis is done as a part of the process, so there is no delay of discovery. As soon as data reflects the problem, it is discovered.
- Third, the analysis is automatic, so that there is no need for a person to be alert and perform the necessary queries to detect the anomaly, it is detected automatically.

Such a break-through approach can overcome the limitations of traditional decisioning approaches including traditional business intelligence and rule-based systems, due to its capability of real-time decisioning.

9 Conclusion

Today, enterprises are under relentless pressure to achieve higher levels of agility: the need for speed and flexibility is paramount in every industry [16]. Increasingly, the best organizations, to remain leaders, must have faster response to customers, competitors and to other external market forces. They must make decisions quickly, possibly in real time.

Real-time decisioning is an analytic process that allows organizations to automate the ‘next best actions’ based upon their goals and objectives. It embeds real-time analytic capabilities into business processes. It analyzes events as they happen, and recommends actions that will most likely influence those events to achieve a set of defined performance goals.

Using real-time decisioning makes it possible to make informed decisions regarding how to treat every participant in a given process based on the characteristics of the actor, as well as the context.

In conclusion, we can make a little comparison to illustrate the real-time decisioning potential: when businesses switched to tracking documents digitally, not only efficiency was affected, but a whole new world of applications was opened; in a similar way, real-time decisioning will certainly create and define entirely new ways of doing business.

References: