
From Product to Function: The Strategic Artificial Intelligence Shift

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The Problem

Products stand at the heart of the business. They fulfill consumer needs, demonstrate corporate innovation; guide research and development, and provide a strategic thrust. Case histories of “dominant” products from software to soft drinks confirm this paradigm. Windows fulfilled executive needs, demonstrated Microsoft’s innovation prowess, guided Microsoft’s research and development efforts, and stood at the heart of Microsoft’s strategies. Forces of artificial intelligence seem to alter this paradigm, however. These forces seem to introduce a shift in the fundamentals of strategic thinking by introducing the concept of strategic product-function analysis. What they say in essence is that big data is revealing a different framework of environment functions. Those functions are introducing new concepts of product technology, product innovation, and product positioning within a strategy construct. They are inducing a strategic shift from products to functions.

How will this shift take place, what could be the driving forces and what patterns of strategic behavior will emerge as a result of all of that, will be the focus of this article.

The article relies on qualitative research. It underlines the premises of AI and explores the fundamentals of product function analysis. It further suggests a model for the conceptual and operational analysis of the product function link. Supporting evidence is then drawn from a wide variety of industries from defense to health.

The article could be of use in managing new product development and the product function shift in the organization facing contemporary disruptions

What is Artificial Intelligence?

Artificial Intelligence can best be defined as a branch of computer science that deals with the simulation of human intelligent behavior. It is an attempt at simulating human cognitive processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for the use of this information), reasoning (using rules to reach approximate or definite conclusions), and self-correction (self-initiated adjustment or mending of errors and malfunctions). AI relates to many sciences from computing, mathematics, and data to psychology, philosophy, and linguistics.

The Artificial Intelligence concept lends itself to segmentation. There is segmentation by time, by complexity, and by genericness. Let us confine ourselves to the time segmentation.

- **Present-day Artificial Intelligence :**

These present-day intelligent systems can handle massive volumes of data but lack the analytical and independent self-awareness element that will be key to building future intelligence. 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 to guide current decisions. The computer's perception of the world is direct and it acts according to what it sees.
- **Limited memory (corrective).** This equipment uses experience to influence future decisions. They can look into the past but past information is only transient and is not saved as part of a library or a learning experience. (The Conversation, November 14, 2016)

- **Future Event Artificial Intelligence:**

Systems within this AI segment do not only form representations about its world but also other agents or entities in the world. They not only understand consciousness but have it.

- **Theory of mind.** This is a psychology term. It refers to the understanding that others have beliefs, desires, and intentions that impact the decisions that they make. Also, those others have beliefs, desires, intentions, and perspectives that are different from one's own. This kind of AI does not yet exist.
- **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 can predict the feelings of others. This type of AI does not yet exist. (The Conversation, November 14, 2016)

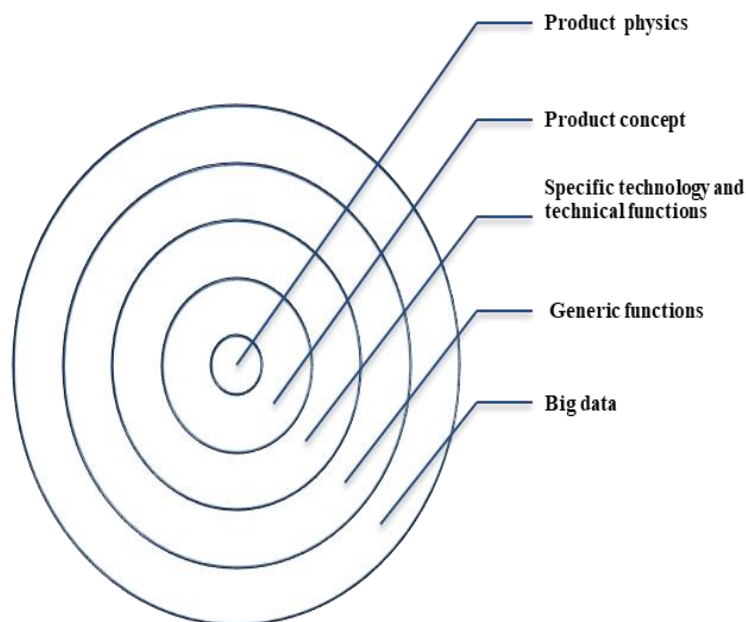
Algorithms are central to the concept of AI. An algorithm is a set of unambiguous instructions that mechanical computing equipment can execute.^[b] A complex algorithm is often built on top of other, simpler, algorithms (Russell & Norvig 2003),

Defining Product Function.

A function is the purpose of an object. Functions are powerful mechanisms for exploring the relationship between people and the instruments of their environments i.e. products. These instruments are function fulfilling products whose fulfillment has “missions”, a technology mission, a sociology mission, an aesthetic mission, and an economic mission among others. The technology and engineering missions deal with the performance of a technology-rooted process and the consequent design and manufacturing implications. The social mission is to make products transmit messages about themselves, their owners, and their makers. The aesthetic mission is to express the products sensory values or sentiment and taste. Finally, the economic mission expresses the exchange value of this product. (Aurisicchio et al, 2011).

Product function analysis develops a function structure or an abstract model of the product, or product concept, without the material features of shape, dimension, or material. It provides a link with the environment where the product is born, used, and abandoned. It also explores the host system, the environmental elements of use; the established and formalized functions; how to control the validity of the functions and functional characterization and hierarchy (Belu et al, 2011)

Figure (1) Product function analysis



Product Function Under Artificial Intelligence

AI technologies will, more likely than not, lead to a fundamental restructuring of industries and the emergence of new arenas. AI frameworks will very likely lead to a shift from strategic market focus to function focus. Functions will determine the instrument, being a product or a service, congruent with business environment conditions. Function analysis derived from big data will contrast with ‘need analysis drawn from market parameters. (Karakasić, 2016)) Rather than relying on customers to tell a business what they want from a product, data analysis will point to the ultimate function of fulfilling medium (El Namaki, 2019).

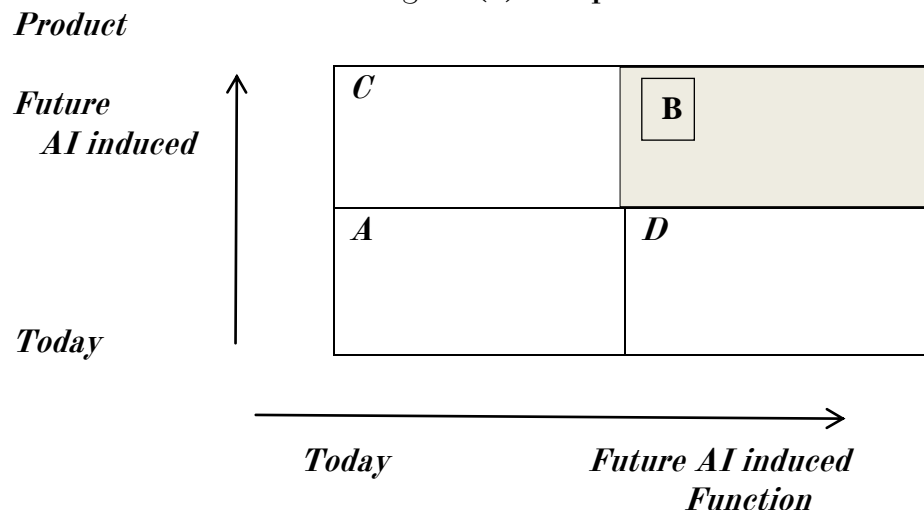
This strategic search for novel function fulfilling products will induce venturing beyond the familiar boundaries of today’s industries. New arenas will be explored and competitive intelligence will lead the way. Artificial intelligence will thus disrupt traditional industry segmentation leading to “leapfrogging” in the development of new industries, the reconfiguration of existing industries, and the emergence of new business arenas. Internet of things IoT, Mobility, Digital logistics, 3D printing, Robotics, Advanced Life Sciences, Cybersecurity and Big Data are all examples of those emerging arenas. (Ransbotham, et al., 2017).

The following figure represents the emerging paradigm. Products-function strategic relationships are projected over time and segmented into four possible outcomes:

- Today’s products for today’s functions or Outcome “A”
- Future products for future AI induced functions or Outcome “B”
- Future (AI induced) products for today’s functions or Outcome “C”
- Future (AI induced) functions for today’s products or Outcome “D”

It demonstrates a flow in products driven by AI induced flows in environmental functions.

Figure (2) The product function shift



Case evidence

The following cases illustrate the two extreme conditions: today's products for today's functions and tomorrow's function triggered products.

Case one: A

Today's products for today's functions: QUALCOMM mobile chips.

Qualcomm, a semiconductor and telecommunications equipment maker has a long history of making mobile phone chips for mobile makers. A typical case for today's products for today's functions. Qualcomm conditions constituted a tight constraint. Access to Qualcomm's cellular chips is made subject to signing a license to Qualcomm's patent portfolio. And the terms of these patent deals were tight, to say the least. Qualcomm was and still is the biggest supplier of these mobile phone chips. It derives most of its revenue from chipmaking and the bulk of its profit from patent licensing. Its contracts with smartphone makers make it almost impossible for other chipmakers to challenge their dominance. Qualcomm has recently been shifting attention to new products based on emerging concepts of connectivity that go beyond homes to cover entire cities and resort to the mobile as a medium. (Ars Technica, 2019).

Case two: B

Future products for future functions: swarm drones and cognitive hostilities.

AI will change future cross country conflict modes. AI technologies will integrate the physical, the informational, and the cognitive. Swarm drones deployed in squadrons with a competency for independent thinking and coordinated maneuver are a case in point. The technology is yet to mature but the process is progressing fast. Future drone swarms are likely to possess the capacity to assess targets allocate tasks and conduct operations with or even without human interaction. Advances in swarming technology are confidential but rapid progress is in the making. (Guardian, 4 Dec 2019).The number of drones, drone task allocation, and swarm division of work are all subject to exploration. Future drone swarms may not consist of the same type and size of drones, but incorporate both large and small drones equipped with different payloads and assigned different roles. The hybrid composition of drone swarms creates a whole that is more potent than the parts. (Kallenborn, 2018) Kristopher, 2019)

Implications for the Strategic Thinking Concept

AI inflicted dynamics along the lines of the suggested matrix will, very likely, lead to a significant shift in approaches to business strategic thinking as much as the very content of the strategies. Several hypotheses could emerge from this analysis. The most important is the one stating that products and services are functions fulfilling instruments and not market derivative.AI derived algorithms will lead to optimum function fulfilling technologies, and products, replacing present-day R and D outcomes. Industries, as a result, will assume different structural parameters.

Summary and Conclusions

Products stand at the heart of the business. They fulfill consumer needs, demonstrate corporate innovation; guide research and development, and provide a strategic thrust. Case histories of “dominant” products from software to soft drinks confirm this paradigm. Windows fulfilled executive needs, demonstrated Microsoft’s innovation prowess, guided Microsoft’s research and development efforts, and stood at the heart of Microsoft’s strategies. Forces of artificial intelligence seem to alter this paradigm, however. These forces seem to introduce a shift in the fundamental concepts of strategic thinking by introducing the concept of strategic product-function analysis. What they say in essence is that big data is revealing a different framework of environment functions. Those functions are introducing new concepts of product technology, product innovation, and product positioning within a strategy construct. The article suggests a model for this shift. This model identifies four outcomes of a relationship between products and functions over time. Several hypotheses could emerge from this analysis. The most important is the one stating that products and services are functions fulfilling instruments and not market derivative

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