

Oxford Martin School

Tackling the challenges
of the 21st century



JAMES MARTIN 21ST CENTURY SCHOOL

First Five Years
2005-2010



Contents

Five years of research and impact	1	Impact beyond academia	20
Transforming Oxford	2	Finances, growth and governance	22
Why the Oxford Martin School?	4	Research Institutes and Programmes	24
Tracking our Progress	6	Selected publications, presentations and press coverage	28
Tackling the challenges of the 21st century	8		
Global scale, future significance	10		
Positive impact, effective influence	12		
Collaborative power, value-added results	14		
Academic excellence, original scholarship	18		

Our research on solar energy aims to develop abundant, efficient and low-cost power through organic photovoltaics.

Five years of research and impact Director's report

The Oxford Martin School is a unique interdisciplinary community that brings great scholars together to work in new ways to address the 21st century's most urgent challenges.

We believe that humanity is at the crossroads. This could be our finest century, where we finally eradicate poverty, disease and other great challenges. Or it could be our worst, where a series of systemic risks overwhelm us and lead to catastrophic events. The outcome will be determined by the ideas we are able to develop and mobilise into effective action. It will depend on our collective capacity to understand and manage global challenges.

The Oxford Martin School was established in 2005 thanks to the vision and generosity of James Martin. It is an extraordinary and unique enterprise. In our first five years we have created a network of some 300 scholars across Oxford. Our transformative research offers new insights and transcends traditional disciplinary structures.

Our approach to research is distinctive. It addresses the toughest questions about the future. We forge interdisciplinary collaboration and bring about positive change. It is an approach that is already reaping rewards through scientific achievements, academic accolades, policy changes and public recognition. Over the past five years, we have made breakthroughs on the frontiers

of science, such as nanotechnology, solar power and particle therapies for cancer. We have grown from our original ten institutes to an interdisciplinary collaboration of Oxford scholars in over 30 research teams tackling future challenges. Our original insights are sought by audiences outside academia, and already have informed governments' policy agendas, corporate business plans and public opinion.

This report reflects on the achievements of our first five years. It provides a glimpse into the tremendously vibrant and diverse research projects we are undertaking at the University of Oxford. We hope that this snapshot stimulates your engagement as we seek to build partnerships and awareness of our research insights.

We are a start-up. The achievements so far are indicative of the enormous potential of the Oxford Martin School to further fulfil its exciting and vitally important mission in the years to come.

Professor Ian Goldin
Director



Transforming Oxford

A message from the Vice-Chancellor of Oxford University

Throughout its history, the University of Oxford has been at the forefront of research and debate on the great issues facing our world. Over the past five years, we have seen the Oxford Martin School grow into what has become a critical role in Oxford – as both a model and a channel for interdisciplinary research on future challenges and opportunities. It has had a tremendous impact on the life and culture of the University through the quality of its research, wide-ranging influence, and success in fundraising efforts. In a very short space of time, the Oxford Martin School has become an integral part of the University, different from other University structures, and highly influential as a result.

The School has a growing international reputation for innovative, interdisciplinary research that resonates in public debate and international decision-making. This report gives some insights into the School's activities and extraordinary achievements of the past five years. I am convinced that building on this remarkable foundation, the School will be even more exciting and successful in the years ahead.

Professor Andrew Hamilton
Vice-Chancellor



The Old Indian Institute building – home of the Oxford Martin School.





Why the Oxford Martin School?

A message from James Martin, Founder



At the start of the 21st century, humankind found itself on an unsustainable course – a course that, unless it is changed, will lead to catastrophic consequences. But there are also incredible opportunities. Medical advances, technological innovation, computing power, and wealth generation bring promises of a better future for everyone. These mega-issues are interrelated and need a long-term view to understand and address them. They demand scholarship of the highest order, for which the University of Oxford is pre-eminent.

The Oxford Martin School works on the principle that humanity's behaviour today will have lasting impacts. By taking a broad, interdisciplinary and long-term look at the problems of the planet, solutions are already starting to emerge from the School's work. Academics are providing original insights into challenges ranging from tropical forest governance to nanotoxicity in new drug delivery methods; or from renewable energy solutions to

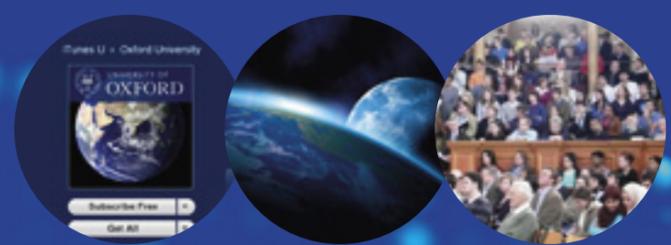
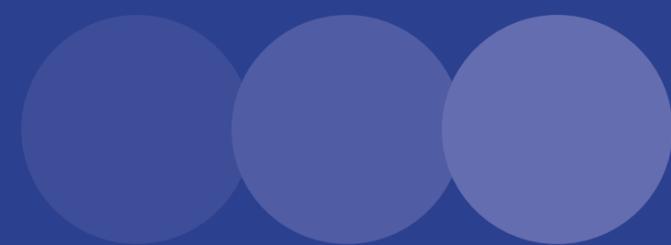
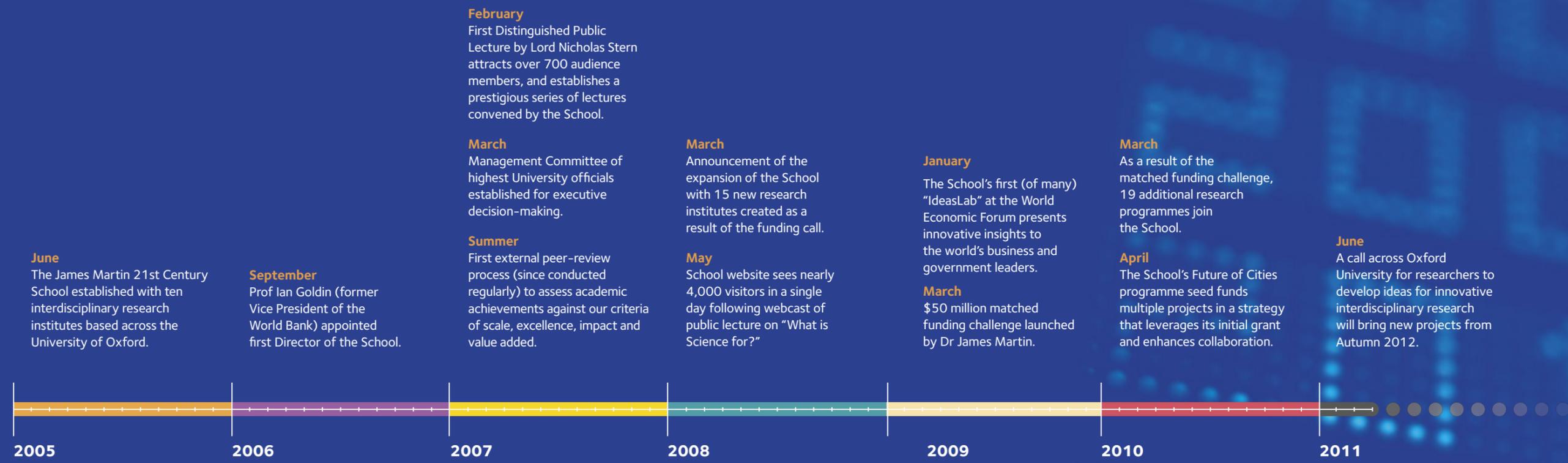
global migration dynamics. Their research is helping to better anticipate the consequences of our actions and influence policy and behaviour accordingly. They are developing new approaches to some of the most intractable questions. In the five years since its founding, the School has grown into a global centre for interdisciplinary scholarship and thinking about the future. I am proud to have made possible the Oxford Martin School, and excited to be engaged with its research.

Dr James Martin
Founder

We believe that powerful ideas can help humanity can change its course to ensure a better future for everyone.



Tracking our progress



Tackling the challenges of the 21st century

Our research remit is wide-ranging and evolving. We are currently probing the future boundaries of the mind; testing the ethical frontiers of bioscience; finding ways to increase crop yields; understanding the impacts of an ageing population; and much more. Our research projects are assessed against four criteria:

- **Scale and Significance**

Is the research topic of global scale and future significance?

- **Impact**

Will this research make a major positive difference in the world outside academia?

- **Value Add**

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

- **Academic Excellence**

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

Our ambitious research agenda clusters projects under four themes that target future challenges and opportunities:

- **Technology & Society**

Examining major demographic change, socio-economic drivers and impacts of new technologies

- **Ethics & Governance**

Exploring new frameworks for analysing and addressing the ethical and management challenges of a complex and interconnected world

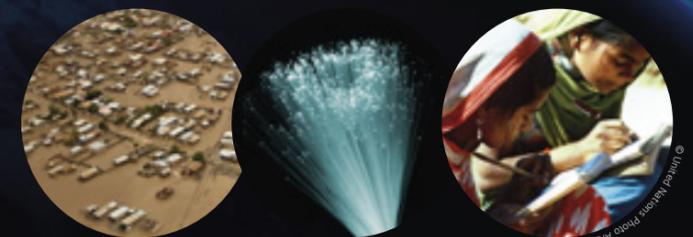
- **Energy & Environment**

Advancing research on energy solutions, environmental science and biodiversity

- **Health & Medicine**

Developing innovative technologies and approaches to health challenges of the future

The examples that follow highlight the achievements of our research through our creative and flexible approach. This is a small sample of how the School is having a global impact and effecting positive change.



Geoengineering the climate:

If we are to avoid dangerous climate change we need to rapidly reduce emissions. But current strategies may fall short. If our best efforts fail or are insufficient to address the challenge, we may need, reluctantly, to consider a Plan B – geoengineering the climate to reduce the harmful effects of increased levels of carbon dioxide in the atmosphere. This is a difficult and controversial strategy, with tremendous uncertainty as to its costs, effectiveness and global impacts. That is why, in 2009, the School initiated the Oxford Geoengineering Programme – to build an evidence-base of science around geoengineering, and to ensure that technological possibilities are, vitally, set in their wider ethical, legal, political and economic contexts.

Climate change is, ultimately, a social problem. It will affect worst the world's poorest people. If geoengineering is going to be a future option, the world's leaders will need robust research on which to base their decisions. This Programme, conducted by oceanographers, chemists, physicists and engineers in collaboration with ethicists and social scientists, aims to provide the evidence and advice required.

Climate change will bring extremes in weather, affecting coastal communities and the world's poorest most severely.

Global scale, future significance

Climate change is a critical challenge that needs to be urgently addressed. Oxford University has a long history of excellence in the environmental and related sciences. We have built on this wide range of established expertise to create new kinds of cross-cutting research. Our aim is to develop original and practical insights that are informed by a deep understanding of the scientific, ethical and social dimensions of climate change.

What kinds of approach are required to address complex global challenges?

We believe that we can make a major difference by bringing fresh thinking and integrated approaches to global challenges. An example is our work on climate and the environment. In 2005, we enabled the Environmental Change Institute to develop new projects on the impacts of the new carbon economy, the public communication of climate research, and challenges of environmental governance. An important part of the research was to bring greater understanding of the human, as well as scientific, dimensions to climate change. The findings from these projects provided innovative contributions to the academic literature and continue to have a significant influence on the global policy agenda.

In 2008, our portfolio of research on the environment expanded to include new multidisciplinary teams of researchers considering major areas of environmental influence and impact, such as transport, oceans and forests. Our team on reducing carbon in transport works on the principle that any attempt to reduce carbon emissions – the major factor influencing our climate – must take into account the interactions between technology and society. They have participated in projects from trialling electric

scooters to building energy efficient sports cars. Much of their learning about how technologies intersect with social systems, public policy and decision-making has been shared and developed with other Oxford Martin School teams, such as those working on the impacts of carbon in the oceans or on tropical forest governance.

A tremendous opportunity to expand and integrate our research portfolio on environmental and related sciences came with the 2009 matched funding challenge. This created new research on climate modelling, renewable technologies, nuclear energy, biodiversity and plant science, as well as geoengineering. Membership of the School allows these disparate research groups to cross-fertilise ideas and share knowledge in ways that were previously not possible in Oxford. Their collaboration with each other and among other academics in the School have contributed to new ways of thinking about our global future. They are helping us to develop theories of risk and resilience, deal with uncertainty, and interpret complex data. They are informing the development of robust measures of international governance, and developing strategies that seek to fairly address the needs of future generations.



Positive impact, effective influence

Great ideas can lead to exciting opportunities, such as new health technologies or better governance. We also need to be prepared for future crises. This will give us the best chance of averting their worst effects. We work with our academics to ensure the results of their research and original insights have a significant positive impact on business, government and civil society.

How can we best prepare for the crisis of a pandemic?

Pandemics have been the greatest killers in history. They remain a substantial threat. Influenza alone killed tens of millions of people in the 20th century. In our increasingly interconnected world, infectious diseases travel faster, further, and have the potential to kill more people than ever before. We are helping the world keep one step ahead of a pandemic through our innovative research at the Institute for Emerging Infections, and unique collaborative initiatives with both academics and policymakers.

Co-led by a professor of mathematical biology and a professor of clinical medicine, the Institute combines modelling and experimental work to learn about how viruses evolve and spread. The team of biologists, mathematicians and clinicians collaborate to develop and interpret evidence that will help governments better anticipate and prepare for challenges posed by novel infections. For example, one of the academics was a member of the review group responding to the House of Lords Select Committee inquiry into 'pandemic influenza'. So, in 2009 when H1N1 'swine flu' started to spread beyond its origins in Mexico, the team had already helped the UK government and international health organisations prepare their responses.

The Institute's directors acknowledge that their recommendations for governments to effectively manage and distribute antiviral drug stockpiles raise complex ethical issues. Governments may need to prioritise the needs of different communities or rate their vulnerabilities to infection. The Institute has teamed up with others in the School to explore the ethical and practical implications of drug distribution strategies. To maximise the results of their collaborations, they have commented in the press, held public events, co-authored papers, and published a widely-acclaimed book on the ethical issues arising from treatment and management strategies for infectious disease. Their efforts continue to help explain the biology, evolution and impact of pandemics, bringing rational advice and reasoned debate on an important public issue.

Informing public debate:
In April 2009, at the height of a media frenzy over the H1N1 outbreak, Professor Angela McLean, Co-Director of our Institute for Emerging Infections, wrote an article for a leading daily newspaper to reassure readers that they should remain calm. "The early days of an emerging infectious disease are often characterised by uncertainty and by rapidly shifting events, but that does not mean that disaster is imminent," she wrote. "For now it is still possible to hope that if a pandemic does emerge, it will be mild enough that today's schoolchildren will scarcely remember it." These words, published just ten days into the outbreak, were written at a time when the common tone verged on the hysterical. The advice, however, was prescient. Recent data show that for every person who became ill with swine flu in 2009, up to twenty people became immune. This explains why the swine flu pandemic was indeed so "forgettable".

New global systemic risks like pandemics require innovative approaches and effective forms of collaboration.



Collaborative power, value-added results

We foster an interdisciplinary research environment. Our scholars are able to develop important collaborative activities that would not traditionally be possible. Together, we harness wide-ranging expertise and develop original insights to address complex questions. It is a value-added approach that is fast bringing benefits to Oxford and the world.

What can collaborative approaches bring to regenerative medicine?

Pluripotent stem cells are the master cells which can develop into any of the 200 or so specialised cell types that make up the body. They offer great potential to replace diseased or worn out tissues and to treat such illnesses as heart disease, Parkinson's or even diabetes. Human lifespan could be greatly prolonged and quality of life enhanced through tissue regeneration and other stem cell treatments. Yet there is still a great deal to learn about stem cell science before we can fully harness its potential and apply these treatments in the clinic.

Oxford University has been involved in stem cell science since its early days, developing expertise in a range of technologies. For example, researchers are working on molecular disguises for embryonic stem cells to avoid tissue rejection, or tracing the transcription factors of cells to understand, and ultimately direct, cell development and specialisation. Until recently, however, these diverse research groups did not have an easy

way to share their knowledge and work closely together. The Oxford Martin School established the Oxford Stem Cell Institute (OSCI) in 2008. The Institute's aim is to help speed up advances in stem cell science and bring new therapies into clinical practice. Now, through OSCI, scientists with different specialisms can link up with each other in a network of excellence that fosters innovative research and collaborative projects.

OSCI is advancing the progression of stem cell research, from its basic science to the mainstream application of new therapies. It requires collaboration across a wide variety of scientific and medical disciplines. OSCI is showing positive signs of success. Since its founding in 2008, the Institute has established an international reputation, and helped position Oxford University at the forefront of stem cell research. Working together, these teams of researchers are making important headway in the field of regenerative medicine and speeding up progress to radical new therapies.

Leveraging impact:

The Oxford Martin School's flexible approach to funding has enabled the Oxford Stem Cell Institute (OSCI) to grow from a virtual network to an established research institute with an international reputation. Over 40 research groups in 17 University departments are now connected through OSCI. With its seed funding to early-stage collaborative projects, OSCI is beginning to see exciting results both in its applications for major new grants and in its research findings.

The new multi-million pound Oxford Parkinson's Disease Centre is an example of a successful spin-off research initiative as a result of a seed grant from OSCI. The Medical Research Council has financed eight DPhil studentships, and the Edward Penley Abraham Foundation awarded £3.5 million for research fellowships and new laboratory space for the Oxford Stem Cell Facility.

Latest research from the Institute reveals how it may be possible to engineer new brain cells from a skin tissue sample. Recent findings also give new hope for treating tumours by targeting cancer stem cells. By leveraging its initial support from the Oxford Martin School, OSCI is showing that the promise of unlocking the therapeutic potential of stem cells is not far away.

Stem cell research holds the promise of regenerating damaged tissues and treating age-related diseases.



Beyond academia: In May 2009, the Oxford Institute for Ethics, Law and Armed Conflict (ELAC) hosted a high-level symposium on 'Proportionality and War' that brought together leading academics, military personnel, NGO representatives, and international lawyers to explore the issues around collateral damage to civilians in situations of conflict. This was just one of their wide-ranging initiatives to take ideas out of academia and reach the audiences who most need access to their research.

Members of the Institute regularly advise governments, military leaders and international organisations, such as the EastWest Institute. Through their blogs, press commentaries and public speaking engagements, they translate their ground-breaking research into critical analysis and policy advice that has demonstrable impact.

Collaborative power, value-added results (continued...)

What kind of expertise is needed to regulate and reduce incidents of war?

The 20th century was by far the bloodiest in human history, with over 180 million people killed as a result of war or conflict. Increasingly, however, the problems of war and conflict bring genuine existential threat to humanity. Nuclear weapons, which have been proliferating at an extraordinary rate in recent years, continue to threaten the elimination of all life on the planet. New forms of mass destruction are now also entirely plausible – weaponised biopathogens, for example.

Problems of war and conflict are crucially different from many other 21st century challenges, such as climate change, pollution, poverty or chronic disease. While climate change could be considered a by-product of forces aimed at the wider good – industrial development, energy use or transport, for example – war is an intentional form of harm. This raises the question of whether part of the solution to the problem of conflict can be found in regulation, management and norms. Current global principles of governance for war, which have barely changed since the Middle Ages, need radical reform.

Recognising the possibilities for delivering genuine innovation to address the problems of conflict, scholars from law, politics and moral philosophy combined forces to establish

the Oxford Institute for Ethics, Law and Armed Conflict (ELAC) at the Oxford Martin School. The School enabled them to develop a new collaborative approach to research that was not previously possible. ELAC is, in fact, the first research institute in the world to bring together these different disciplines with the aim of regulating and eventually eliminating conflict. The research seeks to inform and develop morally sound legal processes to regulate and eliminate war, or at least mitigate some of its worst threats and atrocities.

Over the past three years, the Institute has successfully established its academic credibility and expert voice. It has become a focal point for scholars engaged in collaborative research on armed conflict, across Oxford and with related institutions worldwide.

New developments in war technology require a radical rethink of the moral arguments and legal frameworks for regulating conflict.



Academic excellence, original scholarship

The Oxford Martin School is renowned for the quality of its academic research. Our scholars meet rigorous academic criteria and have achieved the best Oxford standards to become members of the School. We provide an environment where they can collaborate effectively, increase their impact and enhance their significance in addressing key questions.

How can we realise the potential of excellent minds to do innovative original research on the biggest future challenges and opportunities?

We believe in the power of original ideas and collaborative solutions. Answers to the problems of tomorrow require a deep intellectual commitment and a creative approach. That is why we attract the highest talent to the School, and foster work that cuts across disciplines. We give some of Oxford's foremost academics the intellectual freedom to create fresh insights through interdisciplinary research.

Academic excellence is one of the founding criteria for projects at the Oxford Martin School. Our researchers are globally recognised by their publications, achievements and awards. They publish in the world's top peer-reviewed journals and are invited to speak at landmark international events. The School's academics include two British knights, four CBEs, and ten Fellows elected to the Royal Society or the British Academy, as well as individuals with numerous other international awards and honorary degrees.

We also attract the finest young scholars, whose potential is acknowledged through academic awards or research grants, including from leading international foundations, such as the Gates Foundation, Leverhulme Trust, Wellcome Trust and Mellon Foundation.

At the Oxford Martin School, we have created a unique community of some of the world's top-rated academics working on future challenges. We provide them with extensive opportunities to collaborate effectively and seed new ideas that might not otherwise germinate. We enable access to networks of expertise beyond their immediate disciplinary domain. Currently, over 100 researchers receive direct financial support from the School. Well over 300 people are connected through leveraged funding. Membership of the School enables this unique network of scholars to share knowledge and reach beyond traditional academic boundaries.

The School aims to provide the space, opportunities and resources for academics to collaborate and communicate outside of their usual realms.



Impacts beyond academia

The development of new insights is our first step to problem solving. The second is ensuring that our academics are linked with policy leaders, decision makers, business executives and the broader community to have a positive impact. Developing this transmission belt between the realms of ideas and of practical actions is central to the mission of the Oxford Martin School. To this end, we support a wide range of outreach initiatives where academics can reach the world's decision makers and the general public.

Influencing policy

Our academics have informed thinking around significant global policy debates. They have helped develop alternatives beyond the Kyoto Protocol and contributed to influential UN Human Development reports. Governments and policy makers from India, Singapore, Australia, the US and across Europe have sought out and benefited from our academic research. Closer to home, academics from the Oxford Martin School have helped challenge the UK Government to explore policy questions beyond the electoral term – from drug scenario planning, to the future sustainability of tropical forests, to the longer term implications of an ageing population for public services.

Convening expertise

Our dynamic events bring together academics, policymakers and practitioners to share their insights with international audiences. Over 9,000 people have attended some 60 seminars, lectures and workshops directly organised by the Oxford Martin School over the past 5 years. In total, more than 420 events have been organised by the School's members.

Reaching global audiences

We support and facilitate innovative opportunities to reach audiences outside academia. We have presented at the World Economic Forum (in Davos and Dalian), TED, Skoll World Forum, the Clinton Global Initiative, and other international fora. We have supported public exhibitions at science and literary festivals and held live public debates to challenge current opinion. Our digital media (webcasts, podcasts, blogs) provide worldwide access to cutting-edge and prescient lectures on topics such as the challenges of global governance, ethical problems of contemporary science, and issues emerging from global financial crisis.

Media

Our academics are regularly called upon to provide expert opinions in the local, national and international press. They contribute to public understanding and interpret complex issues. Oxford Martin School researchers are featured and cited in an international mix of media outlets, including *The Economist*, *Wall Street Journal*, *China Daily*, *New Scientist*, CNN and the BBC.

Private and public sector leadership

We are frequently invited to share our insights on future challenges with some of the world's leading business people and policy makers. Organisations that have turned to us for advice at the very highest levels include Vodafone, McKinsey and Virgin, as well as the British Foreign and Commonwealth Office, the UK Prime Minister's Office, and the US, South African and Singaporean governments.

Our website first launched in 2007 and was relaunched under our new name in 2010. Recent figures show that we have had:

- **Over 300,000 website visitors from more than 200 countries/territories**
- **Over 2 million podcasts downloaded**
- **Over 1 million documents downloaded**
- **Nearly 100,000 views of our videos**
- **Over 30,000 views of our blogs**

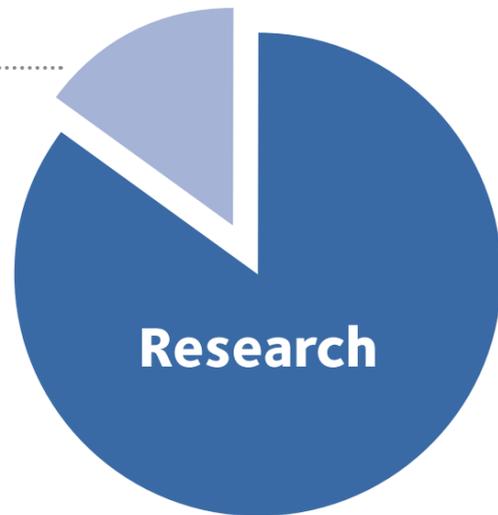
High profile public events in prominent venues help us share important ideas with new audiences.

Finances, growth & governance



Average annual spend
for 2005/06–2009/10

£2.5 million



Anticipated average annual spend
for 2010/11–2014/15

£14 million

The Oxford Martin School has a proud history of financial strength and robust management of its research. Our annual turnover of research funding has increased nearly six-fold over the past five years, with over 80% of our funding allocated directly to research at Oxford University. Over the next five years, as the School continues to grow, we anticipate increasing our proportion of direct research funding to at least 85%.

Key to our financial strategy and governance are three specific premises:

1. **Review:** We have established robust administrative procedures utilising independent, external expertise in our financial management, allocation of awards and academic review processes. Academic programmes undergo rigorous assessment to become part of the School. Regular external reviews ensure the maintenance of academic excellence and impact targets. Our School Management Committee oversees, reviews and advises on these processes and ensures value for money.
2. **Reach:** Going forward, our primary objectives are to diversify and enhance our funding streams to help reach ambitious targets of research and impact. We aim to strengthen our portfolio of activity and ensure the full breadth of Oxford expertise is harnessed effectively. We aim to provide continued flexibility in how we identify, fund and facilitate our research. We launched a new funding call in June 2011 that will contribute to these objectives.
3. **Results:** Investments in our research yield results while meeting the best standards of philanthropic governance. Our financial strength in this current era of economic uncertainty is a reflection of the depth and compelling significance of that research, and our success in enhancing its impact through outreach and policy engagement. Despite the challenging funding environment, we are growing rapidly. This is due to the extraordinary generosity and support of our donors, the strength of commitment of the University of Oxford to the School, and the strides being made by the School's research community.

Growth, expansion and leverage: The Oxford Martin School was founded in 2005 through an inspirational gift from Dr James Martin of \$100 million – the largest gift to Oxford University by a single donor in its 900-year history. In 2009 Dr Martin helped inspire other funders and philanthropists to support the School by pledging a further \$50 million in an innovative matched funding challenge. This attracted 27 supporters to make donations or grants to the School's projects. Contributions came from individuals, foundations, and corporate funders, including George Soros, the Gatsby Foundation, the Intercontinental Hotel Group, the Clore Duffield Foundation, and the Tasso Leventis Conservation Foundation. The extraordinary success of the matched funding scheme, despite its launch at a time of global financial crisis, has so far led to the creation of 21 new research programmes in the Oxford Martin School.

The decisions we take today will impact the opportunities of future generations globally.



Research Institutes and Programmes

The Oxford Martin School, under the directorship of Ian Goldin, houses a small central team providing management, communication and administrative expertise.

As research projects evolve with each new funding call, this central team oversees the outreach, influence and development opportunities.

21st Century Ocean Institute

Predicting and preparing for large-scale changes in the ocean chemistry and sea levels.

Biodiversity Institute

Bringing together research from the natural and social sciences to address the challenges of our sustainable existence on Earth.

Future of Humanity Institute

Fostering more rational, reflective and responsible ways of dealing with humanity's biggest challenges.

George Centre for Healthcare Innovation

Informing and implementing the development of innovative strategies to manage 21st century healthcare challenges.

Institute for Carbon and Energy Reduction in Transport

Developing new technologies, approaches and advice that will help governments and industry increase the rate and effectiveness of carbon reduction strategies.

Institute for Emerging Infections

Understanding the underlying processes that drive the emergence and spread of novel human infectious diseases.

Institute for New Economic Thinking @ Oxford

Providing new perspectives for economic analysis, policy, empirical modelling and forecasting to address the major challenges of the global economic system.

Institute for Science and Ethics

Identifying and providing advice on the ethical issues involved in current and near-future scientific advances in emerging technologies.

Institute for Science, Innovation and Society

Providing new research, policy and practical approaches to understanding technological and social change in the 21st century.

Institute for the Future of Computing

Accelerating and informing research in the development of computational and information technologies.

Institute for the Future of the Mind

Harnessing new technologies of the 21st century to maximise the potential of the mind at its most vulnerable: the young mind and the ageing mind.

Institute for Vaccine Design

Designing and developing new vaccines against infectious diseases that are effective and deliverable worldwide.

Institute of Nanoscience for Medicine

Understanding how nanostructures interact with human cells, with the aim of establishing fundamental design principles for new drug delivery methods.

International Migration Institute

Investigating and understanding the way that human mobility is changing the face of global society.

Oxford Centre for Tropical Forests

Strengthening understanding and action on the conservation and use of forest resources around the world.

Oxford Geoengineering Programme

Exploring what, if any, climate intervention techniques could be most effectively employed, and how such a global process might be governed.

Oxford Institute for Ethics, Law and Armed Conflict

Developing insights that will effectively regulate and prevent incidents of war.

Oxford Institute for Global Economic Development

Developing better understandings of development economics that will enable the world's poorest populations to participate successfully in the world economy.

Oxford Institute of Population Ageing

Investigating and advising on the wide-ranging impacts brought about by the global rise in the number of elderly people.

Oxford Programme for the Future of Cities

Exploring the social and technological changes that cities will face over the next 50 years.

Oxford Stem Cell Institute

Speeding up advances in stem cell science and bringing new therapies into clinical practice.

Particle Therapy Cancer Research Institute

Advancing the technology of charged particle therapies, and developing a robust evidence base to promote its use more widely in the treatment of cancer.

Plants for the 21st Century Institute

Generating scientific resources and information that will help maximise crop outputs and protect 'hotspots' of species diversity.

Programme in Nuclear and Energy Materials

Developing an understanding of the key materials problems which challenge the safe and efficient exploitation of nuclear power in the 21st century.

Programme on Computational Cosmology

Advancing methodologies and technologies for processing large amounts of data, and extending these insights to accelerate progress in other fields, such as climate science and medicine.

Programme on Globalising Tidal Power Generation

Examining and developing new technologies that will make use of a globally abundant supply of low speed tidal flow resources to deliver clean and affordable renewable power across the globe.

Programme on Mind and Machine

Developing and applying technology that will allow the observation of, and intervention in, brain function.

Programme on Modelling and Predicting Climate

Increasing the reliability of climate prediction through the development of novel mathematical techniques for use in next-generation earth-system models.

Programme on Solar Energy: Organic Photovoltaics

Developing new ideas for both the fabrication and operation of more efficient and cost-effective photovoltaic power.

From 2011:

Oxford Martin Programme on the Future of Food

Integrating and advancing research to address the challenges of feeding the global population sustainably, healthily and equitably.

Oxford Martin Programme on the Impacts of Future Technology

Developing new research into the long-term impacts of transformative technological change on societies.

Ensuring global food security is a major challenge that requires innovative research in economic, social, environmental and plant sciences.

Directors of research at the Oxford Martin School

Each research institute or programme is directed by leading Oxford academics who manage interdisciplinary research teams from academic departments across the University.

Mr Dapo Akande, Co-Director, Oxford Institute for Ethics, Law and Armed Conflict, *University Lecturer in Public International Law*

Sir Tony Atkinson, Deputy Director, Institute for New Economic Thinking @ Oxford, *Professor of Economics*

Professor David Banister, Deputy Director, Institute for Carbon and Energy Reduction in Transport, *Professor of Transport Studies*

Professor Alistair Borthwick, Co-Director, Programme on Globalising Tidal Power, *Professor of Engineering Science*

Professor Nick Bostrom, Director, Future of Humanity Institute, *Professor of Philosophy*

Professor Robin Cohen, Director, International Migration Institute, *Professor of Development Studies*

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

Dr Sonia Contera, Co-Director, Institute of Nanoscience for Medicine, *RCUK Fellow in Biological Physics and Nanomedicine*

Professor Richard Darton, Co-Director, Oxford Geoengineering Programme, *Professor of Engineering Science*

Professor Liam Dolan, Co-Director, Plants for the 21st Century Institute, *Sherardian Professor of Botany*

Dr Paul Fairchild, Co-Director, Oxford Stem Cell Institute, *RCUK Academic Fellow in Stem Cell Biology and Immunology*

Dr Chris Farmer, Co-Director, Programme on Modelling and Predicting Climate, *Research Fellow in Applied Mathematics*

Professor Pedro Ferreira, Co-Director, Programme on Computational Cosmology, *Professor of Astrophysics*

Professor Jonathan Flint, Co-Director, Programme on Mind and Machine, *Professor of Molecular Psychiatry*

Dr Bennett Foddy, Deputy Director, Institute for Science and Ethics, *Research Fellow at Oxford Uehiro Centre for Practical Ethics*

Professor Charles Godfray, Director, Oxford Martin Programme on the Future of Food, *Hope Professor of Zoology*

Professor Colin Goding, Co-Director, Oxford Stem Cell Institute, *Professor of Oncology*

Professor Alain Goriely, Co-Director, Programme on Solar Energy: Organic Photovoltaics, *Professor of Mathematical Modelling*

Professor Baroness Susan Greenfield, Director, Institute for the Future of the Mind, *Professor of Pharmacology*

Professor Chris Grovenor, Co-Director, Programme in Nuclear & Energy Materials, *Professor of Materials*

Professor Sarah Harper, Director, Oxford Institute of Population Ageing, *Professor of Gerontology*

Professor Gideon Henderson, Co-Director, 21st Century Ocean Institute, *Professor of Earth Sciences*

Professor Sir David Hendry, Director, Institute for New Economic Thinking @ Oxford, *Professor of Economics*

Professor Adrian Hill, Co-Director, Institute for Vaccine Design, *Professor of Human Genetics*

Professor Guy Houlby, Co-Director, Programme on Globalising Tidal Power, *Professor of Civil Engineering*

Professor Bleddyn Jones, Co-Director, Particle Therapy Cancer Research Institute, *Professor of Clinical Radiation Biology*

Professor Jane Langdale, Co-Director, Plants for the 21st Century Institute, *Professor of Plant Development*

Professor Susan Lea, Co-Director, Institute for Vaccine Design, *Professor of Chemical Biology*

Dr George Leeson, Deputy Director, Oxford Institute of Population Ageing, *Senior Research Fellow in Sociology*

Dr Chris Lintott, Co-Director, Programme on Computational Cosmology, *Departmental Lecturer in Physics*

Professor Stephen MacMahon, Co-Director, George Centre for Healthcare Innovation, *Professor of Cardiovascular Medicine*

Professor Yadvinder Malhi, Director, Oxford Centre for Tropical Forests, *Professor of Ecosystems Science*

Professor James Marrow, Co-Director, Programme in Nuclear & Energy Materials, *James Martin Professor of Energy Materials*

Professor David Marshall, Co-Director, 21st Century Ocean Institute, *Professor of Oceanography*

Dr Malcolm McCulloch, Director, Institute for Carbon and Energy Reduction in Transport, *University Lecturer in Engineering Science*

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

Professor Gero Miesenböck, Co-Director, Programme on Mind and Machine, *Waynflete Professor of Physiology*

Professor Robyn Norton, Co-Director, George Centre for Healthcare Innovation, *Professor of Public Health*

Professor Tim Palmer, Co-Director, Programme on Modelling and Predicting Climate, *Royal Society Professor of Physics*

Professor Ken Peach, Co-Director, Particle Therapy Cancer Research Institute, *Professor of Particle Physics*

Professor Rodney Phillips, Co-Director, Institute for Emerging Infections, *Professor of Clinical Medicine*

Dr Kazem Rahimi, Deputy Director, George Centre for Healthcare Innovation, *Senior Clinical Researcher in Essential Healthcare*

Professor Steve Rayner, Director, Institute for Science, Innovation and Society, *James Martin Professor of Science and Civilisation*

Dr David Rodin, Co-Director, Oxford Institute for Ethics, Law and Armed Conflict, *Senior Research Fellow in Philosophy*

Professor Bill Roscoe, Co-Director, Institute for the Future of Computing, *Professor of Computing Science*

Professor John Ryan, Co-Director, Institute of Nanoscience for Medicine, *Professor of Physics*

Professor Mark Sansom, Co-Director, Institute of Nanoscience for Medicine, *Professor of Biochemistry*

Professor Julian Savulescu, Director, Institute for Science and Ethics, *Uehiro Professor in Practical Ethics*

Dr Henry Snaith, Co-Director, Programme on Solar Energy: Organic Photovoltaics, *RCUK Academic Fellow in Physics*

Professor Anne Trefethen, Co-Director, Institute for the Future of Computing, *Professor of Computing and Information Technology*

Professor Anthony Venables, Co-Director, Oxford Institute for Global Economic Development, *BP Professor of Economics*

Professor Jennifer Welsh, Co-Director, Oxford Institute for Ethics, Law and Armed Conflict, *Professor of International Relations*

Dr Richard Willden, Co-Director, Programme on Globalising Tidal Power, *EPSRC & RCUK Academic Fellow in Marine Renewable Energy*

Professor Katherine Willis, Director, Biodiversity Institute, *Tasso Leventis Chair in Biodiversity*

Management Committee

The Oxford Martin School's Management Committee meets each term and has executive responsibility for the overall strategy of the School, including budgets and accountability.

Members:

Professor Roger Goodman
Head, Social Sciences Division
(Chair of the Management Committee)

Professor Alastair Buchan
Head, Medical Sciences Division

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

Professor Ian Goldin
Director, Oxford Martin School

Professor Alex Halliday
Head, Mathematical, Physical and Life Sciences Division

Professor Sally Shuttleworth
Head, Humanities Division (succeeded by Professor Shearer West on 1 July 2011)

Professor Ian Walmsley
Pro-Vice-Chancellor, Research

Advisory Council

The Advisory Council of the Oxford Martin School meets annually and provides expert advice to guide the School's future direction.

Members:

Dr Larry Brilliant
President, Skoll Global Threats Fund

Victor Chu
Chairman, First Eastern Investment Group

Vittorio Colao
Chief Executive, Vodafone Group

Francis Finlay
Chair, James Martin 21st Century Foundation; Co-Chairman, EastWest Institute, New York

Orit Gadiesh
Chair, Bain & Co

John Gage
Co-Founder, Sun Microsystems

Ben Goldsmith
Founding Partner, WHEB Ventures Ltd

Zaha Hadid
Founding Director, Zaha Hadid Architects

Professor Andrew Hamilton
Vice-Chancellor, University of Oxford (Chair)

Mo Ibrahim
Founder, Mo Ibrahim Foundation

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

Dr James Martin
Founder, Oxford Martin School

Julia Marton-Lefèvre
Director-General, IUCN

Professor Joseph Nye
Harvard Kennedy School

Ngozi Okonjo-Iweala
Minister of Finance, Nigeria

Professor Lord Martin Rees
University of Cambridge, and Astronomer Royal

Professor Amartya Sen
Harvard University, and Nobel Laureate

Mark Shuttleworth
IT entrepreneur and Founder of the Ubuntu Project

Sir Martin Sorrell
Chief Executive, WPP

Professor Lord Nicholas Stern
London School of Economics

Professor Joseph Stiglitz
Columbia University, and Nobel Laureate

HRH Prince Talal Bin Muhammad
Prince of Jordan

Sir Crispin Tickell
Former British Ambassador

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

Dr Craig Venter
President, J Craig Venter Institute

Professor Zhou Qifeng
President, Beijing University

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

Ex-Officio:

Professor Ian Goldin,
Director, Oxford Martin School

Professor Roger Goodman,
Chair of the Management Committee for the Oxford Martin School



Selected publications, presentations and press coverage

The references below are a small selection of our work. They give an insight into the breadth and depth of activity conducted across the Oxford Martin School.

Publications:

Katzkouris, A. et al. "Discovery and analysis of the first endogenous lentivirus", *Proceedings of the National Academy of Sciences*, April 10, 2007 104(15): 6261-6265

The paper establishes the first unambiguous example of a "missing link" between simple lentiviruses, which can be caught by many animals, and HIV/SIV viruses with more complex genomes that only affect humans and other primates.

Prins, G. and Rayner, S. "Time to ditch Kyoto", *Nature*, 25 October 2007 449: 973-975

The authors argue that the Kyoto Protocol is a symbolically important expression of governments' concern about climate change. As an instrument for achieving emissions reductions, though, it has failed.

Frame, D. "Call off the quest!", *Science*, 26 October 2007: 318 (5850): 582-583

Uncertainty in climate sensitivity, argues the author, means that the long-term warming response to doubling carbon dioxide may not be a problem after all, unless politicians choose to turn it into one.

Goldin, I. and Reinert, K. *Globalisation for Development: Trade, Finance, Aid, Migration, and Policy*, World Bank and Macmillan Palgrave, Washington and Basingstoke, 2007

The authors present policy recommendations to make globalisation more effective as a vehicle for shared growth and prosperity.

Goodman, R. and Harper, S. (eds) *Ageing in Asia: Asia's Position in the New Global Demography*, Routledge, Oxford, 2007

Ageing, the authors argue, can no longer be considered as simply a national question. Implications of its global dimension should be considered, especially in terms of issues such as human rights and quality of life.

May, R. and McLean, A. *Theoretical Ecology: Principles and Applications*, Oxford University Press, Oxford, 2007

The authors provide an overview of theoretical ecology that focuses on application, bridging the traditional division of theory and practice.

Ord, T., Hillerbrand, R., Sandberg, A., "Probing the improbable", *Journal of Risk Research*, 30 October 2008 13(2): 191-205

The article explores important methodological problems which arise when assessing risks with very low probabilities and very high stakes.

Ramirez, R. (ed) *Business Planning for Turbulent Times: New Methods for Applying Scenarios*, Earthscan Ltd, Oxford, 2008

This book provides business and organisational leaders with insights on how best to deal with increasing turbulence, complexity and uncertainty.

Thomas, A., et al. "Penultimate Deglacial Sea-Level Timing from Uranium/Thorium Dating of Tahitian Corals", *Science*, 29 May 2009 324(5931): 1186-1189

This study, featured on the cover of *Science* magazine in 2009, shows that the behaviour of ice sheets is much more volatile and dynamic than previously thought, implying that there may still be unidentified natural phenomena driving the fluctuation in Earth's ice coverings.

Jones, B., "United Kingdom radiation oncology — past, present and future", *Clinical Oncology*, August 2009, 21(6): 509-511

The author reviews the state of radiation oncology in the United Kingdom.

Akande, D., "The legal nature of security council referrals to the ICC and its impact on Al Bashir's immunities", *Journal of International Criminal Justice*, 2009 7(2):333-352

This article considers whether states are obliged or permitted to arrest Sudanese President Omar al Bashir pursuant to a warrant of arrest issued by the International Criminal Court.

Arinaminpathy, N., Savulescu, J., McLean, A., "Effective use of a Limited Antiviral Stockpile for Pandemic Influenza", *Bioethical Inquiry*, 2009 6:171-179

Mathematical models are used to show how to distribute a limited drug stockpile to minimise morbidity and mortality.

Cohen, R. and Toninato, P. (eds), *The Creolization Reader: Studies in mixed identities and cultures*, Routledge, Oxford, 2009

The authors describe the increasing complexity and diversity of the global age through the lens of 'creolization'.

Schmitt, C.B., et al. "Global analysis of the protection status of the world's forests", *Biological Conservation*, 2009

A team that included Lauren Coad of the Oxford Centre for Tropical Forests found that, according to the criteria set out by the World Conservation Union only 7.7% of the world's forests are safeguarded.

Wilkinson, A. and Ramirez, R., "Canaries in the mind: Exploring how the financial crisis impacts 21st century future-mindfulness", *Journal of Futures Studies*, March 2010, 14(3): 45-60

This paper focuses on the 2007-2010 financial crisis to clarify misconceptions and confusions concerning 'scenario planning'.

de Haas, H., "The internal dynamics of migration processes: A theoretical inquiry", *Journal of Ethnic and Migration Studies*, 29 June 2010

A conceptual framework on the internal dynamics of migration processes is proposed by elaborating a set of hypotheses and mechanisms at play in the various stages of migration.

Bostrom, N., *Anthropic Bias: Observation selection effects in science and philosophy*, Routledge, Oxford, 2010

The book explores how to reason when you suspect that your evidence is biased by "observation selection effects".

Sarat, A. and Lezaun, J. (eds), *Catastrophe: Law, politics and the humanitarian impulse*, University of Massachusetts Press, Amherst, 2010

The essays in this book ask us to rethink our understanding of catastrophe and to imagine new legal, political, and humanitarian responses.

Selgelid, M.J., McLean, A., Arinaminpathy, N., Savulescu J., *Infectious Disease Ethics*, Springer, 2010

The authors investigate the ethics of drug distribution strategies in pandemics.

Presentations:

Prime Minister's Strategy Unit, June 2007

Ian Goldin, Julian Savulescu and Angela McLean, "Future shocks and challenges"

Conference of International Alliance of Research Universities, Singapore, June 2008

Sarah Harper, Kenneth Howse and George Leeson, "Policy challenges of ageing"

House of Commons, July 2008
Ian Goldin, Sarah Harper, "From academic research to government policy: 21st century challenges in perspective"

The Dutch Defence Academy and Ministry of Defence, November 2008

David Rodin, "Technology and Asymmetry"

World Economic Forum IdeasLab, Davos, Switzerland, 29 January 2009

Paul Fairchild, "How are stem cells revolutionising regenerative medicine?"

Angela McLean, "How does a newly-emergent infection become an epidemic?"

John Ryan, "Nanoscience - a new approach to healthcare"

Julian Savulescu, "Bio-liberation or bio-threat?"

Copenhagen Climate Conference, March 2009

Diana Liverman, "People matter: Human agency and the response to climate change"

World Economic Forum IdeasLab, Davos, Switzerland, 28 January 2010

Paul Collier, "Natural resources and failed states"

Ian Goldin, "Managing systemic risk"
Angela McLean, "Drug resistance and the global commons"

The Royal Society, January 2010
Steve Rayner, "Geoengineering: a brave new world"

World Economic Forum IdeasLab, Davos, Switzerland, 26 January 2011

Ian Goldin, "Technology and society"
Gideon Henderson, "Climate and geoengineering"

Susan Lea, "Pandemics and vaccines"

Gero Miesenböck, "Neuroscience and behaviour"

Katherine Willis, "Biodiversity and citizen science"

House of Lords, February 2009

Nim Pathy, influenza preparedness testimony to the Science and Technology Select Committee

Press:

"Revolutionary stem cell therapy boosts body's ability to heal itself" *The Guardian*, 8 January 2009

Paul Fairchild comments on a major step towards using stem cells to regenerate tissue (Oxford Stem Cell Institute).

"Humans could provide spark that ignites the Amazon" *New Scientist*, 9 February 2009

Yadvinder Malhi explains how man-made climate change could induce a drought that might set alight the Amazon rainforest (Oxford Centre for Tropical Forests).

"HIV evolution outpaces vaccines" *Wired*, 26 February 2009

Rodney Phillips explains some of the reasons developing a vaccine for HIV has proved so difficult (Institute for Emerging Infections).

"Swine flu: Fingers crossed for a forgettable epidemic" *The Daily Telegraph*, 1 May 2009

The swine flu epidemic might not be as grave as we fear, says **Angela McLean** (Institute for Emerging Infections).

"When will computers be smarter than us?" *Forbes*, 22 June 2009

Nick Bostrom describes how long it will be before we develop human-level artificial intelligence (Future of Humanity Institute).

"Artificial sperm and the race to build a baby" *The Times*, 12 July 2009

Genetic selection through artificial reproduction is in our future, argues **Julian Savulescu** (Institute for Science and Ethics).

"Empire: The world's most powerful club" *Al Jazeera English*, 30 September 2009

Jennifer Welsh talks about whether the UN Security Council is being superseded by other global institutions (Oxford Institute for Ethics, Law and Armed Conflict).

"Oxford electric motors turn heads as well as wheels" *The Daily Telegraph*, 21 December 2009

A profile of Yasa Motors, the spin out company based on the work of **Malcolm McCulloch** (Institute for Carbon and Energy Reduction in Transport).

G8+5 Environment Ministers' Meeting, Siracusa, Italy, April 2009
Max Boykoff, "Climate change and the media"

TED Global, Oxford, July 2009
Ian Goldin, "Navigating our global future"

Intelligence Squared, London, September 2009
Public event with multiple Oxford Martin School academics, "The world in 2050"

The Royal Institution, London, October 2009

Ian Goldin, "Humanity at the crossroads: 21st century risks and opportunities"

Sydney Festival of Dangerous Ideas, Sydney, Australia, October 2009

Julian Savulescu, "Unfit for life: Genetically enhance humanity or face extinction"

Humanity +, London, April 2010
Nick Bostrom, "Reducing Existential Risks"

TED Global, Oxford, July 2010
Gero Miesenboeck, "Reengineering a brain"

"Trace that metal" *Nature*, 14 January 2010

Gideon Henderson talks about the launch of a project to sample and study the trace metals in ocean water that is vital to marine life (21st Century Ocean Institute).

"Global disaster: is humanity prepared for the worst?" *The Observer*, 25 July 2010

Nick Bostrom talks about planning for catastrophes (Future of Humanity Institute).

"Artificial meat? Food for thought by 2050" *The Guardian*, 16 August 2010

Charles Godfray explains how artificial meat could help build a sustainable food system (Oxford Martin Programme on the Future of Food).

"50 ideas to change science forever" *New Scientist*, 11 October 2010

Steve Rayner explains why we should research possible geoengineering options (Institute for Science Innovation and Society).

US Presidential Commission on Bioethics, Washington, DC, July 2010

Russell Powell, "The Ethics of Synthetic Biology: A Comprehensive Approach"

European Grid Infrastructure Technical Forum, Amsterdam, September 2010

Ken Peach, "Hadrontherapy and Grids - Issues and Requirements"

The Royal Academy of Arts, London, November 2010

Ian Goldin, "Africa 2050: Will Africa Claim the 21st Century?"

UN Climate Forum, Cancun, Mexico, December 2010

Kenneth Richards, "Institutional Support for an International Forest Carbon Sequestration Agreement"

"Unweaving the cosmic web: Relativity goes large"

New Scientist, 12 October 2010
Pedro Ferreira takes a closer look at the validity of general relativity (Programme on Computational Cosmology).

"Tipping point for Apps on Facebook" *The New York Times*, 24 October 2010

Felix Reed-Tsochas discusses research on Facebook habits (Institute for Science, Innovation and Society).

"Geoengineering: Lift-off" *The Economist*, 4 November 2010

Tim Kruger is featured in an article that outlines possible geoengineering strategies (Oxford Geoengineering Programme).

"Looking ahead - a guide to the future" *The Daily Telegraph*, 30 November 2010

Adrian Hill talks about designing vaccines for the future (Institute for Vaccine Design).

"Your chance to spot an alien world" *BBC Radio 4*, 17 December 2010

Chris Lintott talks about the trials and achievements of citizen science (Programme on Computational Cosmology).



The Oxford Martin School was founded as the James Martin 21st Century School at the University of Oxford in 2005 through the vision and generosity of Dr James Martin. It is a unique interdisciplinary research initiative tackling future global challenges. In 2009, a \$50 million matched funding challenge initiated by James Martin more than doubled the School's size.

Our mission is to foster innovative thinking, interdisciplinary scholarship and collaborative activity to address the most pressing risks and realise important new opportunities of the 21st century. Our aims are delivered through two interconnected strategies:

- **Supporting research –**
we fund and facilitate forward-looking interdisciplinary research to address 21st century challenges and opportunities.
- **Enhancing impact –**
we foster public engagement and impact-oriented initiatives that will influence policy and effect positive change on a global scale.

Contact

Oxford Martin School
Oxford University
34 Broad St, Oxford, OX1 3BD, UK
tel: +44 (0)1865 287430
fax: +44 (0)1865 287435
email: info@oxfordmartin.ox.ac.uk
www.oxfordmartin.ox.ac.uk

 www.twitter.com/oxmartinschool

 www.facebook.com/oxfordmartinschool

