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Smart IT Technologies of the Current Century

Shweta Ohri*

Abstract

As we know that the emerging IT technologies are essential for our day to day live. During the last few decades we have seen a great leaps in IT technologies which are all innovations that revolution the way we live and work. In this paper we cover those emerging, smart and revolutionary technologies. The paper also cover a broad range of IT areas, from software development to network management.

Keywords: Mobile App Development, Business Intelligence, Data Mining and Predictive Analytics, Cloud Computing, Configuration Management, Software Security Assurance, Virtualization, Network Optimization, Converged Infrastructure, Unified communications, IBM Cognos, Big Data

1. Introduction

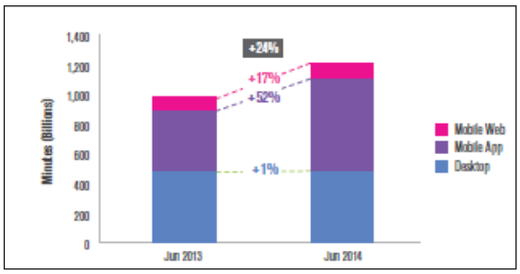
The rapid advances in information and communication technology (ICT) in recent decades has had an enormous effect on everyone, including education, work and shopping. Access to information has exploded, with the scope and detail of material available increasing almost beyond comprehension. Dogged by a significant legacy estate, lack of Most IT departments have been forced to evolve through a series of tactical decisions as opposed to adopting a well thought through strategic transformation program.

In the remaining of this paper, there are two more sections. In Section 2, we provide a brief idea about today's smart technologies. Also, the conclusions and references are references are provided in Section 3.

2. Today's Smart Technologies that the Companies Must Adapt to for Staying in Business

(1) Mobile App Development: The major development of the last century was the desktop computer which was the central hub for all the consumer's digital activities. But with the proliferation of smart phones, the success of the tablet, mobile's rise has been swift. bile devices are increasingly used to access applications and content online. The use of tablets and phones is growing. People are spending more time with their mobile devices. Cisco projects mobile traffic will increase 13-fold by 2017 and there will be more mobile devices than people on earth by 2017 [1]. The increased use of mobile devices and the preference for specialized applications make mobile app development a key technology. Many tools are available for iPhone development, android development these days. Figure 1 shows Digital Time Spent Growth Driven by Apps.

Figure 1.



(2) Business Intelligence: Business Intelligence provides analysis for making effective and high quality business decisions. Companies have application and device logs that can provide

* Department of Information Technology, Jagannath International Management School, [Affiliated from Guru Gobind Singh Indraprastha University] Vasant Kunj, New Delhi, India. E-mail: shweta.ohri@jagannath.org

fine-grained detail about performance and their customers' online activity. The purpose of BI is to support better business decision making. Essentially, BI systems are data-driven Decision Support Systems. Many companies like Microsoft, Oracle, and IBM make use of BI software like querying software, digital dashboards, data mining. Decision engineering and process mining to stay competent in business. Business intelligence software is designed with the primary goal of extracting important data from an organization's raw data to reveal insights to help a business make faster and more accurate decisions. BI software uses a number of analytics features including statistics, data and text mining and predictive analytics to reveal to consolidate and summarize data.

(3) Data Mining and Predictive Analytics: Data mining and predictive analytics build models that allow you to make classification decisions as well as make predictions. The ultimate goal of data mining is prediction and predictive data mining is the most common type of data mining and one that has the most direct business applications. Centre of Excellence CIBIT, Netherlands based company, providing consulting and training in Knowledge Discovery and related technologies. Fuzzy Logix, product and services company that provides in-database analytic solutions, with existing libraries and applications. IBM, offering SPSS Modeller, Cognos and other business analytics and data mining software.

(4) Cloud Computing: Cloud Computing is a technology that uses the internet and central remote servers to maintain data and applications. The technology allows consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing data storage, processing and bandwidth. Companies like Amazon use cloud service like Amazon Web Services, half-dozen services including the Elastic Compute Cloud, for computing capacity, and the Simple Storage Service, for on-demand storage capacity [2]. AT&T use Synaptic Hosting, an application hosting service that offers pay-as-you-go access to virtual servers and storage integrated with security and networking functions [2]. Google uses Google Apps, a set of online office productivity tools including e-mail, calendaring, word processing and a simple Web site creation tool; Posting, a set of e-mail and Web security services; and the Google App Engine, a platform-as-a-service offering that lets developers build applications and host them on Google's infrastructure[2]

(5) Configuration Management: The term Configuration management (CM) is a systems engineering process for establishing and maintaining consistency of a product's performance, functional and physical attributes with its requirements. CM is the process of identifying, controlling and verifying the Configurations Items (CIs) within a service, recording their status. Cisco uses an application change tracking and development tool for application governance [3]. Companies like Bank of America, NYSE, and salesforce.com rely on Puppet Labs software to gain insight into infrastructure configurations and operation.

(6) Software Security Assurance: The software employed in major companies is one of the most valued assets which must be protected against any threats. So there must be a strategy for software security that is tailored to the specific risks facing the organization. Vulnerabilities in software can jeopardize intellectual property, consumer trust, and business operations and services. A broad spectrum of critical applications and infrastructure, from process control systems to commercial application products, depend on secure, reliable software. The major characteristics for such a software include Logic analysis, Data analysis, constraint analysis and informal reviews. Oracle Software Security Assurance (OSSA) is Oracle's methodology for building security into the design, build, testing, and maintenance of its products. Oracle's goal is to ensure that Oracle's products, as well as the customer systems that leverage those products, remain as secure as possible.[4]

(7) Virtualization: Virtualization is the process of introducing a layer of abstraction in a device or system in order to decouple higher-level systems from implementation details. Virtualization has been applied to operating systems, storage systems, and networking. Virtualization is widely adopted because it allows us to more efficiently use resources from CPUs to storage arrays. Virtualization is a fundamental technology to cloud computing enabling rapid and efficient provisioning of virtual machines across well-equipped data centres. Power Network

Monitoring and Response System is a 100-year old diversified power generation and wholesale distribution company which uses data virtualization for a similar network operational reporting solution. In addition it has provided linked data services views across critical generation and distribution systems along the value chain to enable rapid diagnostics and response to outages and disruptions [5]. Agile and Big Data is a national oil company that used data virtualization to create a logical data warehouse combining relational and unstructured Big Data with multiple interfaces for reporting tools, analytics, and data services access. This delivers real-time decision support for field operations combining production and well data against the backdrop of historical analytics.[5]

(8) Network Optimization: Network performance is mostly dependent upon the network architecture. Optimization techniques can help mitigate a wide variety of performance problems. Optimization techniques range from TCP optimizations to the use of content distribution networks around the globe. Many telecommunication companies make use of network optimization for improving the network traffic.

(9) Converged Infrastructure: Converged infrastructure is a technology which groups multiple information technology (IT) components into a single, optimized computing package. The major components of a converged infrastructure may include servers, data storage devices, networking equipment and software for IT infrastructure management. IT organizations use converged infrastructure to centralize the management of IT resources, to consolidate systems, to increase resource-utilization rates, and to lower costs. For instance HP Converged System is a portfolio of system-based products from Hewlett-Packard (HP) that integrates preconfigured IT components into systems for virtualization, cloud computing, big data, collaboration, converged management, and client virtualization [6].

(10) Unified Communications: Unified communications is used to describe a business system, that encompasses a broad range of technologies and applications that have been designed, sold and supported as a single communications platform or as one entity. Unified communications system generally enables companies to use integrated data, video, and voice in one supported product. For example, a single user can access a variety of communication applications such as e-mail, video, fax, voice, and others through a single user mailbox. Additionally, unified communications has expanded to incorporate collaboration and other interactive systems such as scheduling, workflow, instant messaging and voice response systems. AT&T use Audio Conferencing, Video Conferencing, Web Conferencing and Messaging. Cisco uses Audio Conferencing, Video Conferencing, Messaging, VoIP [7].

(11) Big data is a collection of data sets so large and complex that it becomes difficult to process using on-hand database management tools. The challenges include capture, storage, search, sharing, analysis, and visualization. The trend to larger data sets is due to the additional information derivable from analysis of a single large set of related data, as compared to separate smaller sets with the same total amount of data, allowing correlations to be found to "spot business trends, determine quality of research, prevent diseases, link legal citations, combat crime, and determine real-time roadway traffic conditions. (*Wikipedia*) Put another way, big data is the realization of greater business intelligence by storing, processing, and analysing data that was previously ignored due to the limitations of traditional data management technologies.

- 2.5 quintillion bytes of data are generated every day!
  - A quintillion is 10^{18}
- Data come from many quarters.
  - Social media sites
  - Sensors
  - Digital photos
  - Business transactions
  - Location-based data

The Four Dimensions of Big Data

- **Volume:** Large volumes of data
- **Velocity:** Quickly moving data
- **Variety:** Structured, unstructured, images, etc.
- **Veracity:** Trust and integrity is a challenge and a must and is important for big data just as for traditional relational DBs

The Four Dimensions of Use

- Aspects of the way in which users want to interact with their data
    - **Totality:** Users have an increased desire to process and analyse all available data
    - **Exploration:** Users apply analytic approaches where the schema is defined in response to the nature of the query
    - **Frequency:** Users have a desire to increase the rate of analysis in order to generate more accurate and timely business intelligence
    - **Dependency:** Users' need to balance investment in existing technologies and skills with the adoption of new techniques.

Problems

- Although there is a massive spike available data, the percentage of the data that an enterprise can understand is on the decline.
- The data that the enterprise is trying to understand is saturated with both useful signals and lots of noise. [8]

Example

Hadoop : Hadoop is a distributed file system and data processing engine that is designed to handle extremely high volumes of data in any structure. Hadoop has two components:

- The Hadoop distributed file system (HDFS), which supports data in structured relational form, in unstructured form, and in any form in between.
- The Map Reduce programming paradigm for managing applications on multiple distributed servers.

The focus is on supporting redundancy, distributed architectures, and parallel processing.

(12) IBM Cognos Business Intelligence: Organizations are pressured constantly to understand and react quickly to information. With a capable and efficient business intelligence solution, all levels of an organization can receive information how, when, and where they need it to make faster and better aligned decisions. Many organizations often satisfy this complexity and these diverse demands with a number of point solutions. With IBM Cognos Business Intelligence (BI) solutions, you can satisfy needs throughout the user community and ensure that everyone can work and collaborate from a consistent set of data. In addition, IT is simplified with fewer components to deploy, manage, and maintain.

IBM Cognos BI provides a unified workspace for business intelligence and analytics that the entire organization can use to answer key business questions and outperform the competition. With IBM Cognos BI, users can:

- Easily view, assemble and personalize information
- Explore all types of information from all angles to assess the current business situation
- Analyze facts and anticipate tactical and strategic implications by simply shifting from viewing to more advanced, predictive or what-if analysis
- Collaborate to establish decision networks to share insights and drive toward a collective intelligence
- Provide transparency and accountability to drive alignment and consensus
- Communicate and coordinate tasks to engage the right people at the right time
- Access information and take action anywhere, taking advantage of mobile devices and real-time analytics
- Integrate and link analytics in everyday work to business workflow and process

3. Conclusions & References

Conclusion

During the last few decades we got a number of emerging technologies in IT which is most important and useful factors. For the growth of individuals and companies the awareness of those technologies are very essential. The purpose of this paper is to make you aware of the same.

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