MIT SLOAN SCHOOL OF MANAGEMENT

MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY (CSAIL)

ARTIFICIAL INTELLIGENCE:
IMPLICATIONS FOR BUSINESS STRATEGY

ONLINE SHORT COURSE

MODULE 1 UNIT 2
Casebook

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1. Defining AI

The term "artificial intelligence" is not easy to define. The word "artificial" is more straightforward, meaning something that doesn't occur naturally. By contrast, "intelligence" has been defined in many ways. One good definition, by the psychologist Howard Gardner, focuses on problem-solving: "Intelligence is the ability to solve problems, or to create products, that are valued within one or more cultural settings" (Gardner 1983). Informally, people sometimes use the term "artificial intelligence" to mean only those activities that are hard for computers to do (like understanding English) as opposed to simpler activities computers routinely do today (like accounting).

An important distinction in the field of AI is between "narrow AI" and "general AI". Narrow AI is defined as "a machine-based system designed to address a specific problem (such as playing Go or chess)" (Kiron 2017). By contrast, general AI refers to machines with the ability to solve many different types of problems on their own, like humans can. To date, all applications of AI are examples of narrow AI. Although general AI is currently a hot research topic, it is still likely decades away from true realization.

For the purposes of this program, Professor Malone's intuitive definition of AI is that it is "machines acting in ways that seem intelligent". Professor Patrick Winston's more formal definition is:

> AI is about the architectures that deploy methods enabled by constraints exposed by representations that support models of thinking, perception, and action. And of course, it's not just about doing, it's also about learning to do.

In Video 1, Professor Winston carefully lays out this definition, explaining each key term in detail.

2. Professor Patrick Winston on the history of AI

In the following two videos, Professor Malone introduces Professor Winston, who then gives a definition and a history of the field of artificial intelligence. In his first video, Professor Winston explains Alan Turing's classic paper and the rationale for the "Turing test". He goes on to describe the early work on AI taking place in research labs such as MIT and Stanford. Having provided a definition of AI, he concludes by discussing the emergence of rule-based expert systems.

Video 1: How do computers think? (Part 1)

In Video 2, Professor Winston continues the historical timeline, from the "AI winter" through to the present. He expands on the milestone events from both a technical and social perspective.

Video 2: How do computers think? (Part 2)

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Optional resources:

To learn more about the history of AI, have a look at a timeline of notable milestones.

Two sections of the 2016 report of Stanford's *One Hundred Year Study on Artificial Intelligence (AI100)*, the Executive Summary and Appendix I, provide useful context and a brief history of AI.

In the first half of this video, Frank Chen of Andreessen Horowitz provides a good overview of the history of AI.

The following article provides a good summary of the current state of AI, explaining what AI can do today and where it has already entered into everyday life. The article concludes with steps to ensure that AI design prioritizes people and is accessible to all.

3. The future of intelligence

In Video 3, Professor Malone interviews Professor Winston about the future of AI to discuss when general or human-level AI might occur. Professor Winston explains the challenges of being able to predict progress and breakthroughs in AI. They discuss the need not only for many kinds of artificial intelligence, but also for different kinds of human intelligence. They highlight the importance of partnerships between people and machines and emphasize the need for many kinds of human and computer intelligence to work together to create a new kind of collective intelligence.
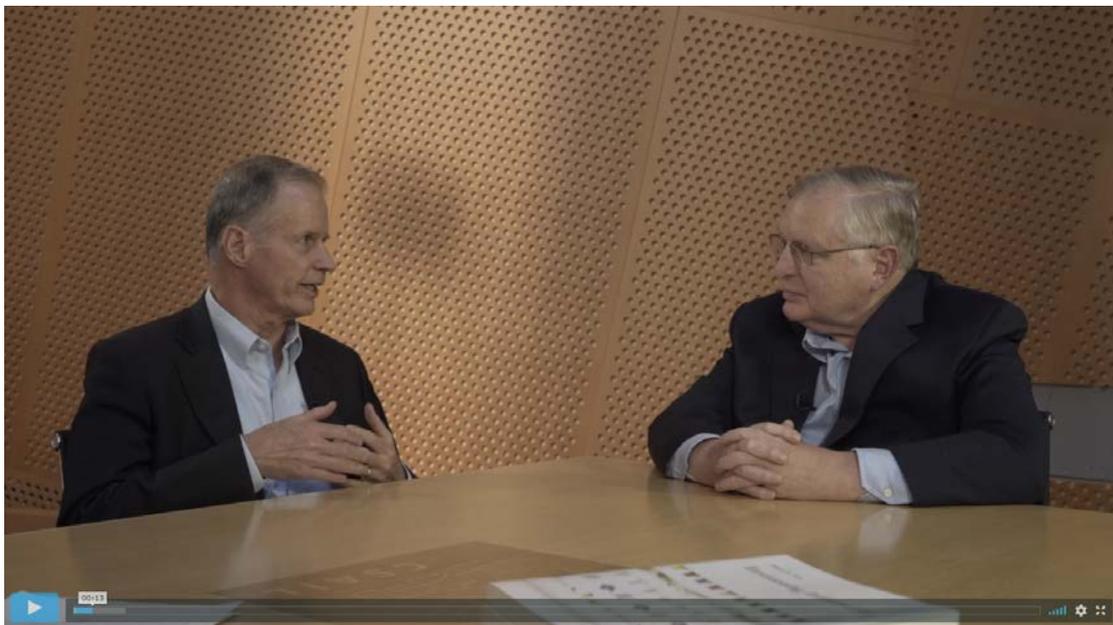
Video 3: The future of intelligence.

4. References

Gardner, Howard. 1983. *Frames of Mind: The Theory of Multiple Intelligences.* New York: Fontana Press.

Kiron, David. 2017. "What managers need to know about artificial intelligence." *MIT Sloan Management Review,* January 25, 2017. http://sloanreview.mit.edu/article/what-managers-need-to-know-about-artificial-intelligence/

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