ETHICS AND GOVERNANCE OF AI AND ROBOTICS

A SURVEY AND SAMPLING OF RELEVANT PROFESSIONAL ETHICS CODES

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sienna.

Ethics and Governance of AI and Robotics: A Survey and Sampling of Relevant Professional Ethics Codes is the result of a search for relevant United States documents regarding AI & Robotics, with the objective of answering the questions:

1. Are there professional organizations that have developed professional ethics codes (PECs) that specifically address the three areas of technology/research?

2. Are there documents from national advisory/ethics groups (NAEGs) that address specifically the three areas?

3. Are there guidance documents on research ethics protocols (GDREP) that specifically address research in the three areas?

This document and its counterparts were produced in 2018 as a contribution to the SIENNA project, an international EU-based consortium dedicated to examining and addressing ethical issues in three new and emerging technology areas: human genomics, human enhancement and human-machine interaction. This third track, which examines the ethics and governance of both artificial intelligence and robotics, ("AI&R") overlapped with work being done as part of the Berkman Klein Center for Internet & Society's Ethics and Governance of Artificial Intelligence Initiative, and that connection offered the Center a chance to contribute to a larger multinational effort. Berkman Klein joined the SIENNA consortium as an associate partner focusing solely on the artificial intelligence and robotics research track. Chris Bavitz and Adam Holland formed the core of the BKC term working on SIENNA materials, with key support during summer 2018 from intern Andrea Nishi.

Other SIENNA partner organizations span the globe and include University of Twente (Netherlands), Trilateral Research (United Kingdom), Uppsala University (Sweden), Helsinki Foundation for Human Rights (Poland), European Network of Research Ethics Committees (Germany), University of Granada (Spain), Ionian University (Greece), Federal University of Rio de Janeiro (Brazil), Dalian University of Technology (China), University of Maastricht (Netherlands), and the University of Cape Town (South Africa).

Each consortium partner produced three related and country-specific reports: a survey and legal analysis of existing relevant law and regulations; a survey and sampling of existing and relevant ethical codes, and a survey and sampling of on-point academic articles and recent more "popular" news and media. The SIENNA core team then synthesized these into a larger report, and also produced a "state of the art" review of the state of artificial intelligence and robotics generally. Adam Holland also participated in SIENNA consortium workshops in the fall of 2018 and 2019.

The main SIENNA website can be found here.

To learn more at Berkman Klein's involvement in the SIENNA project, and additional resources from this work, please visit https://cyber.harvard.edu/story/2021-02/ethics-and-governance-ai-and-robotics.

The United States of America
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Please fill in your individual information in TABLE 1.

TABLE 1: INDIVIDUAL AND COUNTRY INFORMATION

Names and emails of persons who did the work (if different from above)	Adam Holland, Christopher Bavitz
Your organisation	Berkman Klein Center for Internet & Society, Harvard University
Your country (again)	The United States of America
Search conducted in which language	English
Acknowledgements (any researcher who helped you to complete this task)	Andrea Nishi

Please list all relevant documents in TABLE 2-4 (add lines if needed):

TABLE 2: LIST OF ALL RELEVANT PROFESSIONAL ETHICS CODES (all three fields)

Ethical issues addressed in which SIENNA area (HG, HE, AI&R)?	Title of document (original + English translation)	URL	Year	Author/organisation	Stated audience	comments
AI&R	On Being A Scientist	https://www.nap.edu/download/12192	2009	The National Research Council of the National Academies of Science,	Scientists and researchers	a report that describes the ethical foundations of scientific practices, and describes some of

				Engineering and Medicine		the personal and professional issues that researchers encounter in their work; does not specifically mention AI&R
AI&R	ABA Model Rules of Professional Conduct	https://www.americanbar.org/groups/professional_responsibility/publications/model_rules_of_professional_conduct/model_rules_of_professional_conduct_table_of_contents.html	2016	American Bar Association	lawyers	ethical guidelines for practicing lawyers; does not specifically mention AI&R
AI&R	AMA Code of Medical Ethics	https://www.ama-assn.org/delivering-care/ama-code-medical-ethics	2016	American Medical Association	doctors; medical professionals generally	General ethical guidelines for practicing doctors does not specifically mention AI&R; see also https://www.ama-assn.org/about-us/modernization-code-medical-ethics-ceja-reports
AI&	AMA First Policy Recommendations on Augmented Intelligence	https://www.ama-assn.org/ama-passes-first-policy-recommendations-augmented-intelligence	2018	American Medical Association	"health and technology stakeholders"	spurred by "a range of concerns about the novel challenges in the design, implementation, and use—especially how AI will be incorporated into the practice of medicine and affect patients"
AI&R	REPORT 41 OF THE BOARD OF TRUSTEES	https://www.ama-assn.org/sites/default/files/media-browser/public/hod/a18-refcomm-b.pdf	2018	American Medical Association	medical profession generally	addresses "augmented intelligence. See BOT 41 in larger document

	(A-18) - Augmented Intelligence (AI) in Health Care					
AI	Data Science Code of Professional Conduct	http://www.datascienceassn.org/code-of-conduct.html	2018	Data Science Association	Data scientists	References “big data,”: “machine learning,” and “algorithms”. Strong focus on confidentiality, client relationship and avoidance of harm.
AI&R	The Ethics Codes Collection	http://ethicscodescollection.org/	2018	Center for the Study of Ethics in the Professions	Multi-stakeholder; various	Enormous collection of 2500+ ethical codes- not all current, incl. those of varying scale and impact for professional organizations, including, e.g,: ● American Association of Engineering Societies ● Academy of Criminal Justice Sciences ● Code of Ethics for Robotics Engineers (2010) Most will not specifically mention AI&R

AI&R	ACM Code of Ethics and Professional Conduct	https://www.acm.org/binaries/content/assets/about/acm-code-of-ethics-and-professional-conduct.pdf	2018	Association for Computing Machinery	computing professionals	also "serves as a basis for remediation when violations occur."
AI&R	Global Data Ethics Pledge (GDEP)	https://github.com/Data4Democracy/ethics-resources	2018	Data For Democracy	data scientists and technologists	"an inclusive community for data scientists and technologists to volunteer and collaborate on projects that make a positive impact on society. "
AI&R	Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles	https://www.aamva.org/GuidelinesTestingDeploymentHAVs-May2018/	2018	American Association of Motor Vehicle Administrators - "Autonomous Vehicle Information Sharing Group	state-level officials, private sector	"AAMVA) is a tax-exempt, nonprofit organization developing model programs in motor vehicle administration, law enforcement, and highway safety.

TABLE 3: LIST OF ALL RELEVANT DOCUMENTS FROM NATIONAL ADVISORY/ETHICS GROUPS (AI&R Only)

Ethical issues addressed in which SIENNA area (HG, HE, AI&R)?	Title of document (original + English translation)	URL	Year	Author/ organization	Stated audience	comments
AI&R	THE NATIONAL ARTIFICIAL INTELLIGENCE RESEARCH AND DEVELOPMENT STRATEGIC PLAN (NAIRDSP)	https://www.nitrd.gov/PUBS/national_ai_rd_strategic_plan.pdf	2016	National Science and Technology Council (NSTC) Select Committee on Artificial Intelligence	Executive branch of U.S. federal govt.	See especially "Strategy 3" This is a document created by an advisory body of the government aimed at a governmental audience. Its goal is to "defines a high-level framework that can be used to identify scientific and technological needs in AI, and to

						track the progress and maximize the impact of R&D investments to fill those needs. It also establishes priorities for Federally-funded R&D in AI, looking beyond near-term AI capabilities toward long-term transformational impacts of AI on society and the world.”
AI&R	Artificial Intelligence Research at National Science Foundation	https://nsf.gov/cise/ai.jsp	2018	the NSF	AI researchers	This is a compilation of AI-related resources, and among others links out to the

						NAIRDSP, above
AI&R	Conflicts of Interest and Standards of Ethical Conduct	https://www.nsf.gov/pubs/manuals/manual15.pdf	2018	NSF	AI researchers	part of larger NSF AI-related resources above
AI&R	Responsible Conduct of Research	https://www.nsf.gov/bfa/dias/policy/rcr.jsp	2018	NSF	researchers and students	does not specifically mention AI&R
AI&R	Scientific Integrity Policy	https://www.nsf.gov/bfa/dias/policy/si/sipolicy.pdf	2018	NSF	scientific researchers generally	does not specifically mention AI&R
AI&R	Shaping Robotics Policy for the 21st Century	https://mcmprodaaas.s3.amazonaws.com/s3fs-public/reports/AAAS%20Robotics%20Report%209.27.17.pdf?_AvRRr5QtPKTVxlWc7W.10zgBxljjrMJ	2017	American Association for the Advancement of Science (AAAS)	policy makers	Robotics-specific compilation of multi-session multi-stakeholder meeting; asks ethics questions, and makes ethical recommendations
AI&R	Artificial Intelligence and National Security	https://www.belfercenter.org/publication/artificial-intelligence-and-national-security	2017	Belfer Center for Science and International Affairs	National security analysts, policy-makers, legislators	A study on behalf of the U.S. Intelligence Advanced Research

						Projects Activity (IARPA)
AI&R	A Roadmap for US Robotics - From Internet to Robotics- 2016 Edition	http://jacobsschool.ucsd.edu/contextualrobotics/docs/rm3-final-rs.pdf; https://cra.org/ccc/wp-content/uploads/sites/2/2016/11/roadmap3-final-rs-1.pdf	2016	Computing Community Consortium; https://cra.org	various stakeholders; policymakers	See especially Section 10
AI&R	The Institute of Electrical and Electronics Engineers (IEEE) Global Initiative for Ethical Considerations in Artificial Intelligence and Autonomous Systems - General Principles	http://standards.ieee.org/develop/indconn/ec/ead_general_principles.pdf	2016	IEEE General Principles Committee	Scientists, engineers, researchers, policymakers and other stakeholders	“high-level guiding principles”

AI&R	Perspectives on Research in Artificial Intelligence and Artificial General Intelligence Relevant to DoD	https://fas.org/irp/agency/dod/jason/ai-dod.pdf	2017	the JASON group	US Govt, policy makers	"JASON is an independent scientific advisory group that provides consulting services to the U.S. government on matters of defense science and technology."
AI&R	Artificial Intelligence and Ethics- papers from 2015 AAAI Workshop	https://www.aaai.org/Library/Workshops/ws15-02.php	2015	Association for the Advancement of Artificial Intelligence.	multi-stakeholder	various papers, forum to discuss the ethical questions implicit in discussion of AI; including papers such as "Toward Ensuring Ethical Behavior from Autonomous Systems: A Case-

						Supported Principle-Based Paradigm",
	Robot Ethics: The Ethical and Social Implications of Robotics (Intelligent Robotics and Autonomous Agents series) Robot Ethics 2.0: From Autonomous Cars to Artificial Intelligence	• https://www.amazon.com/Robot-Ethics-Implications-Intelligent-Autonomous/dp/0262016664 • https://www.amazon.com/dp/0190652950		Ethics and Emerging Sciences Group	"policymakers, business, academia, as well as the broader public "	"a non-partisan organization focused on risk, ethical, and social concerns related to new sciences and technologies . Both are edited volumes
AI&R	"Best Practices for Protecting Privacy, Civil Rights & Civil Liberties In Unmanned Aircraft Systems Programs"	https://www.dhs.gov/sites/default/files/publications/UAS%20Best%20Practices.pdf	2015	U.S. Department of Homeland Security Privacy, Civil Rights & Civil Liberties Unmanned Aircraft Systems Working Group	government agencies, private sector, first responders	"Our goal, rather, is simply to share the best practices we have identified as helping to sustain privacy, civil rights, and civil liberties

						throughout the lifecycle of an unmanned aircraft systems program
AI&R	A National Machine Intelligence Strategy for the United States	https://csis-prod.s3.amazonaws.com/s3fs-public/publication/180227_Carter_MachineIntelligence_Web.PDF?CLlXGgQQQoc78akgCk.2StKO7NsrC2J1	2018	Center for Strategic & International Studies	policymakers, government, private sector	see especially Sections D, E & F
AI&R	Artificial Intelligence Research, Development and Regulation	https://ieeeusa.org/wp-content/uploads/2017/07/FINALformattedIEEEUSAAIPS.pdf	2017	IEEE-USA	multi-stakeholder	
AI&R	Asilomar AI Principles	https://futureoflife.org/ai-principles/?cn-reloaded=1	2017	Future of Life Institute	multi-stakeholder	
AI&R	The AI Now Report: The Social and Economic Implications of Artificial Intelligence	https://ainowinstitute.org/AI_Now_2017_Report.pdf	2017	AI Now Institute	multi-stakeholder	makes recommendations in four topics, including ethics and governance.
AI&R	Robots In American Law; Artificial Intelligence Policy: A Primer and Roadmap	https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2737598 ; https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3015350		Ryan Calo	lawyers, legal academy policy makers,	Although these pieces are by an individual author, Professor

						Calo is generally recognized as one of the leading experts and thinkers in the US on the legal and ethical implications of robots and AI
AI&R	Exploring or Exploiting? Social and Ethical Implications of Autonomous Experimentation in AI	https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2846909	2016	Sarah Bird, Solon Barocas, Kate Crawford, Fernando Diaz and Hanna Wallach	academics, AI researchers	Kate Crawford is generally recognized as one of the leading experts and thinkers in the US on the legal and ethical implications of robots and AI

TABLE 4: LIST OF ALL RELEVANT GUIDANCE DOCUMENTS ON HOW TO WRITE RESEARCH ETHICS PROTOCOLS (all three fields)

Name of national REC	Title of document (original + English translation)	Ethical issues addressed in which SIENNA area (HG, HE, AI&R)?	URL	Stated audience	comments
Markkula Center for Applied Ethics @ Santa Clara University	Ethics in Technology Practice	HG, HE, AI&R	https://www.scu.edu/ethics-in-technology-practice/	The materials are "designed specifically for practice-oriented ethics training programs within the tech industry"	This is a suite of generalized ethical design resources. "The materials include a workshop teaching guide, overviews of technology ethics and relevant conceptual frameworks for ethical decision-making, case studies, an ethical toolkit for integrating consideration of ethics throughout product development, a sample workflow integration of the tools, and a list of best practices in technology design and engineering."

IEEE - “Institute of Electrical and Electronics Engineers”	“ETHICALLY ALIGNED DESIGN - A Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems”	AI&R	http://standards.ieee.org/develop/indconn/ec/ead_v2.pdf	engineering and technology professionals, policymakers	most saliently: “Embedding Values into Autonomous Intelligent Systems pp. 33-54; Methodologies to Guide Ethical Research and Design pp. 55-72 This is a draft version - final version to be published in 2019 See also the synthesis document in the row below
IEEE - “Institute of Electrical and Electronics Engineers”	Becoming a Leader in Global Ethics: Creating a Collaborative, Inclusive Path for Establishing Ethical Principles for Artificial Intelligence and Autonomous Systems	AI&R	http://standards.ieee.org/develop/indconn/ec/becoming_leader_global_ethics.pdf	engineering and technology professionals, policymakers	Drafted as a way to highlight insights inspired by the feedback received to v.1 of “Ethically Aligned Design” - the document above
multi-author	“Using Ethical Reasoning to Amplify the Reach and Resonance of Professional Codes of Conduct	AI	https://www.ncbi.nlm.nih.gov/pubmed/25431219	scientists, researchers, professionals in the field.	“insufficient time, space, and thought have been dedicated to training these people to engage with the ethical, legal, and social issues

	in Training Big Data Scientists				in this new domain. Since Big Data practitioners come from, and work in, diverse contexts, neither a relevant professional code of conduct nor specific formal ethics training are likely to be readily available. This normative paper describes an approach to conceptualizing ethical reasoning and integrating it into training for Big Data use and research"
National Institutes of Health	Guiding Principles for Ethical Research	AI&R	https://www.nih.gov/health-information/nih-clinical-research-trials-you/guiding-principles-ethical-research	researchers generally	doesn't mention AI&R specifically.
National Academies of Sciences, Engineering and Medicine	Fostering Integrity in Research" Ch. 9; "Identifying and Promoting Best Practices for Research Integrity"	AI&R	https://www.nap.edu/read/21896/chapter/14	Researchers	General guidelines for ethical research design

Please choose for every area the most relevant documents and fill out the TABLES below.

TABLE 7: MOST RELEVANT DOCUMENTS IN AI & Robotics

Document 1 –On Being A Scientist

Document found via (national associations or Google or another database)	National association/Google search
Title of the document	On Being A Scientist
Kind of document (PEC, NAEG, GDREC)	PEC
Document developed by whom (organisation, profession)?	The National Research Council of the National Academies of Science, Engineering and Medicine
Year of publication (between 2005-2018)	2009
Document saved in folder as	On Being A Scientist.pdf
Who is the stated audience	"graduate students, postdocs, and junior faculty in an academic Setting; scientists at all stages in their education and careers, including those working for industry and government"
What definition of AI&R is used in the document?	As a general overview of ethical practices in science, the document does not explicitly mention or define AI or robotics.
What forms of AI&R are described/covered in the document?	As a general overview of ethical practices in science, the document does not explicitly mention or define AI or robotics. Rather, the document addresses the unique challenges posed by practicing scientific research in the 21st Century
Which ethical issues are addressed in the document?	The entire range of ethical issues a scientist might face, from plagiarism to human subjects to the treatment of data- along with how to handle them.
How are the ethical issues addressed? Are solutions offered? If so, which ones?	The document strongly promotes collaboration and discussion of standards and ethical challenges, as well as ongoing training and the integration of ethics into scientific curricula
Format of the document (checklist, continuous text, other)?	Book; continuous text PDF
How is the document structured?	As a book, with chapters devoted to individual topics; along with case studies
Why is the document important/useful for your country?	Authored by the National Academies, an important and influential group in United States research circles, the document provides an overview of the professional standards of science and explains why adherence to those standards is essential for continued scientific progress.
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	Yes, because it provides a comprehensive examination of what is considered to be ethical scientific practice in the United States, principles which will underlie any AI&R specific ethical codes or guidelines.

Document 2 – Data Science Code of Professional Conduct

Document found via (national associations or Google or another database)	National association/Google
Title of the document	Data Science Code of Professional Conduct
Kind of document (PEC, NAEG, GDREC)	PEC
Document developed by whom (organisation, profession)?	Data Science Association
Year of publication (between 2005-2018)	2018
Document saved in folder as	datasciencecodeofprofessionalconduct.pdf
Who is the stated audience	Data scientists
What definition of AI&R is used in the document?	The document does not use the terms “artificial intelligence” or “robotics,” but defines “big data,” “machine learning,” “algorithm,” “heuristics,” and“predictive analytics”
What forms of AI&R are described/covered in the document?	Those having to do with machine learning and working with large datasets
Which ethical issues are addressed in the document?	Confidentiality of data sets, obligations to clients, data quality, and general integrity.
How are the ethical issues addressed? Are solutions offered? If so, which ones?	With proscriptive norms. Each rule in the document is of the “A data scientist shall…” or “may…” form
Format of the document (checklist, continuous text, other)?	Continuous text webpage; downloadable as a PDF
How is the document structured?	An introduction, a lengthy definitions section and then nine rules with explanations.
Why is the document important/useful for your country?	It is a example of a sub filed working squarely within the AI space creating its own targeted ethical norms
Is the document useful for the development of the SIENNA codes and other ethical	It will likely be useful, yes, since it is written as universal to data scientists, and will shed light on ethical practices within that aspect of the artificial intelligence space.

frameworks? If yes, please explain.	

Document 3 – ACM Code of Ethics and Professional Conduct

Document found via (national associations or Google or another database)	National organization/Google
Title of the document	ACM Code of Ethics and Professional Conduct
Kind of document (PEC, NAEG, GDREC)	PEC
Document developed by whom (organisation, profession)?	Association for Computing Machinery
Year of publication (between 2005-2018)	2018
Document saved in folder as	acm-code-of-ethics-and-professional-conduct.pdf
Who is the stated audience	"all computing professionals, including current and aspiring practitioners, instructors, students, influencers, and anyone who uses computing technology in an impactful way."
What definition of AI&Ris used in the document?	As a general overview of ethical practices in computer science and practice, the document does not explicitly mention or define AI or robotics.
What forms of AI&R are described/covered in the document?	Computing in general
Which ethical issues are addressed in the document?	General principles, professional responsibility, , leadership roles, and compliance with the code itself.
How are the ethical issues addressed? Are solutions offered? If so, which ones?	The document seeks to offer guidelines and provide a principled a basis for ethical decision-making, rather than a "algorithm for solving ethical problems." It promotes accountability and transparency broadly.
Format of the document (checklist, continuous text, other)?	Continuous text, 10 pp document
How is the document structured?	Four major headings; each with one to eight subheadings.

Why is the document important/useful for your country?	Important because it is a code specific to a profession that is and will be at the heart of any and all AI and robotics practice.
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	Likely yes, it may provide a useful window into successfully addressing and incorporating the world-view of computing professionals when designing AI and robotics-specific codes.

Document 4 - American Medical Association documents: 5.1- REPORT 41 OF THE BOARD OF TRUSTEES (A-18) - Augmented Intelligence (AI) in Health Care; 5.2 - AMA Passes First Policy Recommendations on Augmented Intelligence; 5.3 - American Medical Association Code of Medical Ethics

Document found via (national associations or Google or another database)	National association; Google
Titles of the documents	(1) REPORT 41 OF THE BOARD OF TRUSTEES (A-18) - Augmented Intelligence (AI) in Health Care; (2) AMA Passes First Policy Recommendations on Augmented Intelligence; (3) American Medical Association Code of Medical Ethics
Kind of document (PEC, NAEG, GDREC)	PEC
Document developed by whom (organisation, profession)?	American Medical Association
Year of publication (between 2005-2018)	(1) 2018; (2) 2018 (3) 2016
Document saved in folder as	(1) A18-bot41.pdf; (2) AMA First Policy Recommendations; (3) N/A [purchase required]
Who is the stated audience	Medical professionals
What definition of AI&R is used in the document?	Documents (1) & (2) refer to “”computational methods that produce systems that perform tasks 27 normally requiring human intelligence. But prefer the term “augmented intelligence” for medicine and health care. As a comprehensive general overview of ethical practices in medicine, document (3) does not explicitly mention or define AI or robotics.
What forms of AI&R are described/covered in the document?	Among others, machine image recognition, natural language processing, and machine learning.

Which ethical issues are addressed in the document?	Bias, fairness, access, confidentiality, transparency and reproducibility; a responsibility to patients
How are the ethical issues addressed? Are solutions offered? If so, which ones?	Document 1, a report on augmented in intelligence in health care, contains policy recommendations, but they are general, including more education, deliberate and thoughtful development of healthcare AI; and an examination of the legal implications. Document 2 contains the five principles that were distilled from document 1. Document 3 is the
Format of the document (checklist, continuous text, other)?	(1) Continuous text; (2) press release; (3) Book
How is the document structured?	(1) Committee report; (2) press release with five bullets; (3) continuous text, 560 pp book.
Why is the document important/useful for your country?	Document 3 represents the latest iteration of the comprehensive distilled ethics of the American Medical Association, one of the largest and most influential professional association in the United States, while documents (2) and (3) represent that organization's thinking on how AI and robotics, specifically in the form of "augmented intelligence" will affect the medical profession.
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	IThe documents will likely be useful with respect to crafting SIENNA codes and frameworks that explicitly or implicitly reference medicine, as well as professionals who have an already clearly instantiated code of ethics.

Document 5 - American Bar Association Model Rules of Professional Conduct

Document found via (national associations or Google or another database)	National association
Title of the document	ABA Model Rules of Professional Conduct
Kind of document (PEC, NAEG, GDREC)	PEC
Document developed by whom (organisation, profession)?	American Bar Association
Year of publication (between 2005-2018)	2016

Document saved in folder as	N/A - purchase required; full text available online at https://www.americanbar.org/groups/professional_responsibility/publications/model_rules_of_professional_conduct/model_rules_of_professional_conduct_table_of_contents.html
Who is the stated audience	Lawyers and legal practitioners
What definition of AI&R is used in the document?	The document does not specifically mention AI&R
What forms of AI&Rare described/covered in the document?	Does not specifically mention AI&R
Which ethical issues are addressed in the document?	All ethical issues that a member of the legal profession might encounter in their daily practice
How are the ethical issues addressed? Are solutions offered? If so, which ones?	A series of proscriptive model rules and behavioral standards win eight categories, each with sub-topics
Format of the document (checklist, continuous text, other)?	Webpage; pdf or bound volume
How is the document structured?	Eight rules and sub-topics with commentary
Why is the document important/useful for your country?	These are the guiding and binding principles for any practicing lawyer in the United States - practitioners who will almost certainly be involved in drafting any ethical guidelines, especially binding ones
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	Yes, the document will serve as a legal frame of reference or touchstone for lawyer participating in drafting guidelines that will apply to US companies or that might involve US lawyers

Document 6 - THE NATIONAL ARTIFICIAL INTELLIGENCE RESEARCH AND DEVELOPMENT STRATEGIC PLAN (NAIRDSP)

Document found via (national associations or Google or another database)	Google
Title of the document	THE NATIONAL ARTIFICIAL INTELLIGENCE RESEARCH AND DEVELOPMENT STRATEGIC PLAN (NAIRDSP)

Kind of document (PEC, NAEG, GDREC)	NAEG
Document developed by whom (organisation, profession)?	National Science and Technology Council (NSTC) Select Committee on Artificial Intelligence
Year of publication (between 2005-2018)	2016
Document saved in folder as	national_ai_rd_strategic_plan
Who is the stated audience	The Executive Branch of the U.S. government; US govt researchers
What definition of AI&R is used in the document?	When "machines use language, form abstractions and concepts, solve the kinds of problems now reserved for humans, and improve themselves." Robotics is defined as a type of AI system operating in the physical world.
What forms of AI&R are described/covered in the document?	The document discusses machine and deep learning, and a variety of AI implementations, including image recognition, language processing,
Which ethical issues are addressed in the document?	Ethical design and implementation of AI systems; research aimed at understanding ethical implications; fairness, transparency and accountability by design; public safety.
How are the ethical issues addressed? Are solutions offered? If so, which ones?	"Strategy 3" is "Understand and Address the Ethical, Le gal, and Societal Implications of AI" is explicitly devoted to ethics. It proposes: further multi-disciplinary research; explicit attention to ethics in design of AI systems and research protocols; developing acceptable ethics frameworks; proactive transparency and explainability.
Format of the document (checklist, continuous text, other)?	Continuous text
How is the document structured?	A report; Executive summary, introduction, seven Research Strategies and concluding recommendations.
Why is the document important/useful for your country?	Although commissioned by the prior administration, this is a comprehensive and thorough document drawing on a wide range of other sources that seeks to describe a national strategic plan for AI. In a more favorable climate for scientific research, it will undoubtedly be a template for any future U.S government sponsored research effort in the AI field, and is likely an input for ongoing private sector research.
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	Yes, it represents the so-far most developed thinking of the U S government on AI research and national strategy to date. In a more favorable climate for scientific research, it will undoubtedly be a template for any future U.S government sponsored research effort in the AI field, and is likely an input for ongoing private sector research.

Document 7 –Shaping Robotics Policy for the 21st Century-Insights from the 2016-17 Halcyon Dialogues

Document found via (national associations or Google or another database)	National Associations
Title of the document	Shaping Robotics Policy for the 21st Century-Insights from the 2016-17 Halcyon Dialogues
Kind of document (PEC, NAEG, GDREC)	NAEG
Document developed by whom (organisation, profession)?	American Association for the Advancement of Science (AAAS)
Year of publication (between 2005-2018)	2017
Document saved in folder as	AAAS Robotics Report 9.27.17.pdf
Who is the stated audience	Policy makers
What definition of AI&R is used in the document?	Robots are defined as “autonomous or semi-autonomous systems that interact directly with the physical world.”
What forms of AI&R are described/covered in the document?	AI is not defined separately, but is discussed as a component of big data and certain aspects of robotics. Per the report’s definition, “certain elements of the “internet of things” were included, but “bots” consisting purely of software were not considered. This focus, however, did not exclude consideration of software as essential to the functioning of robots”
Which ethical issues are addressed in the document?	The document covers a range of ethical issues in robotics, including “transitioning military robotic systems to the civilian sector;” healthcare data; issues surrounding human/robot emotional interaction and cybernetic enhancement; embedded ethics from a design perspective; accountability and trust for robotic systems; ethical enforcement, and the possibility of a national regulatory body concerned with ethical decision making;
How are the ethical issues addressed? Are solutions offered? If so, which ones?	The report identifies design and implementation, minimizing risk, and trust, communication and explainability as key ethical issues. It recommends deliberate cultivation of a diverse set of stakeholders in constant communication with each other who can then foster the development and implementation of best practices in all sectors to create and maintain trust throughout the robotics and AI space. Finally, it recommends the creation of a federal (national) interagency coordinating body to further the development of legal, regulatory, and ethical decision making along with enforcement mechanisms.

Format of the document (checklist, continuous text, other)?	Continuous text; a 64 pp report
How is the document structured?	A summary or recommendations, an executive summary, and then “chapters” on four specific focus areas: medical robots, military robots in the civilian sector, the implications of robotics for work and social justice, and the intersection of robots and policy.
Why is the document important/useful for your country?	The document represents the output of a large and diverse group of stakeholders on key topics in robotics and makes granular policy recommendations regarding: data, standards and best practices; funding and investment; further opportunities for dialogue; research; and governance and regulation
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	Yes. The document explicitly discusses the issues surrounding the development of ethical systems, codes and frameworks, and makes recommendations in this space.

Document 8 - A Roadmap for US Robotics - From Internet to Robotics- 2016 Edition

Document found via (national associations or Google or another database)	Google
Title of the document	A Roadmap for US Robotics - From Internet to Robotics- 2016 Edition
Kind of document (PEC, NAEG, GDREC)	NAEG
Document developed by whom (organisation, profession)?	Workshop output by a consortium of Universities
Year of publication (between 2005-2018)	2016
Document saved in folder as	rm3-final-rs.pdf
Who is the stated audience	Anyone working within the robotics field; the US Government.
What definition of AI&R is used in the document?	No explicit definition of robotics- but an expansive concept of the word is implied throughout - likely anything capable of even partial autonomous action in the physical world.

What forms of AI&R are described/covered in the document?	No AI except as as part of a robotic technology; a comprehensively inclusive definition of robotics and robotic applications, from manufacturing to vacuums to healthcare and autonomous vehicles. See pp 33-35
Which ethical issues are addressed in the document?	Although a primarily technical document, the authors believe that the development of robotics must place against a backdrop of law, policy, ethics, and economics—among other social, cultural, and political forces. They identify safety, liability, impact on labor, social interaction, privacy and security as key ethical issues.
How are the ethical issues addressed? Are solutions offered? If so, which ones?	They are presented as a critical underlying framework for any research or discussion. The document therefore makes three basic broad recommendations: Greater expertise in government; Support of interdisciplinary research in government and academia; and a removal of research barriers
Format of the document (checklist, continuous text, other)?	Continuous text; an edited report of 109 pp
How is the document structured?	Presented as a report with sections arranged by topic
Why is the document important/useful for your country?	Represents input from a broad cross-section of experts in industry and academia; created for a multi-stakeholder audience; the latest iteration of an ongoing process and document [previous “editions” in 2009 and 2013]
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	It will likely be partially useful. It is a comprehensive and nuanced look at a national plan for the technical development of robotics in the United States. Although not specifically engaged with ethical issues, it presents a wide range of issues with which any ethical framework will need to be able to engage.

Document 9 - IEEE Global Initiative for Ethical Considerations in Artificial Intelligence and Autonomous Systems - General Principles

Document found via (national associations or Google or another database)	Google/National Association
Title of the document	IEEE Global Initiative for Ethical Considerations in Artificial Intelligence and Autonomous Systems - General Principles
Kind of document (PEC, NAEG, GDREC)	NAEG
Document developed by whom (organisation, profession)?	The Institute of Electrical and Electronics Engineers (IEEE)

Year of publication (between 2005-2018)	2016
Document saved in folder as	IEEE_general principles.pdf
Who is the stated audience	General audience; authors of governance frameworks
What definition of AI&R is used in the document?	"physical robots (such as care robots or driverless cars) or software AIs (such as medical diagnosis systems, intelligent personal assistants, or algorithmic chat bots)."
What forms of AI&R are described/covered in the document?	"Artificial intelligence and autonomous systems"; no specific forms are discussed or covered, the document is comprised of high-level principles and recommendations.
Which ethical issues are addressed in the document?	Human benefit; accountability and responsibility; transparency, education and awareness;
How are the ethical issues addressed? Are solutions offered? If so, which ones?	Concise recommendations for each of the four ethical issues, along with a list of supplemental resources
Format of the document (checklist, continuous text, other)?	Continuous text, 7 pp
How is the document structured?	Introduction followed by
Why is the document important/useful for your country?	IEEE is a large an influential organization whose recommendations will be consulted and possibly followed by smaller entities
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	Likely yes - it identifies high level or even universal ethical issues that will need to be addressed by any governance framework.; However, it does not go into sufficient levels of detail to make it a key resource.

Document 10 - Artificial Intelligence Research, Development and Regulation

Document found via (national associations or Google or another database)	Google/National Association

Title of the document	Artificial Intelligence Research, Development and Regulation
Kind of document (PEC, NAEG, GDREC)	NAEG
Document developed by whom (organisation, profession)?	The Institute of Electrical and Electronics Engineers (IEEE) - USA Ad Hoc Committee on Artificial Intelligence Policy
Year of publication (between 2005-2018)	2017
Document saved in folder as	FINALformattedIEEEUSAAIPS.pdf
Who is the stated audience	U.S Government; field experts
What definition of AI&Ris used in the document?	"Artificial Intelligence (AI) is the theory and development of computer systems that are able to perform tasks which normally require human intelligence such as, visual perception, speech recognition, learning, decision-making, and natural language processing."
What forms of AI&R are described/covered in the document?	No explicit forms
Which ethical issues are addressed in the document?	Fairness, transparency, safety, consumer and social acceptance; "public well-being"
How are the ethical issues addressed? Are solutions offered? If so, which ones?	The document offers broad, high-level recommendations to "provide effective regulation of AI to ensure public well-being while fostering a robust AI industry," including removing impediments to research on those topics; legal modernization, and the creation of an interagency govt. panel
Format of the document (checklist, continuous text, other)?	Continuous statement; position paper.
How is the document structured?	Short position paper arranged by topic.
Why is the document important/useful for your country?	Represents the IEEE's recommendations on AI R&D
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	Partially yes; gives nuance to other IEEE recommendation and documents, including document 9 above.

Document 11 - A National Machine Intelligence Strategy for the United States

Document found via (national associations or Google or another database)	Google
Title of the document	A National Machine Intelligence Strategy for the United States
Kind of document (PEC, NAEG, GDREC)	NAEG
Document developed by whom (organisation, profession)?	Center for Strategic & International Studies Technology Program
Year of publication (between 2005-2018)	2018
Document saved in folder as	180227_Carter_MachineIntelligence_Web.PDF
Who is the stated audience	policy-makers and governmental
What definition of AI&Ris used in the document?	Machine intelligence is defined as “performing tasks that would normally require human intelligence”; data-based and task-specific
What forms of AI&R are described/covered in the document?	A wide variety, including image recognition, farm management, urgan sensors,
Which ethical issues are addressed in the document?	Promoting safe and responsible development of machine intelligence technologies; proactively mitigating and managing risk; addressing liability for MI systems
How are the ethical issues addressed? Are solutions offered? If so, which ones?	Recommendation to fund research that promotes accountability and control of MI systems, along with transparency, and predictability; the creation of national and global ethical standards; an open data system; and articulating new and targeted legal principles, including training the judiciary and attorneys
Format of the document (checklist, continuous text, other)?	Continuous text
How is the document structured?	Report with topic-based sections, and a recommendations section.
Why is the document important/useful for your country?	The document was drafted to articulate a comprehensive national policy
Is the document useful for the development of the SIENNA codes and other ethical	It will likely be useful as a detailed example of an established and well-known policy group’s response to the AI&R question as it pertains to the United States

frameworks? If yes, please explain.	

Document 12- The AI Now Report: The Social and Economic Implications of Artificial Intelligence

Document found via (national associations or Google or another database)	Google
Title of the document	The AI Now Report: The Social and Economic Implications of Artificial Intelligence
Kind of document (PEC, NAEG, GDREC)	NAEG
Document developed by whom (organisation, profession)?	AI Now Institute
Year of publication (between 2005-2018)	2017
Document saved in folder as	AI_Now_2017_Report.pdf
Who is the stated audience	academics and stakeholders in the AI&R fields
What definition of AI&R is used in the document?	No explicit definition is given of either; a fairly broad one appears to be assumed.
What forms of AI&R are described/covered in the document?	Any and all - the document is written at a very general level with respect to relevant technologies
Which ethical issues are addressed in the document?	Labor, bias, human rights, explainability and transparency, diversity, cross-disciplinary design and research, and ethics broadly
How are the ethical issues addressed? Are solutions offered? If so, which ones?	The document is primarily a descriptive one, offering a detailed “state of the field.” As such, it does not offer detailed solutions but instead points out a variety of ongoing efforts, and urges that close attention continue to be paid to the issus it identifies. The report recommends more research and monitoring, along with much more transparency and oversight, along with greater diversity of researcher background and outlook.
Format of the document (checklist, continuous text, other)?	Continuous text
How is the document structured?	Report form: Recommendations, executive summary, four topic-based sections

Why is the document important/useful for your country?	It is a detailed document by one of the leading national research groups that focuses explicitly on ethics.
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	Yes, it will likely be useful, since it is an ethics-specific document that examines and summarizes the recent scholarly literature in the field as to current work in the field. It is also a document that the organization plans to release annually, making year -to-year changes illuminating.

Document 13 - Ethics in Technology Practice -A Toolkit

Document found via (national associations or Google or another database)	Google
Title of the document	Ethics in Technology Practice
Kind of document (PEC, NAEG, GDREC)	GDREC
Document developed by whom (organisation, profession)?	Markkula Center for Applied Ethics at Santa Clara University
Year of publication (between 2005-2018)	
Document saved in folder as	Markkula Center_ToolkitOnlineFinal.pdf
Who is the stated audience	multi-stakeholder; especially designers and engineers
What definition of AI&Ris used in the document?	None specifically, this is a general “ethics in technology”: set of resources
What forms of AI&R are described/covered in the document?	None specifically, this is a general “ethics in technology”: set of resources
Which ethical issues are addressed in the document?	A variety are mentioned, including transparency, algorithmic bias and accountability, sustainability and machine autonomy
How are the ethical issues addressed? Are solutions offered? If so, which ones?	The resources available in the materials include: toolkits, case studies and hypotheticals teaching guides, a “framework for ethical decision making” and a set of best practices for ethical design. As a set of guidelines, it offers solutions for engaging with ethical concerns, rather than specific solutions to ethical conundrums

Format of the document (checklist, continuous text, other)?	continuous text with bulleted lists; slide deck
How is the document structured?	Website with links to text-based resources
Why is the document important/useful for your country?	This is a suite of generalized ethical design resources, including: "a workshop teaching guide, overviews of technology ethics and relevant conceptual frameworks for ethical decision-making, case studies, an ethical toolkit for integrating consideration of ethics throughout product development, a sample workflow integration of the tools, and a list of best practices in technology design and engineering."
Is the document useful for the development of the SIENNA codes and other ethical frameworks? If yes, please explain.	Yes. The richness and complexity of the materials available will be an excellent starting resource or reference for development of codes and other frameworks.

SUMMARY FOR RESEARCH ON AI/Robotics in the United States

Although there are no professional organizations in the United States devoted exclusively to AI and/or robotics, ("AI&R"), there are a wide variety of professional organizations whose focus overlaps to some degree, sometimes strongly, with the AI&R fields. For example, the American Association for the Advancement of Science, the The National Research Council of the National Academies of Science, Engineering and Medicine, and the Ethics and Emerging Sciences Group, to name only a few, have all begun to devote significant organizational resources to examining the spectrum of issues, including ethics, relevant to AI and robotics. There are also organizations with a more narrow focus, such as the Data Science Association and the Association for Computing Machinery, whose scope will clearly overlap with aspects of AI&R.

Additionally, there are professional organizations such as the American Medical Association and the American Bar Association which, despite having conceptual foci nominally quite different from AI&R, will nevertheless unquestionably have to address AI&R questions as a matter of practice; for example, with algorithmic sentencing or robotic surgery, respectively. Each of these organizations has either a general and comprehensive ethical code with an exclusive focus on principles of professional conduct, or a document specifically targeted to AI and robotics, or both, as is the case with the American Medical Association. The University of Illinois maintains a comprehensive database of over 2500 ethical codes, searchable by organizational type, of which it is nearly certain many will come to address AI&R (specifically or both by implication) as those fields become more ubiquitous in professional practice.

There is an even wider variety of governmental bodies, academic and policy research centers, and advocacy groups dedicated to providing policy-makers, the private sector and the general public with information, ethical guidelines and other (policy) recommendations regarding the development and application of a variety of AI and robotics technologies. Key organizations of this type include: the National Science and Technology Council (NSTC) Select Committee on Artificial Intelligence; the National Science Foundation; the Institute of Electrical and Electronics Engineers ("IEEE"), which has a US branch; the Computing Community Consortium; the Association for the Advancement of Artificial Intelligence; the Belfer Center for Science and International Affairs; and the Future of Life Institute. There are also various organizations in the AI and robotics space, such as the Ai Now Institute and the Berkman Klein Center and MIT Media Lab's Ethics and Governance of Artificial Intelligence Initiative, that are working on ethics and governance that have not yet produced final ethical guidelines or other policy documents, but intend to do so in the near future. Also of note is the fact that there are a few key scholars at institutions in the United States, such as Ryan Calo at the University of Washington, Kate Crawford at New York University's AI Now and Kate Darling at MIT's Media Lab, among others, who have devoted the bulk of their work to AI and robotics-related topics, and who are seen as reliable and salutary authorities on these topics.

Several United States academic research centers and governmental organizations have drafted general guideline documents for the creation of ethical guidelines. The National Institutes of Health has released "Guiding Principles for Ethical Research" while the National Academies have published ""Identifying and Promoting Best Practices for Research Integrity." The Markkula Center for Applied Ethics and the IEEE have created guidance documents specific to ethical technology practice and to AI and robotics, respectively, with the Markkula Center producing a suite of tools and documents all addressing integrating ethics. Finally, the authors mentioned above, as well as others, have written individually on the topic of ethical design for AI and robotics at some length.