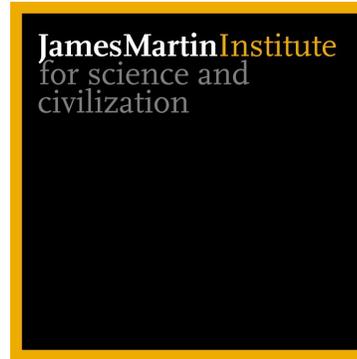


Policy Foresight Programme

Director: Sir Crispin Tickell



Record of the Workshop on

Policy Foresight and Global Catastrophic Risks

21 July 2008

James Martin 21st Century School

University of Oxford

Future of
Humanity
Institute



THE JAMES MARTIN
21ST CENTURY SCHOOL
UNIVERSITY OF OXFORD

Introduction

On 21 July 2008, the Policy Foresight Programme, in conjunction with the Future of Humanity Institute, hosted a day-long workshop on “Policy Foresight and Global Catastrophic Risks” at the James Martin 21st Century School at the University of Oxford. This document provides a record of the day’s discussion.

Sir Crispin Tickell chaired the day’s events, and began by noting that the purpose of the day was to bring together academics and policymakers to promote discussion on the actions that governments, and in particular the British government, could take now to create a more resilient society in the face of catastrophes. A list of the major recommendations to come out of the workshop is presented in the box to the right.

This workshop immediately followed a three-day conference on Global Catastrophic Risks, organised by the Future of Humanity Institute and held at the University of Oxford.

Recommendations for government

- The government should pay more attention to (and fund more research on) the impacts of the most severe types of catastrophe that could happen in 10-50 years, in order to identify potential adaptation and mitigation measures that need to be put in place soon in order to have the best chances of success.
- The government should be more involved in international work on preventing proliferation of nuclear material, specifically highly enriched uranium.
- Planning for catastrophes should include preparedness and research for the occurrence of multiple catastrophes at the same time, the interactions between them, and the possibility of disruption of civil order and international relations in the case of the most severe types of catastrophe.
- The government should ensure that the Climate Change Bill and Water and Food Bill create a more stable market for investing in catastrophe adaptation measures.
- When conducting assessments of catastrophic risks, governments should employ state-of-the-art probabilistic forecasting methodologies, such as prediction markets, the Delphi method, blue team/red team exercises, multidisciplinary expert analysis, and peer review. Attention should be given to how institutional agendas and cognitive biases might skew the results. Proposed mitigation and adaptation strategies should be subjected to expert-reviewed cost-benefit analysis.
- The government should promote an international process for assessing global catastrophic risks from emerging biotechnologies that could facilitate the design and production of biological weapons of mass destruction, and for identifying regulatory measures for mitigating such risks.

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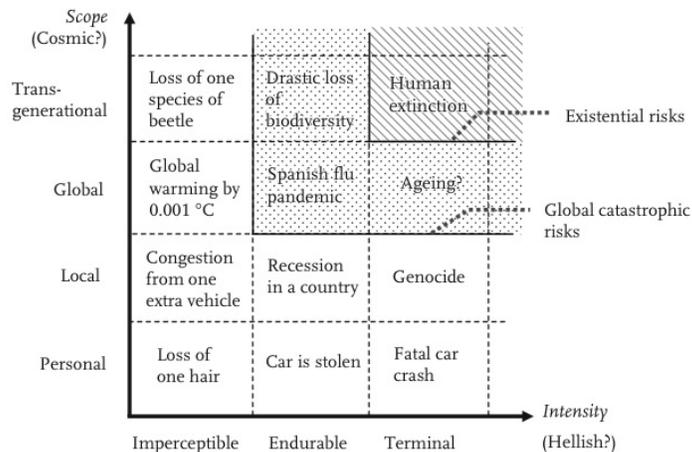
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Setting the framework for the day's discussion

Dr Nick Bostrom

Dr Nick Bostrom, Director of the Future of Humanity Institute, began the day's programme by summarising the previous conference that many of the participants at this workshop had attended. The conference, and this workshop, coincide with the launch of an edited volume, *Global Catastrophic Risks*, in which twenty-six leading experts look at the gravest risks facing humanity in the 21st century, including natural catastrophes, nuclear war, terrorism, global warming, biological weapons, totalitarianism, advanced nanotechnology, general artificial intelligence, and social collapse. The book also addresses over-arching issues – policy responses and methods for predicting and managing catastrophes. Most of these risks, Bostrom noted, were anthropogenic in origin.

Bostrom pointed out how discussions about catastrophic risks, which were significant in terms of both intensity and scope (see graph), were often proxies for wider social discussions, with different motivations and goals playing heavily into a person's perception of the risk.



Specifically addressing biological risks, Bostrom noted that risks from biological terrorist attack were moderate today, but they were likely to increase in the future. For instance, with the wider distribution of machines capable of replicating DNA, it was more likely people could make stocks of nearly-extinct deadly viruses, such as small pox, or invent entirely new ones. He reiterated the need for countries seriously to commit to international efforts for regulating the transfers of biotechnology. Similarly, regarding nuclear technologies, Bostrom pointed to the need to secure uranium stores and to reenergise multilateral negotiations on nuclear disarmament.

Bostrom also noted possible policy initiatives that would protect more generally against a wide range of global catastrophic risks. Increasing stockpiles of food and

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supplies could buffer societies against a whole range of catastrophes, such as an agricultural pandemic, nuclear war, or other things that could destabilise international trade.

The secondary effects of catastrophes often caused more economic destruction and damage than the primary effects. Some of these secondary effects were social collapse – where a society ceased to function – and government overreaction. For instance, a terrorist attack might cause a limited number of deaths, but government overreaction to that could cause an order of magnitude or more deaths. Having thought through choices in advance might help in making a more rational choice in the aftermath of an event.

Bostrom noted the need for more research in this area, both for specific risk assessments and for interdisciplinary work between sociologists, international relations experts, philosophers, and others in order to make sure that the risks were viewed from as many angles as possible.

Social collapse: some ways we might avoid it

Prof Robin Hanson

Prof Robin Hanson, an economist from George Mason University, discussed the possibility of social collapse coming about as a result of a global catastrophe. The metaphor of a person tripping on a stair was apt here. The concern was not that the person would trip on one step, but rather that the single trip would cause the person to fall down all the stairs. Similarly, many societies today were so highly specialised and interconnected that a disruption in one of them could create a cascading series of disruptions in all of them. Today's societies were also built on long-term relationships, for example in mortgages. When you had an extreme event, however, those relationships broke down as people's time horizons shortened, and thus trust in the institutions of society was lost. Many authorities were aware of the ripple effect and the loss of trust that was likely to occur in the wake of a catastrophe, but this awareness tended not to be translated into actively warning the public about the risks. All of these factors, when combined, were a recipe for social collapse.

Hanson noted that while there were many similarities between emergencies and catastrophes, there were significant differences. One difference was that, if we wanted to prepare for an emergency, we needed only prepare a section of society, say the emergency services. Preparing for a catastrophe, however, required the mobilisation of more substantial portions of the population. For example, in preparing for an earthquake, an emergency preparedness plan might call for people to seek refuge under doorways, but this only applied for minor earthquakes. Most of the damage to

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a society, however, would come from large earthquakes that brought down entire buildings.

All policy actions that we might take now will initiate a chain of causation that starts from now. Hanson's concern was when that policy chain of causation intersects with the disaster chain of causation, to reduce disaster. There were broad policies that governments could foster, such as governing population size, the degree of peace in a region, and diversified sources of inputs for production and consumption. There were also policy changes that governments could take to reduce the likelihood of specific disasters, such as removing hair-trigger alerts on nuclear weapons or changing farming practices to reduce the spread of pandemics. Finally, there were policies that focus on what to do once social collapse has begun. These policies include disaster planning and building seed banks. All three sets of policies must be pursued.

In discussion, the following points were made:

- Efforts to prevent global catastrophic risks could be incorporated into other tasks of society. For example, fostering better relations between nuclear states could help in both reducing stockpiles of nuclear weapons and ensuring viable commercial nuclear projects. It should be possible to develop policy with the awareness of satisfying multiple goals.
- In the previous conference, one participant had referred to the idea that technologies were on an accelerating curve. In his opinion though, humanity was already surfing the curve, and would continue to do so in the 21st century. In reply, one participant at this workshop said that, while many people had an image of a train of technology speeding down the track such that we could not be able to keep up with it, our social ability to adapt to technology was the limiting factor in that technology's acceptance in society. It was noted that technological change used to be much more disruptive when societies had significantly to adapt to them. Now, however, we had institutions which shielded the public from much of the disruptiveness of technological change, making it appear to happen behind the scenes.
- Debate followed on whether brilliant people were the cause of most disasters, either by directly making them happen (as was the case in most financial disasters) or by leaving the scene when or before disasters happened, as was the case with Hurricane Katrina. A retort was that it was not the brilliant people who caused disasters, but the institutions that allowed them to make decisions that had disastrous effects. Another retort was that scientists were more content to supply new answers to old questions (thus missing the catastrophic 'elephant in the room') rather than come up with new questions.

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- In the financial sphere, one reason for catastrophes was that the best minds were in businesses rather than regulation. This led to poor quality regulation, which in turn created the likelihood for an unstable market.
- There was much discussion of a risk that had not been raised yet: that of mass extinction of species. Succinctly stated, humans were destroying the natural habitat of species and driving them to extinction faster than they could evolve into their new habitat. A participant noted that half of all species were on 2% of the earth's surface, but those were not necessarily the same spots where most evolution took place.
 - In reply to this point, it was noted that there was a chapter in the *Global Catastrophic Risks* book about past extinctions. One issue was that the extinction of a species was seen to have little short term impact on societies as opposed to, for instance, damage to the economy. It was also the case that, while it was much easier now to talk about matters relating to climate change, there was little room in current political discourse for discussions on biodiversity.
 - From a financial point of view, it could be said that we were valuing the vast extent of species too high, as life could survive with a very limited number of them. We could learn a lot about the impact of a species on an ecosystem, it was suggested, by doing a controlled extinction, though ethical considerations would probably prevent such an experiment. It was very difficult, however, to say that species had value in the sense used by many economists.
- There was no consensus on why civilizations collapsed, as most of the past cases had been significantly different from each other, and alternative theories had equal ability and inability to explain them.
- One major social collapse that could be envisaged in the next few decades was in Bangladesh. Because of rising sea levels, almost all of Bangladesh would be flooded. There was a huge population there, and migration of that population to other countries in what was already a war-torn area could create significant disruptions in all societies in the region.

Policy recommendations for preventing nuclear terrorism

Dr William Potter & Gary Ackerman

The discussion then turned to the topic of nuclear terrorism and how to prevent it. Dr William Potter, Director of the James Martin Center for Nonproliferation Studies¹ at the Monterey Institute for International Studies, began the discussion by focusing on supply-side prevention of destructive nuclear capabilities. He found it implausible in the near term for non-state actors to use nuclear means to threaten the extinction of mankind, but stressed the very real risks that they could design and build crude but functional nuclear explosives (i.e., improvised nuclear devices), as well as acquire intact nuclear weapons (especially relatively small tactical nuclear weapons). In addition, he pointed out other frequently neglected nuclear terrorist risks involving cyber-terrorism and tactics to spoof nuclear weapons command and control systems into thinking that an adversary had launched a nuclear pre-emptive strike.

Potter provided five practical steps which could be taken by policymakers to reduce the threat of nuclear terrorism. The overall step that Potter argued for was that particular attention should be given to the following: enhancing security of nuclear stockpiles; consolidating stockpiles; reducing the number of stockpiles around the world; and ultimately eliminating stockpiles altogether. In respect to the approximately 1700 metric tonnes of highly enriched uranium (HEU) scattered around the world, he argued that we need to de-legitimise the possession and commerce in HEU in the civilian nuclear sector. This was realistic, as there are very few civilian applications of HEU and in almost every instance low-enriched uranium (LEU) could be substituted for HEU. Only HEU could be used in the most basic military nuclear devices. Potter pointed out that in many of the recent initiatives to address the problem of HEU, the United Kingdom had been unacceptably silent, whether it were in the review process of the Nonproliferation Treaty (NPT) review process or at the annual International Atomic Energy Agency General Conferences.

A third step that governments could take was to secure and eliminate tactical nuclear weapons. There was very little military rationale and a dubious political rationale for continuing to deploy United States tactical nuclear weapons in Europe. If the US were to withdraw the small remaining number of nuclear weapons from Europe, that would help in persuading Russia to reduce its much larger stockpiles of tactical

¹ The James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies is independent of the James Martin Institute for Science and Civilization and the James Martin 21st Century School, although they do collaborate – this workshop being an example.

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nuclear weapons. Britain should press the United States and Russia to initiate negotiations on legally binding and verifiable reductions of tactical nuclear weapons, rather than their current approach of deferring to U.S. and Russian preferences (i.e., do nothing). This was particularly desirable with the advent of a new American administration.

The fourth step related to enforcement and prosecution for violations of treaties and resolutions, and in particular United Nations Security Council Resolution 1540. UNSCR 1540 required all states to put in place and enforce export controls on all weapons of mass destruction (WMD) related materials. This included chemical, biological, and missile technology as well as nuclear technology. It also called for prosecution and sentencing of violators. In most countries, there are greater penalties for driving under the influence of alcohol than transporting or exporting weapons-grade nuclear material.

Potter argued that the final step was to increase the warning and decision time before any launch of nuclear weapons. Measures which imposed procedural and physical delays in the launch of nuclear forces would have the advantage of reducing the likelihood of any launch, whether terrorist-related or not.

Potter then handed over to Gary Ackerman, Director of the National Consortium for the Study of Terrorism and Responses to Terrorism, to discuss nuclear terrorism from the demand side perspective. Ackerman similarly had five points that policymakers should contemplate. First, more effort needed to be given to detecting the intent of would-be terrorists. This was the remit of intelligence and law enforcement agencies. While much had been said on the reform of these organisations, Ackerman said more attention needed to be given to the identity and behaviour of potential perpetrators, as well as to the web of active and passive facilitators who would be necessary for the success of any nuclear endeavour. A dedicated programme of net assessment using standardised threat analysis methodologies to detect those groups and individuals of greatest concern would help in avoiding attacks.

Ackerman's second point was about the need to deter the facilitators as well as the terrorists. We must ensure that there were powerful incentives for facilitators to refrain from actively assisting terrorists to acquire weapons, weapons-useable material or detailed technical knowledge. The most obvious way to do this was to demonstrate that their participation in any part of the nuclear chain would be identified, and that retribution would be swift and certain.

Ackerman's third point was the need to avoid any encouragement of nuclear transfers. This was particularly relevant when the potential facilitator had an affinity to terrorist causes. For instance, we might seek to avoid or reorient those actions which would give more weight to defensive, as opposed to offensive, jihad, as this rhetoric would make some Islamic scientists feel that they are obliged to take a more active role in the jihad.

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His fourth point was to return to the Cold War notion of “thinking the unthinkable”. This involved moving beyond the current analytical and policy to ask ‘what would happen if they did acquire them?’ One answer was that they would face many of the same control dilemmas that states currently faced. We must also consider our possible responses to this acquisition: did we retaliate with force and take out their central command? That would work if the central command had sole control of the weapon, but not if there was a delegated control structure to field commanders.

Ackerman’s final point was that we might be approaching the terrorist problem from the wrong viewpoint. Currently we were using linear approaches, but perhaps we should create “honey pots” to trap would-be proliferators.

In discussion the following points were made:

- One participant noted that traditional deterrence measures were focused on the possibility of mutual attack between states. An alternative would be to draw up a list of the most likely proliferators of terrorism and say that, should proliferation occur, we would retaliate against the most likely state. Another participant noted a less radical measure would be to hold states responsible for physical security of stockpiles, and not let them participate in international transfers of nuclear material if they did not have such measures. This followed logically from UNSCR 1540, but was not something that was being pursued at the moment.
- An important point to note was that both demand and supply side initiatives should be pursued at the same time. There was much that we could do on the demand side if we only recognised the problem and accepted that there was no commercial detriment in increasing control of nuclear material.
- There was discussion on how the design of new nuclear “pebble bed” reactors made it difficult to extract any useable uranium from the reactors themselves. While this might be the case, however, there still needed to be a process to create the uranium-filled pebbles which went into the reactor, and that process must have all the necessary safeguards. One way to do this would be to concentrate the production of nuclear material in a few locations worldwide.
- Pebble bed reactors were also seen as a part of the solution to global warming, particularly in China, where trial runs were commencing. This solution, however, relied on the rapid take-up of the technology, which was a major bottleneck in many approaches to deal with global catastrophic risks.

How governments cope with major risks, with particular reference to climate change adaptation

Dan Hamza-Goodacre

The afternoon session focused on the policymaker's perspectives on global catastrophic risks. The first speaker was Dan Hamza-Goodacre from the Adapting to Climate Change Programme in the Department for Environment, Food, and Rural Affairs (Defra). He began with a review of the projected impacts of climate change for Britain, which included warmer wetter winters, hotter drier summers, more severe floods, and sea level rise. These changes could result in significant social and economic costs, such as higher heat-related death rates and hospital admittances, increases in insurance claims, and disruptions to transport services. They may also have some benefits, however, such as less cold related death rates, longer growing seasons, and new markets for adaptation technology.

There would be regional variations, with the South East likely to be one of the most impacted regions. Drawing on the 2006 Stern Review, Hamza-Goodacre noted that some impacts from climate change were now inevitable due to emissions already produced, and his unit was tasked with developing adaptation strategies for responding to those changes. This was in addition to work done elsewhere on mitigation of greenhouse gases and contingency planning and emergency preparedness.

He said that adaptation could mean a number of things, including: living with or accepting change; retreating or avoiding change; increasing resilience or reducing the vulnerability of society to change; and preventing change from affecting behaviour. Taking overheating in classrooms as an example, the first would involve simply putting up with overheating in schools, the second with closing schools for the hottest periods, the third with building schools with better ventilation, and the final with installing air conditioning systems.

Hamza-Goodacre stated that the role of government was largely to correct market failures and provide value-based interventions. Correcting market failures involved removing barriers (such as a lack of information on the severity of changes), creating incentives for innovation, delivering public goods (such as flood defences), and leading by example (by managing adaptation strategies on government estates).

The Adapting to Climate Change unit in Defra employed six main methods to manage the risks of climate change. First, they coordinated the development of a more robust and comprehensive evidence base about the impacts and consequences of climate change. Second, they fostered legislation, such as the Climate Change Bill. Third,

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they raised awareness for the need to take action. Fourth, they help build capacity for adaptation through local and regional partnerships. Fifth, they worked with other governmental departments to embed adaptation changes into government policy. And finally, they helped create governance and accountability mechanisms for evaluating the government's progress on reaching adaptation goals.

Hamza-Goodacre concluded by stating that climate change adaptation was an issue which penetrated all government departments, and that the aim for the next few years was to put in place this adaptation programme.

In discussion the following points were made:

- It was hard to define adaptation costs because of the cross-cutting nature of adaptation and because it was often an extension of existing work; an example was the difficulty in dissociating the amount spent on flood defence for climate change and for floods not related to climate change. Government funding for adaptation is provided both for the adaptation programme secretariat and for each Government department working on adapting to climate change.
- In reply to a question about how strong Hamza-Goodacre's unit had been able to make the case for investing in changes now for events that might not occur for 50 years, he replied that it was now under discussion and that the case was manifesting itself in a range of new policies and activities within the government, whose current line was threefold: to avoid near-term losses; to avoid the need for costly retrofits in the future on new infrastructure being built; and to avoid irreversible losses.
- At the moment, there was little work being done on the consequences of a dynamic interaction between different areas of catastrophes, for instance a financial crisis coupled with major flooding.
- The Adapting to Climate Change unit was currently engaged in an assessment of methodologies for addressing climate change. The last few years had seen a significant increase in integrated assessment approaches. The process that the unit was employing was meant to be continuously refreshing, with new information used to adjust policies as needed.
- In the corporate sector, there was an enormous amount of money to invest in adaptation strategies, but investments were being held back because the risks were too high. It was hoped that the Climate Change Bill would help in breaking down the governments goals and carbon budgets, which should aid in developing a more stable marketplace.

The UK Civil Contingencies Secretariat: perspectives on implementing policy for catastrophic risks

John Tesh

John Tesh, the Deputy Director of Capabilities at the Civil Contingencies Secretariat in the Cabinet Office, was the final speaker for the day. He said that the Civil Contingencies Secretariat (CCS) was concerned primarily with drawing together the efforts of the government in this area. It handled emergencies of all kinds. It was set up in 2001 in response to the foot-and-mouth disease outbreak, the fuel strike, and the severe flooding that was becoming more frequent. Rather than trying to predict what the next disaster might be, the CCS weighed the probabilities of likely disasters to prepare the government to handle them, at least in the short term.

The CCS had about 50 staff in London, engaged in short-term crisis management and planning but also looking forward to identify possible emergencies in order to improve the resilience of the country as a whole. It addressed many different types of emergencies, including man-made accidents, natural hazards, and counter-terrorism. Regarding counter-terrorism, the government had a four-pillar strategy: preventing people from becoming terrorists; preventing them from carrying out terrorist acts; protecting infrastructure; and preparing for the consequences of an attack. The CCS specifically focused on the last of these pillars.

Tesh said that previous civil protection strategies during the Cold War period had dealt with a monolithic threat through top-down central management in an environment of secrecy. Current resilience strategies, in contrast, addressed complex interconnected risks with bottom-up multi-agency responses and fostered an environment of transparency and openness. The Capabilities section of the CCS worked to develop four kinds of capabilities. The first, crisis management capabilities, involved making sure that everyone who has a role in emergencies understood what that role entailed. The CCS helped institutionalise this process through designing the UK Civil Contingencies Act of 2004. Second, the CCS worked to help business continuity in the face of emergencies, recently through working with the British Standards Institute on producing standards on business continuity. Third, the CCS helped to develop a common set of necessary resources that anyone would need in an emergency. Finally, the CCS identified the specific capabilities needed for particular types of risk. In general, the CCS adopted a risk management framework: identifying and assessing risks, and building and evaluating resilience.

A recent development of the CCS was the National Risk Register – due to be published in August 2008 – which was intended to help communities themselves to get involved in understanding the relative likelihood and impact of a range of risks

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that were likely to occur over the next 5 years. The methodology used to generate the Risk Register involved gathering a risk assessment community of about 100 people around the government and asking them what risks they thought ought to be included in a national risk assessment; and using the same group to reach a consensus view of the risks. A full explanation of the risk assessment methodology would be included in the report. The impact of risks was based on six factors: the number of people liable to be killed; the number of people who fell ill; the amount of economic damage it would do; the amount of social disruption it would cause; and the amount of anxiety it would cause to the general population. The Register was meant to be a stimulant to discussion, and would change as a result of it. He put up a chart, which would be included in the report, to illustrate his points.

In discussion the following points were made:

- Most of the discussion was on the National Risk Register. As the Register had not been published, the discussion was somewhat circumscribed:
 - A number of risks seemed notably absent from the chart, for reasons that seem to be related to national security.
 - Studies had been done on the psychology of risk. The CCS is familiar with much of this but would familiarise itself with the examples cited.
- One participant noted how the CCS was on a five-year planning cycle, but some of the greatest risks would not be realised in 5, 10, or even 15 years. Yet if we did not begin preparing for them now, our societies would be much less resilient when the time came. Tesh said that the CCS was not constrained to deal only with short term risks, but that a five year risk assessment enabled most of the common risks to be anticipated in a timely fashion.
- Tesh noted that the Government's approach to countering the threat of terrorism, including the acquisition by terrorists of nuclear devices, and to the risks of other catastrophes to be contained in the National Risk Register, was set out in the National Security Strategy published in March.

The recommendations for government are stated at the beginning of this record.

Record prepared by:

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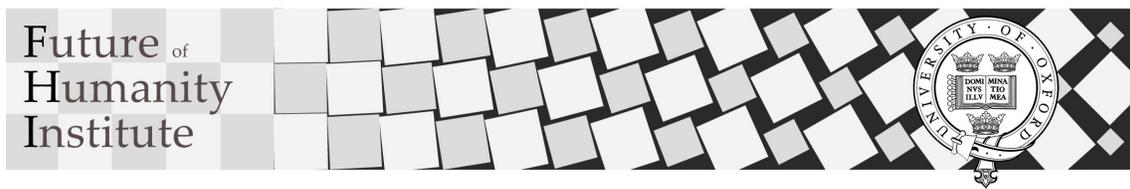
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Policy Foresight Programme

Director: **Sir Crispin Tickell**

The Policy Foresight Programme, part of the James Martin Institute for Science and Civilization at the University of Oxford, is designed to facilitate interaction between government, business, industry, the media, and academia on issues of science, technology, and the environment. The purpose is to identify leverage points in current policy that could have significant long-term benefits for civilization. Under the direction of Sir Crispin Tickell, the main activity of the Programme is to host up to six 1-day seminars a year, where around 25 people engage in constructive debate to further integrative thinking on a particular issue. The emphasis of the seminars is to look anywhere from 10 to 50 years into the future to see what will be the major decisions we will be faced with then and what can be done now to direct policy along a resilient path. The Programme covers all major areas of the James Martin School for the 21st Century.

www.martininstitute.ox.ac.uk/jmi/networks/Policy+Foresight+Programme.htm



About

The Future of Humanity Institute is a unique multidisciplinary research institute at the University of Oxford. The Institute belongs to the Faculty of Philosophy and the James Martin 21st Century School.

Mission

FHI's mission is to bring excellent scholarship to bear on big picture questions for humanity. Despite the great theoretical and practical importance of these issues, they have received scant academic attention. The Institute enables a few outstanding and creative intellects to work on these pivotal problems in close collaboration. Our goal is to pioneer research that demonstrates how such problems can be rigorously and fruitfully investigated.

The Institute's work centres on how anticipated technological developments may affect the human condition in fundamental ways--and how we can better understand, evaluate, and respond to radical change. We currently pursue four interlinked research programs:

- **Human enhancement:** How can medicine and technology be used to enhance basic biological capacities, such as cognition and lifespan? Can enhancement be ethical and wise?
- **Global catastrophic risks:** What are the biggest threats to global civilization and human well-being? Will the human species survive the 21st century?
- **Rationality and wisdom:** How can we make better decisions under conditions of profound uncertainty and high stakes? How can we reduce bias and human error in making such decisions?
- **Future technologies:** What will be the impacts of potentially transformative technologies such as advanced nanotechnology and artificial intelligence?

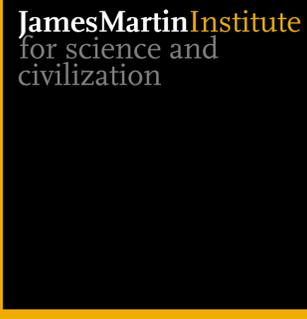
Our research staff is drawn from a variety of fields, including physics, neuroscience, economics, and philosophy—several of us having an academic background in more than one discipline. We use whatever intellectual tools seem most likely to be effective for the specific problem at hand, often combining the techniques of analytic philosophy with those of theoretical and empirical scientific inquiry.

FHI also works to promote public engagement and informed discussion in government, industry, academia, and the not-for-profit sector.

Excellence

Founded in 2005, FHI has already gained a reputation for the high quality of its scholarship and its groundbreaking research. Among its staff are recognised world-leaders in their fields. Our research is published in the world's top scientific and philosophical journals, and we are frequently asked to advise governments and other public bodies. FHI is part of the world-renowned Oxford Faculty of Philosophy, which consistently achieves a superior rating in independent rankings. It was given the highest rating, 5*, in the latest RAE exercise. Applied ethics at the University of Oxford was ranked in Group 1 of such programs in the English-speaking world by the Philosophical Gourmet Report 2006. The most recent internal University review concluded that the output of the FHI was "impressive", and noted the high quality of the Institute's personnel, its present work, and its future potential.

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James Martin Institute for Science and Civilization

Director: **Professor Steve Rayner**

The James Martin Institute for Science and Civilization is part of the James Martin 21st Century School. The Institute focuses on identifying what have been called the “wicked problems“ (those that are persistent and intractable) of the 21st Century; the “uncomfortable knowledge” which challenges existing institutional arrangements that are ill-prepared to deal with such problems; and the pluralistic institutional arrangements that encourage emergent innovative responses known as “clumsy solutions”.

The Institute focuses these lines of inquiry in relation to four quadrants:

- Science, Technology, and Risk
- Futures
- Complex Social and Technological Systems
- Institutional and Behavioural Change

Each topic is approached in partnership with other institutes and centres at Oxford, and with an international network of collaborating organisations from academia, government, business and civic society.

www.martininstitute.ox.ac.uk



THE JAMES MARTIN
21ST CENTURY SCHOOL
UNIVERSITY OF OXFORD

James Martin School for the 21st Century

Director: **Dr Ian Goldin**

It is likely that the 21st century will be an unusually challenging one in the history of mankind. The goal of the School is to develop strategies for responding to the most serious problems, some of which even have the potential to threaten the future of humanity itself. At the same time, we also seek to harness the most promising opportunities facing the world in the new century.

The James Martin 21st Century School, founded in June 2005 at the University of Oxford, is a unique collaborative research effort. The focus of the School is on stimulating Oxford's research, by giving the University's scholars the resources and space to think imaginatively about the problems and the opportunities that the future will bring.

The work must meet the best Oxford scholarly standards, must be original and additional to work done elsewhere, and is expected to have a global impact. The 21st Century School has been designed to:

- Initiate new and collaborative research and encourage members of the University to take up new areas and new styles of thinking
- Operate a research grant programme to stimulate innovative research at the Institutes
- Facilitate lectures, seminars and other teaching activities to encourage students and faculty to focus on future challenges. Workshops and other outreach will ensure ideas generated by the School inform public and private decision-making and that the School's work is informed by the global challenges facing governments and society.

The central hub of the School consists of the Director, Dr Ian Goldin, along with a small secretariat and a number of James Martin Fellows. It provides overall leadership and facilitates cross-cutting and interdisciplinary perspectives and supports the work of research Institutes. The Research Institutes, each undertake leading-edge research in their own subject area, and are typically funded for a number of years. There are currently ten Institutes, each of which is located in a department of the University: The James Martin Institute for Science and Civilization; The Environmental Change Institute; The Institute for Ageing; The Institute for Emergent Infections in Humans; The Institute for the Future of the Mind; The International Migration Institute; The e-Horizons Institute; The Oxford Future of Humanity Institute; The Programme on the Ethics of the New Biosciences; and The World Education Institute.

The School also has an affiliation with the Center for Nonproliferation Studies at the Monterey Institute of International Studies. The Center contributes its perspective on the dangers of weapons of mass destruction to the work of the School in exploring the potential consequences of emerging technologies that could shape the future of mankind.

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