Asian Institute of
Digital Transformation

PRE-READING ASSIGNMENT NO. 3 (6 pages)
WEEK 1 SYLLABUS: EXPONENTIAL TECHNOLOGIES
(The Drivers of Digital Transformation)

ARTIFICIAL INTELLIGENCE AND COGNITIVE COMPUTING IN DIGITAL TRANSFORMATION

Artificial intelligence (AI) is already present in plenty of applications, from search algorithms and tools you use every day to bionic limbs for the disabled. What are AI and cognitive computing and how are various forms of AI used and developing?

Artificial intelligence is here for a long time in many forms and ways. In recent years significant progress has been made in some areas of AI. This doesn't mean that AI, in general, is evolving as fast, just those fields. And some of them are increasingly used for different domains of digital transformation. Instead of talking about artificial intelligence (AI), some describe the current wave of AI innovation and acceleration with terms and concepts such as cognitive computing. Others focus on several real-life applications of artificial intelligence that often start with words such as "smart" (omnipresent in anything related to the Internet of Things and AI), *"intelligent," "predictive"* and *"cognitive"*, depending on the exact application.

Artificial intelligence is essential for and in, among others, Industry 4.0 information management, digital health, and life sciences, big data analysis, security (cybersecurity and others), various consumer applications, next-gen smart building technologies, FinTech, predictive maintenance, robotics and so much more. In other words: in very diverse areas where data and information are essential. On top of that, AI is added to several other technologies, including IoT, to unlock the full value of these technologies in several applications and processes.

Artificial intelligence (AI) is a term that has somewhat of a negative connotation in general perception but also in the perception of technology leaders and firms. One major issue is that artificial intelligence has become like a thing, just like 'the cloud' or 'the Internet of Things' that we talk about.

Misconception About Artificial Intelligence

Hollywood loves AI (or better, **superintelligence**, which are not the same). It makes for good sci-fi blockbusters and movies where non-human things such as robots take over the world. The fact that AI is such a broad concept leads to misunderstandings about what it exactly means. Some people are really speaking about machine learning when they talk about AI or about deep learning or about text mining. Others essentially talk about analytics and in doomsday movie scenarios everything gets mixed, including robotics and superintelligence. And in most cases we really talk about some form of AI.

This phenomenon goes hand in hand with the fact that artificial intelligence has failed to deliver upon expectations from previous *popularity waves* and is really old as a concept, research field and set of technologies. Still, deep learning, image recognition, hypothesis generation, artificial neural networks, they're all real and parts are used in various applications. According to IDC, cognitive computing is one of six Innovation Accelerators on top of its third platform.

Artificial intelligence is being used faster in many technological and societal areas although there is quite some hype about what "it" can do from vendors. The increasing attention and adoption of forms of AI in specific areas has triggered debates about how far we want it to go in the future.

Prominent technology leaders have warned about the danger and think tanks and associations have been set up to think about and watch over the long-term impact of AI (and robotics) with discussions on the future of humanity and the impact of superintelligence, and concerns abut the impact of automation/AI/robots on employment. If it makes us feel more comfortable to talk about *"intelligent", "cognitive"* or *"smart"* anything, so be it. What matters more is how artificial intelligence is here and increasingly will be, why it's here, how it helps and is used and what it can mean for you.

AI and Other Transformational Technologies

When people try to explain that artificial intelligence is already here since a long time in some form, they often refer to the algorithms that power Google's search technology or the avalanche of apps on mobile devices. Strictly speaking, these algorithms are not the same as AI though.

Also think about speech recognition, for instance. Or identification technologies, product recommendations and even the electronic games we play. And of course there are many examples, depending on industry or function. Marketing, for instance, uses a bunch of platforms with forms of AI: from the sentiment analysis in social platforms to the predictive capabilities in data-driven marketing solutions. And then there are all those apps such as Uber, Airbnb and the likes that connect you with respectively an Uber driver in the neighborhood and an Airbnb place to stay – powered by AI.

To understand the role and current wave of AI in today's and tomorrow's business and society context it's important to look at the realities and technologies underneath the big overlapping umbrella term. It's also important to see the current wave of artificial intelligence in a context of big data, unstructured data, integration and digital transformation.

AI and The Third Platform Technologies

The foundation of that so-called **3rd Platform** consists of 4 sets of technologies (social, mobility, analytics and cloud) that are interconnected and de facto inherently connected with AI as well. Each of these sets of technologies are technological drivers of digital transformation as such. On top of these 4 foundational sets or pillars (cloud computing that is essential in AI, mobility, social and big data analytics) are the so-called **Innovation Accelerators,** the term we used before. These are again various sets of technologies and technological innovations that drive digital transformation and all of them are inherently integrated with artificial intelligence and in reality some are even close to synonyms of AI.

AI and The Internet of Things

Other innovation accelerators where AI fits in include the Internet of Things. Once you start connecting everything you need APIs, connectors, information analysis technologies and *"embedded intelligence",* essentially code that makes it all possible. Moreover, the Internet of Things, that really is about automation and information (with on top of that a layer of possibilities to, for instance, enhance customer experience or make life a bit easier) adds loads of data, Big Data (one of the four pillars of the 3rd platform) to an already exploding digital data universe. The majority of all that data is unstructured and needs to be turned into knowledge and automated actions, as good old rules-based information management approaches simply can't handle it. Guess what is needed to make it possible and to even make all these other aspects of the Internet of Things possible: ***artificial intelligence.***

Cognitive AI In The Age of Data Analytics

AI and cognitive aren't just present in that innovation accelerator layer. It is also very present in the four pillars of the third platform that are driving and enabling digital transformation, just as they changed the ways we behave, work and innovate. We already mentioned Big Data in that context: ever more unstructured data. The solution: ***more artificial intelligence***. Moreover Big Data as such isn't the crux of the matter. For years we know that most of all Big Data Analytics matter. Turning data into outcomes knowledge, actions, insights etc. That analytics part is so important that IDC has called the Big Data pillar the Big Data/Analytics pillar. What is needed for these analytics? Indeed, again ***AI techniques.***

AI/Cognitive and Unstructured Data/Content

We mentioned earlier how the data universe is exploding with unstructured data growing much and much faster than other data. This is, among others due to mobile data traffic and the Internet of Things. This phenomenon isn't new either and has been predicted since at least 2000. There are debates about the exact meaning of unstructured data and to what degree it is different from unstructured or semi-structured data.

Simply said unstructured data is all the data you would get from IoT sensors, social media (again a link with one of the four pillars), text files (email) and much more. Since several years it is estimated that 80% of data is unstructured and that percentage seems to grow as the volume of unstructured data keeps growing faster. The typical thing with unstructured data is that it doesn't have a predefined data model as you have with data sitting in a relational database, for instance. Unstructured data and content as such has no meaning or context because in principle we don't know what it is. It comes in many shapes and forms and from several sources and is often text-intensive. From paper documents that need to get digitized, to Twitter messages or email, also a major source of unstructured data/content.

In Conclusion: AI and The Question of Ethics

Artificial intelligence is and will be critical for many technological and business evolutions. And, yes, it is one of many enablers of digital transformation. Just looking at one context where AI and cognitive are used, Intelligent Document Recognition, there are several forms of artificial intelligence, such as semantic understanding, statistical clustering and classification algorithms such as SVM, Bayes and Neural-Net. For now, let's say it's clear there is no harm in an algorithm enabling people to find something better and there is no harm in having a system that helps you process and understand information faster and better to improve anything worth improving such as customer service and cybersecurity or people's health, to name just a few.

One of the founders of artificial intelligence as a concept was US computer scientist and cognitive scientist Dr. John McCarthy. He is believed to also have coined the term and defined artificial intelligence as "the science and engineering of making intelligent machines". After a conference in 1956, where McCarthy was present, the first wave really took off, mainly focusing on research. On top of that, there was the success of the Internet, which also led to quite some hype and predictions that didn't really live up to their promises. The spreading availability and usage of the Internet did cause a stir. AI was again debated a lot and became popular.

Today's artificial intelligence wave is one of rapid adoption of AI technologies in new applications, driven by, among others the mentioned 3rd platform technologies, including the cloud, faster processing capabilities, scalability, Big Data, IoT, the push of various companies in a space where technologies continue to be refined across several applications and industries (self-driving cars, robotics, the rise of chatbots and more) and, last but not least, market demand for smart and intelligent technologies to leverage the potential of new technologies, information and digital transformation.

In general the main driver and common thread across all of this is the data deluge. Without AI there isn't that much to do with data to put it simply. Advanced analytics, predictability in areas where traditionally silos exist and decisions are based upon historical data, handling unstructured data are some of these examples.

Last but not least, there are also the advances in specific forms of artificial intelligence. Deep learning, a form of machine learning, is certainly part of that and by the time you read this we'll have new developments as things do speed up.

Whether this wave will lead to true and continuing business momentum however remains to be seen despite *good signs,* as is the next wave and the increasing number of discussions on the *"ethics",* security and *"place"* of AI in the future. The *"AI and robots taking over mankind view"* and superintelligence evolutions – instead of AI as mimicking possibilities of the human brain for a purpose – are real concerns and deserve attention.

It's clear that artificial intelligence is indeed not new but has changed a lot and gains more attention than ever. It's becoming ubiquitous and transforms the way we work, live and do business. Along with robotics (and phenomena such as 3D printing, the Internet of Things, etc.), artificial intelligence is again an increasingly debated topic. Still, this wave is not the last one, it is even very similar in many regards to the previous one and the hype is loud.

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