International Conference on Knowledge Management, ICKM 2016, 10-11 October 2016, Vienna, Austria

Artificial intelligence creates a wicked problem for the enterprise

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Abstract

James Watt invented the steam engine in the 17th century. It outperformed human muscle power by orders of magnitude. Nobody imagined that this single invention would evocate massive consequences: The steam engine increased industrial production, led to societal upheaval, and changed the political landscape for the next 100 years. There had been no historical parallel on the effect of a dedicated technical invention on humankind in such a short timeframe. At the beginning of the 21st century, we might experience a similar dynamic. This time, artificial intelligence spread the word of a new era that makes cognitive capabilities available on a large scale. Machines with highly sophisticated mental competencies will turn upside down the knowledge work in every company department, be it marketing, human resources, research and development, customer service, or the even the board of directors. Moreover, this time, intelligent machines will outperform human brain power. This paper argues that the arrival of artificial intelligence at the enterprise pave the way to a *wicked problem*: It cannot be resolved by tested methodologies, given procedures, and best practices. Instead, it requires a more sophisticated approach: First, companies must involve all relevant stakeholders at the initial stage of deployment because the impact of artificial intelligence is far-reaching. Second, companies must question their given value system because it closely resonates with the capabilities of artificial intelligence machines. Third, companies must conduct controlled experiments, because "divide and rule" do not work anymore to handle machines that mimic human thinking.

Keywords: cognitive computing; wicked problem;

> "Some problems are so complex that you have to be highly intelligent
> and well-informed just to be undecided about them."
> Laurence J. Peter

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1. Introduction

Over the last three years, the author has studied how companies suspiciously watch the emergence of a new technology called *Artificial Intelligence (AI)*[1], especially, *Cognitive Computing*[2,3,4]. In short, both approaches make use of algorithms based on *Deep Learning* and *Reinforcement Learning* that exploit big data by mimicking skills of higher human thinking[5]. Augurs already claim the advent of an "era of cognitive systems"[6]. Market research companies see the emergence of a new market[7,8,9]. Moreover, the evidence is increasing, that cognitive computing will create a large impact on any company[10,11].

For that purpose, the existing enterprise Information Technology (IT) platform must be elongated by systems that yield the value-add from artificial cognitive capabilities[12]. However, this transformation will not come easy.

2. Challenges of new technologies

Enterprises will face many challenges from artificial intelligence simultaneously. All employees will be affected, their way of working, the way they make decisions, or do predictions and forecasts. Cognitive tools fundamentally reshape and redefine the way of knowledge work as we know it today[13,14].

Any new technology is poised to shake an organization in two ways: 1. New technologies change the balances of power because some people will make better use of it to pursue their goals, others might no; 2. New technologies force all people in an organization to improve their "cognitive literacy"[15].

Exploiting a new technology has always been a procedure of social negotiation by nature. Success largely depends on a collaborative effort of all stakeholders either involved, addressed, or affected. In the last decades, only a few IT trends led to disruptive consequences for an enterprise: Email access and Internet capability have been the two most recent breakthroughs in this regard. The existing methodologies of project management and IT deployment proved sufficient to overcome the challenges accompanied by the introduction of both.

However, while artificial intelligence is entering the front door, those familiar implementation processes will not work anymore. Some trends leverage the challenges of its deployment: The enterprise hierarchies flatten, new forms of collaboration open up, and companies run towards more employee democracy. Workforce diversity is more important today and offers a breadth of options and considerations to juggle challenges. That, in turn, helps to find creative solutions to significant problems, which creates more robust solutions than in the past.

However, companies often tend to ignore threats along the way when it comes to understanding the impact of new technologies. They cannot just substitute legacy technology by a revolutionary one and hope to marginalize psychological and societal impact. A technology that mimics artificial intelligence threatens the integrity of the organization: It changes humans' motivation and attitudes, and wreaks havoc decision-making procedures. Thus, contemporary strategies for IT deployment do not work at the arrival of hyper-intelligent machines. Those issues cannot be resolved by collecting additional data on the disruptive character of cognitive tools to define pertinent topics in more detail or to dismantle a large challenge into tinier tasks.

Current IT planning and deployment techniques would only lead to increased confusion and additional risks for companies. In a better scenario, they will just cause a "productivity paradox", i.e. artificial intelligence might not achieve the productivity gains expected, because companies do not understand how to exploit them[16]. In an unfortunate scenario, a company will not survive this threat at all. Why is this? Because artificial intelligence creates a *wicked problem*, that is extremely difficult to resolve.

3. What is wickedness?

Wickedness is a degree of difficulty. Characterizing the nature of wicked problems is difficult because conventional procedures cannot handle and resolve the[17]. A wicked problem comprises three attributes: First, it has *many causes*. Second, it is *tough to describe*. Moreover, third, it does not provide a *simple answer*. Ecologic disaster, Islamic terrorism, or the recent global financial crisis are examples of wicked problems.

Wicked problems are the opposite of hard but ordinary problems that are answered in a finite period by applying standard techniques (e.g. number crunching, project planning, trend extrapolation). Not only that conventional