



JAMES MARTIN 21ST CENTURY SCHOOL

# Oxford Martin School

Tackling the challenges of the 21st century



## Welcome

**Professor Ian Goldin**, *Director, Oxford Martin School*  
*Professor of Globalisation and Development, University of Oxford*

The Oxford Martin School is an exciting and unique interdisciplinary research initiative at the University of Oxford. We bring together leading academics from diverse intellectual backgrounds to find new practical and scalable solutions to some of the biggest challenges confronting humanity.

We live in a hyper-connected world of accelerating change. Citizens and decision makers are navigating a complex landscape in which choices made today will have long-term ramifications. By providing fresh insights, our researchers are both informing those choices and delivering answers to some of the toughest challenges ahead.

Through a highly competitive and selective process, we have created over 35 interdisciplinary institutes and programmes in the

Oxford Martin School that draw together leading researchers from medical, physical and social sciences, as well as the humanities. All our teams are housed in Oxford, and from the coming year a significant critical mass of our research will be co-located within our iconic building in the centre of Oxford.

Our aim is to be a catalyst for ideas. We bring together an active and engaged community of scholars who are defined by their excellence and shared desire to work outside disciplinary silos in order to address the most pressing challenges of our time. Our research projects range from preserving the world's biodiversity to understanding the human brain and decision making. We are harnessing the power of citizen science in the study of large, complex datasets; and developing cutting-edge

technologies to facilitate new solutions. Examples include innovative approaches to developing vaccines for malaria, enhanced root systems for drought resistant crops, and carbon-free transport and energy systems. Our integrative work on systemic risk and complexity, as well as globalisation and governance, draws on multiple research groups and disciplines from across the School.

Our research aims to provide decision makers with the understanding they need to make the right choices in addressing key global economic, social and environmental challenges. We recognise that our success depends on our relevance and ability to distil and communicate our ideas. To this end, we look forward to your engagement with us.



**“In our near future we can expect extreme and diverse paradigm shifts, enabled by technology and driven by many factors. Oxford Martin School research is playing a vital role in devising powerful ways to deal with the complex challenges humanity faces.”**

**James Martin**, *Founder, Oxford Martin School*

## About the Oxford Martin School

The Oxford Martin School is a unique, interdisciplinary research community of over 300 scholars working across the University of Oxford to address the most pressing global challenges and opportunities of the 21st century.

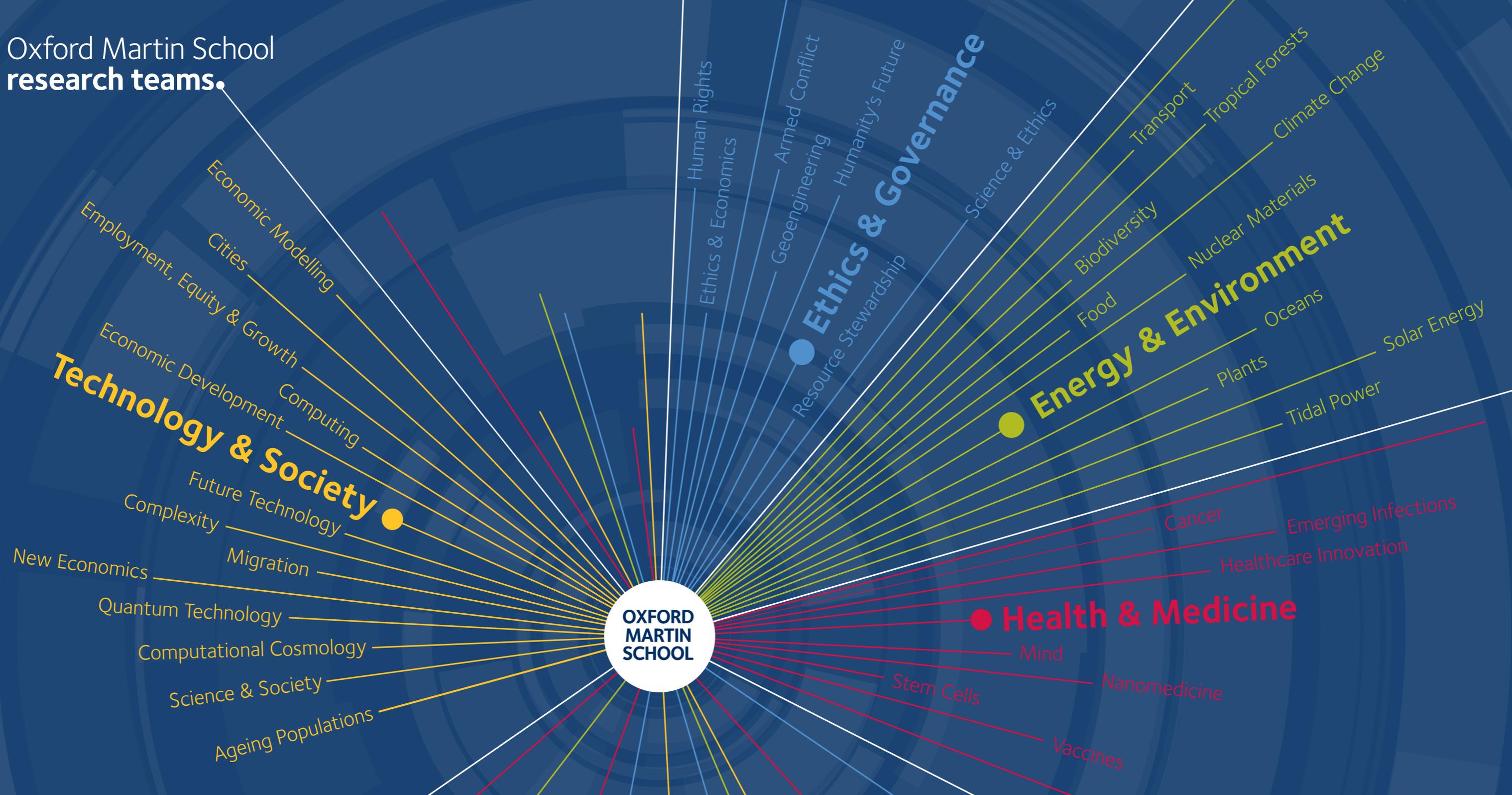
From the governance of climate change and the possibilities of quantum physics, to the future of food and the implications of our ageing population, we currently support over 35 research teams who are working to find solutions to some of the biggest questions that concern our future.

Founded in 2005 through the vision and generosity of Dr James Martin, the Oxford Martin School has grown into a global centre for interdisciplinary

scholarship and thinking about the future. In the seven years since the School's founding, our annual turnover of research funding has increased nearly six-fold from £2.5 million to over £14 million per year.

We are developing new approaches to some of the most intractable questions. Our research is helping to better anticipate the consequences of our collective actions, and to influence policy and behaviour globally. It is supported by a small core team of professionals who work to facilitate collaborative activity, foster public engagement, and translate and transmit ideas to influential audiences.

Oxford Martin School  
**research teams.**



## How we work

Our research is constantly evolving, with each research group established to achieve specific, clearly defined objectives. We cover four core themes: health and medicine; energy and environment; technology and society; and ethics and governance. Our strength lies in our ability to bring individuals from different disciplines together to work in teams which interrogate complex and globally significant challenges.

The School selects its teams through a highly competitive process and measures on-going performance against four criteria:



### 1. Scale and Significance

Is the research topic of global scale and future significance?



### 2. Academic Excellence

Are the people involved the best in their field, through past achievement and future potential?



### 3. Impact

Will this research make a major positive difference in the world outside academia and how will this be achieved?



### 4. Value Add

What is innovative about this research; how is it interdisciplinary; could the research be undertaken elsewhere; and, how will it add value to the School's overall aims?

“We need organisations like the Oxford Martin School to actually force us out of that little academic cocoon and confront the mighty issues of the world.”

**Professor Paul Collier**, *Co-Director, Oxford Institute for Global Economic Development*

“We often know what the solutions are to these tough global questions. What we lack is the will to do something about them. Through its ground-breaking interdisciplinary scholarship and innovative approach to cross-cutting partnership, the Oxford Martin School is generating the solutions, and importantly, putting them into action.”

**Chris Patten (Lord Patten of Barnes)**, *Chancellor, University of Oxford; Chairman, BBC Trust; member of the Oxford Martin Commission for Future Generations*

## AGEING POPULATIONS

### Oxford Institute of Population Ageing

*Director:*

*Professor Sarah Harper,  
Professor of Gerontology*

Over the next fifty years, the age composition of nearly every country is expected to move to one in which the old outnumber the young. We are seeing a fundamental shift in the demographic structure of society. This is historically unprecedented and will require significant changes to many of our institutions, from education to pensions. We investigate the wide-ranging impacts brought about by the global decline in fertility and late life mortality, which is driving this age compositional change, and make policy recommendations for how government, business and society can respond.

## ARMED CONFLICT

### Oxford Institute for Ethics, Law and Armed Conflict

*Directors:*

*Dapo Akande, University Lecturer in Public International Law*

*Dr David Rodin, Senior Research Fellow in Philosophy*

*Professor Jennifer Welsh, Professor of International Relations*

The 20th century was by far the bloodiest in human history. What might the 21st century have in store if we do not reconsider the ways we manage conflict? We have brought together expertise in ethics, law and international politics to reassess how the world governs armed conflict. Our work helps establish ethical principles at the foundations of international decision-making, from the use of precision munitions such as armed drones, to the global governance of nuclear weapons. We aim to determine how more authoritative structures and decision-making mechanisms can be created for the management and reduction of conflict.

“I’m a great believer in the Oxford Martin School’s idea of interdisciplinary working. It’s been enormously valuable for us and it’s also been fantastic fun. It makes for a terrific way to work but also the returns are very rewarding – we find things out quicker and we ask better questions.”

**Professor Angela McLean**, *Co-Director, Institute for Emerging Infections*

"I've long worried that the odds of our present civilisation reaching the end of this century without a severe setback are no better than 50/50. Against such odds, it's a relief that places like the Oxford Martin School are applying deep academic research to the big issues of the 21st century. It gives me hope."

**Martin Rees (Lord Rees of Ludlow)**, *Astronomer Royal; former President of the Royal Society; Fellow of Trinity College, University of Cambridge; member of the Oxford Martin School Advisory Council and Oxford Martin Commission for Future Generations*

# CAN WE ELIMINATE THE PROSPECT OF CYBER ATTACK?



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## BIODIVERSITY

### Biodiversity Institute

Director:  
Professor Katherine Willis, Tasso Leventis Chair in Biodiversity

Biodiversity is vital to the planet's life support system and provides the basic natural services – water, food, air – on which humans depend. However, climate change and human impacts are bringing biodiversity to a crisis point beyond which it may be impossible to replenish species or repair ecosystems. We have created a strong interdisciplinary research collaboration, both to advance the science of biodiversity and to develop the frameworks, structures and novel technologies to implement this science into management and policy. Our focus on biodiversity beyond protected areas and our integration of new technologies will help businesses and society develop best practices to conserve biodiverse ecosystems into the next century.

## CANCER

### Particle Therapy Cancer Research Institute

Directors:  
Professor Bleddyn Jones, Professor of Clinical Radiation Biology  
Professor Ken Peach, Professor of Particle Physics

Radiotherapy is successfully used in the treatment of about 40% of cancers, but it can cause transient and permanent side effects, some of which are severe. For this reason, the dose used is often restricted if the cancer is too near a vital organ. Charged particle therapy (CPT) offers potential advantages over conventional radiotherapy, since a much lower dose is delivered to healthy tissues and specifically to many vital organs. Currently, there are few comprehensive reports on CPT efficacy and few formal clinical trials have been performed. We are studying the clinical effectiveness and the associated radiation biology of CPT to treat cancer, and developing innovative partnerships to promote its use in the UK and elsewhere.

## CITIES

### Oxford Programme for the Future of Cities

Directors:  
Professor Michael Keith, Professor in Anthropology  
Professor Steve Rayner, James Martin Professor of Science and Civilization

Cities all over the world face complex and rapidly evolving challenges, such as climate change, global migration flows, transnational governance demands, financial volatility and expanding social inequalities. Addressing these challenges requires ingenuity and versatility, whether in policy making, investment decisions or daily life. Our focus on the 'flexible city' provides a new way of thinking about urban change. Our aim is to advance innovation in decision-making and help find more effective policies and governance structures that will enable cities to respond to evolving circumstances.

## CLIMATE CHANGE

### Programme on Modelling and Predicting Climate

Directors:  
Dr Chris Farmer, Research Fellow in Applied Mathematics  
Professor Tim Palmer, Royal Society Research Professor in Climate Physics

Climate predictions are used for making major decisions in climate mitigation, adaptation and geoengineering. The quality of a decision depends on the accuracy of the forecasts and how well the uncertainty in the forecast can be estimated. We bring advanced mathematical modelling techniques to develop new and better understandings of climate dynamics and atmospheric physics. We play an active role in informing global debate and advancing the field of climate science by developing improved modelling methods for weather and climate prediction.

“Fresh thinking in economics is urgently needed to mitigate many global challenges, not least systemic financial crises, the creation of sustainable jobs and employment, and the wide-ranging challenges of development. That is why I am supporting research at the Institute for New Economic Thinking at the Oxford Martin School (INET@Oxford).”

**George Soros**, Co-Founder, INET@Oxford

## COMPUTATIONAL COSMOLOGY

### Programme on Computational Cosmology

*Directors:*

*Professor Pedro Ferreira, Professor of Astrophysics*

*Dr Chris Lintott, Departmental Researcher in Physics*

Throughout most of scientific history, the speed at which we added to our knowledge of the universe was limited by the amount of data available. Science in the 21st century is fundamentally different. Advances in technology provide an unprecedented wealth of information to researchers. We are a team of astrophysicists who recognise that the tools and technologies we are developing to map the skies can be used in many other fields of analysis. Our focus is on enhancing collaboration across disciplines and sharing methodologies that will accelerate progress in fields as diverse as oceanography, climate science and medicine.

## COMPUTING

### Institute for the Future of Computing

*Directors:*

*Professor Sadie Creese, Professor of Cybersecurity*

*Professor David De Roure, Professor of e-Research*

*Professor Bill Roscoe, Professor of Computing Science*

We are entering a new world of 21st century computing that requires better understanding as the reach and speed of computers accelerate. Critically, cyber security is an increasingly important requirement in this data-driven world. We research, analyse and develop new computing technologies to help apply advanced algorithms for climate modelling, create simulations for disease research and increase analytical capacity for mapping vast quantities of complex information. While advancing these computing technologies, our efforts aim to develop a safe, secure and prosperous cyberspace through leading international research and collaborative programmes.

## ECONOMIC DEVELOPMENT

### Oxford Institute for Global Economic Development

*Directors:*

*Professor Paul Collier, Professor of Economics*

*Professor Anthony Venables, BP Professor of Economics*

Although the last 20 years have seen an unprecedented fall in global poverty, inequality remains an urgent issue in those countries which have been left behind. We are improving understanding of why some regions have successfully increased participation in the world economy while others have not. We are actively involved in informing international policy debates around development challenges, and helping to implement successful strategies that will raise the opportunities for low-income countries currently left behind.

## EMERGING INFECTIONS

### Institute for Emerging Infections

*Directors:*

*Professor Angela McLean, Professor of Mathematical Biology*

*Professor Rodney Phillips, Professor of Clinical Medicine*

New infections still present a threat to humanity. They are impossible to prevent and hard to predict. If we can understand the underlying processes that drive the emergence and spread of human infectious diseases, we take an important step towards mitigating their most devastating impacts. We use both experimental and modelling work to learn how viruses evolve and infect, with the aim of developing timely and effective strategies to prevent further infections. We expanded in 2012 with new funding from the Oxford Martin School to use the latest genome sequencing technologies to develop individually-tailored therapies that can clear – or sustainably suppress – chronic viral infections, such as hepatitis C and HIV.

## FOOD

### Oxford Martin Programme on the Future of Food

*Director:*

*Professor Charles Godfray, Hope Professor of Zoology*

Without radical change to the way we produce and consume food, as well as to the governance of the food system, there is a substantial risk of significant increases in food prices with major political, environmental and humanitarian consequences. We aim to bring both fresh insights and effective action to address the challenges of feeding the global population sustainably, healthily and equitably. To achieve this, we work closely with academia, government, civil society and the private sector, to develop new scientific and policy approaches to critical issues concerning demand, supply and governance in the global food system.

## FUTURE TECHNOLOGY

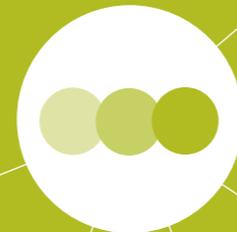
### Oxford Martin Programme on the Impacts of Future Technology

*Director:*

*Professor Nick Bostrom, Professor of Philosophy*

As the rate of technological innovation accelerates, it is vital to understand the nature of technological change, its directions and potential for humanity. We take a long-term view of the future, aiming to understand the impacts of breakthroughs in potentially transformative technologies such as computing, artificial intelligence, nanotechnology and surveillance technologies. By examining the technological capabilities that might be attained, we can gain an understanding of the implications for society and the consequences of present trajectories.

# WHAT WILL CITIES OF THE FUTURE BE LIKE?



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and Energy Reduction  
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## GEOENGINEERING

### Oxford Geoengineering Programme

Directors:

*Professor Richard Darton, Professor of Engineering Science*

*Professor Gideon Henderson, Professor of Earth Sciences*

*Professor Steve Rayner, James Martin Professor of Science and Civilization*

*Professor Julian Savulescu, Uehiro Professor in Practical Ethics*

Geoengineering is the deliberate, large-scale intervention in the Earth's natural systems to address climate change. Although society's first priority should be to reduce global carbon emissions, we may need to consider geoengineering technologies to reduce the harmful effects of elevated levels of carbon dioxide in the atmosphere. We combine scientific research into the practical application and scalability of proposed solutions with explorations of the ethical implications of technological deployment. We aim to provide governance solutions through robust research on the ethical, legal, social and geopolitical implications of a range of geoengineering approaches.

## HEALTHCARE INNOVATION

### George Centre for Healthcare Innovation

Directors:

*Professor Stephen MacMahon, Professor of Medicine*

*Professor Robyn Norton, Professor of Public Health*

In this decade more than 120 million people will die before the age of 60 from chronic diseases, such as heart diseases and cancers. Road traffic injuries will kill another 20 million and disable many more. We are working to develop novel strategies for managing disease, injury and disability, with a focus on regions of the world where health and social services are ill-equipped to deal with these challenges, in particular India and China. Our approach is two-pronged: research on the evaluation and implementation of practical, affordable models of care delivery, and development of investment-ready, low-cost technologies to increase access to effective treatments for major chronic diseases.

## HUMAN RIGHTS

### Oxford Martin Programme on Human Rights for Future Generations

Directors:

*Dapo Akande, University Lecturer in Public International Law*

*Professor Simon Caney, Professor in Political Theory*

*Professor Sandra Fredman, Rhodes Professor of the Laws of the British Commonwealth and the United States*

Challenges such as poverty, environmental change and armed conflict require international co-operation on an unprecedented scale. Our actions on these issues will affect the welfare of future generations and those who do not have a voice. Yet there are serious questions regarding the adequacy of existing frameworks to face these challenges. We have formed a unique collaboration of experts in law, politics and ethics to consider the ways in which ethical dilemmas can be translated into robust legal and policy solutions. We aim to inform the development of a global governance framework for resource allocation and institutional regulation in which justice and human rights play a fundamental role.

## HUMANITY'S FUTURE

### Future of Humanity Institute

*Director:*  
Professor Nick Bostrom, Professor of Philosophy

No-one can know what the future will hold, but through our research, we consider how we as a society might deal with different future scenarios, and ideally avoid some of them. We examine a range of potential global risks, from nuclear war to worldwide tyrannies, pandemic infections, cosmic hazards and economic collapse. With a team of leading intellects from philosophy, mathematics, economics and physics, we aim to develop more informed, reflective and responsible ways of dealing with global threats in order to positively shape humanity's long-term future.

## MIGRATION

### International Migration Institute

*Directors:*  
Dr Oliver Bakewell, Senior Researcher, Oxford Department of International Development  
Dr Hein de Haas, University Lecturer, Oxford Department of International Development

The movement of people has always played a central role in social, economic and political change. However, policy makers and researchers are ill-prepared for future migration trends primarily because of a limited insight into the factors driving human mobility and how such factors affect the global migration map. We pioneer new theoretical and methodological approaches, working with researchers and policy makers in the global South and North. We approach migration as an intrinsic part of broader global transformation processes rather than a problem to be solved. Our work aims to inform policies that can fully realise the potential benefits of migration for individuals and societies.

## MIND

### Programme on Mind and Machine

*Directors:*  
Professor Jonathan Flint, Professor of Molecular Psychiatry  
Professor Gero Miesenböck, Waynflete Professor of Physiology  
Professor Scott Waddell, Professor of Neurobiology

Advances in understanding how the brain works are rapidly leading to new possibilities for intervention in brain function. The ability of brains and machines to talk directly to each other is fast becoming a possibility. We are pioneering the field of optogenetics, which involves the genetic modification of nerve cells in the brain to respond to light. We bring together a collaboration of biologists, engineers and computer scientists to work on developing and applying this technology that allows the observation of and intervention in brain function. While advancing science, we are also addressing the profound ethical, legal and social issues related to understanding behaviour and potentially manipulating it.

## NANOMEDICINE

### Institute of Nanoscience for Medicine

*Directors:*  
Dr Sonia Contera, University Lecturer in Biological Physics and Nanomedicine  
Dr Sonia Trigueros, Research Fellow in Biological Physics

Nanotechnology has the potential to revolutionise the way we detect and treat trauma and disease. However, much work is needed to establish fundamental design principles and understand potential nano-toxicological effects before effective treatments can be developed. We are working at the interface of biology, physics, chemistry and engineering to create the tools to facilitate novel strategies for new treatments using nanostructures that target disease and promote healing.

## NEW ECONOMICS

### Institute for New Economic Thinking at Oxford (INET@Oxford)

*Director:* Eric Beinhocker, Executive Director, INET@Oxford

Fresh economic thinking is required to address a number of critical challenges that the world faces, ranging from managing systemic financial crises, to reinvigorating economic growth and addressing rising inequality. INET@Oxford is providing new perspectives for economic analysis, empirical modelling and policy design to address the major challenges of the global economic system. Our aim is to stimulate innovation and debate in economics, support leading-edge interdisciplinary research, and redefine the education of the next generation of economists, business people and government leaders.

INET@Oxford has a rapidly expanding portfolio of programmes. Current initiatives include:

#### Complexity Economics

Applying perspectives and tools from complex systems theory, network theory, reflexivity theory, and evolutionary theory to deepen our understanding of economic phenomena, including financial system stability and fragility, economic growth and innovation, environmental sustainability, and the management of systemic risk.

*Directors:*  
J. Doyne Farmer, Professor of Mathematics

Felix Reed-Tsochas, James Martin Lecturer in Complex Systems

#### Economic Modelling

Researching the causes and consequences of the financial crisis, the impacts of shifts in inequality of income and wealth, flaws in mathematical tools underpinning neo-classical economics, and the development of new forecasting methods that are robust in the face of structural change.

*Directors:*  
Sir David Hendry, Professor of Economics

Sir Tony Atkinson, Professor of Economics

#### Ethics and Economics

Involving economists, philosophers, legal scholars, management researchers and policy experts to examine why financial institutions take such enormous risks, which are not always in the interest of their shareholders and clients, and why post-2008 the financial services industry is strongly resisting reforms that would constrain such risk-taking.

*Directors:*  
John Armour, Professor of Law and Finance

David Vines, Professor of Economics

#### Employment, Equity and Growth

Identifying and assessing the economic theories, policies and institutional changes required for fairer, more inclusive growth, with a focus on creating sustainable jobs and reducing unemployment in a period of intensifying globalisation and technology change.

*Acting Director:*  
John Muellbauer, Professor of Economics

# CAN WE PRESERVE OUR PRECIOUS NATURAL RESOURCES?



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## NUCLEAR MATERIALS

### Programme in Nuclear and Energy Materials

*Directors:*  
Professor Chris Grovenor, Professor of Materials  
Professor James Marrow, James Martin Professor of Energy Materials

Oil and gas are finite resources and many countries are turning to nuclear power to help solve the world's energy problems. The question about nuclear power has now become not if we should be using it but how we can ensure the next generation of nuclear power systems is demonstrably safer, proliferation resistant and efficient. We are building a world-class centre of research to understand the materials problems in nuclear power generation and to transmit our knowledge to key decision makers in policy and business.

## OCEANS

### 21st Century Ocean Institute

*Directors:*  
Professor Gideon Henderson, Professor of Earth Sciences  
Professor David Marshall, Professor of Oceanography

In the coming decades, the ocean carbon cycle will experience major changes which have not occurred for at least three million years. These changes will have profound impacts on the chemistry and biology of the ocean and on our future climate. We are trying to understand and quantify how the ocean responds to a changing carbon cycle. We integrate Oxford leadership in ocean physics and biogeochemistry with innovative computational modelling of ocean circulation. Our research aims to predict and prepare for large-scale changes in ocean chemistry and sea levels.

## PLANTS

### Plants for the 21st Century Institute

*Directors:*  
Professor Liam Dolan, Sherardian Professor of Botany  
Professor Jane Langdale, Professor of Plant Development

Ensuring food and fuel security around the world in the 21st century is a major challenge that requires innovative research in plant sciences. We bring together three pinnacles of food security: improving crop production, promoting species conservation, and protecting forested land. Our research across the crop sciences is helping to develop plants that will be able to tolerate drought, produce greater yields and resist disease. A key aim is to generate scientific resources and foster initiatives that will enable policy makers, conservation agencies, multinational companies and individuals to use land in the most sustainable and efficient way.

## QUANTUM TECHNOLOGY

### Oxford Martin Programme on Bio-Inspired Quantum Technologies

*Directors:*  
Professor Dieter Jaksch, Professor of Physics  
Professor Vlatko Vedral, Professor of Quantum Information Science

Quantum computing offers an as yet unfulfilled promise of making gigantic leaps in our data-processing capacity, and could lead to important benefits across all aspects of society. The greatest hurdle in the development of such technology is the extreme fragility of quantum memory. We are taking an innovative top-down perspective to learn from nature how certain biomolecules, such as those responsible for photosynthesis, are able to demonstrate quantum coherence. With our interdisciplinary team of physicists, material scientists, modellers and computer scientists, we are developing ways to replicate these properties and take the first steps to building a quantum computer.

“When we needed advice on the big questions that will shape South Africa’s future to 2030, we turned to the Oxford Martin School. From water security to tackling unemployment to transport futures, the School’s academics helped to challenge and inform our thinking.”

**Trevor Manuel**, Minister and Chair of the National Planning Commission, South Africa; member of the Oxford Martin Commission for Future Generations

## RESOURCE STEWARDSHIP

### Oxford Martin Programme on Resource Stewardship

Directors:

Professor Myles Allen, Professor of Geosystem Science

Professor Jim Hall, Professor of Climate and Environmental Risks

Professor Steve Rayner, James Martin Professor of Science and Civilization

Professor Katherine Willis, Tasso Leventis Chair in Biodiversity

Freshwater, land, atmosphere and biodiversity are universally vital resources subject to both cumulative and systemic pressures arising from human activities, which put them under severe degradation and even depletion. We have gathered a team of philosophers, anthropologists, economists, modellers and environmental scientists to re-think how we monitor, manage, maintain and allocate globally important resources. Our aim is to work through understandings of individual and collective behaviour and current institutional practice to deliver a new framework for stewardship that will ensure the world’s essential resources remain available for generations to come.

## SCIENCE & ETHICS

### Institute for Science and Ethics

Director:

Professor Julian Savulescu, Uehiro Professor of Practical Ethics

New and emerging sciences, such as those in stem cells, synthetic biology, artificial reproduction, the cognitive sciences and genomics, may radically and profoundly change human life. Without practical ethics, our knowledge of what we can do will radically outstrip our understanding of what we should do. The world’s decision makers need to know if, how and under what circumstances we should place limits on research, development and use of these kinds of scientific advances. Our experts in medicine, philosophy, practical ethics, sociology and psychology are collating relevant evidence and applying philosophical methodology to analyse a range of ethical issues and help make recommendations for possible courses of action.

## SCIENCE & SOCIETY

### Institute for Science, Innovation and Society

Director:

Professor Steve Rayner, James Martin Professor of Science and Civilization

Advances in science and technology promise to bring solutions to a wide range of challenges faced by humanity, but they also raise difficult ethical, practical and governance questions that need addressing urgently. We bring fresh insights from cross-disciplinary approaches that question entrenched assumptions about how science, technology and society work. Our four core research programmes on cities, climate alternatives, bioproperty and neuromarketing share a common theme through exploring the role of science and values in shaping policy responses. We combine the highest standards of scholarship and relevance to pursue and disseminate timely research in the UK and worldwide.

## SOLAR ENERGY

### Programme on Solar Energy: Organic Photovoltaics

Directors:

Professor Alain Goriely, Professor of Mathematical Modelling

Dr Henry Snaith, Reader in Physics

Solar energy technologies play an increasingly important role in our global power generation mix. To date, a key challenge has been in the need to bring down the cost and raise the efficiency of solar technologies. While organic solar cells are cheaper to produce, lighter and more flexible than traditional silicon-based solar cells, the problem of efficiency remains. Our collaboration between mathematical modelling and physical experiments is bringing new detail to the challenge, and will subsequently enable an acceleration in improvement of devices to ensure that solar energy makes the maximum contribution to society’s energy budget.

## STEM CELLS

### Oxford Stem Cell Institute

Directors:

Dr Paul Fairchild, University Lecturer in the Immunobiology of Stem Cells

Professor Colin Goding, Professor of Oncology

Stem cells offer huge potential to replace diseased or worn out tissues and treat such illnesses as heart disease, Parkinson’s and even diabetes. Yet there is still a great deal to learn about stem cells before we can fully harness their potential and apply these treatments in the clinic. We have created an internationally renowned centre of interdisciplinary expertise on stem cell science, fostering a network of scholars working on a broad range of technologies, from adult to embryonic stem cells, and from nuclear reprogramming to tissue engineering. Our work is helping to harness opportunities and accelerate innovation across the range of specialist expertise in stem cell research.

## TIDAL POWER

### Programme on Globalising Tidal Power Generation

Directors:

Professor Guy Houlby, Professor of Civil Engineering

Dr Richard Willden, University Lecturer in Engineering Science

Tidal power presents a huge, as yet untapped, opportunity to generate clean and affordable power. However, to fully harness the potential of tidal energy, there are many challenges to overcome, from infrastructure lock-in and regulatory hurdles to engineering obstacles. We examine how to make best use of this globally abundant supply of low-speed tidal flow resources, as well as carry out independent research on turbine mechanism and design. Our objective is to harness and deliver renewable power across the globe in a way that is both economic and scalable.

## TRANSPORT

### Institute for Carbon and Energy Reduction in Transport

Directors:

Professor David Banister, Professor of Transport Studies

Dr Malcolm McCulloch, University Lecturer in Engineering Science

Effective interventions in low carbon transport require models that combine the technological feasibility with an appreciation of the complexities of how markets work. Understanding these relationships is central to our research. Our whole-systems approach has resulted in the development of a model that combines the technological opportunities for low carbon vehicles with the socio-technical difficulties associated with the diffusion of innovation and public acceptance of those technologies. The output of our research is of direct interest to the transport industry, and we provide policy advice on the pathways to implementation.

## TROPICAL FORESTS

### Oxford Centre for Tropical Forests

Director:

Professor Yadvinder Malhi, Professor of Ecosystems Science

Tropical forests are the greatest treasures of life on Earth, housing over half of all global biodiversity and providing numerous ecosystem services, including cycling of carbon and water. We conduct fundamental research on the natural and social science of tropical forests and their governance, and foster a broad network of expertise across academics, NGOs and businesses to share knowledge and perspectives about the ecology, conservation and stewardship of forests around the world. We aim to understand the functioning and future prospects of tropical forests, and provide a resource for all those with a stake in their future.

## VACCINES

### Oxford Martin Programme on Vaccines

Directors:

Professor Adrian Hill, Professor of Human Genetics

Professor Susan Lea, Professor of Chemical Pathology

Professor Andrew Pollard, Professor of Paediatric Infection and Immunity

Professor Christoph Tang, Glaxo Professor of Cellular Pathology

Death from infectious diseases remains a substantial risk to many people and the threat of global pandemics continues to pose great challenges for vaccine research. We design and develop new vaccines against infectious diseases of global health importance, such as pandemic influenza, dengue, malaria, meningitis, typhoid and hepatitis C. In 2012, our programme expanded with funding from the Oxford Martin School to integrate improved vaccine design with new needle-free delivery technologies. Our research incorporates a broad range of disciplines that underpin modern vaccinology, from pathogen genomics to molecular biology to health economics, while also exploring the ethical frameworks required to respond to new vaccination approaches.

# CAN WE ELIMINATE ILLNESS & DISEASE?



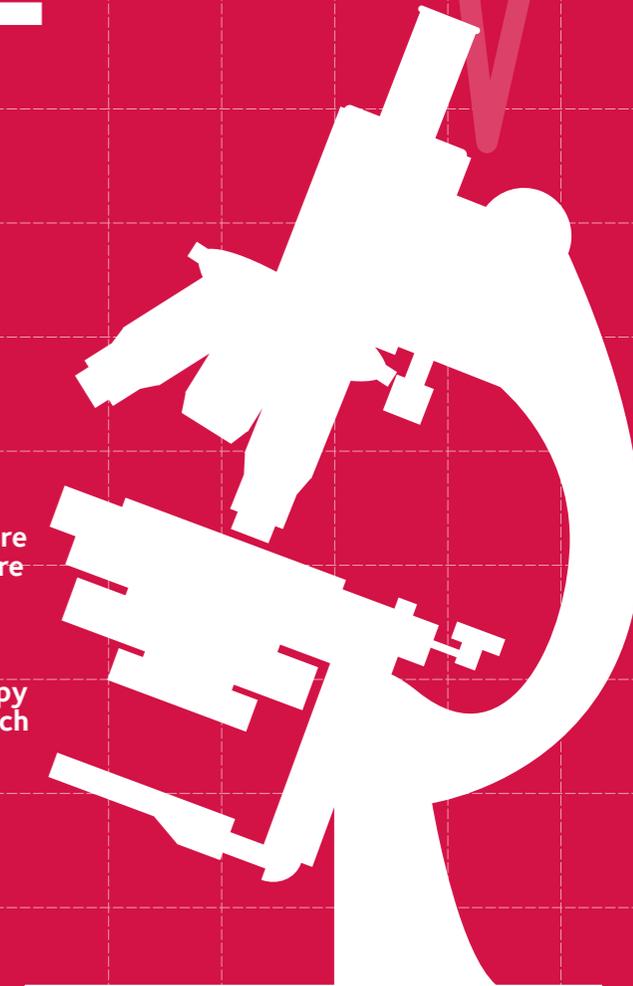
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## Oxford Martin Commission for Future Generations

### Chaired by Pascal Lamy, Director-General of the World Trade Organization

Given the complexity and gravity of today's economic, social and environmental challenges, improving decision-making to consider the implications for the coming decades must be a priority for every responsible community or organisation.

The Oxford Martin Commission for Future Generations, launched in September 2012, aims to address the growing short term preoccupations of modern politics and identify ways to overcome today's impasse in key economic, climate, trade, security, and other negotiations. Chaired by Mr Pascal Lamy, Director-General of the World Trade Organization, the Commission brings together leaders from government, business and society to examine the current gridlock in international and national attempts to deal with key global problems.

**Michelle Bachelet**, former President of Chile; Executive Director, UN Women

**Lionel Barber**, Editor, The Financial Times

**Roland Berger**, Chairman, Roland Berger Strategy Consultants

**Ian Goldin**, Director, Oxford Martin School; Professor of Globalisation and Development, University of Oxford (Deputy Chair of the Commission)

**Arianna Huffington**, President and Editor-in-Chief, Huffington Post Media Group

**Mo Ibrahim**, Chair of the Board, Mo Ibrahim Foundation

**Luiz Felipe Lampreia**, former Minister of Foreign Affairs, Brazil

**Liu He**, Minister, Office of the Leading Group on Financial and Economic Affairs, Development Research Center of the State Council, the People's Republic of China

**Kishore Mahbubani**, Dean and Professor in the Practice of Public Policy, Lee Kuan Yew School of Public Policy, National University of Singapore

**Trevor Manuel**, Minister and Chair of the National Planning Commission, South Africa

**Julia Marton-Lefèvre**, Director-General, International Union for Conservation of Nature (IUCN)

Embedding the long-term into today's increasingly pressured decision structures will allow societies and businesses to harvest the extraordinary potential and mitigate the systemic risks and vulnerabilities associated with future developments. As pressures mount, there is an urgent need to focus on the legacy left for future generations.

This important initiative draws on a highly distinguished group of Commissioners and the latest analysis of global best practice, as well as the wide-ranging expertise of more than 300 scholars associated with the Oxford Martin School. The Commission will provide guidance on how countries, businesses and global institutions may overcome the pressures of short-term crisis management in order to meet urgent national and global challenges – with the final report to be released in late 2013.

**Nandan Nilekani**, Chairman, Unique Identification Authority of India; former CEO, Infosys

**Chris Patten** (Lord Patten of Barnes), Chancellor, University of Oxford; Chairman, BBC Trust

**Baron Peter Piot**, Director, London School of Hygiene and Tropical Medicine; former Executive Director, UNAIDS

**Martin Rees** (Lord Rees of Ludlow), Astronomer Royal, former President, the Royal Society; Fellow of Trinity College, University of Cambridge

**Amartya Sen**, Nobel Laureate and Professor of Economics and Philosophy, Harvard University

**Nicholas Stern** (Lord Stern of Brentford), IG Patel Professor of Economics, London School of Economics

**Jean-Claude Trichet**, former President, European Central Bank

**Robert Zoellick**, former President, The World Bank

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The Oxford Martin School provides fixed term funding for innovative, future-oriented projects, either through establishing a new Institute or through developing a specific academic programme of research.

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Addressing questions about how and why our environment is changing and how responses can be developed.

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**Pascal Lamy**, Director General, World Trade Organization

**Amory Lovins**, Co-founder, Chairman & Chief Scientist, Rocky Mountain Institute

**James Martin**, Founder, Oxford Martin School

**Julia Marton-Lefèvre**, Director-General, International Union for Conservation of Nature (IUCN)

**Joseph Nye**, Professor & former Dean, Harvard Kennedy School

**Ngozi Okonjo-Iweala**, Minister of Finance, Nigeria

**Martin Rees** (Lord Rees of Ludlow), Astronomer Royal, former President of the Royal Society; Fellow of Trinity College, University of Cambridge

**Amartya Sen**, Professor, Harvard University

**Mark Shuttleworth**, IT entrepreneur and Founder of the Ubuntu Project

**Martin Sorrell** (Sir), Chief Executive, WPP

**Nicholas Stern** (Lord Stern of Brentford), Professor, London School of Economics

**Joseph Stiglitz**, Professor, Columbia University

**HRH Prince Talal Bin Muhammad**, Prince of Jordan

**Crispin Tickell** (Sir), former Director, Policy Foresight Programme

**Laurence Tubiana**, Director, Institute of Sustainable Development and International Relations

**Craig Venter**, President, J Craig Venter Institute

**Zhou Qifeng**, President, Beijing University

**Ernesto Zedillo**, Director, Yale Center for the Study of Globalization; former President of Mexico

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**Professor Alastair Buchan**, Head, Medical Sciences Division

**Professor Timothy Endicott**, Dean, Faculty of Law (representing the Social Sciences Division)

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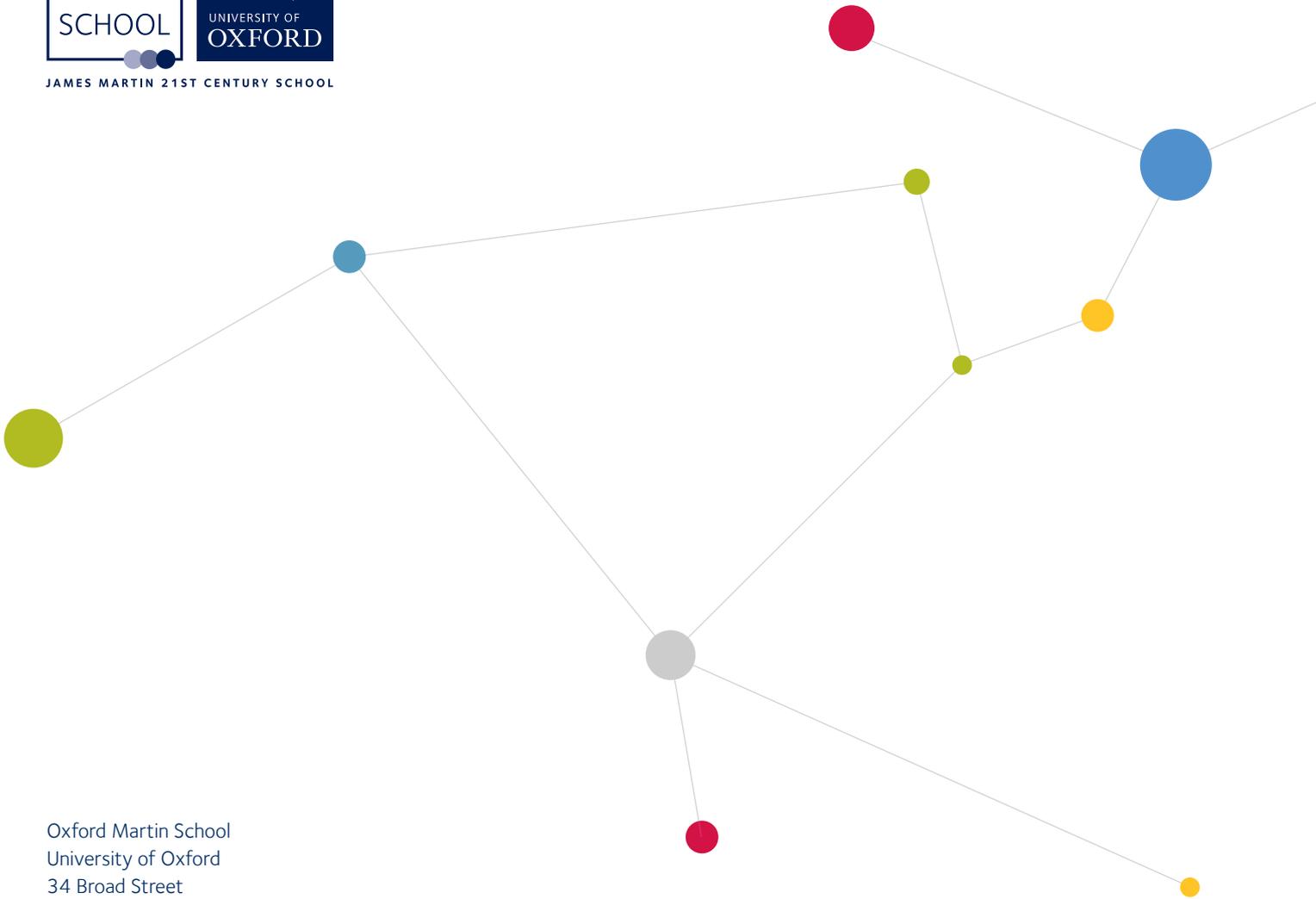
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**Professor Shearer West**, Head, Humanities Division



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