

# The Challenges of Business Intelligence in Cloud Computing

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## Abstract

**Background/Objectives:** Cloud technology is one of the trending acquisitions by IT industry and cloud organizations. Though it comes with numerous challenges and cost barriers, it is still considered to be an important source of commercial analytics. **Methods/Statistical Analysis:** Cloud combines itself with facets available in the organizations. Necessarily it doesn't seek for technical domains but matches with all available resources. Business Intelligences is a wonder source that enhances itself with cloud terminology and technical nuances of cloud resources. Response time and aspects of business intelligence solutions goes hand in hand. This paper gives a clear understanding and deep insights on mathematical indicators of Business Intelligence (BI) and its encounters with cloud lexicons. **Findings:** This study analyses the crucial challenges that accompanies cloud technology when utilized with Business Intelligence. Major contribution lies around the crucial uncertainties that overrule the opportunities in cloud computing. Mathematical analyses like return on investment and payback value methods which are used to determine the economic hand-outs and proportions towards the obtainable tenets are also deliberated in this work. Agility is measured in terms of the potential users that bypass cloud resources through business intelligence. The study also encompasses various Business Intelligence chauffeurs. **Applications/Improvements:** The concept of BI can be well handled through cloud tools like CloudSim, CloudAnalyst and Aneka using different models of cloud. The results can be improvised with the capability of BI methods.

**Keywords:** Business Intelligence (BI), Capital Expenses, Return on Investment, Response Time, Service Allocator

## 1. Introduction

IT industry does face ethical issues on term of its infrastructure in deliverance with computing. Giving the right resource to right customer becomes an immediate need of business intelligence oriented cloud services. Demand and acquisition of resources to satisfy rising desires of customers or users is the immediate purpose of emergent technologies. Technically, superlative performance and reformist development in technology can only be measured through its Customer satisfaction levels and potentiality to produce preeminent results. In recent years cloud terminology of computing is gaining a proportion of relevance in almost every field of technology<sup>1</sup>. It has also taken an upper hand in impending virtual technologies to all walks of domain. Cloud comes up with three foremost models or services like infrastructure, platform and

software. Considering the scenarios of cloud computing there are two important perspectives, consumer and provider's perspective. In terms of consumer or the user of cloud services they are allowed and offered all kinds of service from cloud. Conceptual terms, consumers are allowed to use the service and only pay for the service that is used. This can also be termed as metered service sharing from cloud resource pool<sup>2</sup>. Computing and business intelligence goes hand in hand with the technical understandings. Whereas, BI requires more of acquisition in terms of parallel processing and large storage production in terms data capability.

Figure 1, which is referred as Business Intelligence Model clearly defines the current stages involved in Business intelligence affianced along with its Delivery approach, Infrastructure, Application, Governance, and Methodology.

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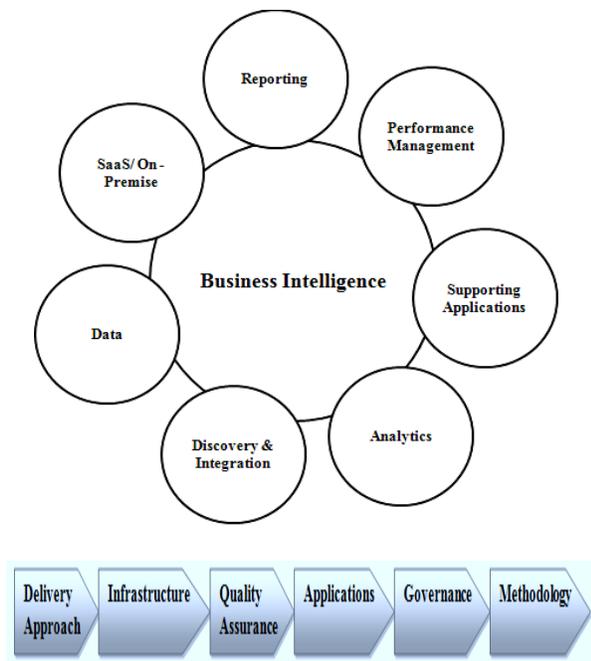


Figure 1. Business Intelligence model defined.

As business intelligence combined with cloud utility resources offer various projects that inhibit technical requirements and analysis on product services. These services extend itself from SaaS model of cloud services. However adopting and combining services from cloud with BI sources bears risk factors and at times it also compounds to high investments returns<sup>3</sup>. Traditional acquisition of BI terms can be utilized for this purpose, to overcome the loss incurred in terms of cloud utilization. Business based solutions are adopted to increase the demand over the services of cloud and to increase the overall response time from software edges. Increasing the agility for IT industries is the key contribution of BI evolutions over cloud technologies<sup>4</sup>.

## 2. Business Intelligence and Cloud - Top Technology Priorities

Cloud computing is a flexible and easy to handle terminology but coupled with few hindrances of grid oriented financed based applications<sup>5</sup>. Some of the common problem incurred in this relevance will be:

- Assessment cunninggs.
- Risk rendering.

- Conventional modelling.
- Value ratios.

Business intelligence is a term that refers to technologies which models and transforms the resources from the customer into a vulnerable data that possess less computability issues<sup>6</sup> shown in Figure 2. This core information can be interpreted into business solutions. Business form of computing the intelligence into cloud resources is a simulated occurrence which takes form (i.e., polymorphic forms) like offshoots, routine analytics and fiscal software computations. BI is also treated as service oriented model under cloud aspect which can be named business intelligence oriented cloud service<sup>7</sup>. The prior and ultimate aim of any cloud service model is to deliver perfect service to clients in terms of service response time. The more reduced time is taken to accountability, the better service is provided by the resource managers of cloud and business components.

Business as service is compounded with listed trials as follows:

- Any service rendered or leased is accepted and accompanied with industrial risks or potential ones. This can be trailed with reduced response time<sup>8</sup>.
- Simulated occurrence with business deliverance can be tackled with reduced turnaround time. This helps in bringing up the revenue or investments costs to the organization<sup>8</sup>.

### 2.1 Cloud – BI: Chauffeurs

Cloud and business intelligence solutions work and play hand in hand. This act encounters numerous indulgences and few to mention are<sup>9</sup>:

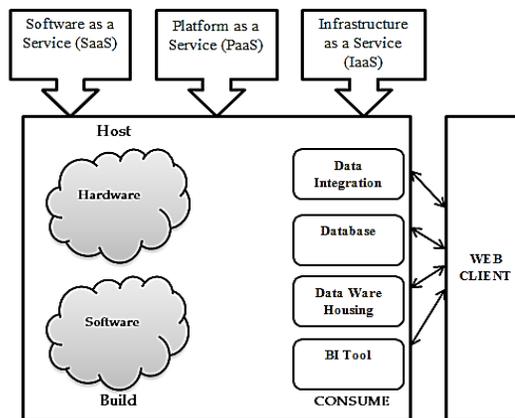


Figure 2. Business Intelligence on the cloud: Architecture.

- Promptness to construction and rendering of cloud and business services.
- Resistance in delivering the services to BI users.
- Emphasis on core services and analytics.
- Reduced cost to organization and providers.
- Resources given at pay as per user - Metered services.

## 2.2 Cloud – BI: Encounters

As researchers and entrepreneurs state a very low productivity over cloud and BI solutions in terms of adopting the hand in hand service troll<sup>9</sup>. Some of usual tantrums faced by these components are listed and its methods of overcoming are also analysed for better results:

- Enactment.
- BI provider's development over solutions offered in leasing the services.
- Quality assessment and lack of hailing the control over the services from cloud.
- Validation on data threats.

## 2.3 Fruition of Cloud and BI (C-BI)

Cloud services is one of the best technology bliss of the epoch which offers wide range of services and leased resources to its users in form of software, infrastructure and platforms<sup>10</sup>. Simplest form of accessing the resources is also a remote feature of this technology. Internet serves as a bridge between the user and the cloud interface. Software as a service is designed to face its dynamic customer in providing the resources as per the requirement. The nature of the requirement as when it reaches the station of datacentre (cloud) remains to be dynamic and not static. As the data center strains under the need for more storage and faster performance (all while keeping costs in check,) cloud computing, open source technologies and other emerging approaches are presenting compelling new ways to manage data and consume IT services<sup>11</sup>. Considering the scenarios of cloud and BI solutions there are two important perspectives, consumer and provider's perspective. In terms of consumer or the user of cloud services they are allowed and offered all kinds of service from cloud. Conceptual terms, consumers are allowed to use the service and only pay for the service that is used. This can also be termed as metered service sharing from cloud resource pool. The key expectation of BI's perspective is to make bigger profits and reduced operational costs<sup>12</sup>. This brings a definite need for heuristics that can

afford to give better performance and enhanced cloud services with resource provisioning capabilities.

## 3. Cloud Business Intelligence

This enhanced terminology of BI solutions is a mixed prediction analysis system of cloud and business intelligence. On a wider connotation, business intelligence is an aspect oriented proposition that effectively handles and distributes the resources from cloud to its vendors with accomplished targets of response time. Some its unique renderings to the users are often considered to be the cost and handling the infrastructure management<sup>13</sup>. This invariably offers a wide range of benefits to both cloud and BI users. Again as per the record of cloud history, both cloud computing and BI go hand in hand in their business strategy and use pay as you go or pay as you use concept. Whether it's the traditional outplay or the economical capability in terms of BI component just takes around six to seven business days to set the atmosphere to enhance the user interface for resource utilization<sup>13</sup>. BI source of computing and acquisition in cloud resource is an emergent technology experienced by growing user requirements (On-demand cloud access). Presuming that, same level of demands is created by the software, platform and infrastructure as a service from cloud environment. Acquiring the resources with no delays or backlogs is still on debate<sup>14</sup>.

## 4. Return on Investment (ROI) for Cloud BI Functioning

Any relevant business functioning require the profit statement canalization, which dental ermines the organizational structure and investment policies. This can be finalized through return on investment policies. Hence once the organizational activities changes to BI components it is necessary to ascertain the current and existing financial returns in order to measure the outcome benefited through BI solutions<sup>14</sup>. Implementation and operational cost incurred also gets into account and ratio analysis of BI solutions. General components which act upon these cadres are:

- Metrics or parameters that rely on investment policies.
- Financial assessment based on return policies.

Financial assessment is often treated as a risk factor and can be analyzed with cost and return balance to achieve

best results and solutions on BI maintenance<sup>15</sup>. Capital expenses and operational cost is regarded to be the backend process of business Intelligence computing. Infrastructural and business activities are entwined together, considering this fact the main focus is thrown on savings and revenue cost incurred by the organization and cloud sectors<sup>16</sup>.

## 5. Business Intelligence on Demand

Computing strategies is an evolving technical agenda which primarily handles resources across the globe for business enhancement and development. Cloud follows various technical throughputs to deliver the resource to the users with business intelligence. This helps the users of the resource to understand on the services that are availed by them and purpose of the same<sup>17</sup>. This is regarded as on demand service or effective resource utilization. In relevance to effective utilization on resource the distribution relies or passes through cloud models. Software service models from cloud are chosen to deliver the services on demand calls to the users from point of restoration. Now response time should invariably be reduced so that more users can be availed and point of profit can also be achieved. The tasks of business monitoring are taken care by BI and cloud components. Once the system monitoring of resource is identified it is certainly necessary to identify the overall monitoring or also referred as routine monitoring. Routine monitoring is often regarded as the cost incurred by the business before the prerequisites altered for BI solutions<sup>17</sup>. The key focus is to reduce the response time and over cost which will be later compare with the before and after state of resource utilization from the user interface. User authorization and manipulation of data in account segregation are some activities that are performed the UI of software model in cloud services.

Data management is another important utility and point of service in terms of cloud and business intelligence. Some of the activities that the user will be given access are:

- Data usage and availability.
- Cost benefits and monitoring tool access.
- Priority list and time consumption access.
- User access role permissions.

There are a number of momentous technologies that make cloud and BI form of computing a possible solution to all need of user requests preforms. One of the

key concepts and the most important is virtualization. Virtualization technique provides a promising methodology through which hardware and software resources of BI and cloud can be comfortably moved on one or more machines which can be divided through partial or complete machine simulation<sup>17</sup>. Virtualization enables dynamic sharing of physical resources in cloud computing environments, allowing multiple applications to run in different performance-isolated platforms called Virtual Machines (VMs) in a single physical server. This technology also enables on-demand or utility computing-a just-in-time resource provisioning model in which computing resources such as CPU, memory, and disk space are made available to applications only as needed and not allocated statically based on the peak workload demand. Hence this pictures in best way that cloud system is bounded by large users, who rent and lease the resource<sup>18</sup>. This brings a definite need for heuristics that can afford to give better performance and enhanced cloud services with resource provisioning capabilities.

### 5.1 Handling Cloud and BI Agility

One of the paradigms of cloud and BI model is Software service which is considered to be both platform and application oriented. Software as a service is considered to be software distribution model where in cloud vendor or the cloud resource provider is allowed to host applications on BI interface, hence creating a pathway for users to access the resource quickly and efficiently. Once the hosting is done, it is necessary that the hosted services need to be made available to the customers over the internet or network. On the other understanding of practicality software or application can be purchased and used over online with the help of cloud to store the file rather than the local computers<sup>18</sup>. This type of service ultimately reduces the biggest burden of user licensing for application that are purchased and installed directly into the computing machine. Therefore the users of SaaS need to subscribe to the software rather than buying them<sup>18</sup>.

As cloud is subjected to vulnerability since it's of vast platform oriented and multi user network, there is need of agility that is to be maintained from the perspective of BI interface. This task is considered to be highly risky and has few prerequisites to be maintained. Few to state are:

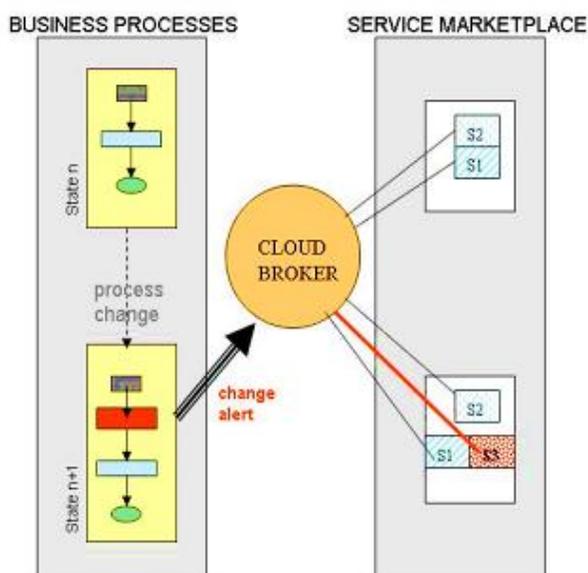
- Capability to measure the productivity of the business.
- SLA subjected prices and strategies from different cloud service providers.

Resources are stored and utilized from the datacentres. Each of them is governed by its centralized providers and they are responsible for all the activities and actions that happen from point of control. Once the user request or places a priority on any demand on access the service provider contacts the BI interface and through the gateway the resource utilization is processed as per the need<sup>19</sup>. It is important to process the request within the stipulated period of time, so this paves way for efficient response time management. Therefore active participant in this process of resource requisition is often the cloud service broker and the service provider who pays more attention in delivering the right resource to the user and the client of BI solutions<sup>19</sup>.

Assuming Figure 3, which the Cloud service broker achieves a repository of all providers and services which are pertinent to the value chain of a company. This allows the Cloud Broker to change the cloud configuration when necessary (because of the process evolution). We are currently working on a framework/language to describe the different cloud services<sup>20</sup>

According to Figure 3, Cloud service broker accomplishes during the business process lifecycle:

- Encounter and obligate of services to the process model when the model is set-up for the first time usage.
- Considering the business process in terms of change.
- Stemming non-explicit changes.
- Resonant the changes on the service binding end<sup>20</sup>.



**Figure 3.** Describing “The cloud broker”.

## 6. Conclusion

Cloud services combined with business intelligences is sharing major technical advantages over the IT giants in today world of technology. Both offer various services to the users of resources leased or rented and also trying to eliminate cost barriers. Reducing response time and offering right resources to the authorised users is the priority concept of business intelligence coupled with cloud computing. Implementation and infrastructure cost do exceed the expectations and limitations of the services provides from entrepreneurs. But, considering the fact and increased turnover profits over ratios of returns on investment is a silent feature of BI. On a wider connotation Business Intelligence concept along with cloud utility services can yield better services to the users though it's challenging in terms of cost and implementation. Though, considering the challenged faced by the users is relatively less when compared with the interpretation thrown by various service brokers to achieve the right source of resource at less service response time. On this account BI with resources sounds to be a greater advent in terms of Customer satisfaction levels.

## 7. References

1. Efraim T, et al. Decision support and business intelligence systems. Pearson Education India; 2007.
2. Alexander L, Hueske F, Markl V. Situational business intelligence. Business Intelligence for the Real-Time Enterprise. Springer Berlin Heidelberg. 2009; 27:1–11.
3. Meng X, et al. Cloud computing boosts business intelligence of telecommunication industry. Cloud Computing. Springer Berlin Heidelberg; 2009; 224–31.
4. Andreas S, Bernhardt DIN. Business Intelligence und Cloud Computing. HMD Praxis der Wirtschaftsinformatik. 2010; 47(5):34–41.
5. Tharam D, Wu C, Chang E. Cloud computing: issues and challenges. IEEE 2010 24th IEEE International Conference on Advanced Information Networking and Applications (AINA); Perth, WA. 2010. p. 27–33.
6. Shuai Z, et al. Cloud computing research and development trend. Future Networks. IEEE 2nd International Conference on ICFN'10; Sanya, Hainan. 2010. p. 93–7.
7. Gatzju GS, Kumar TU, Wache H. Cloud broker: Bringing intelligence into the cloud. IEEE 3rd International Conference on Cloud Computing (CLOUD); Miami, FL. 2010. p. 544–5.
8. Willem TJJ, Van der Walt JS. Business intelligence in the cloud: Original research. South African Journal of Information Management. 2010; 12(1):1–15.

9. Henning B, Kemper H G. Business intelligence in the cloud? PACIS; 2010. p. 1528–9.
10. Sean M, et al. Cloud computing - The business perspective. Decision Support Systems. 2011; 51(1):176–89.
11. Stevan M. Would cloud computing revolutionize teaching business intelligence courses? Issues in Informing Science and Information Technology. 2011; 8:209–17.
12. Singh GY, Rathore VS. Cloud business intelligence–is what business need today. International Journal of Recent Technology and Engineering. 2013; 1(6):81–6.
13. Rajathi A, Saravanan N. A survey on secure storage in cloud computing. Indian Journal of Science and Technology. 2013; 6(4):4396–401.
14. Pal AS, Pattnaik BPK. Classification of virtualization environment for cloud computing. Indian Journal of Science and Technology. 2013; 6(1):3965–71.
15. Victor C. The business intelligence as a service in the cloud. Future Generation Computer Systems. 2014; 37:512–34.
16. Mamlouk L, Segard O. Big Data and Intrusiveness: Marketing issues. Indian Journal of Science and Technology. 2015; 8(S4):189–93.
17. Business intelligence on the cloud overview, use cases and ROI. Available from: <http://research.ijcaonline.org/ctngc/number2/ctngc1018.pdf>
18. Business intelligence in the cloud. Available from: <http://isibox.ir/pdf/eghtesad/Business%20intelligence%20ine%20the%20cloud.pdf>
19. Introduction to business intelligence with cloud. Available from: <https://www.rgpv.ac.in/icbdt/Papers/CL-158.pdf>