



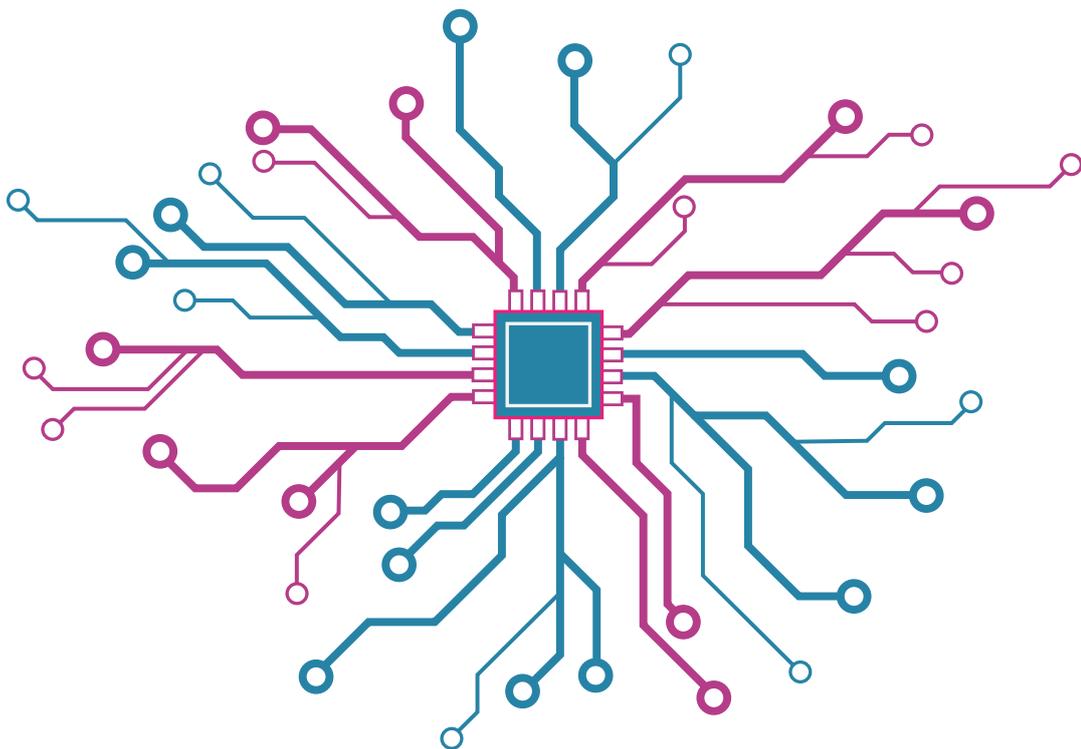
The Pontifical
Academy of Sciences



The Pontifical
Academy of Social Sciences

A CONFERENCE ORGANIZED JOINTLY BY THE PONTIFICAL ACADEMY OF SCIENCES (PAS)
AND THE PONTIFICAL ACADEMY OF SOCIAL SCIENCES (PASS)

ROBOTICS, AI, AND HUMANITY: SCIENCE, ETHICS, AND POLICY



16-17 May 2019 | Casina Pio IV | Vatican City



“Only through a firm resolve shared by all economic actors may we hope to give a new direction to the destiny of our world. So too artificial intelligence, robotics and other technological innovations must be so employed that they contribute to the service of humanity and to the protection of our common home, rather than to the contrary, as some assessments unfortunately foresee.”

Message of His Holiness Pope Francis to the Executive Chairman of the “World Economic Forum” on the occasion of the annual Gathering in Davos-Klosters, 23-26 January 2018.

“Humanity has entered a new era in which our technical prowess has brought us to a crossroads. We are the beneficiaries of two centuries of enormous waves of change: steam engines, railways, the telegraph, electricity, automobiles, aeroplanes, chemical industries, modern medicine, information technology and, more recently, the digital revolution, robotics, biotechnologies and nanotechnologies... Technoscience, when well directed, can produce important means of improving the quality of human life, from useful domestic appliances to great transportation systems, bridges, buildings and public spaces... The fact is that ‘contemporary man has not been trained to use power well’ (1), because our immense technological development has not been accompanied by a development in human responsibility, values and conscience. Each age tends to have only a meagre awareness of its own limitations. It is possible that we do not grasp the gravity of the challenges now before us...”

(1) Romano Guardini, *The End of the Modern World*, Wilmington, 1998, p 82.

Pope Francis, *Laudato Si’*, pp 75-78.

Conference concept

Recent advances in machine learning (commonly referred to as artificial intelligence – AI), and robotics have elicited widespread debate over their benefits and drawbacks for humanity. The emergent technologies have for instance implications within medicine and health care, employment, transport, manufacturing, agriculture, and armed conflict. While there has been considerable attention devoted to robotics/AI applications in each of these domains, the time is ripe to gain a fuller picture of their connections and the possible consequences for our shared humanity. To this end, PAS and PASS have agreed to jointly organize this multidisciplinary conference to be held May 16-17, 2019.¹ In addition to examining the current research frontiers in AI/robotics, the participants will discuss the likely impacts on societal well-being, the risks for peace and sustainable development, as well as the attendant ethical and religious dimensions of these technologies. Topics to be addressed in the conference sessions include:

- ▶ Scientific foundations and innovation drivers of AI/robotics (inter alia mathematics, algorithm innovations, computer science, related roles of big data use)
- ▶ Person-robot relations and the implications for socie-

ty, taking into account differences between low- and high-income countries, rural and urban communities, youth and elderly

- ▶ Technology and engineering of robotics and applications of AI/robotics in industries and services, and the implications for work and employment, manufacturing, agriculture and food systems, health services, poverty and marginalization
- ▶ Robot–human interactions and implications
- ▶ AI/robotics and the changing character of warfare
- ▶ Ethical and religious aspects of AI and robotics; robots and identity (or even robots’ rights) and need for regulatory policies on the use and future development of AI/robotics technologies

Papers shall be submitted by April 25, 2019 for circulation before the workshop. The papers will subsequently be revised for open access publication in an edited volume of an academic press.

¹ Two related conferences have previously been held at Casina Pio IV: PAS conference on “Power and Limitations of Artificial Intelligence” (December 2016), and the workshop on “Artificial Intelligence and Democracy” (March 2018).

Programme

DAY 1 16 MAY 2019	
9:00	Opening and Introductory remarks Marcelo Sánchez Sorondo* <i>Bishop Chancellor of the Pontifical Academies of Sciences (PAS) and Social Sciences (PASS)</i> Margaret Archer* <i>Visiting Professor, Arctic University of Norway, Tromsø</i> Joachim von Braun* <i>PAS President</i> Stefano Zamagni* <i>PASS President</i>
1. FOUNDATIONAL ISSUES IN AI AND ROBOTICS (consciousness) Chair: Joachim von Braun	
9:30	Could a robot be conscious? Lessons from the cognitive neuroscience of consciousness Stanislas Dehaene* <i>Collège de France, Paris</i>
9:50	Discussion
10:00	Could a robot be conscious? Lessons from philosophy Markus Gabriel <i>Bonn University, Germany</i>
10:20	Discussion
10:30	Coffee break
2. THE SCIENCE AND ENGINEERING OF AI AND ROBOTICS (robotics engineering, industries, internet of things and robot-robot and human-robot interactions) Chair: Stefano Zamagni	
11:00	Logic in computer science and proof systems Gilles Dowek <i>INRIA, France</i>
11:20	Discussion
11:30	Foundation of artificial intelligence and effective universal induction Armin Cremers <i>B-IT Emeritus Research Group, Germany</i>
11:50	Discussion
12:00	Compliant and impedance controlled robots: the paradigm change for innumerable “collaborative” applications (e.g. health and elderly care, factory of the future, space exploration, mobility) Gerhard Hirzinger <i>DLR / Technical University Munich, Germany</i>
12:20	Discussion
12:30	Lunch at the Casina Pio IV
3. AI/ROBOT – HUMAN INTERACTIONS AND ETHICAL IMPLICATIONS (robotics, cognitive science, and social theory) Chair: Pierpaolo Donati	
14:30	Human-robot synergy and its emergent properties Margaret Archer* <i>Visiting Professor, Arctic University of Norway, Tromsø</i>
14:50	Discussion
15:00	Critical ingredients of autonomy, lessons from neuroscience Wolf Singer* <i>Max Planck Institute for Brain Research, Frankfurt, Germany</i>
15:20	Discussion

* Designates PAS or PASS Academicians.

15:30	Human-robot interactions and affecting computing: the ethical implications Laurence Devillers <i>Paris-Sorbonne, LIMSI-CNRS, France</i>
15:50	Discussion
16:00	What is it to implement human-robot joint action? Aurélie Clodic <i>LAAS/CNRS, Toulouse, France</i>
16:20	Discussion
16:30	General discussion
17:00	Coffee break
4. ROBOTICS CHANGING THE FUTURE OF WORK, FARMING, POVERTY AND ECOLOGY (labour markets, and employment; impacts on the unskilled and poor, industry 4.0, opportunities and challenges for poverty reduction; precision farming; environment and ecology opportunities and risks) Chair: Gregory M. Reichberg	
17:30	Industrial robotics and the global organization of production Koen De Backer <i>OECD, Paris, France</i>
17:50	AI/robotics implications for poverty and marginalization Joachim von Braun* <i>Director Centre for Development Research, Germany</i>
18:10	Discussion
18:20	Farming robotics for precision agriculture Ciryll Stachniss <i>University of Bonn, Germany</i>
18:40	Robotics and AI for food security and innovation Maximo Torero <i>Assistant Director General for Economics, FAO</i>
19:20	AI and robots in workplaces Arisa Ema <i>University of Tokyo and Visiting Researcher at RIKEN Center for Advanced Intelligence Project</i>
19:40	General discussion
20:00	Dinner at the Casina Pio IV

DAY 2 17 MAY 2019	
5. ROBOTICS AND SERVICES (education, the aged, health services/personalized medicine, mobility, homes...) Chair: Joachim von Braun	
9:00	Explainability and plausibility as prerequisite for trusted AI Christoph Peylo <i>Global Head of Bosch Center for Artificial Intelligence, Stuttgart, Germany</i>
9:20	Discussion
9:30	Regulating AI in the financial services industry Frank Pasquale <i>University of Maryland, Baltimore, USA</i>
9:50	Discussion

10:00	Robotics in the classroom. Hopes or threats? Pierre Léna* <i>Université Paris-Diderot and Paris Observatory, France</i>
10:20	Discussion
10:30	Moral development in the digital environment Antonio Battro* <i>Academia Nacional de Educación, Buenos Aires, Argentina</i>
10:40	Discussion
11:00	General discussion
11:15	Coffee break
6. ROBOTICS, AI, AND MILITARIZED CONFLICT Chair: Armin Cremers	
11:45	Designing robots for the battlefield: state of the art Bruce Swett <i>Johns Hopkins University Applied Physics Laboratory, Baltimore, USA</i>
12:05	Discussion
12:15	Military applications of AI and the relevance of virtue ethics Gregory M. Reichberg* and Henrik Syse <i>Peace Research Institute Oslo, Norway</i>
12:35	Discussion
12:45	The use of AI in cyber war: ethical and regulatory challenges Sophie-Charlotte Fischer <i>Center for Security Studies, ETH Zurich, Switzerland</i>
13:05	Discussion
13:15	The impact of AI on nuclear deterrence and military strategy, including the ethical implications Nobumasa Akiyama <i>Hitotsubashi University, Tokyo, Japan</i>
13:35	Discussion
13:45	General discussion
14:00	Lunch at the Casina Pio IV
7. SOCIETY, ETHICAL, RELIGIOUS, AND REGULATORY DIMENSIONS OF ROBOTICS/AI (identifying dividing lines between robots and AI/human 'enhancement', 'personhood' and robots; 'self-consciousness', empathy, defining risks, and what should be prevented; altering of legislation and regulation, e.g. accountability, judicial and insurance issues, criminal responsibility, public and corporate governance) Chair: Margaret Archer	
15:00	Robots and rights Wolfgang M. Schröder <i>Katholisch-Theologische Fakultät Würzburg, Germany</i>
15:20	Discussion
15:30	Responsible robotics Aimee van Wynsberghe <i>Delft University of Technology, Netherlands</i>
15:50	Discussion
16:00	Impact of robotics on human relations Pierpaolo Donati* <i>Alma Mater Professor University of Bologna, Italy</i>

16:20	Discussion
16:30	Regulating AI: considerations that apply across domains Angela Kane <i>Vienna Center for Disarmament and Non-Proliferation, Austria</i>
16:50	Discussion
17:00	Coffee break
17:30	AI regulation: finding a balance between efficiency and social effects Stefano Quintarelli <i>Chair, Italian Digital Agency</i>
17:50	Discussion
18:00	Conclusions and discussion of workshop statement A workshop statement will be drafted before the workshop and shared with participants for discussion and inputs in this session Joachim von Braun, Stefano Zamagni, and Margaret Archer (moderated discussion with all participants)
19:00	Dinner at the Casina Pio IV

List of Speakers



NOBUMASA AKIYAMA is a professor at the Graduate School of Law and the Graduate School of International and Public Policy at Hitotsubashi University in Japan, and an adjunct research fellow at the Japan Institute of International Affairs. His other professional appointments include memberships in various governmental consultative groups and study groups at the ministries of Foreign Affairs and Defense, the Japan Atomic Energy Commission, and the Nuclear Regulatory Commission of Japan; and advisor to the Japanese delegation to the Non-Proliferation Treaty Review Conferences. Professor Akiyama has published extensively and presented papers at various conferences on nonproliferation, Japan's national security, and nuclear energy. He also worked on the review of the Fukushima nuclear accident as a leader of the working group for the Independent Commission on the Investigation of the Fukushima Nuclear Accident, initiated by a private think tank, the Rebuild Japan Initiative Foundation.



MARGARET S. ARCHER founded the Centre for Social Ontology at Ecole Polytechnique Fédérale de Lausanne in 2011, when Professor of Social Theory. She is now Visiting Professor at three European universities. Archer was elected as the first woman President of the International Sociological Association at the 12th World Congress of Sociology (1986 - 90). Pope Francis appointed her as President of the Pontifical Academy of Social Sciences in 2014- 19. She was a founding member of PASS and the Academy of Learned Societies in the Social Sciences and is a trustee of the Centre for Critical Realism. She has published 43 volumes and had six devoted to her work.



ANTONIO M. BATTRO MD, University of Buenos Aires; Docteur de l'Université de Paris (Psychology). Member of the Academia Nacional de Educación, Argentina, and the Pontifical Academy of Sciences. Director of the International School on Mind, Brain and Education, Ettore Majorana Foundation and Centre for Scientific Culture, Erice. Former member of the Centre d'Epistémologie Génétique, Geneva (Jean Piaget); Associate Director at the École Pratique des Hautes Études, Laboratoire de Psychologie Expérimentale et Comparée, Paris; Robert F. Kennedy Visiting Professor, Graduate School of Education, Harvard, and Chief Education Officer, OLPC, One Laptop Per Child. He works in education in the digital environment.



JOACHIM VON BRAUN | PRESIDENT is considered an internationally leading expert on the problems of hunger and malnutrition and solutions of these problems. His scientific publications address poverty, international development economics, economics of natural resources, agriculture, and science and technology policy. von Braun is Director of the Center for Development Research (ZEF) and Professor for Economic and Technological Change at University of Bonn, Germany. ZEF is Germany's leading multi-disciplinary research institute on aspects of development. von Braun serves on various international, and European advisory councils. He is member of the German Academy of Science Leopoldina, Academy of Engineering acatech, and north rhine Westphalian Academy of Science and Arts, as well as African Academy of Science. He serves as co-editor of several academic journals. He has had work experience in the following countries: Egypt, Gambia, Guatemala, Rwanda, Sudan, Ethiopia, India, China, Bangladesh, Russia.



AURÉLIE CLODIC is a Research Engineer at LAAS-CNRS, Toulouse, France. During her PhD she designed and implemented an architecture to deal with task refinement and execution as well as needed communications and monitoring in several contexts (robot guide in a museum, robotic assistant). Her research aims to study human-robot collaborative task achievement and robotics architecture design dedicated to human-robot Interaction. She's currently involved in the H2020 Mummer Project (mummer-project.eu) and ANR JointAction4HRI project (<http://jointaction4hri.laas.fr/>). She is the principal investigator of the "toward a Framework for Joint Action" workshop series (fja.sciencesconf.org). homepage; <https://homepages.laas.fr/aclodic/>



ARMIN B. CREMERS received his doctoral degree in mathematics and his lectureship qualification in computer science from the University of Karlsruhe (now KIT). From 1973 he has served on the Computer Science Faculties of the University of Southern California, the University of Dortmund, and, since 1990, the University of Bonn as Head of the Artificial Intelligence / Robotics / Intelligent Vision Systems Research Groups. In 2002 he became Founding Director of the Bonn-Aachen International Center for Information Technology (b-it), in 2004 Dean of the School of Mathematics and Science and in 2009 University Vice President. Emeritus since 2015. Works on AI Foundations and AI Systems Engineering.



KOEN DE BACKER is Head of Division in the Directorate for Science, Technology and Innovation (STI) of the OECD with special oversight of the steel and shipbuilding sectors. He coordinates the activities of the OECD Steel Committee and the OECD Council Working Party on Shipbuilding. He also facilitates and coordinates the work of the Global Forum on Steel Excess Capacity within the G20. Mr. De Backer joined the OECD in 2006 and has worked on different topics in the Directorate for Science, Technology and Industry and the Statistics Directorate: economic globalisation, multinational enterprises, offshoring/outsourcing, R&D internationalisation, industrial policy, open innovation, entrepreneurship, structural business statistics and micro-data. He was one of the persons leading the OECD work on Global Value Chains. Prior to joining the OECD, Mr. De Backer held post-doctoral positions at the Universitat Pompeu Fabre in Barcelona (Spain) and at the Department of Applied Economics of the K.U.Leuven, acted as advisor to the Minister of Economic Affairs in Belgium, and was professor at the Vlerick Leuven Gent Management School. Mr. De Backer holds a PhD degree of the K.U. Leuven (Belgium) and a Master of Business Administration degree of the K.U.Leuven/UCI (USA).



STANISLAS DEHAENE is one of Europe's leading cognitive neuroscientists. Born in 1965, he has been studying cognitive science since the last 22 years and is the author of five books, two television movies, and over 150 scientific publications in journals such as *Science*, *Nature*, *Nature Neuroscience*, and *PNAS*. Dehaene directs the INSERM-CEA Cognitive Neuroimaging unit, located in Orsay near Paris (www.unicog.org). His work uses advanced techniques of functional magnetic resonance imaging, electro-encephalography, intracranial electrodes, and psychological manipulations to study how culture and biology interact in the human brain. He is renowned for his work on the neural bases of mathematical abilities, but also for his studies of reading, language, bilingualism, and consciousness. Stanislas Dehaene has received several international prizes and the Piuх XI medal of the Pontifical Academy of Sciences (Vatican). He is the author of *The Number Sense: How Mathematical Knowledge Is Embedded In Our Brains*; *Reading in the Brain The Science and Evolution of a Cultural Invention*; and *Consciousness and the Brain*.



LAURENCE DEVILLERS is a professor of artificial intelligence & ethics at Paris-Sorbonne University since 2011 and at Computer science laboratory for mechanics and engineering sciences (LIMSIS) at the Scientific Research National Center, a head of the team "Affective and social dimension in spoken interaction". Laurence Devillers has taken part in several national and European projects on human-robots social and affective interactions. Laurence Devillers is leading a cluster of robots-human co-evolution at the Institute of Digital Society and "Robotic interactive" at Paris-Saclay. In November 1992 she has defended a thesis of Doctor in Sciences, Specialty Computer Science thesis on "Recognition of continuous speech with a hybrid neuronal and Markovian system". Holding a PhD from Paris-Sud University (Paris XI), she is studying affective and social dimensions in Man-Robot spoken Interactions. She is an author of numerous books on artificial intelligence. She participated in the deployment of the national platform TransAlgo (Transparency and Explanation of Algorithms) (2017). She is also a founding member of HUB IA (private-public eco-system) on applied ethics (since 2017). In 2017-2018 she was a member of ISCA and ISCA Distinguished Lecturers.



PIERPAOLO DONATI is *Alma Mater* Professor (PAM) of Sociology at the University of Bologna. Past-President of the Italian Sociological Association and Counsellor of the IIS, he is currently a member of the Pontifical Academy of Social Sciences and the Academy of Sciences of the University of Bologna. He has published more than 800 research work both theoretical and empirical. He is internationally known as the founder of an original "relational sociology" or "relational theory of society". Recent publications: *Discovering the relational goods* (2019); *Life as Relation. A Dialogue between Theology, Philosophy, and Social Science* (2019); *Sociología relacional de lo humano* (2019).



GILLES DOWEK I am a researcher at Inria and professeur attaché at the ENS Paris-Saclay. I am interested in the formalization of mathematics (type theory, set theory, etc.), in proof processing systems (proof-checking, automated theorem proving, etc.), in physics of computation, in the safety of aerospace systems, and in the epistemology and ethics of informatics. I am a member of the Scientific board of La main à la pâte. I am a member of the Scientific board of the Société informatique de France and of the CERN, *Commission de réflexion sur l'éthique de la recherche en sciences et technologies du numérique d'Allistene*, l'Alliance des sciences et technologies du numérique. I also have been a consultant for the National Institute of Aerospace, a lab of the NASA Langley research center. I have participated to the development and the proof of ACCoRD, an Airborne Coordinated Conflict Resolution and Detection system.



ARISA EMA is Assistant Professor at the University of Tokyo and Visiting Researcher at RIKEN Center for Advanced Intelligence Project in Japan. She is a researcher in Science and Technology Studies (STS), and her primary interest is to investigate the benefits and risks of artificial intelligence by organizing an interdisciplinary research group. She is a member of the Ethics Committee of the Japanese Society for Artificial Intelligence (JSAI), which released the Japanese Society for Artificial Intelligence Society Ethical Guidelines in 2017. She is also a board member of Japan Deep Learning Association (JDLA) and chairing Public Affairs Committee.



SOPHIE-CHARLOTTE FISCHER is a PhD Candidate at the Center for Security Studies at ETH Zurich and a Research Affiliate with the Center for the Governance of AI at the University of Oxford. Her research focuses on the national security implications of emerging dual-use technologies. In her dissertation, she explores the changing relationship between Western military organizations and commercial technology companies. Previously, Sophie worked with the UN Office for Disarmament Affairs' Asia and Pacific Office and gained further work experience with NATO and the German Federal Foreign Office. She holds a Master's degree in International Security Studies from Sciences Po Paris.



MARKUS GABRIEL is the Chair for Epistemology, Modern and Contemporary Philosophy and Director of the International Centre for Philosophy at the University of Bonn. Born in 1980, Gabriel studied Philosophy and Ancient Greek in Bonn and Heidelberg; previous to his current position, he was appointed as Assistant Professor at the New School of Social Research in New York. Gabriel has held visiting professorships at Aarhus University, PUC Porto Alegre, PUC Rio de Janeiro and UC Berkeley. His research interests include epistemology, philosophy of religion and aesthetics, ancient philosophy, Post-Kantian Idealism, contemporary analytical and post-analytical philosophy.



GERHARD HIRZINGER has been director of DLR's institute of "Robotics and Mechatronics", one of the most acknowledged robotic institutes worldwide. His research activities have covered space- and tele-robotics, sensors, actuators, humanoid and medical robotics, robotic electromobility and flight systems, including a lot of technology transfer. He has become well-known for the "paradigm change" in robotics towards whole-arm sensitive and compliant collaborative systems. He was prime investigator of the first remotely controlled space robot ROTEX and received numerous awards, e.g. the Joseph-Engelberger-Award, all relevant IEEE awards, the order of merit of the Federal Republic of Germany and the Leibniz-Award, Germany's highest scientific award.



ANGELA KANE is a well-known expert in political relations and negotiations, operating in a complex multilateral environment. She holds a number of professional positions, including Senior Fellow at the Vienna Centre for Disarmament and Non-Proliferation, Vice President of the International Institute for Peace, and Visiting Professor and Member of the Strategic Committee of the Paris School for International Affairs SciencesPo. In addition to board memberships in several NGOs in Europe, the United States and Asia, she is a Member of the United Nations University Council; participates in the work of the High-Level Group on Artificial Intelligence of the European AI Alliance, and serves as Co-Chair of the Global Future Council on the Korean Peninsula of the World Economic Forum. Until 2015, Ms. Kane had a long and distinguished career at the United Nations; her functions included High Representative for Disarmament Affairs (2012–2015), Under-Secretary-General for Management (2008–2012), Assistant Secretary-General for Political Affairs (2005–2008) and Assistant Secretary-General for General Assembly and Conference Management. She served as Deputy Special Representative of the Secretary-General for the United Nations Mission in Ethiopia and Eritrea (UNMEE), and had postings in the Democratic Republic in the Congo, Indonesia, and Thailand. Before joining the UN Secretariat, she worked for the World Bank. Ms Kane studied at the University of München and holds degrees from Bryn Mawr College and the Johns Hopkins School of Advanced International Studies. She received an honorary doctorate from the Middlebury Institute of International Studies (Monterey, California)



PIERRE LÉNA born 1937, is a French astrophysicist, Emeritus Professor at the Université Paris-Diderot and Paris Observatory. His scientific work focused on infrared astronomy and star formation. His interest for image quality led him to contribute to develop adaptive optics and the interferometry of the *European Very Large Telescope (VLT)* in Chile, both making today the VLT a unique instrument for the study of exoplanets and black holes. He co-founded in 1996 *La main à la pâte* to renovate science education in primary and middle schools, working at national, European and international levels, chairing in 2011 the *InterAcademy Partnership for Science* education program. Then for 2012–2016, he chaired the new Foundation *La main à la pâte*, created by the French Academy of sciences. In 2018, he created the Office for Climate Education in connection with IAP and IPCC, with a broad international network. Pierre Léna belongs to the French Académie des sciences, the Pontifical Academy of Sciences and several others.



FRANK PASQUALE is Professor of Law at the University of Maryland, and a member of the NCVHS at the U.S. Department of Health & Human Services. His book *The Black Box Society* (Harvard Univ. Press, 2015) has helped inform and shape the global algorithmic accountability movement. He is editor of the collection *Care for the World* (Cambridge Univ. Press, 2019), an appreciation of *Laudato Si'*. He has authored over 50 scholarly articles, including *Law's Acceleration of Finance: Redefining the Problem of High-Frequency Trading* (2015); *Professional Judgment in an Era of Artificial Intelligence and Machine Learning* (2019), and *A Rule of Persons, Not Machines* (2019).



CHRISTOPH PEYLO is Global Head of Bosch Center for Artificial Intelligence (BCAI) with locations in Sunnyvale, Bangalore and Renningen. Prior to joining Robert Bosch GmbH in 2017 he was VP at Deutsche Telekom Laboratories in Berlin, where he worked in the area of AI, (Cyber-) Security, Industrie 4.0, and IoT. Before joining Deutsche Telekom in 2006 he worked in various positions from software engineer to managing director of a software company. Christoph Peylo has studied Computer Science, Computational Linguistics and Artificial Intelligence and acquired his Ph.D. at the University of Osnabrück in the field of AI.



STEFANO QUINTARELLI born June 14th, 1965 in Negrar, Verona, Italy. Serial entrepreneur, he founded the first Italian business Internet Service Provider, listed on the stock market. He was a founder and board member of Clusit, Italy's security association, Chairman of AIIP, Italy's ISP association, Chief Digital Officer of Gruppo 24 Ore, Italy's leading financial publishing group. He is an active business angel. Professor of Information systems, Network security and security. Member of the Italian Parliament, member of Commission of Internet rights of the Chamber of Deputies, Chairman of the steering committee of Italy's Digital Agency. His interest is the intersection between technology, regulation and markets.



GREGORY M. REICHBERG is Research Professor at the Peace Research Institute Oslo (PRIO) and Adjunct Professor in the Department of Political Science at the University of Oslo. He currently heads the Oslo-based Research School on Peace and Conflict (a consortium that offers doctoral courses) and is an associate editor of the *Journal of Military Ethics*. From 2009-2012 he was director of the PRIO Cyprus Centre in Nicosia, where he coordinated research and dialogue activities on the search for a political settlement to the island's division. Over the last ten years he has been engaged in religious dialogue on social/political issues in Iraq and other settings. Reichberg's recent publications include the monograph *Thomas Aquinas on War and Peace* (2017), the co-edited volume *Religion, War, and Ethics: A Sourcebook of Textual Traditions* (2014, with Henrik Syse), and articles in the *Journal of Military Ethics*, *Nova et Vetera* (English edition), *Ethics and International Affairs*, and the *Journal of Religious Ethics*.



MARCELO SÁNCHEZ SORONDO | CHANCELLOR was born in Buenos Aires and was ordained a priest in 1968. He was lecturer in the history of philosophy at the Lateran University in Rome where he became full professor. He was dean of the Faculty of Philosophy at the same university and full professor of the history of philosophy at the Libera Università Maria SS. Assunta, Rome. In 1998 he was appointed Chancellor of the Pontifical Academies of Sciences and Social Sciences by St John Paul II, who then consecrated him titular Bishop of Vescovio. Awards: Cavaliere di Gran Croce (Italy); official of honour of the Légion d'Honneur (France); Grão Mestre da Ordem de Rio Branco (Brazil), Official of the Republic of Austria, Knight of the Republic of Chile, Member of Accademia dei Gergofili, Member of the Accademia Italiana del Vino; Corresponding Member of the Academia de Ciencias de Cuba; Orden del Aguila Azteca (Mexico); Innovation Award of the Gregor Mendel Foundation.



WOLFGANG M. SCHRÖDER joined the University of Würzburg in 2015 for the newly created Professorship of Philosophy at the Faculty of Catholic Theology. He is member of the DIN Standards Committee for Artificial Intelligence, German Expert in the ISO Working Group on Artificial Intelligence Standards, and member of the VDI Advisory Council. Prior to joining his Würzburg Faculty, Wolfgang held temporal professorships at the University of Tuebingen and the University of Bochum. He was Diltthey Fellow of the Fritz Thyssen Stiftung (2010-2015), SIAS Fellow at the Wissenschaftskolleg zu Berlin (2006) and at Yale Law School (2005).



WOLF J. SINGER studied Medicine in Munich and Paris, obtained his MD and PhD in Munich. He is Director em. at the Max Planck Institute for Brain Research in Frankfurt, Founding Director both of the Frankfurt Institute for Advanced Studies (FIAS) and of the Ernst Strüngmann Institute for Neuroscience (ESI) and Director of the Ernst Strüngmann Forum. His research is focused on the neuronal substrate of higher cognitive functions.



CYRILL STACHNISS is a full professor at the University of Bonn and heads the lab for Photogrammetry and Robotics. Before that, he was with the University of Freiburg and the Swiss Federal Institute of Technology. Since 2010 a Microsoft Research Faculty Fellow and received the IEEE RAS Early Career Award in 2013. Since 2015, he is a senior editor for the IEEE Robotics and Automation Letters. In his research, he focuses on probabilistic techniques for mobile robotics, navigation, and visual perception. Areas of research are exploration, SLAM, agricultural robotics, computer controlled cars, and UAVs. He has coauthored over 200 publications.



BRUCE A. SWETT is a computational and experimental neuroscientist with expertise in how the brain learns, controls, and automates movements, high performance computing, and Artificial Intelligence (AI) algorithms. Dr. Swett's Ph.D. is in Neuroscience and Cognitive Sciences from the University of Maryland at College Park. His post-doctoral work was completed at the National Institute of Deafness and other Communications Disorders, National Institutes of Health. Dr. Swett's research interests at JHU/APL include brain-computer interfaces, artificial general intelligence, and biologically-inspired robots. Dr. Swett is the recipient of multiple awards for excellence in research, and is a member of the Army Science Board.



HENRIK SYSE (M.A., Boston College; Ph.D., University of Oslo) is a Research Professor at the Peace Research Institute Oslo, a Professor of Peace and Conflict Studies at Bjørknes University College, and Chief Co-Editor of the *Journal of Military Ethics*. He has published widely in the fields of philosophy, politics, and ethics. He was a member of the Norwegian Press Complaints Commission 2002-2016, has been a Member of the Norwegian Academy of Language and Literature since 2010, and a member of the Norwegian Nobel Committee, which awards the Nobel Peace Prize, since 2015, serving as its Vice Chair since 2017.



MAXIMO TORERO is Assistant Director General for economic and social development at the Food and Agriculture Organization of the United Nations in Rome. Before joining FAO, he served at the World Bank Group as Executive Director for Argentina, Bolivia, Chile, Paraguay, Peru and Uruguay. He led the Markets, Trade and Institutions Division at the International Food Policy Research Institute in Washington, D.C. He is a Professor at the University of the Pacific, Perú (on leave) and Alexander von Humboldt Fellow at University of Bonn, Germany. He has published more than 40 peer-reviewed academic articles analyzing poverty, inequality and behavioral economics in top journals – including in *Quarterly Journal of Economics*, *Econometric Theory*, *American Economic Journal: Applied Economics*, *Review of Economics and Statistics* and *Journal of Labor Economics*. Specifically, he has studied the role of infrastructure, institutions and technology on poverty reduction, and the importance of geography, infrastructure access and assets in explaining poverty. He is the author of 14 books, including *Food Price Volatility and its Implications for Food Security and Policy* and *Innovations for Inclusive Value Chain Development: Successes and Challenges*.



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Memorandum

- Pickup schedule from your hotels to the Casina Pio IV on 16 and 17 May 2019:
A bus will leave the Hotel Crowne Plaza at h. 8.30 a.m and the Domus Sanctae Marthae at h. 8.45 a.m. to accompany participants to the Academy's Headquarters, the Casina Pio IV.
- On 16 and 17 May the same buses will take you back to your hotels after dinner at 8:00 p.m.
- Lunch and dinner for the participants will be served at the Academy every day. If you are a vegetarian or have any dietary restrictions (food allergies, and/or religious restrictions), please let us know as soon as possible.
- WI-FI credentials
Network: **WLAN_PADS (WPA2)**
Password: **!!WIFI_2017_PADS!!**



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