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Could Cognitive Computing Enhance Business Strategic Thinking?

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Abstract: Could cognitive computing, an AI derived paradigm that focuses on reasoning and understanding at a quasi abstract level, enhance the cognitive processes inherent in human strategic thinking?. Cognition is an output of processes within the human brain. It delivers creativity and innovation. Cognitive computing delivers concepts, insights and innovations too. Could the two "systems" synergize? Could cognitive computing support executive cognition demonstrated in the course of a vision, a strategy or an innovation. Could it support, in a structural manner, the strategic thinking processes and instruments adopted in business strategy?
This will be the focus of the following article.
The article resorts to qualitative analysis. It starts with an analysis of the process of strategic thinking in business and the cognitive dimension thereof. It then proceeds to an analysis of Artificial Intelligence and the cognitive underlying processes thereof A common ground is then explored and an analysis of the implications for strategic thinking ensues.
The article explores an intricate issue. Although it does not provide a definitive conclusion it could open the door for many challenges and implications.
Keywords: Cognitive Computing, Business, strategic thinking**.**

1 Introduction

1.1 What is Strategic Thinking?

Strategic thinking is a mental process that blends vision, strategies and goal achievement. It is a cognitive activity. It produces thought. It delivers unique insights, distinct capabilities and competitive advantage Strategic thinking comes with specific demands. It requires a systems perspective or a holistic view of the environments, the events and the players within the business context. It appeals to intent (Prahalad, 2005). The focus that allows individuals within an organization to leverage energy, focus attention and concentrate on goal achievement. It works with a broad time horizon that holds past, present and future in equal view. "Strategy is not driven by future intent alone. It is the gap between today's reality and intent for the future that is critical." (Hamal and Prahalad, 2005). Finally the strategic thinking process requires a hypothesis driven sense of direction that ensures the incorporation of both creative and critical thinking into strategy making.

1.2 The Cognitive Dimension of Strategic Thinking

Cognitive psychology is the scientific investigation of human cognition or human mental abilities from perception, attention, learning and memory to concept formation, reasoning, judgment, decision-making, problem solving, and language processing. It deals with processes that link mental stimulus (input) to mental response (output). Cognitive psychology plays a role in the emergence of cognition rooted strategies (Dumper et al, 2019) (Sieff, 2014) . Cognition leads to opportunities and opportunities lead to strategies.

Cognition is a prime source of strategic thinking. It works through associative thinking or the creation of new mental models based on new technology association. Associative thinking occurs when the brain is free to "associate," or link up

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ideas, thoughts, observations, sensory input, memory of existing knowledge, and subconscious. These associations could relate to products, processes, or insights. . Product applications embed the technology in a product or service to provide end-customer benefits. Process applications embed the technology in an organization's workflow to automate or improve operations. And insight applications use cognitive technologies—specifically advanced analytical capabilities such as machine learning—to uncover insights that can inform operational and strategic decisions across an organization

Associative thinking requires a radical departure from past mental framework. Top management's perception of their industry, their organization's perception of itself and third party perception of the organization go through a vast process of change (Blanding, 2013).

2 Artificial Intelligence and Cognitive Computing

2.1 What is Artificial Intelligence?

Artificial Intelligence (AI) is "A branch of computer science dealing with the simulation of intelligent behavior ….. ". It is also "the capability of a machine to imitate intelligent human behavior." (Forbes, Feb 14, 2018,). The processes of simulation of human intelligence by machines, especially computer systems, include learning (the acquisition of information and rules for using the information), reasoning (using the rules to reach approximate or definite conclusions) and self-correction. AI blends several sciences from computing and data sciences to psychology, philosophy and linguistics, among others.

AI concepts could be segmented according to the stage of concept development over time.

• **The present.**

Present day intelligent systems are systems able to handle massive volumes of data but lack the analytical and independent self-awareness element. They are either reactive or limited memory.

• Reactive. These are equipment that analyzes possible moves, their own and their opponent's, and choose the most strategic move. They do not have the ability either to form memories or to use past experiences in order to guide current decisions. The computer's perception of the world is direct and it acts according to what it "sees ".

• Limited memory (corrective). These equipment use past experience in order to influence future decisions. Past information are, however, only transient and are not saved as part of a library or a learning experience. (The Conversation, November 14, 2016).

• **The future.**

This AI segment does not only form an image of its own world, but also of other agents or entities in the world at large. It does not only understand consciousness, but has it.

• Theory of mind. This is a psychology term that refers to the ability to attribute mental states, beliefs, knowledge desires and intentions, to one self and to understand that others have beliefs, knowledge desires and intentions that are different from one's own. (Baron, Simon 1991). And they impact upon their decisions. This kind of AI does not exist yet...

• Self-awareness. In this category, AI systems have a sense of self and consciousness. Machines with self-awareness understand their current state and can use the information to infer what others are feeling. Conscious beings are aware of them, know about their internal states, and are able to predict feelings of others. This type of AI does not exist yet. (The Conversation, November 14, 2016).

2.2 The cognitive dimension of Artificial Intelligence: cognitive computing.

Cognition within Artificial Intelligence is closely associated with the system structure of the process.

AI is built, as a system , around a flow of inputs, transformations, outputs and a feedback loop. Data, raw and otherwise, as well as artificial neural sub-systems constitute the inputs. Learning (machine and otherwise) and analysis (diagnostic, predictive and otherwise) provide the transformation. Insights, technologies as well as derived sub-systems constitute the

output. Feedback loop conveys outputs to the input and transformation segments and triggers essential adjustments..(El Namaki, 2019)

One can hypothesize that the cognition within artificial intelligence is the output of the learning and analysis processes that take place within the transformation segment of the AI system. Cognitive computing is the medium.

Cognitive computing is a type of computing that focuses on reasoning and conceptual analysis often analogous to human cognition. It deals with symbolic and conceptual information rather than pure data or sensor streams. (Computer World, 3 marches 2016). It resorts to computerized models to simulate the human cognition process and to find solutions in complex situations. It involves technologies that power cognitive applications as expert systems, neural networks, robotics and virtual reality (VR).

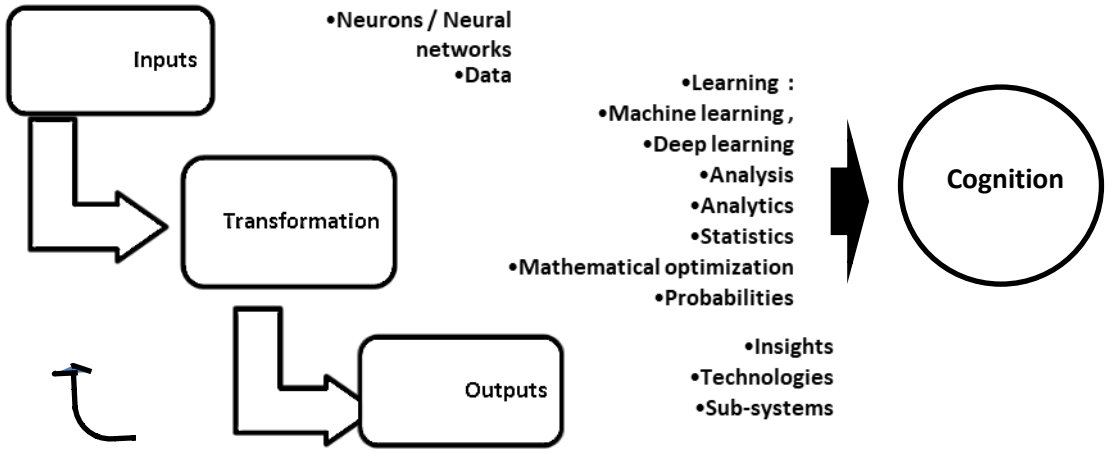

Fig.1: AI system constructs.

Source: Adapted from El Namaki , M " A System's approach to the Artificial Intelligence concept", Journal of Knowledge Management Application and Practice An International Journal ,1 Aug 2019.

The term cognitive computing is typically used to describe AI systems that aim to simulate human thought. Human cognition involves real-time analysis of environment, context and intent, among many other variables that inform a person's ability to solve problems. A number of AI technologies are required for a computer system to build cognitive models that mimic human thought processes, including machine learning, deep learning, neural networks, and NLP and sentiment analysis. (Rouse).

Cognitive Computing is a mixture of computer science and cognitive science – that is, the understanding of the human brain and how it works. By means of self-teaching algorithms that use data mining, visual recognition, and natural language processing, the computer is able to solve problems and thereby optimize human processes. (IBM, November 20, 2017) . Vast amounts of structured and unstructured data are fed to machine learning algorithms. Over time, cognitive systems are able to refine the way they identify patterns and the way they process data to become capable of anticipating new problems and model possible solutions.

3 The Common Ground

There is a measure of congruence between human and machine cognitions.

The cognitive drivers of strategic thinking seem to run parallel to the underlying forces of cognitive computing. The input is different but the output could be comparable. Human cognition imbedded into strategic thinking delivers three prime concepts: the concept of vision, the concept of strategy and the concept of corrective action. All of them are creative concepts derived from cognitive processes conducted by the human brain. Cognitive computing produces conceptual frameworks mimicking the cognitive processes of the human brain as well. Cognitive computing resorts to technologies as machine self-learning, natural language processing, data mining and others in order to deliver cognition. Processes that simulate the human cognition process in order to solve complex and at times amorphous problems. It is computing focusing on reasoning often in a manner that is analogous to human cognition or at least inspired by it. It deals with symbolic and

conceptual information rather than data or sensor streams (Noyes, 2016). It also resorts to more advanced algorithms to be enabled to understand naturally spoken or written human communications.

Cognitive computing is also combined with analytics to produce computing analytics or a combination of analytics and cognitive computing technologies which is used to help humans make smarter decisions. Cognitive analytics enables users to apply human-like intelligence to various tasks, for example, it understands not only the words in a text but the full context of the written or spoken material and also recognizes objects among a large amount of information in an image. This could induce business vision conception and innovation.

4 Implications to Strategic Thinking

Cognitive computing prime contribution to strategic thinking could relate to its ability to evaluate hypotheses based on present day knowledge, integrate fresh data and reach new findings. It can also look at information from multiple perspectives, provide several solutions and order findings according to confidence in inputs. . (Market leadership journal, October 20, 2016).

Product and process innovations are a case in point.

- **Product and service innovation.**
  Cognitive technologies could prove to be a powerful tool in the strategic shift from existing products to novel function fulfilling instruments. Those could be derivatives of existing products i.e. More effective, convenient, safer, faster, distinctive, or otherwise more valuable products. They can also bring about entirely new classes of products and services that can create new markets and generate large gains for inventors Automakers are, for instance, using computer vision and other cognitive technologies in order to develop self-driving cars, a radically different instrument for a function i.e. transportation. . (El Namaki, 2019).
- **Processes and insights.**
  Cognitive technologies could improve processes and create insight. Natural language processing techniques, for instance, make it possible to analyze large volumes of unstructured textual information that has not yielded to other techniques. Machine learning can draw conclusions from large, complex data sets and help make high-quality predictions from operational data. .(Deloitte Review 2015).

Current cognitive computing platforms introducing one form or the other of those cognitive innovations include IBM‘s Watson platform. Watson constitute a new era of computing based on an ability to interact in natural language, process vast amounts of disparate forms of big data, and learn from each interaction.. And there is also Microsoft AI infusing apps, websites, and bots with intelligent algorithms to see, hear, speak, understand, and interpret user needs through natural methods of communication. And there is SAS’s contribution providing NLP, text analytics, and data mining solutions based on structured data.

5 Summary and Conclusions

Cognitive computing, an AI derived paradigm that focuses on reasoning and understanding at a quasi abstract level, seem to enhance the cognitive processes inherent in business strategic thinking.. Cognition which is an output of processes within the human brain delivers creativity and innovation. Cognitive computing delivers concepts, insights and innovations too. The two “systems” seem to synergize with cognitive computing having the potential of supporting executive cognition demonstrated in the course of a vision, a strategy or an innovation. It seems, also, to support the strategic thinking processes by an ability to evaluate conflicting present day hypotheses and updating those through novel information or data. Cognitive technologies could, in this and other ways, deliver product and process innovations and shifts.

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