



January 10, 2019

Submitted Electronically

Matthew S. Borman
Deputy Assistant Secretary for Export Administration
U.S. Department of Commerce
1401 Constitution Avenue, N.W.
Washington, DC 20230

Re: Comments in Response to ANPRM on Review of Controls for Certain Emerging Technologies in Docket 180712626–8840–01 (RIN 0694–AH61)

Dear DAS Borman:

The Association for Computing Machinery (ACM)¹ and the Computing Research Association (CRA)² respectively represent the great bulk of individuals and institutions responsible for fundamental research in computing in the United States. CRA and ACM's U.S. Technology Policy Committee³ are pleased, therefore, to jointly submit today our input in the above-referenced proceeding on the possible impact of new export controls on the computing research ecosystem that has made America the world's leader in information technology.

¹ ACM, the Association for Computing Machinery, is the world's largest and longest-established association of computing professionals, representing approximately 50,000 individuals in the United States and 100,000 worldwide. Our members are engaged in virtually all aspects of computing in academia, government, and both the public and private sectors. ACM is a non-profit, non-lobbying and non-political organization.

² The Computing Research Association (CRA) is an association of more than 200 North American academic departments of computer science, computer engineering, and related fields; laboratories and centers in industry, government, and academia engaging in basic computing research; and affiliated professional societies. CRA's mission is to strengthen research and advanced education in the computing fields, expand opportunities for women and minorities, and improve public and policymaker understanding of the importance of computing and computing research in our society.

³ The Committee, to which these comments should be attributed, is charged by ACM with providing policy and law makers throughout government with timely, substantive and apolitical input on computing technology and the legal and social issues to which it gives rise.

The nation's export control regulations are among those matters on which ACM's U.S. Technology Policy Committee and CRA previously have commented and remain of core concern to our respective members.⁴ We thus welcome this opportunity to do so again and are particularly appreciative that, in crafting its ANPRM, the Department of Commerce (Department) and Bureau of Industry and Security (BIS) expressly disclaim any intention in this docket "to expand jurisdiction over technologies that are not subject to EAR, such as 'fundamental research' . . ."

ACM's Committee and CRA anticipate providing more detailed, technically-based comments at future stages of this docket. Today, we respectfully submit the following broad observations, recommendations and requests which we hope will inform and help contour this and related proceedings' evolution and outcomes:

- 1) Assure that fundamental research remains unimpeded by both direct regulation, as disclaimed by the ANPRM, and the indirect or unintended consequences of new controls.

National Security Decision Directive 189 (Directive), promulgated in 1985 and declassified in 1998, remains in force and highly relevant to the present proceeding. Originally authored to control "the flow of science, technology, and engineering information" in the face of intelligence threats in academia and federal laboratories posed by "Eastern Bloc" nations, NSDD 189 also was expressly grounded in a co-equal counterbalancing consideration. Having acknowledged the threat then posed, it goes on to state:

At the same time, our leadership in science and technology is an essential element in our economic and physical security. The strength of American science requires a research environment conducive to creativity, an environment in which the free exchange of ideas is a vital component.

Consequently, as a matter of official policy, the Directive expressly states that "to the maximum extent possible, the products of fundamental research remain unrestricted."⁵ It also states as a matter of policy that, "where the national security requires control, the mechanism for control of information generated during federally-funded fundamental research . . . is classification. . . . No restrictions may be placed upon the conduct of reporting of federally-funded fundamental research that has not received national security classification, except as provided in applicable U.S. statutes."

⁴ Indeed, no fewer than 8 of the 14 "representative technology categories" identified in the ANPRM that may be considered "emerging" (comprised of at least 25 enumerated subdisciplines) directly relate to one or more aspects of computing and the work of ACM and CRA's members. These include (as numbered in the ANPRM): artificial intelligence (2); microprocessors (4); advanced computing (5); data analytics (6); quantum information and sensing (7); robotics (10); brain-machine interfaces (11); and advanced surveillance (14). See 83 Fed. Reg. 58201- 02 (November 19, 2018).

⁵ In relevant part, the Directive defines "fundamental research" as "basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community..."

What was true of leadership in science and technology as articulated in NSDD 189 more than thirty years ago remains true today. The expansion of the internet, and advances in computing power and data storage barely imaginable in 1985, have made the “free exchange of ideas” fueling international collaboration in computing science and other related disciplines not only routine but frequently the central prerequisite to progress.

In addition, work in most areas of artificial intelligence research revolves around and is substantially advanced by conferences that rotate regularly between Europe, Asia, and the United States. New controls that limit travel and/or dissemination of research results, intentionally or indirectly, thus risk isolating U.S.-based AI research from the rest of the world’s and could erect a major obstacle to progress. The same also may be said of research and conferences related to computer vision and robotics. In the latter’s case, it also is worth noting that no major manufacturer of robots is currently U.S.-based, so a control regime imposed on emerging technologies in this sphere could be profoundly devastating.

Accordingly, we urge the Department and BIS, in formulating any proposed new rules in this docket to incorporate in them:

- a) NSDD 189’s broad and categorical protection for fundamental research because of its centrality to the nation’s technological leadership;
 - b) the Directive’s specific mandate that such research and associated information sharing may only be restricted through formal national security classification; and
 - c) a permanent ongoing inter-agency process informed by public comment designed to periodically reassess the status of any research activity ultimately so restricted in light of changed global circumstances.
- 2) Particularly with regard to information technologies related to “artificial intelligence,” deliberately craft the least impactful regulations and policies possible consistent with Congress’ recent statutory mandates and the nation’s national security needs.

Information technologies have been major drivers of the United States’ justifiably vaunted “innovation economy” over the past two decades. This has been true in no sphere more than the constellation of disciplines popularly labelled as “artificial intelligence” or “AI.” Progress and results in these fields (which include machine learning, neural networking and organic computing) have been and will be even further accelerated by leaps in advanced data analytics. Products integrating artificial intelligence capabilities, from autonomous vehicles to cell phones and other consumer electronics, comprise a large and growing percentage of America’s exports. Special care thus must be taken to minimize the potentially adverse effects of new export controls on AI research, development and deployment to preserve the nation’s economic strength and global leadership in these vital areas of inquiry.

We also note, and ask that the Department and BIS officially do the same, that advances in “applied” AI research and development increasingly have resulted from the direct funding of academic initiatives by industry.⁶ New export control regulations could significantly impact such efforts, many of which will not be excluded from regulation as federally-funded “fundamental research” is under current law. Accordingly, new regulation must be intentionally framed to avoid negatively impacting the ability of universities and companies to continue to work together in this increasingly important economic sector.⁷

3) Across all disciplines, conceive and draft proposed regulations with extraordinary rigor.

Clarity and precision in regulatory language and associated policy statements are of course, always desirable and important. They take on added importance in the current context, however, because the societal, economic and security consequences of even inadvertent overbreadth are so significant.

Restrictions targeting AI-incorporating products could well adversely impact U.S. competitiveness in AI research. The distinction between a “product” and “research” in AI is not as clear-cut as it is with respect, for example, to such hardware products like supercomputers or smartphones. U.S. companies make deep neural network software frameworks available in open source for both research and production use. For example, TensorFlow is a widely used machine-learning development framework developed by Google and released as open source software as early as 2015.

Such access to programs of this kind benefits the company (and others) by increasing use of its platform and encouraging innovation in its application and integration by developers with perspectives that often extend well beyond the authoring company’s own. Controls on industry-developed technologies like TensorFlow could dramatically constrain the fundamental work at U.S. universities that depend on it.

In the long-term, the chilling effect of overly broad regulatory language also could well reduce the number and quality of skilled personnel critically needed to drive new areas of innovation. U.S. graduate schools are already seeing a decline in enrollments and applications among Asian graduate students due to their growing uncertainty about the reliable availability and durability of visas on which they depend to study and, in many cases, subsequently work for U.S. companies. If that came to pass at scale, there would be an enormous reset required in the staffing of all manner of research projects from which it could take the nation at least a decade to recover.

⁶ This dynamic has been fueled by the increasing pace of innovation in this area, which in turn has fueled a boom in training and workforce development to meet the hiring needs of the American industry.

⁷ Such care, for example, should involve the rigorous study, modeling and assessment of the effects of potential regulations on any line of research that may be designated an “emerging technology” within the AI disciplines before such rules are adopted.

In crafting potential proposed rules and related materials in this docket, we specifically urge the Department and BIS to:

- a) Expressly exclude purely economic harm from all applicable definitions of “the national security of the United States;”⁸
 - b) Consistently employ the precise language of the Export Control Reform Act of 2018 when referring to the statutory standard for potential control of an emerging technology, which requires that to be regulated such a technology must be “*essential* to the national security of the United States,”⁹ rather than “important”¹⁰ to it – a potentially confusing and much lower threshold;
 - c) Factor into all determinations affecting the subject and scope of all proposed rules that the inclusion of any and all emerging technologies within the export control regime is likely to produce a pronounced chilling effect on the recruitment and retention of top students and professionals from other nations to U.S. academic institutions, laboratories and companies (as others document in greater detail in their own filings);¹¹ and
 - d) Prior to issuance of any proposed rule in this or related dockets, utilize all germane *existing* export regulation impact assessment mechanisms to assure that the rule-making process is informed at the earliest possible stages by the broadest range of input and expertise available.
- 4) Prioritize the amount and quality of input in this docket over the speed of its resolution.

Shortly after release of the ANPRM, we were among multiple parties in the public and private sectors to request that as many as 90 days of additional time be permitted for interested parties to respond thoroughly to it. While grateful for the short time granted, we are concerned that the choice to extend the deadline for these comments by just 22 days may connote that the Department and BIS do not fully appreciate the complexity of the many issues this proceeding necessarily raises and the potential costs of administrative haste.

⁸ We note and appreciate that the ANPRM in this docket omits economic impacts from all illustrative lists of harms.

⁹ 50 U.S.C. §4817(a)(1)

¹⁰ While accurately quoting the statutory standard in four instances, the ANPRM substitutes “important” for “essential” in five others.

¹¹ See, e.g., Comments in this docket of the Association of American Universities and the Association of University Export Control Officers.

Accordingly, we respectfully suggest and request that:

- a) A 60 to 90-day period be formally provided to all interested parties in which to submit Reply Comments to the Department and BIS on responses to the ANPRM;
- b) All future comment cycles also include the opportunity to file both initial and reply submissions, and that a minimum of 60 days be permitted to make each such filing;
- c) In addition to broadly soliciting public comment, the Department and BIS engage with the National Academies, National Science Foundation, and other bodies of the government expert in scientific convenings for the purpose of promptly organizing and conducting multiple public symposia and other fora to discuss critical issues raised throughout this and related dockets; and
- d) The Department and/or BIS, similarly, publicize and conduct a series of “listening sessions” across the nation, perhaps in conjunction with leading educational institutions in each region of the country.

ACM’s U.S. Technology Policy Committee and CRA, and their thousands of expert members, look forward to assisting the Department and BIS throughout this proceeding to assess the need for and contours of any proposed new export control regulations, and both their proposed and unintended consequences. Please contact Peter Harsha of CRA and Adam Eisgrau of ACM with any questions concerning these comments, or for assistance on any computing-related technical matter within the scope of this docket. They may be reached at harsha@cra.org and eisgrau@acm.org, respectively.

Respectfully submitted,



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