

CRS Seminars on Disruptive Technologies: Videos

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The rapid pace of technology innovation and application is affecting both the global economy and human behavior. It has led to the emergence of disruptive technologies with the potential to create large-scale economic and social disruptions. Smartphones and other forms of mobile computing, for example, have had large economic effects on the telecommunications sector, as well as large social impacts.

The effects of such technologies are difficult to predict and present complex facets to Congress as it responds to the opportunities and challenges those technologies pose. Not only are the paths of their development and implementation uncertain, but systematic data collection on them is sparse.

To assist Congress in determining how to respond to those opportunities and challenges, CRS has held a series of seminars for Congress on disruptive technologies.¹ The series is designed to provide an opportunity for congressional staff to better understand the impact of disruptive technologies as well as policy challenges and opportunities these technologies create that may be of interest to Congress. In the seminars held to date, 25 private-sector and government experts discussed technical, economic, policy, and legal aspects of six topics in disruptive technology: artificial intelligence, autonomous vehicles, blockchain, commercial spaceflight, cybersecurity, and gene editing. This report describes each of the seminars in the series and provides links to videos of them that are available on the CRS website.

Artificial Intelligence

Advances in artificial intelligence (AI) are affecting many sectors of the U.S. economy, such as health care, defense, and manufacturing. As investments and innovations in AI grow, new technologies have demonstrated many potential benefits, from improvements in health and safety to economic growth. Concurrently, rapid advancements in AI have raised concerns, such as job losses and potential social, ethical, and security risks, as well as policy and regulatory questions. Further, questions regarding federal support for AI, and subsequent impacts on U.S. innovation and competitiveness, are underscored by China's recent announcement of its goal to become the global leader in AI by 2030.

This seminar focused on broad cross-sector issues in AI. A panel of experts discussed advances in AI technologies and applications, the federal role in research and development of these technologies and coordination with academia and industry, projected impacts on the U.S. workforce, and cross-sector policy considerations for Congress. The speakers were

- Ryan Calo, Assistant Professor of Law, and Faculty Director, Tech Policy Lab, University of Washington School of Law
- Tom Mitchell, Professor, School of Computer Science, and Department Head, Machine Learning Department, Carnegie Mellon University
- Lynne Parker, Associate Dean of Faculty Affairs and Engagement, Tickle College of Engineering, and Professor, Electrical Engineering and Computer Science, University of Tennessee

CRS Video WVB00177, *Artificial Intelligence: Innovation, Impacts, & Policy Considerations for the 115th Congress*, by Laurie A. Harris.

For Further Information

Laurie A. Harris, Analyst in Science and Technology Policy

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Autonomous Vehicles

Motor vehicles are increasingly equipped with technologies that supplement or supplant driver behavior to reduce the nearly 40,000 annual U.S. motor vehicle deaths, as well as related injuries. The rising automation of vehicles may lead in the future to widespread use of vehicles where there is no driver. Two seminars in the series addressed the topic, with the first providing an overview and the second focusing on specific technology and policy issues.

The first seminar on this topic provided an introduction to autonomous vehicles and how federal and state laws and policies may change to address their possible economic and social effects. Speakers addressed implications for transportation and vehicle safety, legal liability issues, changes in insurance, ways to educate the public about pending transportation changes, and federal and state regulatory options. The speakers were

- Robin Chase, Transportation Entrepreneur, Former CEO of Zipcar
- James Lynch, Vice President, Data and Information and Chief Actuary, Insurance Information Institute
- Robert Molloy, Director of the Office of Highway Safety, National Transportation Safety Board
- Bryant Walker Smith, Professor, University of South Carolina Law School

CRS Video WVB00163, *Autonomous Vehicles and the 115th Congress*, by Bill Canis.

The second seminar addressed three topics: ways that disruptive vehicle technologies affect the deployment of fully autonomous vehicles, different testing methods and their impact on future recalls, and the challenge of ensuring vehicle cybersecurity. The three invited speakers offered their professional perspectives on technological and policy issues addressed in the legislative proposals in the 115th Congress. The speakers were

- Joshua Corman, Chief Security Officer and Senior Vice President, PTC
- Steven E. Shladover, Research Engineer (Retired), University of California PATH Program
- Michael Wagner, Chief Executive Officer, Edge Case Research

CRS Video WVB00218, *Autonomous Vehicles: Technology and Cybersecurity Issues*, by Bill Canis.

For Further Information

Bill Canis, Specialist in Industrial Organization and Business

Blockchain

Applications of blockchain technology could potentially disrupt a wide range of recordkeeping systems integral to finance, trade, government, and other sectors. The technology provides an innovative way of using existing information technologies to manage, track, and secure transactions online, which may yield time and cost savings in processing and recording transactions accurately and efficiently. Private companies and investors are using it to create or develop cryptocurrencies (such as Bitcoin), trading networks, and supply chain management systems. Governments are looking to the technology to increase the efficiency and effectiveness of public services and regulatory compliance. Still other possible future applications include systems used in title transfers, medical recordkeeping, and personal identity verification, among others.

The growth of Bitcoin and other blockchain applications is leading some Members of Congress and their staffs to seek objective information on the technology, the potential for disruptive economic and social impacts, and policy implications for Congress. To assist Congress in understanding this disruptive technology, CRS brought together a panel of nationally recognized experts to provide a primer on what the technology is and how it works, to discuss selected applications, and to explore policy implications and options. Questions addressed included the following: What is blockchain technology, and how does it work? How does it differ from other technology used in recording and managing transactions? What are its advantages, disadvantages, and potential impacts? When is blockchain technology useful, and when is it not? What are the major current and proposed applications of blockchain? What policy implications does blockchain raise? What options might Congress consider to address them? The speakers were

- Christian Catalini, Assistant Professor, Technological Innovation, Entrepreneurship, and Strategic Management, MIT Sloan School of Management
- Samantha Pelosi, Senior Vice President for Payments and Innovation, Bankers Association for Finance and Trade
- Dylan Yaga, Computer Scientist, Computer Science Division, National Institute of Standards and Technology

CRS Video WVB00200, *Understanding Blockchain Technology and Its Policy Implications*, by Chris Jaikaran.

For Further Information

Chris Jaikaran, Analyst in Cybersecurity Policy

Rachel F. Fefer, Analyst in International Trade and Finance

David W. Perkins, Analyst in Macroeconomic Policy

Commercial Spaceflight

The increasing role of the private sector in spaceflight has expanded congressional and public interest in space. For many years, spaceflight was the exclusive province of national governments, with commercial contractors providing most of the hardware and many services. Commercial launch providers began to launch commercial satellites in the 1980s, but human spaceflight and most other activities in space have remained largely in government hands. Recently, new technologies, the emergence of new entrepreneurial companies, and changes in government policy have created growing interest in the commercial space sector. Technologies driving this interest include the recovery and reuse of rocket stages, which proponents hope will significantly reduce the cost of space launch; the substitution of fleets of small satellites for single large satellites, which may reduce costs and enable new applications; and robotics, which may enable cost efficiencies such as in-space satellite refueling and potential new applications such as asteroid mining.

This seminar addressed emerging space technologies with the potential to disrupt the commercial space sector; how the sector may evolve, taking advantage of these technological developments; potential impacts on industry, government, and society at large; and potential policy issues for Congress. The speakers were

- Mathew Dunn, Director of Government Affairs, SpaceX
- Michael Gold, Vice President, Washington DC Operations and Business Development, Space Systems Loral (SSL)

- Richard B. Leshner, Vice President, Government Affairs and Policy, Planet
- Phil Smith, Senior Space Analyst, Bryce Space and Technology

CRS Video WVB00187, *Commercial Spaceflight: New Technologies and Applications*, by Daniel Morgan.

For Further Information

Daniel Morgan, Specialist in Science and Technology Policy

Cybersecurity

The rapid growth and evolution of cyberspace is generating substantial change and uncertainty in the cybersecurity environment. Major technology innovations are driving many of those changes and are having increasingly disruptive effects, which makes anticipatory legislative responses to cybersecurity challenges difficult.

To help Congress address that problem, this seminar brought together a panel of experts in cybersecurity and policy to discuss three topics: (1) the evolving cybersecurity landscape and the impacts of disruptive technologies, including mobile computing, cloud computing, the Internet of Things, and artificial intelligence; (2) the challenges that such changes and uncertainty pose for legislation and policy; and (3) options for more proactive legislative response and their advantages and disadvantages. The speakers were

- Margie Gilbert, Program Manager, Team Cymru
- Tom Kellermann, Chief Executive Officer, Strategic Cyber Ventures
- Martin Lindner, Managing Principal Consultant, SecureWorks
- Phyllis Schneck, Former Deputy Under Secretary for Cybersecurity and Communications, U.S. Department of Homeland Security

CRS Video WVB00145, *Cybersecurity: How Can Congress Get Ahead of the Curve?*, by Eric A. Fischer.

For Further Information

Eric Fischer, Senior Specialist in Science and Technology

Chris Jaikaran, Analyst in Cybersecurity Policy

John W. Rollins, Specialist in Terrorism and National Security

Gene Editing

Since its discovery, scientists, science fiction writers, and others have speculated on the implications of being able to control and modify DNA. A new gene editing technology, known as CRISPR-Cas9, offers the potential for substantial improvement over previous technologies, with many in the scientific, engineering, and business communities asserting that CRISPR-Cas9 will lead to groundbreaking advances in the investigation, prevention, and treatment of diseases; agriculture; energy; and ecosystem conservation.

To help Congress understand this innovative technology, this seminar brought together a panel of experts to discuss the potential opportunities offered by CRISPR-Cas9; potential risks associated with CRISPR-related products and research and development, including ethical, legal, and social implications; and how the current federal regulatory framework addresses gene-edited products

and research as well as the need for potential changes associated with advanced gene-editing technologies. The speakers were

- George M. Church, Professor, Department of Genetics, Harvard Medical School
- Barbara J. Evans, Director, Center for Biotechnology and Law, University of Houston Law Center
- Elizabeth Heitman, Professor, Program in Ethics in Science and Medicine, University of Texas Southwestern Medical Center
- Jeffrey Kahn, Director, Johns Hopkins Berman Institute of Bioethics

CRS Video WVB00151, *Advances in Gene Editing: Balancing Promise and Risk*, by Marcy E. Gallo.

For Further Information

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