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DEFENSE INNOVATION BOARD
PUBLIC LISTENING SESSION

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CARNEGIE MELLON UNIVERSITY
THURSDAY, MARCH, 2019

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The Defense Innovation Board Public
Listening Session, taken before me, the
undersigned, Eileen L. Drake-Ober, a Notary Public
in and for the Commonwealth of Pennsylvania, at
Carnegie Mellon University Studio Theater,
5000 Forbes Avenue, Cohon Center, First Floor,
Pittsburgh, Pennsylvania 15213, commencing
at 1:36 o'clock p.m., the day and date above set
forth.

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1 APPEARANCES :

2 Panel Members :

3 Dr. Richard Murray

4 Dr. Missy Cummings

5 Dr. Michael McQuade

6 Milo Medin

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ALSO PRESENT :

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Joshua Mancuse

10 Christopher Brunett

11 Provost James Garrett

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1 P-R-O-C-E-E-D-I-N-G-S

2 MR. BRUNETT: Good afternoon. My name
3 is Christopher Brunett. I serve as the
4 designated federal officer for the Defense
5 Innovation Board. It is my role to open this
6 public listening session of the science and
7 technology subcommittee of the Defense
8 Innovation Board. Thank you to Carnegie
9 Mellon University for hosting us today --
10 hosting today's sessions.

11 If you've not done so already, please
12 silence your electronic devices. This
13 session is part of the Defense Innovation
14 Board initiative called artificial
15 intelligence principles project. Today's
16 session is being recorded and live streamed
17 to allow members of the public to attend
18 virtually. It will also be accessible on the
19 board's website, innovation.defense.gov.
20 Thank you to the defense media activities for
21 providing their expert support to this event.

22 Welcome to all of our in-person and
23 virtual attendees. As we begin this public
24 meeting, allow me to share a few procedural
25 remarks. This board is a discretionary

1 independent advisory board operated under the
2 Federal Advisory Committee Act and the
3 government Sunshine Act. Today's meeting was
4 announced in a federal register notice posted
5 Friday, February 15th, 2019. There have been
6 no significant changes to the meeting's
7 agenda as posted in the federal register
8 notice. The public was invited to submit
9 written comments for board members to
10 consider. 16 written comments were received
11 in advance of today's session. These
12 comments will be posted on-line with the
13 minutes of this meeting. We welcome
14 additional written comments on a rolling
15 basis, which can be submitted via our
16 website. The primary purposes of this
17 session is to provide an opportunity for
18 members of the public to provide verbal
19 comments to the board subcommittee today.

20 As a reminder, these are comments to
21 the board, not question and answer session.
22 Board members may ask clarifying questions.

23 With that, I now turn the meeting over
24 the board's executive director,
25 Joshua Marcuse, for his opening remarks and

1 introduction of our board members.

2 MR. MARCUSE: Thanks, Bruno, and
3 welcome, everyone, and thank you to Carnegie
4 Mellon University for hosting us. This is
5 our first official public listens session for
6 the AI principles project, and we cannot be
7 more excited to start this off in the
8 country's premier institutions for AI
9 research development, thought leadership, and
10 its application.

11 More than a half century ago, Carnegie
12 Mellon's own Herb Simon and Alan Newell wrote
13 the first artificial intelligence program.
14 Since then CMU has forged a culture around
15 using technology to solve real problems,
16 which is why we believe CMU is the perfect
17 host for this sort of engagement.

18 I would like to introduce our board
19 members present today: Dr. Missy Cummings,
20 who is the professor of engineering and
21 director of human autonomy lab at Duke
22 University; Dr. Michael McQuade, the vice
23 president of research right here at CMU;
24 Mr. Milo Medin, vice president of wireless
25 services, Equitable; and Dr. Richard Murray,

1 professor of control and dynamical systems
2 and bioengineering at Caltech. Dr. McQuade
3 and Dr. Murray are the co-chairs of the
4 Defense Innovation Board's science and
5 technology subcommittee, and as such, they
6 are leading this initiative.

7 I would like to give a brief overview
8 of this project and sort of how we all came
9 to be in this room together to kind of set
10 the context for this conversation. Last
11 July, the department asked the board to
12 undertake an effort to help establish a set
13 of artificial intelligence principles for
14 defense. After a few months of planning and
15 some internal discussions, the first weeks of
16 2019 saw the board begin convening a mix of
17 academics, researchers, ethicists, lawyers,
18 business executives, non-profit leaders,
19 venture capitalists, policy experts, and a
20 wide variety of other people in the AI field
21 to provide input to this process through a
22 series of roundtable conversations.

23 We are taking care to include not only
24 experts, who often work with the department,
25 but also AI skeptics, DOD critics, and

1 leading AI engineers who have never worked
2 with the department before. There may be
3 differences of opinion among this diverse
4 group, since these matters are controversial.
5 We will not shy away from disagreements, as
6 respectful and forthright dialogue should
7 lead to meaningful understanding on all
8 sides, and a robust context of ideas should
9 generate new insights into this question of
10 how to set up an ethical framework for the
11 Department of Defense.

12 DOD recognizes the need to view AI
13 differently than other technologies,
14 especially on ethics and the imperative to
15 get this right on how DOD employs these
16 technologies. Artificial intelligence not
17 only affects the men and women who serve in
18 uniform in our country, but societies around
19 the world, and that's why the board is a
20 different process than we typically do, to
21 ensure that our process of developing these
22 principles is robust, inclusive, and
23 transparent. We want everyone to take part
24 in this dialogue because these issues touch
25 everyone, and that's why it's so important

1 that all of you are here today to join us,
2 and to those who are watching on-line, or to
3 come to watch this video in the future, we
4 appreciate your taking this role as a citizen
5 very seriously.

6 Today's public listening session is
7 one element of this board's initiative, and
8 we hope that this helps the board -- helps
9 advance the board's dialogue. I want to
10 outline the flow of how this remaining few
11 hours will unfold. In a moment, I'll ask
12 Michael McQuade to say a few words on behalf
13 of the Defense Innovation Board, and then
14 we'll hear from the Carnegie Mellon provost,
15 Dr. Jim Garrett, someone we're very glad to
16 involved in this initiative who we've had the
17 pleasure of interacting with over the last
18 couple of days.

19 After Jim's remarks, we will move to
20 the public comments for the bulk of the time,
21 when audience members can address the board,
22 and I know this is the part that you are all
23 here to see, so when we get to that point,
24 I'll explain how the public comments will
25 proceed in more detail.

1 If you haven't already submitted a
2 comment on-line -- and, again, Bruno said we
3 have received 16 of those -- when you RSVP,
4 I'll ask you to take one of these comment
5 cards and give them one of my colleagues who
6 will be in the aisles. This is the way in
7 which you essentially raise your hand, and
8 so, we really hope that all of you -- if you
9 haven't taken a comment card, will do so,
10 because we would love to hear from as many of
11 you as we have time for.

12 Just before the public comments begin,
13 we'll collect those cards -- and here are the
14 important part, we really are going to limit
15 every comment to the five minutes. It's
16 perfectly acceptable for you to be
17 20 seconds, but it is not acceptable to be
18 5 minutes and 20 seconds. We do this to be
19 fair so we can hear from everyone, so I'm
20 going to tap on the microphone to let you
21 know when you have one minute left, and when
22 you have no minutes left I'm going to be as
23 polite as possible in making you sit down.

24 We also have written comments, and so,
25 for those of you that submitted written

1 comments, but aren't physically here, I have
2 asked Bruno to read those comments, because I
3 think it's very important that those public
4 comments be heard by everyone, as well as the
5 board members, so luckily Bruno has agreed to
6 read them so you don't have to listen to my
7 voice that much longer.

8 And now, I will turn things over to
9 Dr. McQuade for a few words.

10 DR. McQUADE: Thank you, Josh. Let me
11 also welcome everybody here with a -- two
12 hats on; one as a CMU employee and one as a
13 member of the Defense Innovation Board.

14 The Defense Innovation Board was
15 started under Secretary Carter with an
16 objective to bring an outside view around
17 topics of innovation, culture, technology to
18 the department to find ways to help the
19 department, if possible, improve the way it
20 operates and achieves its mission for the
21 country.

22 We have, over the last two years, had
23 multiple engagements with the department.
24 They have ranged from examining the way the
25 department does software, does including both

1 acquisition and execution of software. We
2 have also substantially had issues around
3 workforce and workforce deployment, and we
4 have had a number of issues, a number of
5 examinations, around technical capacities of
6 the department, so a fairly broad remit, and
7 through all of those discussions, the
8 overarching implications of AI as a
9 broad-based technology has been front and
10 center for quite some time, and for those of
11 you who follow the department, you will see
12 that there are a large number of initiatives
13 over the last year or 18 months relative to
14 the way AI is being examined and rolled out,
15 including some activity here at CMU,
16 substantial activity here at CMU.

17 In the process of that discussion
18 around AI, both on the Defense Innovation
19 Board with my colleagues and with the broader
20 community, we have constantly had in the
21 middle of that conversation that it is not
22 just the technology, it is not just the
23 fundamental science or mathematics or however
24 you want to characterize AI, it is also a
25 social element of the way -- the way the

1 department and society operate, and,
2 therefore, carries with it both obligations
3 and responsibilities around ethics and the
4 ethical use in an environment where the
5 department is trying to prosecute its
6 mission.

7 Josh gave you a little bit of
8 background about why we're here and how that
9 got set up. I would simply end by saying the
10 following: That in this day and age, and
11 with the technology as broadly implicative as
12 AI, it is absolutely necessary to encourage
13 broad public dialogue on the subject. I
14 would also say it is, in this day and age,
15 even more important to encourage respectful
16 public dialogue in -- in that comment. So
17 everybody who is willing to speak today, we
18 want to hear what you have to say. I would
19 just ask us all to be respectful in the way
20 we communicate that message, and please be as
21 open and evocative for us as possible,
22 because at the end of the day we are trying
23 to represent the broad set of issues and
24 consequences and discussion around ethics of
25 AI.

1 So thank you, very much, for being
2 here. We really do appreciate hearing from
3 everybody. And thanks to all of my
4 colleagues for coming to CMU.

5 Josh?

6 MR. MARCUSE: Many of you know Jim as
7 a pillar of the CMU community, a three-time
8 graduate of the university and a longtime
9 professor of civil and environmental
10 engineering, having also served in a variety
11 of leadership roles at CMU before becoming
12 provost, has a strong background in sensors,
13 data analytics, and a unique blend of
14 technical research and leadership experience.
15 It's my great pleasure to welcome him to the
16 podium.

17 MR. GARRETT: Thank you, Josh, and
18 good afternoon to all of you. I'm Provost
19 Jim Garrett. It's my pleasure to welcome
20 you, those of you here in person, as well as
21 those of you on-line and on the live stream,
22 to this afternoon's public listening session
23 with the Defense -- Defense Innovation Board.

24 I hope that prior to today's session
25 you had the opportunity to learn about the

1 amazing work produced by Carnegie Mellon
2 University for artificial intelligence
3 strategies for a host of important
4 industries. In fact, our university has held
5 a place at the forefront of innovation and
6 emerging technologies for decade, globally
7 and locally right here in Pittsburgh as an
8 essential component of our city's own tech
9 revolution. We're proud that this
10 recognition is one of CMU's signature
11 strengths, alongside our deep tradition of
12 infusing collaboration and interdisciplinary
13 academics that expand the horizons of
14 knowledge. Every day our students, faculty,
15 and researchers work collaboratively across
16 disciplines, and share their curiosity,
17 knowledge, and discoveries with each other to
18 innovate and to inspire each other.

19 Even more broadly, I believe that as a
20 university, our role is to focus not just
21 internally on the impactful technologies and
22 scientific research produced by the Carnegie
23 Mellon University community, it's equally
24 vital that we bring outside perspectives and
25 voices to our campus. By providing platforms

1 such as today's public listening session, we
2 live up to the respect and world-class
3 reputation that we've earned as a university.
4 We help to lead conversations that explore
5 new ways of thinking, and ponder questions
6 that make us evolve in the work that we do.

7 Today's listening session surrounding
8 the ethical and responsible use of artificial
9 intelligence is a prime example of how our
10 university also values freedom of expression,
11 especially as it relates to the accountable
12 ways that we're using the dynamic
13 technology -- this dynamic technology. The
14 sense of accountability, as well as the
15 societal implications and artificial
16 intelligence's impact on the workforce, are
17 also topics that we teach our students in a
18 number of exciting and relevant academic
19 programs in this space.

20 We're proud that you chose Carnegie
21 Mellon University to facilitate these
22 important discussions. Our university, as
23 was pointed out by Joshua, is the birthplace
24 for artificial intelligence, so I can't think
25 of a more fitting place to examine the

1 guiding principles for the technology that is
2 revolutionizing the world, and what solutions
3 we're trying to explore.

4 Together, all of us have a tremendous
5 responsibility to do the right thing. I hope
6 that the DIB members and all of our
7 distinguished guests visiting today will
8 benefit greatly from different perspectives
9 that will be shared, and are inspired through
10 Carnegie Mellon's leadership towards
11 discovering common objectives as global
12 technology leaders.

13 Now, please join me in welcoming back
14 to the podium Joshua Marcuse, who will kick
15 off today's public listening session. Thank
16 you.

17 MR. MARCUSE: Excellent. Thank you,
18 very much, Jim, and thank you again for
19 hosting us here. We're very happy to be
20 here, and had great, great sessions earlier
21 today with faculty.

22 So I thought a good way to get this
23 conversation started was to offer a very
24 brief primer of, I think, three key ideas
25 that undergird this conversation about

1 ethics, so let me just run through a few
2 things that I think will help inform the
3 audience and the public about what the
4 department's current approach to this issue
5 is.

6 In a memo to all DOD personnel last
7 month, on leading with an ethics mind set,
8 the Acting Secretary of Defense Shanahan
9 observed a key component of leadership is
10 reinforcing ethical behavior across the full
11 spectrum of our work and recognizing ethics
12 principles as the foundation upon which we
13 make sound informed decisions. Ethics are,
14 indeed, foundational to the responsible use
15 of artificial intelligence, and we believe
16 that the department can show technical
17 leadership and moral leadership in the world
18 on this issue.

19 Secretary Shanahan's insight has
20 been -- the approach that DOD has also sought
21 in all of its other adaptations to emerging
22 technology can be applied to artificial
23 intelligence, and that's why DOD leaders
24 asked the Defense Innovation Board to develop
25 an ethical framework for the adoption of AI

1 on the very same day it announced the
2 establishment of the joint AI center. That
3 request was the basis for the board launching
4 the AI principles project about which this
5 meeting is a crucial part. As a foundation
6 for this discussion, I want to cover three
7 ideas that I will only very briefly
8 introduce.

9 First, I'm going to discuss how the
10 department believes the law of war applies to
11 DOD's use of AI, particularly in military
12 operations, so I would like to point out
13 military operations are probably a small
14 fraction of the situations which the
15 department might choose to use artificial
16 intelligence; second, what the department's
17 current policy is on autonomy and weapons in
18 studies because of the important intersection
19 between autonomy and artificial intelligence;
20 and, third, what the department's newly
21 released artificial intelligence strategy
22 says about AI in ethics.

23 Those of you who don't know, the
24 department really just launched only about a
25 month ago its -- its first AI strategy.

1 These are exciting new developments in
2 the field of AI, like many emerging
3 technologies that preceded it, but the
4 department's commitment to our values and the
5 rule of law is enduring. To put it another
6 way, the addition of AI to any existing
7 system process or product doesn't diminish
8 the department's commitment to abide by the
9 law of war.

10 So what really is the law of war? The
11 law of war is a body of international law,
12 specifically adapted to the conduct of
13 warfare. For the United States, this body of
14 law includes treaties the United States has
15 accepted, such as the 1949 Geneva Conventions
16 and customary international law which results
17 from the general and consistent practice of
18 states done out of the sense of legal
19 obligation.

20 There are five fundamental principles
21 that the foundation for a law of war, which
22 is explained in DOD's official law of war
23 manual, and I'm just going to very briefly
24 run through what these five fundamentals are.

25 First, the military necessity

1 justifies the use of all measures needed to
2 defeat the enemy as quickly and efficiently
3 as possible that are not prohibited by the
4 law of war. Humanity forbids the infliction
5 of suffering, injury, or destruction
6 unnecessary to accomplish a legitimate
7 military purpose. Proportionality means that
8 even where one is justified in acting, one
9 must not act in a way that is unreasonable or
10 excessive. Distinction obliges parties to a
11 conflict to distinguish principally between
12 the armed forces and the civilian population,
13 and between unprotected and protected
14 objects. Honor demands a certain amount of
15 fairness in offense and defense, and a
16 certain mutual respect between opposing
17 military forces.

18 The key points to understand about the
19 intersection of the law of war and AI I would
20 say are the following: First, international
21 law of war provides a well-established body
22 of law to address the legality of conduct in
23 the context of armed conflict.

24 Second, existing law of war rules can
25 apply when new technologies such as new types

1 of artificial intelligence are used in armed
2 conflict.

3 Third, the fundamental principles of
4 the law of war provide a general guide for
5 the conduct of war where no more specific
6 rule applies; thus, provides a framework to
7 consider novel, legal, and ethical issues
8 posed by emerging technologies such as AI.

9 DOD has a robust process to implement
10 the law of way, including training
11 regulations and procedures, the reporting of
12 incidents involving alleged violations,
13 investigations and reviews of incidents, and
14 appropriate corrective actions.

15 DOD lawyers are engaged in efforts to
16 articulate how existing law of war principles
17 apply to emerging technologies such as
18 artificial intelligence.

19 And, last, and conversely, experts are
20 engaged in understanding how or if the
21 potential of something like an emerging
22 technology such as artificial intelligence
23 precipitates strategic or tactical questions
24 about which current law of war is not yet
25 developed, and that is the reason that we're

1 here, because we are asking that question,
2 and, hence, our listening session is designed
3 to aid the department in undertaking that
4 process.

5 So with that, we move to the second
6 area, which is what is the current policy on
7 autonomy and weapons systems. The department
8 has issued specific guidance on autonomy in
9 weapons systems, which is not synonymous with
10 artificial intelligence, but is clearly
11 related to it, and that document is known as
12 DOD Directive 3000.09, which was signed on
13 November 21st, 2012, and then was reissued
14 with minor administrative revisions in 2017,
15 and I would just say this is a very public
16 document. You can all find it if you Google
17 it, and it's very short and very clear, and
18 I encourage you to read it.

19 The purpose of this document is that
20 it establishes three key ideas. The first
21 is -- and I'm going to quote directly from
22 the policy -- it says it establishes DOD
23 policy and assigns responsibilities for the
24 development and use of autonomous and
25 semi-autonomous functions in a weapons

1 system, including manned and unmanned
2 platforms, and this document also establishes
3 guidelines designed to minimize the
4 probability and consequences of failures in
5 autonomous and semi-autonomous weapons
6 systems that can lead to unintended
7 engagements.

8 So basically there are four things
9 this document says, and, again, I'm just
10 going to give four short excerpts here that
11 basically give you the general idea of what
12 the policy says to the department.

13 First, it is DOD policy that an
14 autonomous and semi-autonomous weapons system
15 shall be designed to allow commanders and
16 operators to exercise appropriate levels of
17 human judgment over the use of force.

18 Second, systems will go through
19 rigorous hardware and software verification
20 and validation, and realistic system and
21 development and operational test and
22 evaluation.

23 Third, persons who authorize the use
24 of, direct the use of, or operate autonomous
25 or semi-autonomous weapons systems must do so

1 with appropriate care, and in accordance with
2 the law of war, applicable treaties, weapons
3 system safety rules, and applicable rules of
4 engagement.

5 And, last, autonomous or
6 semi-autonomous weapons systems intended to
7 be used in a manner that falls outside of
8 these policies must be approved by the
9 undersecretary of defense for policy,
10 undersecretary of defense for acquisition
11 technology and logistics, and the chairman of
12 the joint chiefs of staff before formal
13 development and again before fielding.

14 Just for a little added context, those
15 three individuals names are three of the most
16 senior officials in the department.

17 So the third area I want to cover --
18 and this is almost unique, it's breaking news
19 here -- is what the AI strategy has to say
20 about this topic. So this recently released
21 and unclassified summary of the strategy --
22 and also it's public, so please feel free to
23 look it up -- and there's a section in it,
24 one of the five pillars of the strategy,
25 which is leading military ethics in AI

1 safety, so I just want to read a -- a short
2 quote directly from the strategy on that
3 subject and that pillar about leading ethics
4 and safety.

5 It reads, "The department will
6 articulate its vision and guiding principles
7 for using AI in a lawful and ethical manner
8 to promote our values. We will consult with
9 leaders from across academia, private
10 industry, and the international community to
11 advance AI ethics and safety in a military
12 context. We will invest in the research and
13 development of AI systems that are resilient,
14 robust, reliable, and secure. We will
15 continue to fund research into techniques
16 that produce more explainable AI, and we will
17 pioneer approaches for AI test evaluation,
18 verification, and validation. We will also
19 seek opportunities to use AI to reduce
20 unintentional harm and collateral damage,
21 that increase situational awareness, and
22 enhanced decision support. As we improve the
23 technology in our use of it, it will continue
24 to share our aims, ethical guidelines, and
25 safety procedures to encourage responsible AI

1 development and use by other nations." And,
2 again, that strategy was signed by the
3 secretary of defense.

4 So the last thing I'm going to cover
5 is what else is in that strategy about
6 ethics, so there is a section about a couple
7 pages directly focused on this issue, and I
8 just want to basically say the six things
9 that the department has committed to as part
10 of the AI strategy.

11 First, developing AI principles for
12 defense, again, which is what we're here to
13 do; second, investing in research and
14 development for resilient, robust, reliable,
15 and secure AI; third, continuing to fund
16 research to understand and explain AI-driven
17 decisions and actions; fourth, promoting
18 transparency in AI research; fifth,
19 advocating for a global set of military AI
20 guidelines; and, sixth, using AI to reduce
21 the risk of civilian casualties and other
22 collateral damage.

23 And we will post that on our website,
24 so if any of you find that was helpful, which
25 I hope you did, you can use that as a

1 reference.

2 And now we get to the real action,
3 which is where you guys get to contribute.

4 Yeah?

5 DR. MURRAY: It's 3/14, 1:59, so I'd
6 just like to recognize Pi day today at this
7 particular time, so --

8 MR. MARCUSE: It's great to know that
9 you all can feel at home with the board
10 members, so they are all members of the same
11 tribe here. Excellent.

12 So now we will hear from the audience
13 for the rest of our allotted time, and many
14 of you submitted your comments to us on-line
15 or RSVP-ed, and we'll certainly do those who
16 have done so. If we get to those comments,
17 then we'll use the comment cards. I -- I've
18 really explained all this. Let's -- we're
19 just going to get -- let's just get straight
20 to it for now. I think that's great. So --
21 perfect. All right.

22 So the first -- first comment we -- we
23 received was from Elli Niewood. Is Elli
24 here? Perfect. Thank you. And after Elli,
25 is William Powers here? William? Okay.

1 Over to Elli. Thank you. Well, can I
2 continue this later? Elli, over to you.

3 MR. NIEWOOD: Hi, I'm Elli Niewood,
4 here from the MITRE Corporation.

5 So, first of all, thank you to the
6 board and to Josh for the opportunity to sort
7 of briefly touch on how we see ethical
8 considerations for military application of
9 artificial intelligence.

10 At MITRE, we are very committed, both
11 to ethical approaches to modern warfare, but
12 also to enabling our service men and women to
13 have at hands for the best technology that
14 they need, both for the mission and for their
15 own protection, and I think, clearly, as Josh
16 has articulated, artificial intelligence
17 impacts both of those commitments to a great
18 extent.

19 AI is a key emerging technology that
20 we think can help the joint force fight and
21 win in future wars, yet at the same time I
22 think it's clear that DOD has struggled to
23 field relevant capabilities leveraging this
24 technology, and I think that's for a number
25 of reasons.

1 One is because I think a lot of the
2 development in this technology comes from
3 areas outside from -- you know, outside the
4 traditional laboratories and companies where
5 DOD has gotten its capability. Some of it, I
6 think, revolves around challenges associated
7 with dirty data sets, with complex system
8 dynamics, and some of which revolves around
9 concerns about how to use this technology in
10 an ethical and open way, and so, clearly,
11 that it needs to be accounted for to move
12 forward.

13 At the same time, you know, from an
14 ethical perspective, we believe AI is similar
15 to a host of technologies that have preceded
16 it and have been fielded and used in ways
17 that -- that have been ethical, and we
18 believe that integrating AI into military
19 systems and operations -- again, as Josh
20 alluded to, as the strategy alluded to -- in
21 many ways we think can help reduce civilian
22 casualties while at the same time providing a
23 critical military advantage to our forces.

24 Just as an example, if you take
25 Claymore mines, remotely triggered

1 anti-personnel devices, that were not banned
2 by the Ottawa convention, were used heavily,
3 for example, in Vietnam, what if a device
4 like that had a sensor that allowed, you
5 know, to determine before detonation if the
6 target was adult sized, was carrying a
7 weapon.

8 Take the -- you know, the downing
9 and -- tragic downing in 1988 of the -- of
10 the Iranian airliner by the -- by the
11 USS Vincennes, the crew of that ship was
12 forced, you know, to take action, really make
13 a split-second decision, about whether or not
14 to engage an unknown aircraft before they
15 fired that missile. If they had had an
16 AI-based seeker on that missile that could
17 have distinguished after firing whether it
18 was a civilian airliner -- aircraft, you
19 know, we think that would have, you know,
20 helped save lives in that case.

21 These examples, I think, are kind of,
22 like, two of the three points we would like
23 to bring to your attention, you know, as you
24 move forward in coming up with principles.

25 The first point is that AI does not

1 fundamentally change, we believe, the way
2 that we employ advanced weapons. Many of the
3 weapons in our inventory today already select
4 an end point or home in on a target within
5 some given set of constraints after they're
6 fired.

7 The Tomahawk cruise missile uses
8 seekers and guidance algorithms which
9 correlate the terrain to digital maps.

10 There are air-to-air missiles that
11 lock on after launch so that the pilot fires
12 them with some expectation of what they will
13 engage, but without knowing for sure what it
14 will do. All of these weapons make
15 autonomous or semi-autonomous decisions about
16 where they go or what to do once a human has
17 decided to go ahead and launch them.

18 With AI technologies, we clearly have
19 less visibility real-time into what the
20 weapon will decide. We may have more
21 difficulty testing the weapon because of the
22 complexity of the -- what the AI will do, but
23 at fundamental level the human has -- you
24 know, is giving up control of decision making
25 in ways that are consistent with existing

1 weapons, and that launch decision, with or
2 without AI inside the weapon, obviously needs
3 to be done in an ethical way that balances
4 the risk to others with the risk to the war
5 fighters, and that's been true for a long
6 time.

7 A second point that I would like to
8 make highlights that, you know, the human is
9 not the ideal decision maker. I think that
10 example with the USS Vincennes makes that
11 clear. According to some reports, the Aegis
12 weapons system on that cruiser knew that
13 there was a civilian transponder code being
14 squawked by the airliner, but the humans did
15 not have time to take that into account as
16 they were making -- as they were making a
17 decision. So used properly, AI technology,
18 we believe, can lead to better decision
19 making, lead to reductions in errors,
20 resulting in less collateral damage, results
21 in less -- fewer unnecessary civilian
22 casualties.

23 The last point that I think Josh also
24 touched on is that AI technology is not
25 primarily focused on the pointy end of the

1 spear about launching weapons; far from it.
2 The applications that DOD is considering
3 revolve around better maintenance, around
4 fusing together data from a variety of
5 sources about finding signals and high
6 volumes of data while making strategic
7 decisions.

8 In closing, we believe it's important
9 to remember there are three ethical
10 commitments we must balance in any set of
11 principles to be developed. We have an
12 ethical responsibility to minimize civil
13 casualties; we have an ethical responsibility
14 to our fellow citizens to find ways to use AI
15 to enhance their security; and we have an
16 ethical commitment to our soldiers, sailors,
17 airmen, and Marines who put their lives at
18 risk to best protect them and give them the
19 capabilities that we need. We think AI can
20 help with all of these. Thank you, very
21 much.

22 MR. MARCUSE: Thank you, very much,
23 Elli.

24 Any clarifying questions? Okay.
25 Great.

1 Okay. So let me just ask, is
2 Kate Crawford or Nick Sinai here? Kate?
3 Nick? Okay. Great.

4 So next I'm going to ask Bruno to read
5 the statement from William Powers from the
6 MIT media lab.

7 And I will ask, is Michelle Kinsey
8 here?

9 Aaron Johnson? Aaron, great, if you
10 wouldn't mind getting ready at the mic, that
11 would be awesome.

12 Over to you, Bruno.

13 MR. BRUNETT: Okay. This is from
14 William Powers from MIT media lab. The
15 comment is the text of a January 7th, 2019
16 op-ed that he co-authored in the Boston Globe
17 called "Beware Corporate Mining Money,
18 Machine Washing of AI."

19 Back in the late 1960s and early '70s,
20 when the fossil fuel industry and the other
21 corporate polluters came under fire for
22 harming the environment, the polluters
23 launched massive ad campaigns portraying
24 themselves as friends of the Earth. This
25 cynical practice was later dubbed green

1 washing. Today we may be witnessing a new
2 kind of green washing in the technology
3 sector, addressing widespread concerns about
4 the pernicious (sic) down sides of
5 artificial intelligence, robots taking jobs,
6 fatal autonomous vehicle crashes, racial bias
7 in criminal sentencing, the ugly polarization
8 of the 2018 election. Tech giants are
9 working hard to assure us of their good
10 intentions surrounding AI, but some of their
11 public relations campaigns are creating the
12 surface illusion of positive change without
13 the verifiable reality, call it machine
14 washing.

15 Last year, Google posted a list of
16 seven AI principles, beginning with be
17 socially beneficial. Microsoft published
18 "The Future Computed", a book calling for
19 human-centered approach to AI that reflects
20 timeless values, and launched a program to
21 support developers working to meet human --
22 humanitarian needs.

23 Germany-based SAP, one of the world's
24 largest software companies, now has an AI
25 ethics advisory panel that includes the

1 theologian -- sorry -- and political
2 scientists and bioethicists. On seeing these
3 initiatives, the natural response is to
4 applaud. If the most powerful tech companies
5 are on the case, surely these problems will
6 soon be solved, or will they?

7 Facebook's response to the intense
8 public scrutiny it has received since the
9 election has been to treat it as its public
10 relations challenge, and after a sell off of
11 stock in the wake of the Cambridge Analytica
12 scandal in the early 2017, Facebook spent
13 \$1.7 million on an ad campaign in subway
14 stations and trains in the Boston area. The
15 slogan was "The Best Part of Facebook Isn't
16 on Facebook," and the accompanying images
17 showed people engaging in healthy, fun,
18 off-line activities such as hiking and
19 dancing. The message, Facebook is all about
20 making our world better, more -- and a more
21 harmonious place; yet, as the New York Times
22 recently reported, the company had also hired
23 lobbyists and opposition research firms to
24 combat Facebook's critics, shift public anger
25 toward rival companies, and ward off damaging

1 regulation.

2 As experts on the societal effects of
3 ethics of AI, a term that broadly refers to
4 all technologies that use decision making
5 algorithms, we are keenly aware of how much
6 work remains to be done in understanding how
7 this new form of intelligence work -- works
8 once it's released to the real world.

9 The tech industry has a long history
10 of humanistic intentions and pronouncements,
11 and, in fact, is responsible for all kinds of
12 progress; yet, somehow, we've gotten into the
13 most serious AI crisis since -- since the
14 dawn of these technologies, and as with
15 climate change and environmental degradation,
16 if we leave oversight of intelligent machines
17 solely to the companies that build and sell
18 technologies, we'll see many more crises in
19 the coming decades.

20 MR. MARCUSE: Great. Thank you, very
21 much, Bruno.

22 So I just want to remind everyone that
23 we really want you to use these comment cards
24 and hand them to my friend, Aaron, here, on
25 the corner, and will give them to me, because

1 I would really love to hear from all of you
2 who came all this way today, and not just
3 have Bruno read all of our friends who have
4 written in, so please don't hesitate.

5 In the meantime, I will ask, is
6 Bobby Cunningham present? Bobby? Or
7 Matthew Dodd? All right.

8 Well, you know what to do next, Bruno.

9 And I'm very glad to hear from you in
10 person, Aaron. Raise your hand.

11 MR. JOHNSON: Hi. Thank you all
12 for -- for coming, and I think it's great
13 that the Defense Innovation Board is -- is
14 tackling this important issue. I especially
15 want to thank Dr. Murray, whose textbook I
16 used in my class in the fall.

17 DR. MURRAY: Can you get closer to the
18 mic?

19 MR. JOHNSON: Yeah.

20 DR. MURRAY: Thank you.

21 MR. JOHNSON: Bring that up here. My
22 main concern is with the -- the use of lethal
23 autonomous weapons systems. The issue of AI
24 and ethics is much broader than that, and --
25 and as you mentioned earlier, that the -- the

1 many -- the places that the DOD is going to
2 be using AI is much, much broader than this.

3 The distinction I want to make in
4 particular about lethal autonomous weapons
5 systems is thinking about moral decision
6 making and moral actions, and so, just
7 because if -- if a human had done the same
8 action as an autonomous system, if -- if they
9 had -- if a weapons system does the exact
10 same actions, it doesn't mean that it was a
11 moral decision process, and that thinking
12 about lethality decisions is something that's
13 much deeper than -- than just sort of what
14 the final result was, and so, I wrote
15 probably more coherent stuff in my written
16 comments, but that was sort of the main point
17 that I wanted to bring up, was that these
18 sorts of ethical decisions can't always be
19 measured, and we can sort of just take the
20 weapons system and put it through some kind
21 of ethical tests and make sure it doesn't
22 kill any civilians or -- or whatever sort of
23 test we come up with, because that's not what
24 defines the moral action, and it has more --
25 actions have more to do with the internal

1 process and the decision to trade off
2 between, you know, possible actions and --
3 and make -- potentially make sacrifice from
4 that, so that's all I wanted to say. Thank
5 you.

6 MR. MARCUSE: Okay. Thank you.

7 Clarifying questions? No? Great.

8 MR. BRUNETT: Comment is from
9 Michelle Kinsey, Boston University.

10 The department of defense, in its push
11 to expand the intelligence, autonomy, and
12 mobility of systems supporting the dismounted
13 soldiers' real-time tactical decision making
14 capabilities will have to address a number of
15 design challenges related to the safe
16 deployment of artificial intelligence
17 learning modules -- models and techniques.
18 Machine learning models are often trained
19 using private data sets that are very
20 expensive to collect, or highly sensitive,
21 using large amounts of computing power.

22 The models are commonly exposed either
23 through on-line APIs, or used in hardware
24 devices deployed in the field or given to the
25 end users. This gives incentives to

1 adversaries to attempt to steal these ML
2 models as a proxy for gathering data sets.

3 While API-based model exfiltration has
4 been studied before, the theft and protection
5 of machine learning models on hardware
6 devices have not been explored as of now.

7 MR. MARCUSE: Is -- is
8 Alexis Priest Simpson present? Alexis?

9 Okay. Do you all have these from
10 outside? There were a stack of these
11 outside. Should we bring these inside for
12 you? Do you need them? Please hand them to
13 Aaron, or just waive them in the air. I did
14 not expect such a shy and retiring bunch.

15 In the meantime, though, I will ask,
16 Bruno, if you would now please read
17 Bobby Cunningham.

18 MR. BRUNETT: Bobby Cunningham from
19 Omnity.

20 Omnity is a self-assembling knowledge
21 curation and discovery platform that fuses
22 advanced natural language processing, machine
23 learning, linguistic block chain, and graph
24 math. Omnity detects similarities across
25 diverse intelligence sources, driving rapid

1 discovery and insight, and has co-founded the
2 Wisdom Tech Society to provide a framework of
3 ethical data curation as data is transformed
4 into wisdom. I've got to slow down a little
5 bit. As artificial intelligence emerges as a
6 means to find patterns, and perform analytic
7 and massive data sets, many organizations,
8 companies, and governments are seeking to
9 leverage this powerful technology for their
10 own applications.

11 However, it is critically important
12 that those that seek to use this technology
13 also better understand both the strengths and
14 weaknesses associated with the data
15 processing strategies, algorithms, and
16 business practices and enabling machine
17 learning. Such understanding is complicated
18 by the massive hyperbole expressed by many
19 companies, often further amplified by
20 journalists who do not understand the topics
21 about which they are writing. Taken
22 together, these forces create unrealistic
23 expectations and even fear.

24 Properly applied machine learning can
25 be a useful tool for exploring and discerning

1 patterns in big data, where human inspection
2 of massive data is not scalable. When
3 seeking to categorize or otherwise sort data
4 into sets that do enable human insight,
5 machine learning processes offer a useful
6 augmentation for human intelligence.

7 One can think of the algorithm --
8 algorithms driving these sorting processes as
9 a form of high dimensional curve fitting;
10 that is, applying a structural analysis to
11 find the underlying patterns in a large data
12 set. Used in this manner, AI technology is
13 well suited for useful application.

14 What computers do poorly is -- what
15 computers do poorly is make judgments.
16 Computers do not understand irony or sarcasm.
17 Computational processes do not well enable
18 abstraction of ideas, generalization, or
19 creative thinking. These areas remain in the
20 realm of the human mind, relying on computer
21 processes, with expectations that the
22 computer can be creative, generalize, or make
23 judgments will lead to disappointment and
24 frustration.

25 Understanding the limits of machine

1 intelligence is critical for the effective
2 use of these technologies. It is important
3 to note that the output of a computational
4 process is limited by the quality of its
5 input data. This clearly applies to
6 consistency of data formatting, completeness
7 of data records, and other quality control
8 metrics; yet it also applies to the ethical
9 sourcing and curation of the data sets,
10 themselves.

11 Where data is sourced from people,
12 organizations, companies, or government
13 agencies, in each case the data sources
14 should be derived in a manner that is both
15 morally appropriate and legally compliant.

16 Finally, the use of data to form
17 insights is a three-step process. Data can
18 be defined as numbers, facts, and figures,
19 such as sensor readings or the monitoring of
20 vital signs in a patient; yet, data alone
21 does not afford insight. When data is
22 contextualized, it transforms into
23 information. When that information is
24 contextualized, that information may form
25 wisdom, leading to actionable insight. Each

1 tier of this transformation process is
2 vulnerable and must be safeguarded ethically
3 so that those actionable insights are
4 consistent with the moral framework of our
5 civilization.

6 At this time, what is most needed is a
7 framework of ethical data curation as data is
8 transformed into wisdom. This is why we at
9 Omnity have co-founded the Wisdom Tech
10 Society. As the Defense Innovation Board
11 considers ways in which to advise the
12 Pentagon with respect to the ethical use of
13 artificial intelligence, we urge you to meet
14 with Omnity and Wisdom Tech Society which
15 will demonstrate technology that can
16 transform the ways which our nation conducts
17 the intelligence gathering methods.

18 MR. MARCUSE: Thank you, Bruno.

19 Aaron, maybe we should hand the cards
20 out again, just a subtle encouragement. Have
21 we received any yet?

22 UNIDENTIFIED MALE SPEAKER: We have
23 one. Wave a hand over there. If you have a
24 card --

25 MR. MARCUSE: Great. Yes. If you

1 have -- yeah, if you have a card, can you
2 hand -- great. Oh, this is very exciting.
3 Wonderful. Thank you. I'm so relieved.
4 Come to this mic. So, Maggie, you -- you've
5 rescued me. Thank you. Please take the
6 microphone. That's phenomenal. Thank you,
7 very much.

8 MS. OATES: Hello, my name is
9 Maggie Oates. I am Ph.D. student here at
10 Carnegie Mellon in societal computing, and I
11 work in Cylab, which is the cyber security
12 laboratory here.

13 Let me first say that I disagree with
14 the very enterprise and existence of the
15 Defense Innovation Board as it seems like a
16 tool to lend credibility to the project of
17 advancing military efficiency, and further
18 escalating the baseline that we consider
19 defense.

20 Second, I object to CMU's heavy
21 involvement with the DOD, and I'm hard
22 pressed to name ethical and responsible use
23 of AI at all.

24 That said, I would like to focus on
25 something else today, and that is what I view

1 as a externality of the project of AI in the
2 DOD, and that is the growth of civil
3 surveillance, both domestically and abroad.
4 The development of machine learning
5 algorithms relies on massive amounts of data,
6 of course, and more methods are being
7 developed to, first of all, reduce the amount
8 of data required, and to reduce the amount of
9 labeled data required. These methods often
10 correlate with having the downside of being
11 hard to explain and more difficult to verify,
12 making them an unlikely use in the DOD's
13 context. Beyond that, the project of
14 labeling data often rests on -- rests on
15 exploitative labor practices. So I stand
16 here to assert that any responsible
17 principles must address the effects that DOD
18 AI will have on surveillance, not only from
19 the state, but also from the tech companies
20 that will be the first line in building that
21 AI. This topic is absolutely not out of the
22 scope. Thank you.

23 MR. MARCUSE: Thank you. I hope we
24 have a few more, and in the meantime,
25 Matthew Dodd from the National Institute of

1 Health.

2 MR. BRUNETT: Matthew Dodd from the
3 National Institute of Health.

4 I would like to thank the board for
5 their leadership and sage counsels to the
6 department, industry, academia, and, indeed,
7 the nation. It is a profoundly overwhelming
8 undertaking of responsibility. I thank you
9 all, and I am humbled by the purity of
10 competence demonstrated by the board. This
11 stands in stark contrast to the anti-expert
12 virus that has infected every corner of
13 society, one participation trophy at a time.

14 While demonstrating that, primarily
15 one has a duty to serve their country and one
16 has a unique -- has unique experiences and
17 tools with which to innovate the notion of
18 service. One has the moral imperative
19 obligation to find out how to manifest it,
20 innovate, so as to be of service. Thank you,
21 again.

22 MR. MARCUSE: Great. Bruno, thank
23 you, very much. Next we will hear from
24 Dave Zubrow from DSEI.

25 Oh, yes, hold on, as long as you

1 promise to give it back to me when you're
2 done, thank you, very much, and after -- and
3 after Mr. Zubrow, we'll hear from Pat Houston
4 next. You can go to the mic, if you want,
5 sir.

6 MR. ZUBROW: Hi, I'm Dave Zubrow from
7 DSEI, and, Josh, your remarks at the
8 beginning struck me, because there was a lot
9 of emphasis placed on adhering to the law and
10 the legal framework that's been built up
11 around conducting military operations and
12 war, and I just -- it struck me that our
13 legal framework and our laws may not
14 adequately express our values and morals as a
15 society, and so, simply adhering to the law
16 may not be enough, so I would ask that in the
17 work and deliberations of the board and
18 others, thinking about how to deploy
19 artificial intelligence into -- into our
20 lives, as well as, you know, national
21 security, that we push at that and say is
22 that enough, is that the right framework, is
23 it really expressing our set of values as a
24 society, so that's my comment.

25 MR. MARCUSE: Thank you, so much.

1 Any clarifying questions? Thank you,
2 very much, sir, greatly appreciate it.

3 Bruno, if you would, Julian Klein, and
4 then over to you, sir, right after that.

5 MR. BRUNETT: Julian Klein from Klein
6 Studios, LLC.

7 Dear DIB, here many my suggestions:
8 One, while AI is very powerful for
9 information gathering, data analysis, and
10 reactive cyber defenses, any -- any AI
11 dealing with humans should have a margin of
12 error for living creatures' mistakes,
13 confusions, and improvisations. No human nor
14 animal should be held to mathematical
15 expectations.

16 Two, humans cannot be backed up,
17 re-downloaded, or rebooted. Any physical
18 world AI should do its best to preserve human
19 life in a humane way, despite any further
20 coded tasks.

21 Three, any powerful AI should come
22 with equally powerful AI minimum of three,
23 which can create a checks and balances
24 scenario. If one AI begins acting strange,
25 the other two can fix it with permission

1 override keys and regulations. One cannot
2 override the other two. In the event all
3 three are corrupted, the owner or developer
4 should have a kill switch and back door code
5 to -- to delete all three.

6 Four, we need a clean -- we need to
7 clean the internet with AI. This sort of
8 cyber regulation will rely on a communicative
9 tech society. Segregating tech expert and
10 what they know may seem safer, but is
11 detrimental to our minimum bar of tech
12 education. A collaborative cyber community
13 will have the creative answers to defense
14 issues.

15 Five, using AI to affect people's
16 ways -- way of life, sway people's opinions,
17 or cause chaos or confusion is different than
18 a media campaign based of AI-collected and
19 configured data. The former is systematic,
20 intentional, and cultural intrusion. The
21 latter is an educated broadcast. Thank you
22 for your time and work.

23 MR. MARCUSE: Bruno, because it's so
24 brief, why don't you just quickly also read
25 Joshua Darrow.

1 MR. BRUNETT: Joshua Darrow,
2 Department of the Navy.

3 Innovation begins and ends with
4 technical capability. Over decades, the
5 government has out sourced its most technical
6 work, eroding the technical skill of -- of
7 the government workforce. To have an
8 innovative government workforce dealing with
9 the distribution of technical work, i.e.,
10 designing, building, testing, redesigning,
11 and testing is essential.

12 MR. MARCUSE: Terrific.
13 Over to you, sir.

14 MR. HOUSTON: Good afternoon. My name
15 is Pat Houston, and I'm a soldier, and I
16 would like to provide four observations from
17 my perspective in my personal capacity based
18 on five tours in Iraq and Afghanistan, and
19 approximately three decades in uniform.

20 First, I want to assure those here
21 today that from what I've seen, the Pentagon
22 is very sensitive to these valid concerns,
23 and is deeply committed to addressing them.
24 Leaders at all levels are totally dedicated
25 to ensuring that AI-enhanced systems are

1 developed and used in compliance with the law
2 and with ethics, and also done in a
3 responsible manner.

4 Number two, I acknowledge that no AI
5 system will ever be perfect, but I also would
6 offer that no military system is perfect. In
7 fact, one of the most unpredictable systems
8 we can employ is the individual soldier. As
9 we all know, human behavior can never be
10 reliably predicted, especially when someone
11 is tired, cold, hungry, and scared, as is
12 often the case with -- with soldiers, but I
13 do think AI can help.

14 One of the measures for determining
15 whether to leverage AI is to ask whether it's
16 as good as, or in some cases better than,
17 what humans can perform by themselves, so
18 we're looking at human machine teaming that
19 leverages the best of both, and that helps
20 preserve appropriate levels of human judgment
21 to address some of the concerns and issues
22 that have already been raised here today.

23 Third, just to address one concern
24 head on, this concern about killer robots,
25 the law of war is very clear that commanders

1 can never unleash systems over which they'll
2 lose control, and that commanders always are
3 responsible for any weapons that they employ.

4 Fourth, and finally, I would suggest
5 that cooperation between the government and
6 academia and industry is absolutely essential
7 to the responsible way ahead in addressing
8 all of these issues. The best and brightest
9 AI researchers out there should insist and
10 have a right to insist on legal and ethical
11 conduct by the governments that they're
12 working with, and once you have that -- that
13 confirmation of ethical and legal performance
14 by those governments out there, then I don't
15 think those AI researchers should boycott the
16 endeavor, as some have suggested that they
17 should do. In my -- in my view, if the best
18 and brightest AI researchers out there who
19 are concerned about ethics boycott the
20 process, that's going to just leave a void
21 that would be filled by other AI researchers
22 who are less ethical or less capable, or
23 both, and I think that would be a recipe for
24 disaster. Thank you.

25 MR. MARCUSE: Thank you, sir.

1 Any clarifying questions? No? Great.

2 Okay.

3 I think I've seen some evidence of
4 cards stirring, so please just feel free to
5 just push -- you know, give them to your
6 neighbor to pass them to me. We can be as
7 casual as this podium stage arrangement
8 permits. That's right. All right.

9 So I'll ask, Bruno, if you would read
10 the statement from Thomas Creeley, and then
11 Henry Hargrove, if you would, please feel
12 free to approach the microphone.

13 MR. BRUNETT: Thomas Creeley, United
14 States Naval War College. The U.S. Naval War
15 College has recently established a special
16 graduate certificate program in ethics and
17 emerging military technology. As its
18 director, I work with a dozen competitively
19 selected students to engage in ethics and
20 technology-related course work, as well as
21 conduct research on the ethical implications
22 of emerging technologies. Each student
23 produces a lengthy professional paper,
24 analyzing some aspects of the ethics
25 technology nexus, many of them dealing with

1 the various forms of AI. We have developed
2 connections with the DARPA, ONR, Boston
3 Global Forum, and the director for defense
4 intelligence, and a number of academic
5 institutions exploring the ethics of AI.

6 MR. MARCUSE: Please.

7 MR. HARGROVE: Thank you for allowing
8 the time for public comment. I wanted to
9 reaffirm the other gentleman's comments
10 before that one about the soldier, in the
11 course of understanding the soldier's
12 behavior, which my comments sort of echo.

13 So in my personal opinion, I -- I just
14 want to echo the need that you've already
15 identified for realistic and continuous
16 testing evaluation, and the reason for this
17 is upon the systems will co-exist with
18 humans, individually and in large social
19 networks, and if we are truly pursuing an
20 understandable AI, the response to stimuli
21 shaped by this humanity, then our DOD model
22 and simulation and live and virtual
23 constructive programs need to keep pace in
24 portrayals of the humans and human technical
25 behavior in those simulations.

1 Secondly, this testing evaluation
2 improvement should be continuous, and that's
3 because our society and the society of our
4 peers -- correction, allies and adversaries
5 is also changing, and so, that behavior is
6 dynamic and depends -- demands that we are
7 current and honest in our own assessments of
8 that portrayal. Thank you.

9 MR. MARCUSE: Thank you. Good.
10 Great. Okay.

11 Now, if you wouldn't mind, that would
12 be great, and bring that back up, and does
13 anyone else need a comment card? Great.
14 Thank you, very much, sir. If you wait, you
15 can just -- that's perfect. You can approach
16 the microphone there on the -- right here
17 would be also excellent. Thank you.

18 MR. CHEN: Thank you, and hello. My
19 name is Kenny Chen, and I would like to share
20 my appreciation that explainability and
21 transparency have been emphasized in the
22 DOD's initial AI strategy, and because this
23 strategy and its components remain at -- in
24 understandably at -- at nascent phase, it's
25 understandable that those terms are not yet

1 clearly or rigorously defined, and so, to
2 that end, I encourage the DOD to pay
3 especially close attention to the question of
4 to whom these AI systems are designed to be
5 explainable and transparent, because there
6 are substantial differences between how
7 accurate information might be delivered to a
8 computer scientist, versus a war fighter on
9 the field, versus a journalist or a
10 politician, and the DOD cannot be too careful
11 in assuring that misinformation and the risks
12 of misunderstanding are minimized.

13 Having talked to people at the U.S. --
14 U.N. Office of Disarmament Affairs, or
15 considerations -- given the pace of decision
16 making within a highly automated, you know,
17 decision system when it comes to
18 international conflict, setting those kinds
19 of standards and understanding will be
20 existentially important, and just as we are
21 currently emphasizing interoperability across
22 information systems and devices and
23 technology, we should apply the same values
24 and scrutiny to the way that organizations
25 communicate with one another. Thank you.

1 MR. MARCUSE: Great.

2 UNIDENTIFIED MALE SPEAKER: Yeah, it's
3 not quite done, but --

4 MR. MARCUSE: Well, sure. That's
5 great. We just -- we just want to make sure
6 we have your -- your contact information.
7 That's great.

8 All right. Bruno, Mark Gubrud's
9 statement.

10 MR. BRUNETT: Mark Gubrud, University
11 of North Carolina, Chapel Hill.

12 We stand today at the start of a
13 revolution, the rapid advance and wide use of
14 AI. Because this technology replaces human
15 intelligence and judgment, it has the
16 potential to cause catastrophic errors with
17 consequences in proportion to the
18 responsibilities being delegated to machines.
19 The specific causes of error in AI may be
20 foreseen, but in general will not be and may
21 not even be identifiable.

22 In complex systems, it becomes, in
23 principle, impossible to foresee all
24 exceptional situations that may and will
25 arise. Computer algorithms are particularly

1 brittle, but also complex networks of analog
2 and living systems exhibit unpredictable
3 collective behavior and sudden crises. As AI
4 advance towards human-level capabilities, its
5 potential for instability is clear.

6 The most severe danger arises from the
7 unforeseeable, untestable interactions of
8 networked complex competing and adversarial
9 systems. Experience with such networks such
10 as the instability of high-speed trading,
11 which has produced several hugely expensive
12 stock market flash crashes has demonstrated
13 the likelihood that confronting and
14 interacting adversarial networks will erupt
15 into crisis or open combat spontaneously --
16 spontaneously, or as triggered by unforeseen
17 circumstances, and in any case, once ignited
18 into a condition of ongoing violence, may
19 escalate -- and execute and escalate that
20 violence so rapidly in such a complicated and
21 opaque way as to resist or frustrate any
22 human attempt to intervene.

23 The ongoing confrontation,
24 competition, and adversarial -- adversarial
25 nature of such systems, and in the

1 adversarial relationship of their creators,
2 contradict and will frustrate any effort to
3 coordinate between them so as to mitigate the
4 risks of unauthorized or uncontrollable
5 conflicts.

6 Why would nations undertake to
7 construct and rely on such obviously
8 dangerous systems? For the same reason as in
9 the Cold War, as in the arms race today, and
10 under the competitive pressure of an
11 advancing technology that is already able to
12 aggregate and correlate more data than any
13 human could, and is increasingly able to
14 integrate that information and make
15 high-level decisions, particularly when
16 signals unambiguous, more rapidly than any
17 human.

18 We must avoid taking that road, but,
19 in fact, it is the road we are already on, so
20 we must avoid going further. The global
21 community must undertake ambitious arms
22 control initiatives, including a mandate of
23 real-time accountable human control over all
24 weapons systems. The DOD and the U.S. cannot
25 do this alone, but America's preference

1 should be for arms control, we should say so,
2 and everything we do should be consistent
3 with that. Unilaterally disarmament or
4 renunciation of strategically decisive weapon
5 technology would -- would be -- would not be
6 effective or possible, but the opposite
7 extreme of trying to win the arms race should
8 be equally strongly rejected.

9 Questions about AI and autonomous
10 weapons are too often framed only in terms of
11 ethics. It is -- is it right to use such
12 weapons? We need to consider the ways in
13 which these weapons are eroding our control
14 and creating a threat to ourselves. We must
15 avoid accelerating the arms race toward the
16 loss of human control and the occurrence of
17 war by accident or misconceived design. Is
18 it ethical to lead a global race to oblivion,
19 instead of leading toward a strong regime of
20 binding verified arms control global
21 governance than human security?

22 MR. MARCUSE: Thank you. That's all.
23 Great. Thank you. Excellent. Thanks a lot.

24 MS. GALLAGHER: I'm April Gallagher,
25 I'm with the DSEI, and when we're talking

1 about ethics and responsible use of AI and
2 machine learning, it -- oh, closer? Louder?
3 Okay. All right.

4 The ethics and responsible use, where
5 I see that, it's really in the details and
6 the implementation, that that's where the
7 ethics are really going to happen, and I've
8 got a list of a couple of examples just to
9 highlight this.

10 So any time you're talking about
11 machine learning, or AI, there's going to be
12 a base rate of error, and if you took an
13 intro to statistics class, 5 percent is
14 acceptable error. Well, so, Tumbler recently
15 put a adult content filter out, and let's
16 pretend that they actually got their
17 5 percent error in this classifying images.
18 They didn't get anywhere near that, but if
19 they had gotten the 5 percent error, that's
20 still billions and billions of images that
21 were misclassified, and millions and millions
22 of unhappy users. Now, 5 percent in a DOD
23 application, that's not okay.

24 So, now, the second point, training
25 data has to match the conditions of use. So

1 Alexa and Siri and lots of other voice
2 applications are really bad with women's
3 voices because their training data had a
4 bunch of male engineers in it. They didn't
5 collect samples from women, and so, women
6 with slightly higher voices, the equipment
7 doesn't work as well for them, and so, you
8 have women soldiers, that's going to be an
9 issue, but let's take that a step farther.
10 If you train a system in the United States,
11 let's say it's going to detect a threat,
12 whether or not a particular person is a
13 threat, based on the emotions that they're
14 displaying, if you train that on data
15 collected here and then you deploy it in
16 theater, it's not going to work because the
17 training data doesn't match the use case, so,
18 again, the details of how it was put together
19 and how it was designed, that's going to
20 change the responsible use. I'm going to
21 skip one that's written down.

22 The last point --

23 MR. MARCUSE: You have time for it, if
24 you want.

25 MS. GALLAGHER: I have time? Okay.

1 All right.

2 Current efforts in explainable AI and
3 people who are the end users of these things,
4 those current efforts are going to be
5 insufficient because -- and there -- there's
6 a lot of proof here. One study in particular
7 took a best-case scenario, all the studies
8 that are working on explainable AI, they work
9 perfectly, they get the results, they
10 presented such results to a largely
11 college-educated audience, and less than
12 60 percent of those users could understand
13 the output, and you've seen the study, so
14 we've got to think about the human
15 computer -- human AI interaction.
16 Explainability is not enough. We have to
17 think about interpretability, and commuting
18 that efficiently.

19 Last point, many predictive systems --
20 so talking more about machine learning
21 here -- they can be harmful or beneficial
22 depending on what you do with the
23 predictions. So if I said I had a system
24 that predicts whether a particular person is
25 going to be a criminal, I think most of us

1 would be horrified if we took that prediction
2 and arrested them and locked them up, a la
3 Minority Report, that's kind of -- they
4 didn't do anything yet, but such systems are
5 actually already being deployed in high
6 schools.

7 If we predict whether or not a
8 particular person is a threat of dropping
9 out, if they're a success or at risk, what
10 happens with that information? Is that
11 student supported? Is that student given
12 extra support so that they can actually
13 complete high school? That's a good use. If
14 they are treated as "Oh, you're already a
15 dropout," then that's irresponsible, and so,
16 what we do with the predictions, it's not the
17 ML, it's what we do with the information.

18 So all of these examples are to
19 highlight that the ethics and responsible
20 use, it really comes down to the details in
21 each particular case. Thank you.

22 MR. MARCUSE: Thank you.

23 MR. MEDIN: Sorry, could I ask a
24 question? You --

25 MS. GALLAGHER: Yes, sir.

1 MR. MEDIN: -- commented about
2 5 percent as acceptable.

3 Where did that come --

4 MS. GALLAGHER: Oh, that's -- so
5 that's the -- the standard T test. It's been
6 kind of the -- and the -- the 5 percent,
7 it -- it comes from just a tradition of
8 statistics. If you do something -- like, if
9 you flipped a coin, when people start getting
10 suspicious that maybe it's not fair is
11 about -- "Oh, that seems weird," it's at
12 about a 5 percent error, and so, that's a
13 good threshold for a T test, but what's
14 happened is because that's the standard
15 statistical threshold, people have, without
16 thinking about it, transferred that 5 percent
17 over to all kinds of machine learning
18 application as, "This is a great threshold,"
19 and it's not for a lot of applications, and
20 so, that's an example of carelessly
21 transferring something from one domain to
22 another domain.

23 MR. MARCUSE: Thank you.

24 MR. MEDIN: Thank you.

25 MR. MARCUSE: Someone here is thinking

1 about whether they would like to make a
2 comment. I'll try to nudge you to the side
3 of giving it a shot.

4 While you're thinking about it, Bruno,
5 if you wouldn't mind reading the statement
6 from Michael Duggan -- Duggan?

7 MR. BRUNETT: Michael Duggan, Booz
8 Allen Hamilton, this is text taken from a
9 Booz Allen white paper called "Analyst 2.0,
10 Redefining the Analysis Trade Craft." It's a
11 little lengthy.

12 MR. MARCUSE: Well --

13 MR. BRUNETT: Analyst 2.0. I'm going
14 to read --

15 MR. MARCUSE: Sure, just a
16 reasonable --

17 MR. BRUNETT: Yep.

18 MR. MARCUSE: -- quantity of it, but
19 no more than five minutes.

20 MR. BRUNETT: Listen for the
21 microphone to be hit.

22 MR. MARCUSE: Yeah.

23 MR. BRUNETT: Making sure official
24 intelligence works for the mission.
25 Artificial intelligence and other advanced

1 analytic approaches are rapidly becoming
2 integral to the intelligence mission. As our
3 nation's security posture grows more complex,
4 and we need to keep our eyes on more people
5 and places, the volume of critical
6 intelligence data is expanding exponentially.

7 It is becoming difficult for analysts
8 alone to keep pace. There is simply too much
9 data to be brought together and analyzed in
10 the short time frames required by the
11 mission. The military and intelligence
12 communities recognize that advanced analytics
13 hold great potential, and they are the
14 beginning -- and they are beginning to adopt
15 these emerging technologies.

16 With AI, for example, instead of an
17 analyst spending hours poring over a stream
18 of satellite photos looking for any
19 significant changes, the computer might
20 complete the task in seconds. This frees up
21 the analyst to spend more time on
22 higher-level analysis, reviewing what the
23 computer has found, and then preparing
24 reports for decision makers that are both
25 timely and comprehensive.

1 In essence, the machines are doing
2 what they do best so that people can do what
3 they do best, but this shift, turning over
4 much of the repetitive work to -- to a
5 computer, is also presenting defense and
6 intelligence organizations with a significant
7 challenge.

8 How can they be sure that the outputs
9 of the computer are both accurate and
10 relevant to the mission? How can
11 organizations be confident that the analytic
12 tools are working for them? The stakes of
13 this are of the highest order. The expertise
14 of the analyst is vital to national security,
15 and if it is lost or diminished in the
16 human-machine connection, the risk can be
17 significant. What if the computer doesn't
18 have it quite right, and faulty analytic
19 output -- outputs are used by commanders or
20 other decision makers down the line?

21 Yet another challenge is that analysts
22 may not accept and use AI formed -- informed
23 analytics, either because they don't trust
24 the outputs, or because they fear that the
25 computers will put them out of a job. There

1 are already examples of this in some
2 organizations. New technology systems are
3 introduced with great fanfare, and then
4 promptly ignored by analysts who are free to
5 pick the tools they want. And yet, with the
6 new technologies, decision makers won't be
7 able to take full advantage of the available
8 data, something that is essential to keep
9 pace with today's threat.

10 Unfortunately, most current approaches
11 to AI and other advanced analytics don't
12 resolve these dilemmas. In fact, they only
13 make them worse. With all -- with all the
14 hype around AI, data scientists and others
15 are caught up in what the technology can do.

16 For example, they try to build better
17 and better models for pattern recognition or
18 object identification, but this research is
19 largely academic and theoretical, and not
20 tied to the specific mission at hand. Yes,
21 the tool can look for changes in photos, but
22 is it the kind of change that the analyst is
23 looking for? Too often, such
24 contextualization is missing, and when that
25 happens, the tools simply can't be relied

1 upon and support decision making. Automation
2 and speed count for nothing if the computer
3 gets it wrong.

4 MR. MARCUSE: Thank you.

5 Any other takers of this opportunity?
6 Once, twice? And we are going to adjourn.

7 So we ask you to stay seated for a
8 moment while the board retires to the green
9 room. If you are a member of the media and
10 you'd like to participate in the media
11 availability, please come forward.

12 Let me close by saying the comments
13 on-line at that website, it's quite easy to
14 do, it takes a couple of clicks, we would
15 really love to hear from you, and let me also
16 close by saying that we will have another
17 listening session like this one in California
18 on April 26th at Stanford University. You
19 will be able to tune in to that live stream
20 and get information about that by signing up
21 for our invitation. We'll send that
22 information to you.

23 And let me just close by saying thank
24 you all, very much, for coming to participate
25 in this conversation and listening to the

1 discussion, and -- and particularly thanks to
2 those who went to the microphone to share
3 their views, greatly appreciate it. Thank
4 you all.

5 - - -

6 (Thereupon, at 2:50 o'clock p.m., the
7 proceeding was concluded.)

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C-E-R-T-I-F-I-C-A-T-E

I, Eileen L. Drake-Ober, the undersigned, do hereby certify that the foregoing seventy-three (73) pages are a true and correct transcript of my stenotypy notes taken of the proceeding held at Carnegie Mellon University, Studio Theater, 5000 Forbes Avenue, Cohon Center, First Floor, Pittsburgh, Pennsylvania 15213, on Thursday, March 14, 2019.



Eileen L. Drake-Ober
Notary Public in and for the
Commonwealth of Pennsylvania
My Commission expires: December 6, 2020

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1	9	action 27:2 30:12 39:8,24	advisory 4:1,2 35:25
1.7 36:13	970 74:12	actionable 44:25 45:3	advocating 26:19
14 74:9	a	actions 21:14 26:17 39:6,10,25 40:2	aegis 32:11
15213 1:15 74:8	aaron 34:9,9 37:24 38:10 41:13 45:19	activities 3:20 36:18	affairs 58:14
15th 4:5	abide 19:8	activity 11:15,16	affect 51:15
16 4:10 9:3	able 61:11,13 71:7 72:19	ad 34:23 36:13	afford 44:21
18 11:13	abroad 47:3	adaptations 17:21	afghanistan 52:18
1949 19:15	absolutely 12:12 47:21 54:6	adapted 19:12	afternoon 3:2 13:18 52:14
1960s 34:19	abstraction 43:18	added 24:14	afternoon's 13:22
1988 30:9	academia 25:9 48:6 54:6	addition 19:6	age 12:10,14
1:36 1:15	academic 15:18 56:4 71:19	additional 4:14	agencies 44:13
1:59 27:5	academics 6:17 14:13	address 8:21 20:22 40:14 47:17 53:21,23	agenda 4:7
2	accelerating 62:15	addressing 35:3 52:23 54:7	aggregate 61:12
2.0 68:9	accept 70:22	adequately 49:14	ago 5:11 18:25
2.0. 68:13	acceptable 9:16 9:17 63:14 67:2	adhering 49:9,15	agreed 10:5
20 9:17,18	accepted 19:15	adjourn 72:6	ahead 31:17 54:7
2012 22:13	accessible 3:18	administrative 22:14	ai 5:6,8 6:20,25 7:1,12 11:8,14,18 11:24 12:12,25 17:25 18:2,4,11 18:22,25 19:2,6 20:19 21:8 24:19 24:25 25:7,11,13 25:16,17,19,25 26:10,11,15,16,18 26:19,20 28:19 29:14,18 30:16,25 31:18,22 32:2,17 32:24 33:14,19 34:18 35:10,16,19 35:24 37:3,13 38:23 39:2 43:12 46:23 47:1,18,21 50:8,10,18,21,22 50:24 51:7,15,18 52:25 53:4,13,15 54:9,15,18,21 56:1,5,20 57:22 58:4 59:14,19 60:3 62:9 63:1,11 65:2,8,15 69:16 70:22 71:11,14
2017 22:14 36:12	accident 62:17	adopt 69:14	
2018 35:8	accompanying 36:16	adoption 17:25	
2019 1:7 4:5 6:16 34:15 74:9	accomplish 20:6	adult 30:6 63:15	
2020 74:14	account 32:15	advance 4:11 8:9 25:11 59:13 60:4	
21st 22:13	accountability 15:14	advanced 31:2 41:22 68:25 69:12 71:11	
26th 72:18	accountable 15:11 61:23	advancing 46:17 61:11	
2:50 73:6	accounted 29:11	advantage 29:23 71:7	
3	accurate 58:7 70:9	adversarial 60:8 60:14,24,24 61:1	
3/14 27:5	achieves 10:20	adversaries 41:1 57:4	
3000.09 22:12	acknowledge 53:4	advise 45:11	
5	acquisition 11:1 24:10		
5 9:18 63:13,17,19 63:22 67:2,6,12 67:16	act 4:2,3 20:9		
5000 1:14 74:7	acting 17:8 20:8 50:24		
6			
6 74:14			
60 65:12			
7			
70s 34:19			
73 74:4			
7th 34:15			

aid 22:3 aims 25:24 air 31:10,10 41:13 aircraft 30:14,18 airliner 30:10,18 32:14 airmen 33:17 aisles 9:6 alan 5:12 alexa 64:1 alexis 41:8,8 algorithm 43:7 algorithms 31:8 37:5 42:15 43:8 47:5 59:25 alleged 21:12 allen 68:8,9 allies 57:4 allotted 27:13 allow 3:17,24 23:15 allowed 30:4 allowing 56:7 alluded 29:20,20 alongside 14:11 amazing 14:1 ambitious 61:21 america's 61:25 amount 20:14 47:7,8 amounts 40:21 47:5 amplified 42:19 analog 60:1 analysis 43:10 50:9 68:10 69:22 analyst 68:9,13 69:17,21 70:14 71:22 analysts 69:7 70:21 71:4 analytic 42:6 69:1 70:11,18	analytica 36:11 analytics 13:13 69:12 70:23 71:11 analyzed 69:9 analyzing 55:24 anger 36:24 animal 50:14 announced 4:4 18:1 answer 4:21 answers 51:13 anti 30:1 48:11 api 41:3 apis 40:23 appearances 2:1 applaud 36:4 applicable 24:2,3 application 5:10 28:8 43:13 63:23 67:18 applications 33:2 42:10 64:2 67:19 applied 17:22 42:24 applies 18:10 21:6 44:5,8 apply 20:25 21:17 58:23 applying 43:10 appreciate 8:4 13:2 50:2 73:3 appreciation 57:20 approach 17:4,20 35:19 55:12 57:15 approaches 25:17 28:11 69:1 71:10 appropriate 21:14 23:16 24:1 44:15 53:20 approved 24:8 approximately 52:19	april 62:24 72:18 area 22:6 24:17 36:14 areas 29:3 43:19 arises 60:6 armed 20:12,23 21:1 arms 61:9,21 62:1 62:7,15,20 arrangement 55:7 arrested 66:2 articulate 21:16 25:6 articulated 28:16 artificial 3:14 5:13 6:13 7:16 14:2 15:8,15,24 17:15 17:22 18:15,19,21 21:1,18,22 22:10 28:9,16 35:5 40:16 42:5 45:13 49:19 68:25 asked 6:11 10:2 17:24 asking 22:1 aspects 55:24 assembling 41:20 assert 47:16 assessments 57:7 assigns 22:23 associated 29:6 42:14 assure 35:9 52:20 assuring 58:11 attempt 41:1 60:22 attend 3:17 attendees 3:23 attention 30:23 58:3 audience 8:21 17:3 27:12 65:11 augmentation 43:6	authored 34:16 authorize 23:23 automated 58:16 automation 72:1 autonomous 22:24 22:25 23:5,5,14 23:14,24,25 24:5 24:6 31:15,15 35:6 38:23 39:4,8 62:9 autonomy 5:21 18:17,19 22:7,8 40:11 availability 72:11 available 71:7 avenue 1:14 74:7 avoid 61:18,20 62:15 aware 37:5 awareness 25:21 awesome 34:11
			b
			back 16:13 34:19 49:1 51:4 57:12 backed 50:16 background 12:8 13:12 bad 64:2 balance 33:10 balances 32:3 50:23 banned 30:1 bar 51:11 base 63:12 based 11:9 30:16 35:23 41:3 51:18 52:17 64:13 baseline 46:18 basically 23:8,11 26:8 basis 4:15 18:3 becoming 13:11 69:1,7

<p>beginning 35:16 49:8 69:14,14</p> <p>begins 50:24 52:3</p> <p>behalf 8:12</p> <p>behavior 17:10 53:9 56:12,25 57:5 60:3</p> <p>believe 5:16 14:19 17:15 29:14,18 31:1 32:18 33:8</p> <p>believes 18:10</p> <p>beneficial 35:17 65:21</p> <p>benefit 16:8</p> <p>best 28:13 33:18 36:15 50:18 53:19 54:8,17 65:7 70:2 70:3</p> <p>better 32:18 33:3 36:20 42:13 53:16 71:16,17</p> <p>beware 34:17</p> <p>beyond 47:13</p> <p>bias 35:6</p> <p>big 43:1</p> <p>billions 63:20,20</p> <p>binding 62:20</p> <p>bioengineering 6:2</p> <p>bioethicists 36:2</p> <p>birthplace 15:23</p> <p>bit 12:7 42:5</p> <p>blend 13:13</p> <p>block 41:23</p> <p>board 1:1,12 3:5,8 3:14,25 4:1,9,19 4:21,22 5:1,18 6:11,16 7:19 8:8 8:13,21 10:5,13 10:14 11:19 13:23 17:24 18:3 27:9 28:6 38:13 45:10 46:15 48:4,10 49:17 72:8</p>	<p>board's 3:19 4:24 6:4 8:7,9</p> <p>bobby 38:6,6 41:17,18</p> <p>body 19:11,13 20:21</p> <p>book 35:18</p> <p>booz 68:7,9</p> <p>boston 34:16 36:14 40:9 56:2</p> <p>boycott 54:15,19</p> <p>breaking 24:18</p> <p>brief 6:7 16:24 51:24</p> <p>briefly 18:7 19:23 28:7</p> <p>brightest 54:8,18</p> <p>bring 10:16 14:24 30:23 38:21 39:17 41:11 57:12</p> <p>brittle 60:1</p> <p>broad 11:6,9 12:13,23</p> <p>broadcast 51:21</p> <p>broader 11:19 38:24 39:2</p> <p>broadly 12:11 14:19 37:3</p> <p>brought 69:9</p> <p>brunett 2:8 3:2,3 34:13 40:8 41:18 48:2 50:5 52:1 55:13 59:10 68:7 68:13,17,20,23</p> <p>bruno 5:2 9:2 10:2 10:5 34:4,12 37:21 38:3,8 41:16 45:18 48:22 50:3 51:23 55:9 59:8 68:4</p> <p>build 37:17 71:16</p> <p>building 47:20 52:10</p>	<p>built 49:10</p> <p>bulk 8:20</p> <p>bunch 41:14 64:4</p> <p>business 6:18 42:16</p> <hr/> <p style="text-align: center;">c</p> <hr/> <p>c 3:1 74:1,1</p> <p>california 72:17</p> <p>call 35:13</p> <p>called 3:14 34:17 68:9</p> <p>calling 35:18</p> <p>caltech 6:2</p> <p>cambridge 36:11</p> <p>campaign 36:13 51:18</p> <p>campaigns 34:23 35:11</p> <p>campus 14:25</p> <p>capabilities 28:23 33:19 40:14 60:4</p> <p>capability 29:5 52:4</p> <p>capable 54:22</p> <p>capacities 11:5</p> <p>capacity 52:17</p> <p>capitalists 6:19</p> <p>card 9:9 45:24 46:1 57:13</p> <p>cards 9:5,13 27:17 37:23 45:19 55:4</p> <p>care 6:23 24:1</p> <p>careful 58:10</p> <p>carelessly 67:20</p> <p>carnegie 1:6,14 3:8 5:3,11 8:14 14:1,22 15:20 16:10 46:10 74:6</p> <p>carolina 59:11</p> <p>carries 12:2</p> <p>carrying 30:6</p> <p>carter 10:15</p> <p>case 30:20 36:5 44:13 53:12 60:17</p>	<p>64:17 65:7 66:21</p> <p>cases 53:16</p> <p>casual 55:7</p> <p>casualties 26:21 29:22 32:22 33:13</p> <p>catastrophic 59:16</p> <p>categorize 43:3</p> <p>caught 71:15</p> <p>cause 51:17 59:16</p> <p>causes 59:19</p> <p>center 1:14 11:10 18:2 74:7</p> <p>centered 35:19</p> <p>century 5:11</p> <p>certain 20:14,16</p> <p>certainly 27:15</p> <p>certificate 55:16</p> <p>certify 74:3</p> <p>chain 41:23</p> <p>chairman 24:11</p> <p>chairs 6:3</p> <p>challenge 36:10 70:7,21</p> <p>challenges 29:6 40:15</p> <p>change 31:1 35:12 37:15 64:20 71:22</p> <p>changes 4:6 69:19 71:21</p> <p>changing 57:5</p> <p>chaos 51:17</p> <p>chapel 59:11</p> <p>characterize 11:24</p> <p>checks 50:23</p> <p>chen 57:18,19</p> <p>chiefs 24:12</p> <p>choose 18:15</p> <p>chose 15:20</p> <p>christopher 2:8 3:3</p> <p>circumstances 60:17</p>
---	---	---	--

<p>citizen 8:4 citizens 33:14 city's 14:8 civil 13:9 33:12 47:2 civilian 20:12 26:21 29:21 30:18 32:13,21 civilians 39:22 civilization 45:5 clarifying 4:22 33:24 40:7 50:1 55:1 class 15:2 38:16 63:13 classifying 63:17 claymore 29:25 clean 51:6,7 clear 22:17 28:22 32:11 53:25 60:5 clearly 22:10 28:15 29:10 31:18 44:5 58:1 clicks 72:14 climate 37:15 close 58:3 72:12 72:16,23 closer 38:17 63:2 closing 33:8 cmu 5:14,16,23 10:12 11:15,16 13:4,7,11 cmu's 14:10 46:20 code 32:13 51:4 coded 50:20 coherent 39:15 cohon 1:14 74:7 coin 67:9 cold 53:11 61:9 collaboration 14:12 collaborative 51:12</p>	<p>collaboratively 14:15 collateral 25:20 26:22 32:20 colleagues 9:5 11:19 13:4 collect 9:13 40:20 64:5 collected 51:18 64:15 collective 60:3 college 55:14,15 65:11 combat 36:24 60:15 come 8:3 39:23 46:4 50:21 67:3 72:11 comes 29:2 58:17 66:20 67:7 coming 13:4 30:24 37:19 38:12 72:24 commanders 23:15 53:25 54:2 70:19 commencing 1:15 comment 9:2,4,9 9:15 12:16 27:17 27:22 34:15 37:23 40:8 49:24 56:8 57:13 68:2 commented 67:1 comments 4:9,10 4:12,14,19,20 8:20,24 9:12,24 10:1,2,4 27:14,16 39:16 56:9,12 72:12 commission 74:14 commitment 19:4 19:8 33:16 commitments 28:17 33:10</p>	<p>committed 26:9 28:10 52:23 committee 4:2 common 16:11 commonly 40:22 commonwealth 1:13 74:13 communicate 12:20 58:25 communicative 51:8 communities 69:12 community 11:20 13:7 14:23 25:10 51:12 61:21 commuting 65:17 companies 29:4 35:24 36:4,25 37:17 42:8,19 44:12 47:19 company 36:22 competence 48:10 competing 60:8 competition 60:24 competitive 61:10 competitively 55:18 complete 66:13 69:20 completeness 44:6 complex 29:7 59:22 60:1,8 69:3 complexity 31:22 compliance 53:1 compliant 44:15 complicated 42:17 60:20 component 14:8 17:9 components 57:23 comprehensive 69:25</p>	<p>computational 43:17 44:3 computed 35:18 computer 43:20 43:22 58:8 59:25 65:15 69:19,23 70:5,9,17 72:2 computers 43:14 43:15,16 70:25 computing 40:21 46:10 concern 38:22 53:23,24 concerned 54:19 concerns 29:9 35:3 52:22 53:21 concluded 73:7 condition 60:18 conditions 63:25 conduct 19:12 20:22 21:5 54:11 55:21 conducting 49:11 conducts 45:16 confident 70:11 configured 51:19 confirmation 54:13 conflict 20:11,23 21:2 58:18 conflicts 61:5 confrontation 60:23 confronting 60:13 confusion 51:17 confusions 50:13 connection 70:16 connections 56:2 consequences 12:24 23:4 59:17 consider 4:10 21:7 46:18 62:12 considerations 28:8 58:15</p>
--	--	---	---

<p>considering 33:2 considers 45:11 consistency 44:6 consistent 19:17 31:25 45:4 62:2 constantly 11:20 constraints 31:5 construct 61:7 constructive 56:23 consult 25:8 contact 59:6 content 63:15 context 6:10 7:8 20:23 24:14 25:12 47:13 contextualization 71:24 contextualized 44:22,24 continue 25:15,23 28:2 continuing 26:15 continuous 56:15 57:2 contradict 61:2 contrast 48:11 contribute 27:3 control 6:1 31:24 44:7 54:2 61:22 61:23 62:1,13,16 62:20 controversial 7:4 convening 6:16 convention 30:2 conventions 19:15 conversation 6:10 11:21 16:23,25 72:25 conversations 6:22 15:4 conversely 21:19 cooperation 54:5</p>	<p>coordinate 61:3 corner 37:25 48:12 corporate 34:17 34:21 corporation 28:4 correct 74:4 correction 57:4 corrective 21:14 correlate 31:9 47:10 61:12 corrupted 51:3 counsels 48:5 count 72:2 country 7:18 10:21 48:15 country's 5:8 couple 8:18 26:6 63:8 72:14 course 47:6 55:20 56:11 cover 18:6 24:17 26:4 craft 68:10 crashes 35:6 60:12 crawford 34:2 create 42:22 50:23 creating 35:11 62:14 creative 43:19,22 51:13 creators 61:1 creatures 50:12 credibility 46:16 creeley 55:10,13 crew 30:11 criminal 35:7 65:25 crises 37:18 60:3 crisis 37:13 60:15 critical 29:23 44:1 69:5 critically 42:11</p>	<p>critics 6:25 36:24 crucial 18:5 cruise 31:7 cruiser 32:12 cultural 51:20 culture 5:14 10:17 cummings 2:3 5:19 cunningham 38:6 41:17,18 curation 41:21 42:3 44:9 45:7 curiosity 14:16 current 17:4 18:17 21:24 22:6 57:7 65:2,4 71:10 currently 58:21 curve 43:9 customary 19:16 cyber 46:11 50:10 51:8,12 cylab 46:11 cynical 34:25</p> <p style="text-align: center;">d</p> <p>d 3:1 damage 25:20 26:22 32:20 damaging 36:25 dancing 36:19 danger 60:6 dangerous 61:8 darpa 56:2 darrow 51:25 52:1 data 13:13 29:7 33:4,6 40:19 41:2 42:3,3,7,14 43:1,2 43:3,11 44:5,6,7,9 44:11,13,16,17,20 44:21 45:7,7 47:5 47:8,9,14 50:9 51:19 61:12 63:25 64:3,14,17 69:6,9 71:8,14</p>	<p>date 1:15 dave 48:24 49:6 dawn 37:14 day 1:15 12:10,14 12:22 14:14 18:1 27:6 days 8:18 dealing 50:11 52:8 55:25 dear 50:7 decade 14:6 decades 37:19 52:4,19 december 74:14 decide 31:20 decided 31:17 decision 25:22 30:13 31:24 32:1 32:9,17,18 37:4 39:5,11 40:1,13 58:15,17 69:24 70:20 71:6 72:1 decisions 17:13 26:17 31:15 33:7 39:12,18 61:15 decisive 62:4 dedicated 52:24 deep 14:11 deeper 39:13 deeply 52:23 defeat 20:2 defense 1:1,12 3:4 3:7,13,20 6:4,14 7:11 8:13 10:13 10:14 11:18 13:23 13:23 17:8,24 20:15 24:9,10 26:3,12 38:13 40:10 45:10 46:15 46:19 51:13 56:3 70:5 defenses 50:10 defined 44:18 58:1</p>
---	--	--	---

defines 39:24	detail 8:25	directive 22:12	dod's 18:11 19:22
degradation 37:15	details 63:5 64:18	directly 22:21	47:12 57:22
delegated 59:18	66:20	25:2 26:7	dodd 38:7 47:25
delete 51:5	detect 64:11	director 4:24 5:21	48:2
deliberations	detects 41:24	55:18 56:3	doing 70:1
49:17	determine 30:5	dirty 29:7	domain 67:21,22
delivered 58:7	determining 53:14	disagree 46:13	domestically 47:3
demands 20:14	detonation 30:5	disagreements 7:5	door 51:4
57:6	detrimental 51:11	disappointment	downing 30:8,9
demonstrate	develop 17:24	43:23	downloaded 50:17
45:15	developed 21:25	disarmament	downside 47:10
demonstrated	33:11 47:7 53:1	58:14 62:3	dozen 55:18
48:10 60:12	56:1	disaster 54:24	dr 2:3,3,4 5:19,22
demonstrating	developer 51:3	discerning 42:25	5:25 6:2,3 8:15
48:14	developers 35:21	disciplines 14:16	10:9,10 27:5
department 6:11	developing 7:21	discoveries 14:17	38:15,17,20
6:24 7:2,11 10:18	26:11	discovering 16:11	drake 1:13 74:2
10:19,23,25 11:6	development 5:9	discovery 41:21	74:12
11:11 12:1,5	22:24 23:21 24:13	42:1	driven 26:16
17:16 18:10,15,24	25:13 26:1,14	discretionary 3:25	driving 41:25 43:8
22:3,7 23:12	29:2 47:4	discuss 18:9	dropout 66:15
24:16 25:5 26:9	developments	discussion 11:17	dropping 66:8
40:10 48:6 52:2	19:1	12:24 18:6 73:1	dsei 48:24 49:7
department's 17:4	device 30:3	discussions 6:15	62:25
18:16,20 19:4,8	devices 3:12 30:1	11:7 15:22	dubbed 34:25
depending 65:22	40:24 41:6 58:22	dismounted 40:12	duggan 68:6,6,7
depends 57:6	dialogue 7:6,24	displaying 64:14	duke 5:21
deploy 49:18	8:9 12:13,16	distinction 20:10	duty 48:15
64:15	dib 16:6 50:7	39:3	dynamic 15:12,13
deployed 40:24	differences 7:3	distinguish 20:11	57:6
66:5	58:6	distinguished 16:7	dynamical 6:1
deployment 11:3	different 7:20	30:17	dynamics 29:8
40:16	16:8 51:17	distribution 52:9	e
derived 44:14	differently 7:13	diverse 7:3 41:25	e 3:1,1 74:1,1
design 40:15	difficult 47:11	document 22:11	earlier 16:20
62:17	69:7	22:16,19 23:2,9	38:25
designated 3:4	difficulty 31:21	dod 6:25 7:12,15	early 34:19 36:12
designed 22:2	digital 31:9	17:6,20,23 21:9	earned 15:3
23:3,15 58:4	dilemmas 71:12	21:15 22:12,22	earth 34:24
64:19	dimensional 43:9	23:13 28:22 29:5	easy 72:13
designing 52:10	diminish 19:7	33:2 39:1 46:21	echo 56:12,14
despite 50:19	diminished 70:15	47:2,17 56:21	ed 27:15 34:16
destruction 20:5	direct 23:24	58:2,10 61:24	educated 51:21
		63:22	65:11

<p>education 51:12</p> <p>effective 44:1 62:6</p> <p>effects 37:2 47:17</p> <p>efficiency 46:17</p> <p>efficiently 20:2 65:18</p> <p>effort 6:12 61:2</p> <p>efforts 21:15 65:2 65:4</p> <p>eileen 1:13 74:2 74:12</p> <p>either 40:22 70:23</p> <p>election 35:8 36:9</p> <p>electronic 3:12</p> <p>element 8:7 11:25</p> <p>elli 27:23,23,24 28:1,2,3 33:23</p> <p>emerges 42:5</p> <p>emerging 14:6 17:21 19:2 21:8 21:17,21 28:19 55:17,22 69:15</p> <p>emotions 64:13</p> <p>emphasis 49:9</p> <p>emphasized 57:21</p> <p>emphasizing 58:21</p> <p>employ 31:2 53:8 54:3</p> <p>employee 10:12</p> <p>employs 7:15</p> <p>enable 43:4,17</p> <p>enabling 28:12 42:16</p> <p>encourage 12:12 12:15 22:18 25:25 58:2</p> <p>encouragement 45:20</p> <p>endeavor 54:16</p> <p>ends 52:3</p> <p>enduring 19:5</p> <p>enemy 20:2</p>	<p>engage 30:14 31:13 55:19</p> <p>engaged 21:15,20</p> <p>engagement 5:17 24:4</p> <p>engagements 10:23 23:7</p> <p>engaging 36:17</p> <p>engineering 5:20 13:10</p> <p>engineers 7:1 64:4</p> <p>enhance 33:15</p> <p>enhanced 25:22 52:25</p> <p>ensure 7:21</p> <p>ensuring 52:25</p> <p>enterprise 46:14</p> <p>environment 12:4 34:22</p> <p>environmental 13:9 37:15</p> <p>equally 14:23 50:22 62:8</p> <p>equipment 64:6</p> <p>equitable 5:25</p> <p>eroding 52:6 62:13</p> <p>error 50:12 59:19 63:12,14,17,19 67:12</p> <p>errors 32:19 59:16</p> <p>erupt 60:14</p> <p>escalate 60:19,19</p> <p>escalating 46:18</p> <p>especially 7:14 15:11 38:14 53:10 58:3</p> <p>essence 70:1</p> <p>essential 14:8 52:11 54:6 71:8</p> <p>essentially 9:7</p> <p>establish 6:12</p> <p>established 20:21 55:15</p>	<p>establishes 22:20 22:22 23:2</p> <p>establishment 18:2</p> <p>ethical 7:10 12:4 15:8 17:10,25 21:7 25:7,24 28:7 28:11 29:10,14,17 32:3 33:9,12,13 33:16 39:18,21 42:3 44:8 45:7,12 46:22 54:10,13,22 55:21 62:18</p> <p>ethically 45:2</p> <p>ethicists 6:17</p> <p>ethics 7:14 12:3 12:24 17:1,7,11 17:13 18:22 24:25 25:3,11 26:6 35:25 37:3 38:24 53:2 54:19 55:16 55:19,24 56:5 62:11 63:1,4,7 66:19</p> <p>evaluation 23:22 25:17 56:16 57:1</p> <p>event 3:21 51:2</p> <p>everybody 10:11 12:17 13:3</p> <p>evidence 55:3</p> <p>evocative 12:21</p> <p>evolve 15:6</p> <p>exact 39:9</p> <p>examinations 11:5</p> <p>examine 15:25</p> <p>examined 11:14</p> <p>examining 10:24</p> <p>example 15:9 29:24 30:3 32:10 67:20 69:16 71:16</p> <p>examples 30:21 63:8 66:18 71:1</p> <p>excellent 16:17 27:11 57:17 62:23</p>	<p>exceptional 59:24</p> <p>excerpts 23:10</p> <p>excessive 20:10</p> <p>excited 5:7</p> <p>exciting 15:18 19:1 46:2</p> <p>execute 60:19</p> <p>execution 11:1</p> <p>executive 4:24</p> <p>executives 6:18</p> <p>exercise 23:16</p> <p>exfiltration 41:3</p> <p>exhibit 60:2</p> <p>exist 56:17</p> <p>existence 46:14</p> <p>existentially 58:20</p> <p>existing 19:6 20:24 21:16 31:25</p> <p>expand 14:13 40:11</p> <p>expanding 69:6</p> <p>expect 41:14</p> <p>expectation 31:12</p> <p>expectations 42:23 43:21 50:15</p> <p>expensive 40:20 60:11</p> <p>experience 13:14 60:9</p> <p>experiences 48:16</p> <p>expert 3:21 48:11 51:9</p> <p>expertise 70:13</p> <p>experts 6:19,24 21:19 37:2</p> <p>expires 74:14</p> <p>explain 8:24 26:16 47:11</p> <p>explainability 57:20 65:16</p> <p>explainable 25:16 58:5 65:2,8</p> <p>explained 19:22 27:18</p>
--	--	---	---

exploitative 47:15 explore 15:4 16:3 explored 41:6 exploring 42:25 56:5 exponentially 69:6 exposed 40:22 express 49:14 expressed 42:18 expressing 49:23 expression 15:10 extent 28:18 externality 47:1 extra 66:12 extreme 62:7 eyes 69:4	feel 24:22 27:9 55:4,11 fellow 33:14 fewer 32:21 field 6:20 19:2 28:23 40:24 58:9 fielded 29:16 fielding 24:13 fifth 26:18 fight 28:20 fighter 58:8 fighters 32:5 figures 44:18 filled 54:21 filter 63:15 final 39:14 finally 44:16 54:4 find 10:18 22:16 26:24 33:14 42:6 43:11 48:19 finding 33:5 fire 34:21 fired 30:15 31:6 fires 31:11 firing 30:17 firms 36:23 first 1:14 5:5,13 6:15 18:9,25 19:25 20:20 22:20 23:13 26:11 27:22 27:22 28:5 30:25 46:13 47:7,20 52:20 74:7 fitting 15:25 43:9 five 9:15 19:20,24 24:24 51:15 52:18 68:19 fix 50:25 flash 60:12 flipped 67:9 floor 1:14 74:7 flow 8:10 focus 14:20 46:24	focused 26:7 32:25 follow 11:11 following 12:10 20:20 forbes 1:14 74:7 forbids 20:4 force 23:17 28:20 forced 30:12 forces 20:12,17 29:23 42:22 forefront 14:5 foregoing 74:3 foresee 59:23 foreseen 59:20 forged 5:14 form 37:7 43:9 44:16,24 formal 24:12 formatting 44:6 formed 70:22 former 51:19 forms 56:1 forth 1:16 forthright 7:6 forum 56:3 forward 29:12 30:24 72:11 fossil 34:20 found 69:23 foundation 17:12 18:5 19:21 foundational 17:14 founded 42:1 45:9 four 23:8,10 51:6 52:16 fourth 26:17 54:4 fraction 18:14 framed 62:10 frames 69:10 framework 7:10 17:25 21:6 42:2 45:4,7 49:10,13	49:22 free 24:22 55:4,12 71:4 freedom 15:10 frees 69:20 friday 4:5 friend 37:24 friends 34:24 38:3 front 11:9 frustrate 60:21 61:2 frustration 43:24 fuel 34:20 full 17:10 71:7 fun 36:17 functions 22:25 fund 25:15 26:15 fundamental 11:23 19:20 21:3 31:23 fundamentally 31:1 fundamentals 19:24 further 42:19 46:17 50:19 61:20 fuses 41:21 fusing 33:4 future 8:3 28:21 35:18
f			
f 74:1 facebook 36:12,15 36:16,19 facebook's 36:7 36:24 facilitate 15:21 fact 14:4 37:11 53:7 61:19 71:12 facts 44:18 faculty 14:14 16:21 failures 23:4 fair 9:19 67:10 fairly 11:6 fairness 20:15 fall 38:16 falls 24:7 fanfare 71:3 far 33:1 farther 64:9 fatal 35:6 faulty 70:18 fear 42:23 70:24 february 4:5 federal 3:4 4:2,4,7			
			g
			g 3:1 gallagher 62:24 62:24 64:25 66:25 67:4 garrett 2:8 8:15 13:17,19 gathering 41:2 45:17 50:9 general 19:17 21:4 23:11 59:20 generalization 43:18

<p>generalize 43:22 generate 7:9 geneva 19:15 gentleman's 56:9 germany 35:23 getting 34:10 67:9 giants 35:8 give 6:7 9:5 23:10 23:11 33:18 37:25 49:1 55:5 given 31:5 40:24 58:15 66:11 gives 40:25 giving 31:24 68:3 glad 8:15 38:9 global 16:11 26:19 56:3 61:20 62:18 62:20 globally 14:6 globe 34:16 go 23:18 31:16,17 49:4 going 9:14,20,22 18:9 19:23 22:21 23:10 26:4 27:19 34:4 39:1 54:20 61:20 63:7,11 64:8,11,16,19,20 65:4,25 68:13 72:6 good 3:2 13:18 16:22 35:9 52:14 53:16 57:9 66:13 67:13 google 22:16 35:15 gotten 29:5 37:12 63:19 governance 62:21 government 4:3 44:12 52:5,7,8 54:5 governments 42:8 54:11,14</p>	<p>graduate 13:8 55:16 graph 41:23 great 13:15 16:20 16:20 27:8,20 28:17 33:25 34:3 34:9 37:20 38:12 40:7 45:25 46:2 48:22 55:1 57:10 57:12,13 59:1,5,7 62:23 67:18 69:13 71:3 greatly 16:8 50:2 73:3 green 34:25 35:2 72:8 group 7:4 grows 69:3 growth 47:2 gubrud 59:10 gubrud's 59:8 guests 16:7 guidance 22:8 31:8 guide 21:4 guidelines 23:3 25:24 26:20 guiding 16:1 25:6 guys 27:3</p> <p style="text-align: center;">h</p> <p>half 5:11 hamilton 68:8 hand 9:7 37:24 38:10 41:12 45:19 45:23 46:2 71:20 hands 28:13 happen 63:7 happened 67:14 happens 66:10 71:25 happy 16:19 hard 35:9 46:21 47:11</p>	<p>hardware 23:19 40:23 41:5 hargrove 55:11 56:7 harm 25:20 harmful 65:21 harming 34:22 harmonious 36:21 hats 10:12 head 53:24 health 48:1,3 healthy 36:17 hear 8:14 9:10,19 12:18 27:12 38:1 38:9 48:23 49:3 72:15 heard 10:4 hearing 13:2 heavily 30:2 heavy 46:20 held 14:4 50:14 74:5 hello 46:8 57:18 help 6:12 10:18 15:4 17:2 28:20 29:21 33:20 53:13 helped 30:20 helpful 26:24 helps 8:8,8 53:19 henry 55:11 herb 5:12 hesitate 38:4 hi 28:3 38:11 49:6 high 33:5 43:9 60:10 61:15 66:5 66:13 higher 64:6 69:22 highest 70:13 highlight 63:9 66:19 highlights 32:8 highly 40:20 58:16 hiking 36:18</p>	<p>hill 59:11 hired 36:22 history 37:9 hit 68:21 hold 48:25 69:13 home 27:9 31:4 honest 57:7 honor 20:14 hope 8:8 9:8 13:24 16:5 26:25 47:23 horizons 14:13 horrified 66:1 host 5:17 14:3 29:15 hosting 3:9,10 5:4 16:19 hours 8:11 69:17 houston 49:3 52:14,15 hugely 60:11 human 5:21 23:17 31:16,23 32:8 35:19,21 39:7 43:1,4,6,20 50:13 50:18 53:9,18,20 56:24 59:14 60:4 60:22 61:13,17,23 62:16,21 65:14,15 70:16 humane 50:19 humanistic 37:10 humanitarian 35:22 humanity 20:4 56:21 humans 32:14 50:11,16 53:17 56:18,24 humbled 48:9 hungry 53:11 hype 71:14 hyperbole 42:18</p>
--	--	---	---

<p>i</p> <p>i.e. 52:9</p> <p>idea 23:11</p> <p>ideal 32:9</p> <p>ideas 7:8 16:24 18:7 22:20 43:18</p> <p>identifiable 59:21</p> <p>identification 71:18</p> <p>identified 56:15</p> <p>ignited 60:17</p> <p>ignored 71:4</p> <p>illusion 35:12</p> <p>images 36:16 63:17,20</p> <p>impact 15:16</p> <p>impactful 14:21</p> <p>impacts 28:17</p> <p>imperative 7:14 48:18</p> <p>implement 21:9</p> <p>implementation 63:6</p> <p>implications 11:8 15:15 55:21</p> <p>implicative 12:11</p> <p>important 7:25 9:14 10:3 12:15 14:3 15:22 18:18 33:8 38:14 42:11 44:2 58:20</p> <p>impossible 59:23</p> <p>improve 10:19 25:22</p> <p>improvement 57:2</p> <p>improvisations 50:13</p> <p>incentives 40:25</p> <p>incidents 21:12,13</p> <p>include 6:23</p> <p>includes 19:14 35:25</p> <p>including 10:25 11:15 21:10 23:1</p>	<p>61:22</p> <p>inclusive 7:22</p> <p>increase 25:21</p> <p>increasingly 61:13</p> <p>independent 4:1</p> <p>individual 53:8</p> <p>individually 56:18</p> <p>individuals 24:15</p> <p>industries 14:4</p> <p>industry 25:10 34:20 37:9 48:6 54:6</p> <p>infected 48:12</p> <p>infliction 20:4</p> <p>inform 17:2</p> <p>information 44:23 44:23,24 50:9 58:7,22 59:6 61:14 66:10,17 72:20,22</p> <p>informed 17:13 70:22</p> <p>infusing 14:12</p> <p>initial 57:22</p> <p>initiative 3:14 6:6 8:7,16</p> <p>initiatives 11:12 36:3 61:22</p> <p>injury 20:5</p> <p>innovate 14:18 48:17,20</p> <p>innovation 1:1,12 3:5,8,13 6:4 8:13 10:13,14,17 11:18 13:23 14:5 17:24 38:13 45:10 46:15 52:3</p> <p>innovation.defe... 3:19</p> <p>innovative 52:8</p> <p>input 6:21 44:5</p> <p>inside 32:2 41:11</p> <p>insight 17:19 42:1 43:4 44:21,25</p>	<p>insights 7:9 44:17 45:3</p> <p>insist 54:9,10</p> <p>inspection 43:1</p> <p>inspire 14:18</p> <p>inspired 16:9</p> <p>instability 60:5,10</p> <p>institute 47:25 48:3</p> <p>institutions 5:8 56:5</p> <p>insufficient 65:5</p> <p>integral 69:2</p> <p>integrate 61:14</p> <p>integrating 29:18</p> <p>intelligence 3:15 5:13 6:13 7:16 14:2 15:9,24 17:15,23 18:16,19 18:21 21:1,18,22 22:10 28:9,16 35:5 37:7 40:11 40:16 41:25 42:5 43:6 44:1 45:13 45:17 49:19 56:4 59:15 68:24,25 69:2,6,11 70:6</p> <p>intelligence's 15:16</p> <p>intelligent 37:16</p> <p>intended 24:6</p> <p>intense 36:7</p> <p>intentional 51:20</p> <p>intentions 35:10 37:10</p> <p>interacting 8:17 60:14</p> <p>interaction 65:15</p> <p>interactions 60:7</p> <p>interdisciplinary 14:12</p> <p>internal 6:15 39:25</p>	<p>internally 14:21</p> <p>international 19:11,16 20:20 25:10 58:18</p> <p>internet 51:7</p> <p>interoperability 58:21</p> <p>interpretability 65:17</p> <p>intersection 18:18 20:19</p> <p>intervene 60:22</p> <p>intro 63:13</p> <p>introduce 5:18 18:8</p> <p>introduced 71:3</p> <p>introduction 5:1</p> <p>intrusion 51:20</p> <p>inventory 31:3</p> <p>invest 25:12</p> <p>investigations 21:13</p> <p>investing 26:13</p> <p>invitation 72:21</p> <p>invited 4:8</p> <p>involved 8:16</p> <p>involvement 46:21</p> <p>involving 21:12</p> <p>iranian 30:10</p> <p>iraq 52:18</p> <p>irony 43:16</p> <p>irresponsible 66:15</p> <p>issue 17:4,18 26:7 38:14,23 64:9</p> <p>issued 22:8</p> <p>issues 7:24 11:2,4 12:23 21:7 51:14 53:21 54:8</p> <hr/> <p style="text-align: center;">j</p> <hr/> <p>james 2:8</p> <p>january 34:15</p> <p>jim 8:15 13:6,19 16:18</p>
---	---	--	---

<p>jim's 8:19 job 70:25 jobs 35:5 johnson 34:9 38:11,19,21 join 8:1 16:13 joint 18:2 24:12 28:20 josh 10:10 12:7 13:5,17 28:6,15 29:19 32:23 49:7 joshua 2:7 4:25 15:23 16:14 51:25 52:1 journalist 58:9 journalists 42:20 judgment 23:17 53:20 59:15 judgments 43:15 43:23 julian 50:3,5 july 6:11 justified 20:8 justifies 20:1</p>	<p>knew 32:12 know 8:22 9:21 13:6 18:23 27:8 29:3,13 30:5,8,12 30:19,19,23 31:24 32:8 38:8 40:2 49:20 51:10 53:9 55:5 58:16 knowing 31:13 knowledge 14:14 14:17 41:20 known 22:11</p>	<p>lead 7:7 15:4 23:6 32:18,19 43:23 62:18 leaders 6:18 16:12 17:23 25:9 52:24 leadership 5:9 13:11,14 16:10 17:9,17,17 48:5 leading 6:6 7:1 17:7 24:25 25:3 44:25 62:19 learn 13:25 learning 40:17,18 41:5,23 42:17,24 43:5 47:4 63:2,11 65:20 67:17 leave 37:16 54:20 left 9:21,22 legal 19:18 21:7 49:10,13 54:10,13 legality 20:22 legally 44:15 legitimate 20:6 lend 46:16 lengthy 55:23 68:11 lethal 38:22 39:4 lethality 39:12 level 31:23 60:4 61:15 69:22 levels 23:16 52:24 53:20 leverage 42:9 53:15 leverages 53:19 leveraging 28:23 life 50:19 51:16 likelihood 60:13 limit 9:14 limited 44:4 limits 43:25 line 4:12 8:2 9:2 13:21 27:14 36:18 40:23 47:20 70:20</p>	<p>72:13 linguistic 41:23 list 35:15 63:8 listen 10:6 68:20 listening 1:2,12 3:6 8:6 13:22 15:1 15:7 16:15 22:2 72:17,25 listens 5:5 little 12:7 24:14 42:4 68:11 live 3:16 13:21 15:2 56:22 72:19 lives 30:20 33:17 49:20 living 50:12 60:2 llc 50:6 lobbyists 36:23 locally 14:7 lock 31:11 locked 66:2 logistics 24:11 long 32:5 37:9 48:25 longer 10:7 longtime 13:8 look 24:23 71:21 looking 53:18 69:18 71:23 lose 54:2 loss 62:16 lost 70:15 lot 29:1 49:8 62:23 65:6 67:19 lots 64:1 louder 63:2 love 9:10 38:1 72:15 luckily 10:5</p>
<p>k</p>	<p>l</p>	<p>m</p>	<p>machine 34:18 35:13 40:18 41:5 41:22 42:16,24 43:5,25 47:4</p>

53:18 63:2,11 65:20 67:17 70:16 machines 37:16 59:18 70:1 maggie 46:4,9 main 38:22 39:16 maintenance 33:3 maker 32:9 makers 69:24 70:20 71:6 making 9:23 31:24 32:16,16,19 33:6 36:20 37:4 39:6 40:13 47:12 58:16 68:23 72:1 male 45:22 59:2 64:4 mancuse 2:7 mandate 61:22 manifest 48:19 manned 23:1 manner 24:7 25:7 43:12 44:14 53:3 manual 19:23 maps 31:9 march 1:7 74:9 marcuse 4:25 5:2 13:6 16:14,17 27:8 33:22 37:20 40:6 41:7 45:18 45:25 47:23 48:22 49:25 51:23 52:12 54:25 56:6 57:9 59:1,4 62:22 64:23 66:22 67:23 67:25 68:12,15,18 68:22 72:4 margin 50:11 marines 33:17 mark 59:8,10 market 60:12 massive 34:23 42:7,18 43:2 47:5	match 63:25 64:17 math 41:24 mathematical 50:14 mathematics 11:23 matters 7:4 matthew 38:7 47:25 48:2 mcquade 2:4 5:22 6:2 8:12 10:9,10 mean 39:10 meaningful 7:7 means 20:7 42:6 measured 39:19 measures 20:1 53:14 media 3:20 34:6 34:14 51:18 72:9 72:10 medin 2:4 5:24 66:23 67:1,24 meet 35:21 45:13 meeting 3:24 4:3 4:13,23 18:5 meeting's 4:6 mellon 1:6,14 3:9 5:4 8:14 14:1,23 15:21 46:10 74:6 mellon's 5:12 16:10 member 10:13 72:9 members 2:2 3:17 4:9,18,22 5:1,19 8:21 10:5 16:6 27:10,10 memo 17:6 men 7:17 28:12 mentioned 38:25 message 12:20 36:19 methods 45:17 47:6,9	metrics 44:8 mic 34:10 38:18 46:4 49:4 michael 2:4 5:22 8:12 68:6,7 michelle 34:7 40:9 microphone 9:20 46:6 55:12 57:16 68:21 73:2 microsoft 35:17 middle 11:21 military 18:11,13 19:25 20:7,17 24:25 25:11 26:19 28:8 29:18,23 46:17 49:11 53:6 55:17 69:11 million 36:13 millions 63:21,21 milo 2:4 5:24 mind 17:7 34:10 43:20 57:11 68:5 mines 29:25 minimize 23:3 33:12 minimized 58:12 minimum 50:22 51:11 mining 34:17 minor 22:14 minority 66:3 minute 9:21 minutes 4:13 9:15 9:18,22 68:19 misclassified 63:21 misconceived 62:17 misinformation 58:11 missile 30:15,16 31:7 missiles 31:10	missing 71:24 mission 10:20 12:6 28:14 68:24 69:2,11 70:10 71:20 missy 2:3 5:19 mistakes 50:12 misunderstanding 58:12 mit 34:6,14 mitigate 61:3 mitre 28:4,10 mix 6:16 ml 41:1 66:17 mobility 40:12 model 41:3 56:21 models 40:17,18 40:22 41:2,5 71:17 modern 28:11 modules 40:17 moment 8:11 72:8 money 34:17 monitoring 44:19 month 17:7 18:25 months 6:14 11:13 moral 17:17 39:5 39:6,11,24 45:4 48:18 morally 44:15 morals 49:14 move 8:19 22:5 29:11 30:24 multiple 10:23 murray 2:3 5:25 6:3 27:5 38:15,17 38:20 mutual 20:16
n			
n 3:1 name 3:2 46:8,22 52:14 57:19 names 24:15			

<p>nascent 57:24 nation 45:16 48:7 nation's 69:3 national 47:25 48:3 49:20 70:14 nations 26:1 61:6 natural 36:3 41:22 nature 60:25 naval 55:14,14 navy 52:2 near 63:18 necessary 12:12 necessity 19:25 need 7:12 28:14 33:19 41:12 51:6 51:6 56:14,23 57:13 62:12 69:4 needed 20:1 45:6 needs 29:11 32:2 35:22 neighbor 55:6 networked 60:8 networks 56:19 60:1,9,14 never 7:1 53:9 54:1 new 7:9 15:5 19:1 20:25,25 35:1 36:21 37:7 71:2,6 newell 5:12 newly 18:20 news 24:18 nexus 55:25 nick 34:2,3 niewood 27:23 28:3,3 non 6:18 north 59:11 notary 1:13 74:13 note 44:3 notes 74:5 notice 4:4,8 notion 48:17</p>	<p>novel 21:7 november 22:13 nudge 68:2 number 11:4,4,12 15:18 28:24 40:14 53:4 56:4 numbers 44:18</p> <hr/> <p style="text-align: center;">o</p> <hr/> <p>o 3:1 o'clock 1:15 73:6 oates 46:8,9 ober 1:13 74:2,12 object 46:20 71:18 objective 10:16 objectives 16:11 objects 20:14 obligation 19:19 48:19 obligations 12:2 obliges 20:10 oblivion 62:18 observations 52:16 observed 17:9 obviously 32:2 61:7 occurrence 62:16 offense 20:15 offer 16:23 43:5 53:6 office 58:14 officer 3:4 official 5:5 19:22 68:23 officials 24:16 oh 46:2 48:25 63:2 66:14 67:4,11 okay 27:25 33:24 34:1,3,13 40:6 41:9 55:2 57:10 63:3,23 64:25 omnity 41:19,20 41:24 45:9,14</p>	<p>once 31:16 37:8 54:12 60:17 72:6 ongoing 60:18,23 onr 56:2 op 34:16 opaque 60:21 open 3:5 12:21 29:10 60:15 opening 4:25 operate 12:1 23:24 operated 4:1 operates 10:20 operational 23:21 operations 18:12 18:13 29:19 49:11 operators 23:16 opinion 7:3 56:13 opinions 51:16 opportunities 25:19 opportunity 4:17 13:25 28:6 72:5 opposing 20:16 opposite 62:6 opposition 36:23 order 70:13 organizations 42:7 44:12 58:24 70:6,11 71:2 ottawa 30:2 outline 8:10 output 44:3 65:13 70:19 outputs 70:8,19 70:24 outside 10:16 14:24 24:7 29:3,3 41:10,11 overarching 11:8 override 51:1,2 oversight 37:16 overview 6:7</p>	<p>overwhelming 48:7 owner 51:3</p> <hr/> <p style="text-align: center;">p</p> <hr/> <p>p 3:1 p.m. 1:15 73:6 pace 56:23 58:15 69:8 71:9 pages 26:7 74:4 panel 2:2 35:25 paper 55:23 68:9 part 3:13 7:23 8:22 9:14 18:5 26:9 36:15 participate 72:10 72:24 participation 48:13 particular 27:7 39:4 64:12 65:6 65:24 66:8,21 particularly 18:11 59:25 61:15 73:1 parties 20:10 pass 55:6 pat 49:3 52:15 patient 44:20 pattern 71:17 patterns 42:6 43:1 43:11 pay 58:2 peers 57:4 pennsylvania 1:13 1:15 74:8,13 pentagon 45:12 52:21 people 6:20 36:17 44:11 58:13 65:3 67:9,15 69:4 70:2 people's 51:15,16 percent 63:13,17 63:19,22 65:12 67:2,6,12,16</p>
---	--	--	--

<p>perfect 5:16 27:21 27:24 53:5,6 57:15</p> <p>perfectly 9:16 65:9</p> <p>perform 42:6 53:17</p> <p>performance 54:13</p> <p>permission 50:25</p> <p>permits 55:8</p> <p>pernicious 35:4</p> <p>person 3:22 13:20 38:10 64:12 65:24 66:8</p> <p>personal 52:17 56:13</p> <p>personnel 17:6 30:1</p> <p>persons 23:23</p> <p>perspective 29:14 52:17</p> <p>perspectives 14:24 16:8</p> <p>ph.d. 46:9</p> <p>phase 57:24</p> <p>phenomenal 46:6</p> <p>photos 69:18 71:21</p> <p>physical 50:17</p> <p>physically 10:1</p> <p>pi 27:6</p> <p>pick 71:5</p> <p>pillar 13:7 25:3</p> <p>pillars 24:24</p> <p>pilot 31:11</p> <p>pioneer 25:17</p> <p>pittsburgh 1:15 14:7 74:8</p> <p>place 14:5 15:25 36:21</p> <p>placed 49:9</p> <p>places 39:1 69:5</p>	<p>planning 6:14</p> <p>platform 41:21</p> <p>platforms 14:25 23:2</p> <p>please 3:11 12:20 16:13 24:22 38:4 41:12,16 46:5 55:4,11 56:6 72:11</p> <p>pleasure 8:17 13:15,19</p> <p>podium 13:16 16:14 55:7</p> <p>point 8:23 18:12 30:25 31:4 32:7 32:23 39:16 63:24 64:22 65:19</p> <p>pointed 15:23</p> <p>points 20:18 30:22</p> <p>pointy 32:25</p> <p>polarization 35:7</p> <p>policies 24:8</p> <p>policy 6:19 18:17 22:6,22,23 23:12 23:13 24:9</p> <p>polite 9:23</p> <p>political 36:1</p> <p>politician 58:10</p> <p>polluters 34:21,22</p> <p>ponder 15:5</p> <p>poorly 43:14,15</p> <p>population 20:12</p> <p>poring 69:17</p> <p>portrayal 57:8</p> <p>portrayals 56:24</p> <p>portraying 34:23</p> <p>posed 21:8</p> <p>positive 35:12</p> <p>possible 9:23 10:19 12:21 20:3 40:2 62:6</p> <p>post 26:23</p> <p>posted 4:4,7,12 35:15</p>	<p>posture 69:3</p> <p>potential 21:21 59:16 60:5 69:13</p> <p>potentially 40:3</p> <p>power 40:21</p> <p>powerful 36:4 42:9 50:8,21,22</p> <p>powers 27:25 34:5 34:14</p> <p>practice 19:17 34:25</p> <p>practices 42:16 47:15</p> <p>preceded 19:3 29:15</p> <p>precipitates 21:23</p> <p>predict 66:7</p> <p>predicted 53:10</p> <p>prediction 66:1</p> <p>predictions 65:23 66:16</p> <p>predictive 65:19</p> <p>predicts 65:24</p> <p>preference 61:25</p> <p>premier 5:8</p> <p>preparing 69:23</p> <p>present 2:6 5:19 38:6 41:8</p> <p>presented 65:10</p> <p>presenting 70:5</p> <p>preserve 50:18 53:20</p> <p>president 5:23,24</p> <p>pressed 46:22</p> <p>pressure 61:10</p> <p>pretend 63:16</p> <p>priest 41:8</p> <p>primarily 32:25 48:14</p> <p>primary 4:16</p> <p>prime 15:9</p> <p>primmer 16:24</p> <p>principally 20:11</p>	<p>principle 59:23</p> <p>principles 3:15 5:6 6:13 7:22 16:1 17:12 18:4 19:20 21:3,16 25:6 26:11 30:24 33:11 35:16 47:17</p> <p>prior 13:24</p> <p>private 25:9 40:19</p> <p>probability 23:4</p> <p>probably 18:13 39:15</p> <p>problems 5:15 36:5</p> <p>procedural 3:24</p> <p>procedures 21:11 25:25</p> <p>proceed 8:25</p> <p>proceeding 73:7 74:5</p> <p>process 6:21 7:20 7:21 11:17 19:7 21:9 22:4 39:11 40:1 44:4,17 45:1 54:20</p> <p>processes 43:5,8 43:17,21</p> <p>processing 41:22 42:15</p> <p>produce 25:16</p> <p>produced 14:1,22 60:11</p> <p>produces 55:23</p> <p>product 19:7</p> <p>professional 55:23</p> <p>professor 5:20 6:1 13:9</p> <p>profit 6:18</p> <p>profoundly 48:7</p> <p>program 5:13 35:20 55:16</p> <p>programs 15:19 56:23</p>
--	---	---	--

<p>progress 37:12 prohibited 20:3 project 3:15 5:6 6:8 18:4 46:16 47:1,13 promise 49:1 promote 25:8 promoting 26:17 promptly 71:4 pronouncements 37:10 proof 65:6 properly 32:17 42:24 proportion 59:17 proportionality 20:7 prosecute 12:5 protect 33:18 protected 20:13 protection 28:15 41:4 proud 14:9 15:20 provide 4:17,18 6:21 21:4 42:2 52:16 provides 20:21 21:6 providing 3:21 14:25 29:22 provost 2:8 8:14 13:12,18 proxy 41:2 public 1:2,12,13 3:6,17,23 4:8,18 5:5 8:6,20,24 9:12 10:3 12:13,16 13:22 15:1 16:15 17:3 22:15 24:22 35:11 36:8,9,24 56:8 74:13 published 35:17 purity 48:9</p>	<p>purpose 20:7 22:19 purposes 4:16 pursuing 56:19 push 40:10 49:21 55:5 put 19:5 33:17 39:20 63:15 64:18 70:25</p> <p style="text-align:center">q</p> <p>quality 44:4,7 quantity 68:18 question 4:21 7:9 22:1 58:3 66:24 questions 4:22 15:5 21:23 33:24 40:7 50:1 55:1 62:9 quickly 20:2 51:24 quite 11:10 59:3 70:18 72:13 quote 22:21 25:2</p> <p style="text-align:center">r</p> <p>r 3:1 74:1 race 61:9 62:7,15 62:18 racial 35:6 raise 9:7 38:10 raised 53:22 ranged 10:24 rapid 41:25 59:13 rapidly 60:20 61:16 69:1 rate 63:12 reactive 50:10 read 10:2,6 22:18 25:1 34:4 38:3 41:16 51:24 55:9 68:14 reading 68:5 readings 44:19 reads 25:5</p>	<p>ready 34:10 reaffirm 56:9 real 5:15 27:2 31:19 37:8 40:13 61:23 realistic 23:20 56:15 reality 35:13 really 9:8,14 13:2 18:24 19:10 27:18 30:12 37:23 38:1 49:23 63:5,7 64:2 66:20 72:15 realm 43:20 reason 21:25 56:16 61:8 reasonable 68:16 reasons 28:25 rebooted 50:17 received 4:10 9:3 27:23 36:8 45:21 recipe 54:23 recognition 14:10 71:17 recognize 27:6 69:12 recognizes 7:12 recognizing 17:11 recorded 3:16 records 44:7 redefining 68:10 redesigning 52:10 reduce 25:19 26:20 29:21 47:7 47:8 reductions 32:19 reference 27:1 refers 37:3 reflects 35:19 regime 62:19 register 4:4,7 regulation 37:1 51:8</p>	<p>regulations 21:11 51:1 reinforcing 17:10 reissued 22:13 rejected 62:8 related 22:11 40:15 55:20 relates 15:11 relations 35:11 36:10 relationship 61:1 relative 11:13 released 18:21 24:20 37:8 relevant 15:18 28:23 70:10 reliable 25:14 26:14 reliably 53:10 relied 71:25 relies 47:5 relieved 46:3 rely 51:8 61:7 relying 43:20 remain 43:19 57:23 remaining 8:10 remains 37:6 remarks 3:25 4:25 8:19 49:7 remember 33:9 remind 37:22 reminder 4:20 remit 11:6 remotely 29:25 renunciation 62:4 repetitive 70:4 replaces 59:14 report 66:3 reported 36:22 reporting 21:11 reports 32:11 69:24</p>
--	--	---	--

represent 12:23	revisions 22:14	sailors 33:16	see 8:23 11:11
reputation 15:3	revolution 14:9	samples 64:5	28:7 37:18 63:5
request 18:3	59:13	sap 35:23	seeing 36:2
required 47:8,9	revolutionizing	sarcasm 43:16	seek 25:19 42:12
69:10	16:2	satellite 69:18	seeker 30:16
rescued 46:5	revolve 33:3	save 30:20	seekers 31:8
research 5:9,23	revolves 29:6,8	saw 6:16	seeking 42:8 43:3
13:14 14:22 25:12	richard 2:3 5:25	saying 12:9 72:12	seen 52:21 55:3
25:15 26:13,16,18	right 5:23 7:15	72:16,23	65:13
36:23 55:21 71:18	14:7 16:5 27:21	says 18:22 22:22	segregating 51:9
researchers 6:17	38:7 49:22 50:4	23:9,12	select 31:3
14:15 54:9,15,18	54:10 55:8,8	scalable 43:2	selected 55:19
54:21	57:16 59:8 62:11	scandal 36:12	self 41:20
resilient 25:13	63:3 65:1 70:18	scared 53:11	sell 36:10 37:17
26:14	rigorous 23:19	scenario 50:24	semi 22:25 23:5,14
resist 60:21	rigorously 58:1	65:7	23:25 24:6 31:15
resolve 71:12	risk 26:21 32:4,4	school 66:13	send 72:21
respect 15:2 20:16	33:18 66:9 70:16	schools 66:6	senior 24:16
45:12	risks 58:11 61:4	science 3:6 6:4	sense 15:14 19:18
respectful 7:6	rival 36:25	11:23	sensitive 40:20
12:15,19	road 61:18,19	scientific 14:22	52:22
response 36:3,7	robots 35:5 53:24	scientist 58:8	sensor 30:4 44:19
56:20	robust 7:8,22 21:9	scientists 36:2	sensors 13:12
responsibilities	25:14 26:14	71:14	sentencing 35:7
12:3 22:23 59:18	role 3:5 8:4 14:20	scope 47:22	series 6:22
responsibility	roles 13:11	scrutiny 36:8	serious 37:13
16:5 33:12,13	rolled 11:14	58:24	seriously 8:5
48:8	rolling 4:14	seated 72:7	serve 3:3 7:17
responsible 15:8	room 6:9 72:9	second 18:16	48:15
17:14 25:25 37:11	roundtable 6:22	20:24 22:5 23:18	served 13:10
46:22 47:16 53:3	rsvp 9:3 27:15	26:13 30:13 32:7	service 28:12
54:3,7 63:1,4	rule 19:5 21:6	46:20 63:24	48:18,20
64:20 66:19	rules 20:24 24:3,3	secondly 57:1	services 5:25
rest 27:13	run 17:1 19:24	seconds 9:17,18	session 1:2,12 3:6
rests 47:14,14		69:20	3:13,16 4:11,17
result 39:14	s	secretary 10:15	4:21 5:5 8:6 13:22
resulting 32:20	s 3:1	17:8,19 26:3	13:24 15:1,7
results 19:16	sacrifice 40:3	section 24:23 26:6	16:15 22:2 72:17
32:20 65:9,10	safe 40:15	sector 35:3	sessions 3:10
retires 72:8	safeguarded 45:2	secure 25:14	16:20
retiring 41:14	safer 51:10	26:15	set 1:15 6:9,12
reviewing 69:22	safety 24:3 25:1,4	security 33:15	7:10 12:9,23 17:7
reviews 21:13	25:11,25	46:11 49:21 62:21	26:19 31:5 33:10
	sage 48:5	69:3 70:14	43:12 49:23

sets 29:7 40:19 41:2 42:7 43:4 44:9 setting 58:18 seven 35:16 seventy 74:3 severe 60:6 shanahan 17:8 shanahan's 17:19 shaped 56:21 share 3:24 14:16 25:24 57:19 73:2 shared 16:9 shift 36:24 70:3 ship 30:11 short 22:17 23:10 25:1 69:10 shot 68:3 show 17:16 showed 36:17 shy 7:5 41:14 sic 35:4 side 68:2 sides 7:8 35:4 signals 33:5 61:16 signature 14:10 74:12 signed 22:12 26:2 significant 4:6 69:19 70:6,17 signing 72:20 signs 44:20 silence 3:12 similar 29:14 similarities 41:24 simon 5:12 simply 12:9 49:15 69:8 71:25 simpson 41:8 simulation 56:22 simulations 56:25 sinai 34:2 sir 49:5 50:2,4 52:13 54:25 57:14	66:25 siri 64:1 sit 9:23 situational 25:21 situations 18:14 59:24 six 26:8 sixth 26:20 sized 30:6 skeptics 6:25 skill 52:6 skip 64:21 slightly 64:6 slogan 36:15 slow 42:4 small 18:13 social 11:25 56:18 socially 35:17 societal 15:15 37:2 46:10 societies 7:18 society 12:1 42:2 45:10,14 48:13 49:15,24 51:9 57:3,3 software 10:25 11:1 23:19 35:24 soldier 52:15 53:8 56:10 soldier's 56:11 soldiers 33:16 40:13 53:12 64:8 solely 37:17 solutions 16:2 solve 5:15 solved 36:6 soon 36:6 sorry 36:1 66:23 sort 5:17 6:8 28:6 39:13,16,19,22 43:3 51:7 56:12 sorting 43:8 sorts 39:18	sought 17:20 sound 17:13 sourced 44:11 52:5 sources 33:5 41:25 44:13 sourcing 44:9 space 15:19 speak 12:17 speaker 45:22 59:2 spear 33:1 special 55:15 specific 21:5 22:8 59:19 71:20 specifically 19:12 spectrum 17:11 speed 60:10 72:2 spend 69:21 spending 69:17 spent 36:12 split 30:13 spontaneously 60:15,16 squawked 32:14 stack 41:10 staff 24:12 stage 55:7 stakes 70:12 stand 47:15 59:12 standard 67:5,14 standards 58:19 stands 48:11 stanford 72:18 stark 48:11 start 5:7 59:12 67:9 started 10:15 16:23 state 47:19 statement 34:5 55:10 59:9 68:5 states 19:13,14,18 55:14 64:10	stations 36:14 statistical 67:15 statistics 63:13 67:8 stay 72:7 steal 41:1 stenotypy 74:5 step 64:9 stimuli 56:20 stirring 55:4 stock 36:11 60:12 straight 27:19 strange 50:24 strategic 21:23 33:6 strategically 62:4 strategies 14:3 42:15 strategy 18:21,25 24:19,21,24 25:2 26:2,5,10 29:20 57:22,23 stream 13:21 69:17 72:19 streamed 3:16 strengths 14:11 42:13 strep 44:17 strong 13:12 62:19 strongly 62:8 struck 49:8,12 structural 43:10 struggled 28:22 student 46:9 55:22 66:11,11 students 14:14 15:17 55:19 studied 41:4 studies 18:18 65:7 studio 1:14 74:6 studios 50:6 study 65:6,13
--	---	---	--

stuff 39:15	systematic 51:19	37:14,18 44:2	theft 41:4
subcommittee 3:7 4:19 6:5	systems 6:1 22:7,9 23:6,18,25 24:6	55:22 69:15 71:6	theologian 36:1
subject 12:13 25:3	25:13 29:19 38:23	technology 3:7	theoretical 71:19
submit 4:8	39:5 40:12 52:25	5:15 6:5 10:17	thing 16:5 26:4
submitted 4:15 9:1,25 27:14	53:7 54:1 56:17	11:9,22 12:11	things 10:8 17:2 23:8 26:8 65:3
substantial 11:16 58:6	58:4,22 59:22	15:13,13 16:1,12	think 10:3 15:24 16:24 17:2 27:20 28:15,20,22,24 29:1,6,21 30:19 30:21 32:9,23 33:19 38:12 43:7 53:13 54:15,23 55:3 65:14,17,25
substantially 11:2	60:2,9,25 61:8,24 65:19 66:4 71:2	17:22 21:22 24:11	thinking 15:5 39:5 39:11 43:19 49:18 67:16,25 68:4
subtle 45:20	t	25:23 28:13,19,24 29:2,9 32:17,24 35:2 42:9,12 43:12 45:15 55:17 55:20,25 58:23 59:14 61:11 62:5 71:2,15	third 18:20 21:3 23:23 24:17 26:15 53:23
subway 36:13	t 67:5,13 74:1,1	term 37:3	thomas 55:10,13
success 66:9	tackling 38:14	terms 57:25 62:10	thought 5:9 16:22
sudden 60:3	tactical 21:23 40:13	terrain 31:9	threat 62:14 64:11 64:13 66:8 71:9
suffering 20:5	take 7:23 9:4 29:24 30:8,12 32:15 39:19 46:5 64:9 71:7	terrific 52:12	three 13:7 16:24 18:6 22:20 24:15 24:15 30:22 33:9 44:17 50:21,22 51:3,5 52:19 74:3
suggest 54:4	taken 1:12 9:9 42:21 68:8 74:5	test 23:21 25:17 39:23 67:5,13	threshold 67:13 67:15,18
suggested 54:16	takers 72:5	testing 31:21 52:10,11 56:16 57:1	thursday 1:7 74:8
suggestions 50:7	takes 72:14	tests 39:21	tied 71:20
suited 43:13	talked 58:13	text 34:15 68:8	tier 45:1
summary 24:21	talking 62:25 63:10 65:20	textbook 38:15	time 8:20 9:11 11:10 13:7 27:7 27:13 28:21 29:13 29:22 31:19 32:6 32:15 40:13 45:6 48:13 51:22 56:8 61:23 63:10 64:23 64:25 69:10,21
sunshine 4:3	tap 9:20	thank 3:8,20 5:3 10:10 13:1,17 16:15,17,18 27:24 28:1,5 33:20,22 37:20 38:11,15,20 40:4,6 45:18 46:3 46:5,6 47:22,23 48:4,8,20,22 49:2 49:25 50:1 51:21 54:24,25 56:7 57:8,9,14,17,18 58:25 62:22,23 66:21,22 67:23,24 72:4,23 73:3	timeless 35:20
support 3:21 25:22 35:21 66:12 72:1	target 30:6 31:4	thanks 5:2 13:3 62:23 73:1	
supported 66:11	task 69:20	theater 1:14 64:16 74:6	
supporting 40:12	tasks 50:20		
sure 31:13 39:21 59:4,5 68:15,23 70:8	teach 15:17		
surely 36:5	teaming 53:18		
surface 35:12	tech 14:8 35:8 36:4 37:9 42:2 45:9,14 47:19 51:9,9,11		
surrounding 15:7 35:10	technical 11:5 13:14 17:16 52:4 52:5,6,9 56:24		
surveillance 47:3 47:18	techniques 25:15 40:17		
suspicious 67:10	technologies 7:13 7:16 14:6,21 19:3 20:25 21:8,17 29:15 31:18 37:4		
sway 51:16			
switch 51:4			
synonymous 22:9			
system 19:7 23:1 23:14,20 24:3 29:7 32:12 39:8,9 39:20 53:5,6 58:17 64:10 65:23			

<p>timely 69:25 times 36:21 tired 53:11 today 3:9 4:19 5:19 8:1 12:17 16:7,21 27:6 31:3 35:1 38:2 46:25 52:21 53:22 59:12 61:9 today's 3:10,15 4:3,11 8:6 13:24 15:1,7 16:15 71:9 tomahawk 31:7 tool 42:25 46:16 71:21 tools 48:17 70:12 71:5,25 topic 24:20 47:21 topics 10:17 15:17 42:20 totally 52:24 touch 7:24 28:7 touched 32:24 tours 52:18 trade 40:1 68:10 trading 60:10 tradition 14:11 67:7 traditional 29:4 tragic 30:9 train 64:10,14 trained 40:18 training 21:10 63:24 64:3,17 trains 36:14 transcript 74:4 transferred 67:16 transferring 67:21 transform 45:16 transformation 45:1 transformed 42:3 45:8</p>	<p>transforms 44:22 transparency 26:18 57:21 transparent 7:23 58:5 transponder 32:13 treat 36:9 treated 66:14 treaties 19:14 24:2 tremendous 16:4 tribe 27:11 triggered 29:25 60:16 trophy 48:13 true 32:5 74:4 truly 56:19 trust 70:23 try 68:2 71:16 trying 12:5,22 16:3 62:7 tumbler 63:14 tune 72:19 turn 4:23 10:8 turning 70:3 twice 72:6 two 10:11,22 30:22 50:16,25 51:2 53:4 types 20:25 typically 7:20</p>	<p>undergird 16:25 underlying 43:11 undersecretary 24:9,10 undersigned 1:13 74:2 understand 20:18 26:16 42:13,20 43:16 65:12 understandable 56:20 57:25 understandably 57:24 understanding 7:7 21:20 37:6 42:17 43:25 56:11 58:19 undertake 6:12 61:6,21 undertaking 22:3 48:8 unfold 8:11 unforeseeable 60:7 unforeseen 60:16 unfortunately 71:10 unhappy 63:22 unidentified 45:22 59:2 uniform 7:18 52:19 unilaterally 62:3 unintended 23:6 unintentional 25:20 unique 13:13 24:18 48:16,16 united 19:13,14 55:13 64:10 university 1:6,14 3:9 5:4,22 13:8 14:2,4,20,23 15:3 15:10,21,22 40:9</p>	<p>59:10 72:18 74:6 unknown 30:14 unleash 54:1 unmanned 23:1 unnecessary 20:6 32:21 unpredictable 53:7 60:2 unprotected 20:13 unrealistic 42:22 unreasonable 20:9 untestable 60:7 urge 45:13 use 12:4 15:8 17:14 18:11,15 20:1 22:24 23:17 23:23,24 25:19,23 26:1,25 27:17 29:9 33:14 37:4 37:23 38:22 42:12 44:2,16 45:12 46:22 47:12 59:13 62:11 63:1,4,25 64:17,20 66:13,20 70:22 useful 42:25 43:5 43:13 users 40:25 63:22 65:3,12 uses 31:7 uss 30:11 32:10</p>
	u		v
	<p>u.n. 58:14 u.s. 55:14 58:13 61:24 ugly 35:7 unambiguous 61:16 unauthorized 61:4 unclassified 24:21 uncontrollable 61:4</p>		<p>valid 52:22 validation 23:20 25:18 values 15:10 19:4 25:8 35:20 49:14 49:23 58:23 variety 6:20 13:10 33:4 various 56:1 vehicle 35:6</p>

venture 6:19	wanted 39:17 40:4	weeks 6:15	wrong 72:3
verbal 4:18	56:8	weird 67:11	wrote 5:12 39:14
verifiable 35:13	war 18:10 19:9,10	welcome 3:22 4:13	y
verification 23:19	19:11,21,22 20:4	5:3 10:11 13:15	yeah 27:4 38:19
25:18	20:19,21,24 21:4	13:19	46:1 59:2 68:22
verified 62:20	21:5,16,24 24:2	welcoming 16:13	year 11:13 35:15
verify 47:11	32:4 49:12 53:25	went 73:2	years 10:22
versus 58:8,9	55:14,14 58:8	white 68:9	yep 68:17
vice 5:22,24	61:9 62:17	wide 6:20 59:13	york 36:21
video 8:3	ward 36:25	widespread 35:3	z
vietnam 30:3	warfare 19:13	william 27:25,25	zubrow 48:24
view 7:12 10:16	28:11	34:5,14	49:3,6,6
46:25 54:17	wars 28:21	willing 12:17	
views 73:3	washing 34:18	win 28:21 62:7	
vincennes 30:11	35:1,2,14	wireless 5:24	
32:10	watch 8:3	wisdom 42:2,4	
violations 21:12	watching 8:2	44:25 45:8,9,14	
violence 60:18,20	wave 45:23	witnessing 35:1	
virtual 3:23 56:22	way 9:6 10:19,24	women 7:17 28:12	
virtually 3:18	11:14,25,25 12:19	64:5,5,8	
virus 48:12	16:22 19:6 20:9	women's 64:2	
visibility 31:19	21:10 29:10 31:1	wonderful 46:3	
vision 25:6	32:3 38:2 50:19	words 8:12 10:9	
visiting 16:7	51:16 54:7 58:24	work 6:24 14:1,15	
vital 14:24 44:20	60:21	15:6 17:11 37:6,7	
70:14	ways 10:18 15:5	46:11 49:17 51:22	
voice 10:7 64:1	15:12 29:16,21	52:6,9 55:18,20	
voices 14:25 64:3	31:25 33:14 45:11	64:7,16 65:8 70:4	
64:6	45:16 51:16 62:12	worked 7:1	
void 54:20	we've 8:16 15:3	workforce 11:3,3	
volume 69:5	37:12 65:14	15:16 52:7,8	
volumes 33:6	weaknesses 42:14	working 35:9,21	
vulnerable 45:2	weapon 30:7	54:12 65:8 70:12	
w	31:20,21 32:2	works 37:7 68:24	
wait 57:14	62:4	world 7:19 15:2	
waive 41:13	weapons 18:17	16:2 17:17 36:20	
wake 36:11	22:7,9,25 23:5,14	37:8 50:18	
want 7:23 8:9	23:25 24:2,6 31:2	worse 71:13	
11:24 12:18 18:6	31:3,14 32:1,12	would's 35:23	
24:17 25:1 26:8	33:1 38:23 39:4,9	writing 42:21	
37:22,23 38:15	39:20 54:3 61:24	written 4:9,10,14	
39:3 49:4 52:20	62:10,12,13	9:24,25 38:4	
56:14 59:5 64:24	website 3:19 4:16	39:15 64:21	
71:5	26:23 72:13		