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From AI to XI: It all starts with "HI"

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ABSTRACT

"HI" is a universal way to greet family, friends, and acquaintances. It is a common word we say many times every day. "HI" can also be very powerful in the context of human intelligence. Humans have always been the core for delivering intelligence, and we as humans provide the intelligence that feeds many XI platforms such as business intelligence, data intelligence, customer intelligence, machine intelligence, artificial intelligence, and augmented intelligence. Humans have the brain power that is the platform for providing pervasive intelligence.

HI - INTRODUCTION

'HI' is a common greeting, an ice-breaker word that most of us say every day to each other. I recall reading an article that we say 'HI' on average twenty times a day. It is also a way to start a conversation to a family member, an acquaintance, a new friend, or someone that you pass by. Today, let's convert that simple 'HI' into 'Human Intelligence.' Human intelligence has existed for millions of years. It is the essence of evolution and existence of you and me as humans. We, as humans, are intelligent and apply intelligence to develop, discover and deliver many things in science, technology, engineering, and math, etc. Let's take for example some scientists and inventors such as Isaac Newton, Benjamin Franklin, Graham Bell, Marie Curie, Tim Berners-Lee, Josephine Cochrane, Dr. Shirley Jackson, Steve Jobs, Sarah Blakely, etc. They have all contributed human intelligence to change and shape the world that we live in.

- Graham Bell - Scottish-born American inventor, scientist, and engineer who is credited with inventing the first practical telephone and co-founded AT&T.

- Tim Berners-Lee - an English engineer and computer scientist, best known as the inventor of the World Wide Web

- Sarah Blakely – creator of SPANX and the world's youngest, self-made female billionaire by *Forbes Magazine* and *TIME*'s 100 Most Influential People

- Josephine Cochrane – an American inventor of the mechanical dishwasher in the shed behind her home and founded a company which became KitchenAid.

- Marie Curie – only inventor to have discovered polonium and radium through the theory of radioactivity and won two Nobel prizes in multiple sciences

- Dr. Shirley Jackson – scientist and researcher who enabled others to invent the portable fax, touch tone telephone, solar cells, fiber optic cables, and the technology behind caller ID and call waiting

- Nancy Johnson - became one of the most important people in history by patenting a design for a hand-operated ice cream maker, which is still used to the current day

- Steve Jobs – an entrepreneur and pioneer of the personal computer, co-creator of the Mac, iPod, iPhone and iPad that has changed the mobile landscape

- Isaac Newton - one of the most influential scientists of all time and as a key figure in the scientific revolution in laws of motion and universal gravitation

Intelligence has become the dominant terminology and practice in the last three decades. Over the years, there have been many 'intelligence' references and buzzwords that have transformed our focus and adoption of technologies. Some platforms consist of the word intelligence include

- Data Intelligence (Integration)

- Business Intelligence

- Customer Intelligence

- Artificial Intelligence

- Augmented Intelligence

- 'X' Intelligence (the next breakout)

We are contributors and consumers to these platforms to make them intelligent. We are the science behind the intelligence and all intelligence start with data that you and I produce and consume.

DI - DATA INTELLIGENCE

Data Intelligence is the ability to analyze the various forms of data in such a way that it can be used by organizations to expand investments and services. Data intelligence can be leveraged by companies' use of internal data to analyze their own operations or workforce to make data-driven decisions in the future.

Data Intelligence is often association with the ETL (Extraction, Transformation and Load) process, data quality and EDW (Enterprise Data Warehouse). Data engineers, data wranglers and data quality stewards play a significance role in the data intelligence landscape.

Data Intelligence involves the process of collecting, integrating and aggregating the data into one file or data table for use in downstream applications. This process can be very tedious and cumbersome due some of the following challenges:

- combining data from numerous sources

- handling inconsistent or non-standardized data

- cleaning dirty data

- integrating data that was manually entered

- dealing with structured and semi-structured data

Data engineers spend as much as 85-90% of their time gathering and preparing data intelligence. The data intelligence process normally involves an IT specialist working closely with a business analyst to thoroughly understand their data needs. Preparing data generally involves fixing any errors (typically from human and/or machine input), filling in nulls and/or incomplete data, and merging/joining data from various sources or data formats tend to consume many resources and personnel hours.

Data intelligence is only as good as its quality. Data quality is a billion-dollar issue that deserves a lot of attention but often swept under the rug. In a simple data quality scenario, you may have multiple values that are used in a data set to represent the same value. An example of this is seen with U.S. states – where various values may be commonly used to represent the same state. A state like North Carolina could be represented by 'NC', 'N.C.', 'N. Carolina' or 'North Carolina' to name a few. Data intelligence designed by humans could be leveraged in this example to identify an incorrect number of distinctive values (in the case of U.S. states, a unique count greater than 50 would raise a flag, as there are only 50 states in the U.S.). These values would then need to be standardized to use only an acceptable or standard accepted abbreviation or only full spelling in every row.

Data intelligence builds a strong foundation for a platform such as an enterprise data warehouse. Data is persisted in a centralized platform so that data intelligence can be governed and traceable for its use to meet regulatory measures. Without the right data intelligence, you will get misleading answers and results. In a worst-case scenario where you have the incorrect data, you will get erroneous results that send you down the path of a devastating decision. Bringing all the data from different sources and ensuring that the data is cleansed and integrated is the core of building block to having data intelligence for achieving answers for decision support.

Humans provide the intelligence to turn data into answers which help to drive insight-driven decisions.

BI - BUSINESS INTELLIGENCE

Business intelligence (BI) provides much of the strategic information you need to adapt to ever-changing economic conditions. Too often, however, intelligence is compromised by:

- Multiple, inconsistent representations of data that make it impossible to validate which answers or results are accurate.

- Repetitive tasks that create massive headaches and waste time/efforts.

- Siloed applications that increase management costs and undermine profitability.

Business Intelligence enables the ability to execute analysis and reporting on the past and present and predict the future. In the 1990s and early 2000s, business intelligence was the pinnacle technology to slice and dice the data from cubes. The capabilities of BI are to offer business analytics in various forms

- OLAP

- MOLAP

- ROLAP

- HOLAP

OLAP, online analytical processing, performs analysis of business data and provides the capability for complex calculations, trend analysis, and sophisticated data modeling. It is the foundation for many kinds of business applications for Business Performance Management, Planning, Budgeting, Forecasting, Financial Reporting, Analysis, Simulation Models, Knowledge Discovery, and Data Warehouse Reporting. OLAP enables end-users to perform ad hoc analysis of data in multiple dimensions, thereby providing the answers for better decision making.

MOLAP, multidimensional online analytical processing, facilitates data analysis by using a multidimensional data cube. A user can use multidimensional view data with different facets. Multidimensional data analysis is also possible if a relational database is used. MOLAP is used for limited data volumes and in this data is stored in multidimensional array. In MOLAP, Dynamic multidimensional view of data is created.

ROLAP, relational online analytical processing, relies on manipulating the data stored in the relational database and enabling the ability to slice and dice the data. In essence, each action of slicing and dicing is equivalent to adding a "WHERE" clause in the SQL statement. ROLAP allows the analysis of large data volumes but can be slow to access all of the data.

HOLAP, hybrid OLAP, combining the technologies of MOLAP and ROLAP. It typically stores data in both a relational database and a multidimensional database, depending on the preferred type of processing. The databases are used to store data in the most functional way possible. For heavy data processing, the data is more efficiently stored in a relational database, whereas multidimensional bases are used for speculative processing.

Human intelligence develops and maintains these technologies to deliver business intelligence about the organization – its people, process and customers. We deliver the insight that businesses rely on to drive intelligent-driven decisions.

CI - CUSTOMER INTELLIGENCE

Customer intelligence refers to Customer Relationship Management, Customer Journey, or Customer Experience. The focal point of CI is all about the customer. Customer Relationship Management (CRM) Systems enable companies to develop effective strategies for managing their relationships and interactions with clients. CRM is useful for both existing and prospective customers alike.

One of the biggest benefits of using a CI system is improving your customer's experience. You and I are customers in one way or another. I strongly believe customer experience is one of the most important aspects to succeed. It drives our behavior whether we return as a repeat customer or go somewhere else to spend our hard-earned money to another business.

Customer experience is at the heart of every successful business. Customer intelligence drives the following benefits.

- Enhance customer satisfaction
- Foster customer loyalty by encouraging customers to keep returning
- Reduces customer churn
- Offers businesses with a competitive advantage
- Increase a company's sales and bottom-line
- Builds more solid customer base and relationships

CI relies intelligence from many data sources. Social media and online channels have quickly become the intelligence platform for enriching customer loyalty programs. CI delivers real-time and 1:1 personalized offers to consumers like you and me when we shop at brick and mortar or online. For CI, humans are the biggest producer and consumer of data for intelligence.

Human intelligence drives the analysis of customers to better understand their behaviors and anticipate their needs. HI becomes an integral aspect to deliver the emotional side of customer experience in order to expand and thrive in a competitive global economy.

AI - ARTIFICIAL INTELLIGENCE

AI, artificial intelligence, is the ability to access a vast store of historical data (structured and semi-structured), then applies machine learning algorithms to discover the connections and correlations across all of those information pieces and human interaction. AI leverages the power of cognitive computing to mimic human intelligence with a self-learning feedback loop of knowledge. As expected, data is at the heart of AI along with natural language processing, probabilistic reasoning, machine learning and other technologies to efficiently analyze context and uncover near real-time answers hidden within colossal amounts of information.

AI relies on lots of data for real intelligence. AI pulls from all data sources that include the traditional data and semi-structured from the digital world - emails and videos, images and sensor readings, plus the vast array of information available on the Internet, such as social media posts and academic research articles. This intelligence is provided by you and me to making sense of all the data that is beyond the capacity of the human brain to process. The significance of AI is that it can adapt and get "smarter" over time by learning through their interactions with data and humans via the feedback loop mechanism. In addition, AI takes advantage of the technological advancement in processing power and massive parallel and distributed computing capabilities that makes applying the analytics more scalable and feasible to quickly answer complex questions and help us to make even smarter decisions. AI can provide real-time responses to complex questions posed in natural language by searching through massive amounts of information that have been entered into its knowledge base, making sense of context, and computing the most likely answer. As developers and users "train" the AI system, answers do become more reliable and increasingly pervasive and precise over time.

With the advancement in computing power and capabilities, AI is ideal for insight-driven discovery and analytic-driven decision making. This is made possible with machine learning algorithms which can be applied to all data for mining of historical trends, real-time behaviors, predicted outcomes, and optimal responses. The AI algorithms can be deployed to operate in a self-automated way by integrating and leveraging the information from all intelligent sources such as Internet of Things. Of course, not all applications should be automated and enable a machine to make the decisions, but it is not unreasonable to allow a machine to mine and analyze your massive data collections autonomously for new, unpredicted, unforeseen, and influential discoveries. The ability to automatically take actions based on data insights is becoming an increasingly important aspect of today's modern business environment to gain the distinct competitive advantage.

AI is exciting and holds many promises. With advancements in technology such analytics, data management, machine learning, and natural language processing, it is widely discussed and debated all at the same time.

AUI - AUGMENTED INTELLIGENCE

AUI, the other AI or augmented intelligence is the integration human interactions with machines to deliver intelligence. After all, it is humans who provide intelligence to make systems smarter, more efficient and effective.

AUI and AI are still in its early stages—and is by no means a replacement for traditional information and analytics programs. AUI systems are probabilistic, meaning they are designed to adapt and make sense of the complexity and unpredictability of semi-structured data combined with human intelligence. They can "read" text, "see" images and "hear" natural speech which is expected in the modern world. They interpret that information, organize it and offer explanations of what it means, along with the rationale for their conclusions. They do not offer definitive answers but information that can lead to the right answers. They can be designed to weigh information and ideas from multiple sources, to reason, and then offer hypotheses for consideration. AUI assigns a confidence level to each potential insight or answer. For businesses that need to find real-time answers hidden within massive amounts of diverse data sources, getting a head start on building AI capabilities could be a strategic and smart move.

AUI will provide additional personalized services to you and me, the consumers of information technology. As humans, we can be inconsistent with our reasoning and decision making. AUI can improve the quality and consistency for business and personal decisions by tracing how decisions are made and measuring the resulting outcomes, allowing leading practices to be shared across the organization and in our personal lives. Finally, it can enhance knowledge sharing, providing fast access to on-demand answers to highly relevant and important questions. Intelligence is about asking—and answering questions to get higher-quality results at a faster speed. These questions are often about driving more value in your organization, data-driven information that leads to analytical-driven answers.

Integrating HI and AI can help managing the highly controversial and debatable topic of ethics and biased algorithms. The trickiest issue about AI is the philosophical and ethical debate among practitioners and regulators. What happens when an AI application makes the wrong decision? Who is responsible and where is the blame? How can practitioners verify? How do AI systems avoid bias? These are the questions that have been raised within the AI and AUI communities.

Ensuring that AI develops ethically and safely will be the responsibility of all stakeholders that include you and me.

'X' INTELLIGENCE

Artificial intelligence (AI) is THE buzzword of the decade. The promise of AI ranges from talking robots to using machine learning and deep learning for complex analytical-driven decisions. An entire chapter or book can be written about artificial intelligence and its intentions to deliver anything and everything. Hollywood even made AI popular in the form of science fiction with memorable and recognizable movies such The Terminator (1984) and

<u>I, Robot</u> (2004). What was science fiction has become non-fiction to certain extent. The good news is that we do not anticipate robots or machines to be the bad, evil characters.

There all many systems that require the touch of humans to deliver real intelligence. AI and AUI have been become the latest trends in technology. AI and AUI are not new but it has resurfaced with great promises. What will be next? I love to hear from you and start a conversation on how we humans can be a part of the next wave of intelligence.

CONCLUSION

Human intelligence makes the impossible possible. As an industry, we are data rich but knowledge poor because organizations are unable to make sense of all the data they collect. We are barely scratching surface when it comes to analyzing all of the data that we acquire. New technologies and innovation in AI and AUI are helping to analyze more data than ever. In addition, the ability to analyze the data has become much more complex and companies may not have the right infrastructure and/or tools for it. As data volumes continue to grow, it is imperative to have the proper foundation for managing data and intelligence.

From AI to XI, it all starts with us, humans, to deliver intelligence. Data is pervasive in every organization and is an aspect in any intelligence ecosystem. Human intelligence is becoming more common to aid with delivering of answers about your business or organization. Technologies augmented with humans to deliver intelligence are the essence of our future.

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