

## [First Look: Fundamentally Understanding the Usability and Realistic Evolution \(FUTURE\) of Artificial Intelligence Act of 2017 \(HR 4625 / S 2217, 115th Congress\)](#)

Requires the Department of Commerce to establish the Federal Advisory Committee on the Development and Implementation of Artificial Intelligence.

Updated last **December 13, 2017**  
for the 12/12/2017 version of the bill.



### WHAT IT DOES

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The [Fundamentally Understanding the Usability and Realistic Evolution](#) (FUTURE) of Artificial Intelligence Act of 2017 (HR 4625 / S 2217) directs the [Department of Commerce](#) to establish a federal advisory committee (FAC) to (1) advise the Secretary on topics related to the development of artificial intelligence (AI), (2) study various aspects of AI, and (3) report administrative and legislative recommendations back to the secretary eighteen months after enactment of the Act.

The FUTURE of AI Act presumes that AI can benefit society if its ongoing evolution is understood and adequate preparations are made for its deployment. Therefore, the FAC will be established to:

1. Promote US investment and innovation to ensure competitiveness;
2. Address the needs of the US workforce resulting from AI developments,
3. Support the development of unbiased AI; and
4. Protect individual privacy rights.

The FAC has three key purposes, according to the bill, including advising, studying, and reporting on various AI topics. Specific topics for each include:

Advice to the Secretary of Commerce on:

- US competitiveness;
- Workforce disruption;
- Science, technology, engineering and math (STEM) education;
- Ethics training for technologists;
- Open sharing of research and data;
- International cooperation;
- Accountability and legal rights;
- Machine learning bias;
- Opportunities for rural communities; and
- Government cost savings and efficiency.

Studies and assessments of:

- How to create a climate encouraging investment and innovation in AI;
- The effects of AI development on the economy, workforce, and US competitiveness;

- How to minimize job displacement and maximize new job opportunities;
- Identification and elimination of bias in AI development, from identification of diverse AI developers, to selection of inclusive source data;
- Incorporation of ethical standards in AI development;
- How privacy rights will be affected;
- The degree to which AI developments will outpace policies intended to protect the public and how laws should be modernized;
- How the federal government utilizes AI to manage large data sets; and
- How AI development can improve efficiency in health care, cybersecurity, infrastructure and disaster recovery.

The FAC will provide a report on its findings to the Secretary, including recommendations for administrative or legislative actions related to AI. The report will be scheduled for eighteen months after enactment of the Act. The Secretary, in turn, will deliver recommendations to Congress 90 days after receiving the report.

The nineteen FAC members will include:

- Five members from academia;
- Six members from industry (including one representing small business);
- Six members from [civil society](#); and
- Two members from labor organizations.

The committee will also include eight or more members selected from the Department of Education, Department of Justice, Department of Labor, Department of Transportation, Federal Trade Commission, National Institute of Standards and Technology, National Science Foundation, and National Science and Technology Council.

#### RELEVANT SCIENCE

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While the Act provides its own definitions, there is currently no universally agreed-upon definition of artificial intelligence. The term *intelligence* is understood as a measure of a machine's ability to successfully achieve an intended goal. Like humans, machines exhibit varying levels of intelligence subject to the machine's design and training. However, there are different perspectives on how to define and categorize AI.

In 2009, a foundational [textbook](#) classified AI into four categories:

- Ones that think like humans;
- Ones that think rationally;
- Ones that act like humans; and
- Ones that act rationally.

Most of the progress seen in AI has been considered "narrow," having addressed specific problem domains like playing games, driving cars, or recognizing faces in images. In recent years, AI applications have surpassed human abilities in some narrow tasks, and rapid progress is expected to continue, opening up new opportunities in critical areas such as health, education, energy, and the environment. This is in contrast to "general" AI, which would replicate intelligent behavior equal to or surpassing human abilities across the full range of cognitive tasks. Experts involved with the National Science and Technology Council (NSTC) [Committee on Technology](#) believe that it will take decades before society advances to artificial "general" intelligence.

According to Stanford University's [100-year study of AI](#), by 2010, advances in three key areas of technology intersected to increase the promise of AI in the US economy:

- [Big data](#): Large quantities of structured and unstructured data amassed from e-commerce, business, science, government, and social media on a daily basis;

- Increasingly powerful computers: Greater storage and parallel processing of big data; and
- Machine learning: Using increased access to big data as raw materials, increasingly powerful computers can be taught to automatically improve their performance tasks by observing relevant data via statistical modeling.

Key AI applications include the following:

- *Machine learning* is the basis for many of the recent advances in AI. Machine learning is a method of data analysis that attempts to find structure (or a pattern) within a data set without human intervention. Machine learning systems search through data to look for patterns and adjust program actions accordingly, a process defined as training the system. To perform this process, an algorithm (called a *model*) is given a *training set* (or *teaching set*) of data, which it uses to answer a question. For example, for a driverless car, a programmer could provide a teaching set of images tagged either “pedestrian” or “not pedestrian.” The programmer could then show the computer a series of new photos, which it could then categorize as pedestrians or non-pedestrians. Machine learning would then continue to independently add to the teaching set. Every identified image, right or wrong, expands the teaching set, and the program effectively gets “smarter” and better at completing its task over time.

Machine learning algorithms are often categorized as supervised or unsupervised. In *supervised learning*, the system is presented with example inputs along with desired outputs, and the system tries to derive a general rule that maps input to outputs. In *unsupervised learning*, no desired outputs are given and the system is left to find patterns independently.

- *Deep learning* is a subfield in machine learning. Unlike traditional machine learning algorithms that are linear, deep learning utilizes multiple *units* (or *neurons*) stacked in a hierarchy of increasing complexity and abstraction inspired by structure of human brain. Deep learning systems consist of multiple layers and each layer consists of multiple units. Each unit combines a set of input values to produce an output value, which in turn is passed to the other unit downstream. Deep learning enables the recognition of extremely complex, precise patterns in data.
- Advances in AI will bring the possibility of *autonomy* in a variety of systems. Autonomy is the ability of a system to operate and adapt to changing circumstances without human control. It also includes systems that can diagnose and repair faults in their own operation such as identifying and fixing security vulnerabilities.

Experimental research in artificial intelligence includes several key areas that mimic human behaviors, including reasoning, knowledge representation, planning, natural language processing, perception, and generalized intelligence:

- *Reasoning* includes performing sophisticated mental tasks that people can do (e.g., play chess, solve math problems).
- *Knowledge representation* is information about real-world objects the AI can use to solve various problems. *Knowledge* in this context is usable information about a domain, and the *representation* is the form of the knowledge used by the AI.
- *Planning and navigation* includes processes related to how a robot moves from one place to another. This includes identifying safe and efficient paths, dealing with relevant objects (e.g., doors), and manipulating physical objects.
- *Natural language processing* includes interpreting and delivering audible speech to and from users.
- *Perception* research includes improving the capability of computer systems to use sensors to detect and perceive data in a manner that replicates humans’ use of senses to acquire and synthesize information from the world around them.

Ultimately, success in the discrete AI research domains could be combined to achieve *generalized intelligence*, or a fully autonomous “thinking” robot with advanced abilities such as emotional intelligence, creativity, intuition, and morality.

## BACKGROUND

The FUTURE of AI Act follows a series of reports issues by the NSTC [Committee on Technology](#) in 2016. The first was [Preparing for the Future of Artificial Intelligence \(SciPol brief available\)](#), which surveyed the current state of AI, its existing and potential applications, and the questions that progress in AI raises for society and public policy. The second, [National Artificial Intelligence Research and Development Strategic Plan \(SciPol brief available\)](#), prioritized key federal research and development investments to maximize the benefits of AI technology. The third and final report, [Artificial Intelligence, Automation, and the Economy \(SciPol brief](#)

[available](#)) provides a review of the positive and negative effects of AI-driven automation on the US economy and describes three broad strategies designed to augment the benefits and reduce the costs.

These three reports were produced following the White House's June 22, 2016, [Public Request for Information \(RFI\)](#) regarding AI as well as a series of workshops addressing the applications of AI. The [workshops](#) included:

- [AI: Law, and Policy](#) (May 24, 2016);
- [AI for Social Good](#) (June 7, 2016);
- [Future of AI: Emerging Topics and Societal Benefit](#) at the Global Entrepreneurship Summit (June 23, 2016);
- [Safety and Control for AI](#) (June 28, 2016); and
- [Social and Economic Impacts of AI](#) (July 7, 2016).

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#### ENDORSEMENTS & OPPOSITION

Ryan Calo (associate professor at the University of Washington School of Law and the faculty co-director of the University of Washington Tech Policy Lab), [press release](#), December 12, 2017: "This is a very thoughtful and timely bill. Gaining the expertise to make wise and inclusive policy around artificial intelligence is absolutely critical. I applaud Senator Cantwell and her co-sponsors for their leadership."

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#### STATUS

The FUTURE of Artificial Intelligence Act of 2017 was [introduced](#) on December 12, 2017 and referred to the Committee on Energy and Commerce, and in addition to the Committees on Science, Space, and Technology, Education and the Workforce, Foreign Affairs, the Judiciary, and Oversight and Government Reform. On December 15, 2017 it was referred to the Subcommittee on Digital Commerce and Consumer Protection.

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#### RECOMMENDED CITATION

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