

Risk & Regulation

Magazine of the ESRC Centre for Analysis of Risk and Regulation

No 18 Winter 2009

Risk and Complexity

**PREDICTIVE SURVEILLANCE:
PRECOGS, CATCHEM,
AND DNA DATABASES**

COMMUNICATING RISK

**LONDON 2012 – A RISK-BASED
OLYMPICS?**

Discourses that standardize:
why management models are
valuable instruments

The Perils of Perfection

Meet the Regulator:
Environment Agency

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NO 18 WINTER 2009

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Wrestling with complexity


CARR Director **Bridget Hutter** discusses the inherent complexity of risk information and explores its implications.

Risk regulation is an inherently complex task, dealing with a multiplicity of contributory factors, changing social, political and economic contexts and competing explanations of risk and interests. The pressures to simplify information and build models to aid in this endeavour and to make the process appear objective and formalistic are legion. Yet there are dangers in these processes and these have long been the subject of CARR research. This issue of *Risk & Regulation* has a number of articles addressing the complexities of risk management and its dangers.

The danger of simplification and its encapsulation in quantitative measures is a theme in Andrea Mennicken's discussion of a recent CARR workshop on market functioning and market failure. Notions of market failure, she argues, are as much political as economic in their definition. Likewise, recovery from failure is an economic and political process which may be riddled with paradox as exemplified by the recent financial crisis. Here we witness failure leading to an intensification in calls for 'more of the same': more regulation when regulation is deemed to have failed, more quantification when this was in place prior to the crisis and more risk management when risk models had also demonstrably failed at all sorts of public and private sector levels. Moreover, the 'usual suspects' and disciplines have been called upon to help recovery when the evidence seems to be that different approaches are called for and lessons need to be thought through from different perspectives.

David Spiegelhalter focuses on public understanding of risk probabilities, taking the example of individual understandings of health probabilities. He argues that it is essential that there is more than a single format for conveying information. This is important as multiple objectives are involved, and also multiple publics with various and changing understandings of the messages conveyed to them. These lessons of individual health outcomes need to be translated to organizational, and particularly public policy, forums where the ways in which risk probabilities are conveyed may influence how risk probabilities are understood and more worryingly, misunderstood. In turn this plays a role in how acceptable risks are considered to be.

There are of course many pressures on organizations to be seen to be in control of risk and this can lead to the development of



complex methods and assemblies of risk management tools. Michael Lynch discusses one such development in the criminal justice arena where there is a long history of attempts to link criminality to biology. The latest endeavour is to predict criminality through DNA profiling. There are many concerns surrounding this and Lynch discusses some of these: including the biased sampling involved, errors in processing, and prejudicial interpretations of database matches. Scientific and technological developments hold out the possibility of new and precise methods of managing risks. John Downer, writing about one of the most highly developed areas of risk management, the aeronautical sector, warns that there are also dangers in technical precision. He argues for some flexibility and in part chimes with risk regulation literatures which offer cautionary messages about unthinking legalistic compliance with the rules.

Demortain takes a slightly more optimistic view of another area of risk modelling, namely the use of generic risk models and their role in standardization. He regards these generic management models as having a variety of advantages – including their flexibility and their ability to enhance legitimacy – which, he argues, are enhanced by the ways they engage actors into processes of standardization. This is important as the political aspects of standardization are inescapable, and generic forms allow space for flexibility and different models of negotiating agreement.

The importance of flexibility is highlighted in an article by Will Jennings who discusses the dangers of risk management in relation to the Olympics. He suggests that the London 2012 Olympics will be the first Games where there has been the systematic and widespread employment of formal

risk management tools. He discusses the multiple areas of risk currently under management by the many different authorities involved, including financial risk, security risk, and construction project management risks. The nature of these risks may well change in the long lead time to the event – the security risks may change and the economic climate has already done so. Moreover, this is an event where there can be no expanding deadline and where any mistakes will be potentially on a world stage. Reputations are at stake. Jennings sees significant risks attaching the risk-based approach; namely the risks of the risk management being crippling, stifling decision-making and overpowering financial budgets.

A number of the articles in this edition are the result of collaborations and CARR events. Will Jennings, CARR Research Associate and a former member of staff, organized a workshop on the Olympics and Risk Management at CARR in June. The event attracted the participation of academics from around the country and practitioners from the main organizations. CARR Research Associate Andrea Mennicken, and Linda Soneryd from the Stockholm Centre for Organisational Research (SCORE) organized a highly successful workshop on market functioning and failure in the public service in September. This was part of an ongoing collaboration between the two Centres which involves a number of academic exchanges and events. Such events and collaborations are valuable in furthering CARR's outreach and capacity building, and important in our development of future programmes.

Bridget Hutter
CARR Director

MEET THE REGULATOR

Environment Agency



We talk to **Miranda Kavanagh** about the Environment Agency and how it is responding to a changing climate.



What does the Environment Agency do?

The Environment Agency is responsible for protecting and improving the environment in England and Wales. What that means in practice is that it's our job to look

after the quality of air, land and water, including managing emissions of greenhouse gases. We're also responsible for protecting people and businesses from flooding and making sure there are opportunities for wildlife to thrive and for people to enjoy the great outdoors.

This important job is going to get more challenging. A changing climate is expected to increase the number of properties at risk of flooding by around 60 per cent over the next 25 years unless we increase investment levels. By 2050, some river water levels in the summer could reduce by up to 80 per cent. The challenges of climate change are so urgent that we have to address not just how we manage its consequences (such as flooding and drought) but also its causes (for instance, by playing our part in reducing greenhouse gas emissions). The Environment Agency manages the EU Emissions Trading Scheme in England and Wales and our direct regulation covers other sources, such as emissions of methane from landfill. Together, these account for 40 per cent of emissions and our role will grow as other sectors, such as aviation, are included.

What has the Environment Agency achieved so far?

Firstly, we've improved the quality of our air and water. We are the principal environmental regulator in England and Wales, which means we set standards that industry must comply with to make sure the environment is protected. From power stations and nuclear installations to the chemicals and water industries, farmers and waste management companies, we use a system of permits to make sure that the emissions they produce are under a certain level. Since 1998, businesses we regulate have reduced greenhouse gas emissions by 4 per cent. Emissions of sulphur oxides that cause acid rain and can have impacts on health have dropped by 69 per cent and waste has been reduced by 14 per cent. There have been improvements in the water environment too – the number of rivers achieving good chemical quality in England have increased by 24 per cent since 1990 and 18 per cent more bathing waters reach the required standard.

Secondly, we play a central role in managing the risk of flooding from rivers and the sea. Fifty-five per cent of our annual budget of over £1 billion is spent on reducing the risk of flooding and responding when flooding happens. In the last five years we improved the level of flood protection to 156,000 households. Our role also means that we provide facilities for angling and boating and improve habitats for fish and other wildlife.

Our third role is being an environmental advisor. We have to be consulted by law on the environmental and sustainability aspects of land use planning. We also advise local authorities on issues such as when planned development is inappropriate because it is in a flood plain. In recent years we've worked with local authorities on this and as a result the percentage of planning decisions that have gone ahead despite our advice has gone down from 11 per cent in 2003 to just over 3 per cent in 2007.

Is there a secret to being a successful regulator?

We've got people working locally on the ground throughout England and Wales, but we've also got a national perspective. We find that working at both scales is a real advantage; for example it helps us reconcile the views of industry bodies with those of individual operators. We believe that good environmental regulation can actively support economic development, but if it's done badly it imposes unnecessary costs on business, on society and even on the environment. We work hard to make sure we're regulating efficiently but without stifling innovation.

What are the Environment Agency's powers?

Traditionally, the way we regulate has been through setting permits, authorizations, licences and consents which specify conditions that business

must comply with to protect the environment. These are still important for our work – and for the environment – but we're also developing other methods of regulation. Over the past decade, alongside our 'traditional' model of regulation, we have been looking at different approaches, such as cap and trade schemes, external accreditation, civil penalties and tax incentives. The EU Emissions trading scheme, the Carbon Reduction Commitment and the Pigs and Poultry Farm Assurance Scheme are all examples of these regulatory approaches. We also have a statutory duty to report on the state of the environment, so we produce reports highlighting environment issues to advise Government and influence businesses.

How do you try to incorporate evidence into your policy-making?

Evidence is critical to what we do. We use our evidence and knowledge to guide our own actions and the decisions we make in a regulatory context, but we also use it to influence the actions of others. This year we have created the Evidence Directorate which brings together our research, analytical and information management expertise. This is enabling us to put evidence at the heart of what we do and increase the application of economics and social research to our regulatory and operational work.

Regulators have been encouraged by the government's Hampton Review to risk-base their regulatory activities – how is the Environment Agency responding to Hampton?

We have been applying risk-based approaches to regulation for many years now and our Operator Pollution Risk Appraisal (OPRA) tool, which takes a risk-based approach to managing our regulatory interventions, has received international recognition as an example of good practice. We're using risk assessment to make sure that the areas we regulate are going to meet the targets set out in our Corporate Strategy, that our environmental permitting regime makes sure we use resources wisely and to direct our enforcement activities, such as an intelligence-led approach to targeting waste crime. We are also working with businesses to give them more advice and guidance on regulation, building upon our successful 'NetRegs' website.

We're facing a huge environmental challenge – the work we do over the next five years will greatly affect the environment for the rest of the 21st century. However, we're working hard to meet that challenge and create a better place for people and wildlife.

Miranda Kavanagh is the Director of Evidence at the Environment Agency, a new role created in 2009.



CARR IMPACT

Christopher Lawless presented a paper entitled 'Risk, Regulation and Forensic Science: Challenges and Opportunities' at the 50th Anniversary Conference of the Forensic Science Society in Harrogate, UK on Friday 30 October.

Bridget Hutter was part of the ESRC, Academy of Social Sciences and British Library public debate series on 'Myths and Realities 2: Making Sense of Risk', Wednesday 18 November, British Library, 6-7.30pm.

Bridget Hutter was invited to become a Member of the World Economic Forum's Global Agenda Council on Catastrophic Risks 2009, in August. She will be taking part in the Summit on the Global Agenda 2009, 20-22 November, Dubai.

Bridget Hutter has received Co-Reach funding for comparative research on regulatory law enforcement in China and the EU. This was as part of a collaborative project with colleagues from the University of Leiden and the Chinese Academy of Social Science.

Erika Mansnerus gave a presentation at the Vital Politics III Conference, at LSE, on 'Ignorance and Uncertainty in the Life Cycles of Evidence: a Case Study of Pandemic Influenzae preparedness planning', in September.

Mike Power gave a talk at the *Travelers* Risk Conference on 'Enterprise risk management – is it broken?', in June.

Mike Power spoke on a panel as part of an ICAEW Audit Quality Forum event to discuss 'How Systemic Risk Issues Impact on the Audit Process', in June.

ACADEMICS ABROAD

David Demortain gave a talk on 'The International Diffusion of the Concept of Risk Analysis' in Paris at the conference 'Governing Uncertainty: The Contribution of Social Sciences to the Governance of Risk in Environmental Health', in July.

Jeanette Hofmann gave a talk on 'Before the Sky Falls Down: A 'Constitutional Dialogue' Over the Depletion of Internet Addresses', in Potsdam at the 5th ECPR General Conference, in September.

Jeanette Hofmann co-organized a conference in Berlin for authors who contributed to a special issue of *Politische Vierteljahrszeitschrift* on the topic of 'Political Economy of the Information Society'; she also gave a presentation on 'The Future of Digital Libraries: Vision, Law and Business', in September.

Jeanette Hofmann gave two lectures 'Public and Private Authority in Internet Governance' and 'Individual Users in Internet Governance' at the European Summer School on Internet Governance, Meissen, in July/August.

Bridget Hutter visited the Stockholm Centre of Organizational Research as part of CARR's three-year joint project with 'Risk Regulation, Markets and Democracy: Reorganizing Economy and Society in the 21st Century', in June.

Bridget Hutter participated in a Roundtable on 'Risk Governance Deficits and Emerging Risks' hosted by the International Risk Governance Council at the Swiss Re Centre for Global Dialogue in Rüschiikon, Switzerland, in June.

STAFF NEWS



Julien Etienne has joined CARR as an ESRC Postdoctoral Fellow. His research interests include compliance theory, major accident hazard regulation, incident reporting, and regulator-regulatee relations.



Christopher Lawless has joined CARR as an ESRC Postdoctoral Fellow. His current research interests include the relationship between science and law, the sociology of forensic sciences, and sociological and philosophical issues concerning the use of evidence and probability theory.



Christine Sweed has been appointed as the CARR Centre Manager.



Anna Phillips has been appointed as the CARR Web and Publications Administrator.

John Downer has inherited David's editorial duties at *Risk & Regulation*.



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Discourses that standardize:

why management models are valuable instruments

David Demortain discusses how risk management models standardize regulatory decision-making.

Models are a key instrument in risk regulation. As amply demonstrated in Michael Power's book *Organized Uncertainty*, the principles of risk management are embodied in 'rational designs'. Translated into standards, these abstract models guide institutional accounting and strategic decision-making processes without directly prescribing any particular organizational form or operation. As such, they illustrate what neo-institutionalism has convincingly been demonstrating: that the more abstract and generic standards are, the more legitimate they appear and the more likely they are to attract potential users. Surely this is paradoxical: standards would bring about harmonization where they are least prescriptive. How do abstract and generic rules constrain agents and bring about harmonization? I suggest that the regulatory value of models is to engage actors, even the most resistant to harmonization, in a process of standardization. They provide a language to express different relations to centrally composed rules and negotiate *how far* standardization should go.

A key model in food safety and environmental health is 'risk analysis' – a conceptual frame according to which public decisions on uncertain health hazards are optimal when risk assessment and risk management are carried out in close connection to one another. This model, outlined in a 1983 report of the US National Research Council (NRC), is based on the assumption that it is difficult, if not impossible, to disentangle scientific and political arguments in a context of uncertainty, or to fold decision-making processes into a standardized procedure that begins with a scientific evaluation of risks. The model simply states that scientists, on one hand, and bureaucrats or elected officials, on the other, should interact as much as possible to agree on the foundation of the decisions they are co-accountable for. By this view, the separation of risk assessment and risk management should be 'functional' rather than institutional.

The flexibility of models is illustrated by the fact that certain countries inverted the NRC's intentions by invoking their 'risk analysis' model to justify the institutional separation of risk assessment and risk management. In France, for instance, these activities were entrusted to separate organizations: risk assessment bodies and traditional bureaucracies. This institutional design turned the science/policy-

making boundary into a complicated bout of inter-organizational politics – precisely the sort of situation which the original model advised against.

The model, thus, has ambivalent effect with regards to standardization. As a model, it can easily be converted into a rule prescribing to keep risk assessment and risk management together. But it can also be appropriated by local actors to codify, and protect, their local choices, such as that of separating risk assessment from risk management. In other words, two distinct relations to standards may be expressed in the same language.

In matters characterised by uncertainty, agreeing on the role of science in decision-making becomes an important institutional challenge. A key insight of the sociology of science is that all knowledge is contextual; it is believed to be true only where the methodological and theoretical conventions on which it is based are accepted. Of course, there are ways to delocalize scientific claims. However, this is most difficult in contexts marked by knowledge gaps. Studies of socio-technical controversies have shown that risks and uncertainty lead to the questioning of knowledge claims and a loss of scientific authority. In such contexts, enquiries about the foundation of any scientific claims are always more exigent. Experts are suspected of concealing normative or political preferences within technical arguments.

There are two possible strategies for escaping the instability of knowledge in risk regulation.

The first is based on collective deliberation. In Callon, Lascoumes and Barthes' *Acting in an Uncertain World*, this is called a 'dialogical approach'. In this view, commonly accepted truths or states of the world can only emerge from a collective commitment to dialogue. Risk analysis contains such approach. The two major statements of the 1983 NRC report – that scientific and political arguments cannot easily be disentangled, and that risk assessment and management should be kept in interaction – clearly demonstrate a preference for deliberation. They outline a model of multi-directional and iterative exchange of arguments.

The second possible strategy is a mechanical one. In Theodore Porter's *Trust in Numbers*, 'mechanical objectivity' refers to the use of seemingly 'objective' and 'replicable' methods to produce public trust in scientific evaluations. Similarly, risk analysis suggests

that risk management decisions can follow from the standard application of an objective risk assessment protocol. According to transnational risk assessment experts, risk analysis for instance, is best understood as a succession of four sequences – hazard identification, hazard characterization, exposure assessment, and risk characterization. According to the mechanical model of risk, deploying these four sequences in their received order makes complex issues tractable, and shows the way towards the appropriate risk management decision.

Dialogical and mechanical approaches are two different ways of managing uncertainty. For instance, they each reserve a different role to quantitative thinking. A mechanical approach trusts numbers and probabilistic calculations much more than a dialogical one. They also boast different relations to centrally composed standards.

The dialogical approach gives much more weight to contextual arrangements. What matters is where people agree with one another as much as how well they apply an external standard. Risk analysis in this sense respects local conventions. It gently standardizes these arrangements by allowing actors to explicate and compare them with others. Its first appearance in the risk analysis language in Europe was during the BSE political crisis. National governments in Brussels started to rationalize the crisis as being caused by an insufficient separation of risk assessment and risk management (i.e. a lack of independence from scientific experts). The risk analysis terminology, however, was only used retrospectively. It was non-existent when those very scientific committees were established, but was adopted across European countries and European Union institutions as a scheme for describing and discussing new institutional designs for decision-making concerning uncertain food-related health hazards. It helped member-states to communicate and exchange information about the institutional designs they respectively adopted. According to the first director of the European Food Safety Authority, 'It is a waste of time to standardise, but we should learn lessons from looking at each other.' In other words, the risk analysis scheme allowed a sort of inter-contextual standardization through mutual observation and communication of local arrangements.

Mechanical objectivity, by contrast, directly depends on standardized procedures. It is constituted by the import of exogenous rules and it is the very fact that these rules are external to the context that guarantees objectivity. Risk analysis legitimizes standardization in this stricter sense when it is presented as a risk assessment procedure.

This stronger form of standardization is typically promoted by scientists. As risk assessors, their occupation is ruled by the risk assessment procedure and its mechanistic understanding of the relationship between science and decision-making. Toxicologists, for instance, are particularly prone to defending the orthodox application of the 'four steps' of risk assessment. By invoking abstract codified knowledge, this model crucially allows occupations to differentiate their expertise, and, as a transnational community, toxicologists circulate and defend this approach to risk analysis across countries. For this reason, its content has not changed in 25 years, and is used across various domains of safety assessment, from industrial chemicals to pesticides and GM foods.

In short, dialogical and mechanical approaches represent two distinct strategies of standardization. These strategies are not applications of the model; they were born with it. Both are valid interpretations of the NRC report, and are always present in the language of risk analysis. The two strategies are articulated and confronted each time and wherever this language is used.

Risk assessment agencies such as the European Food Safety Authority are one site where this confrontation takes place. Agency officials and in-house risk assessment experts typically have opposite strategies: a dialogical one for the former, a mechanical one for the latter. The contrast is also clear in international standard-setting arenas, where both types of actors are involved. One such arena is the Codex Alimentarius: the inter-governmental body for international food standards. The Codex Alimentarius has been working on a risk analysis standard since the late 1990s. This agenda is the intersection of two projects. The first driver was

the diffusion of the risk assessment methodology by transnational experts. The second was the need of national governments to ensure that their way of making decisions on food matters was internationally acceptable at a time when suspicions were arising that governments might use scientific and health-related arguments to block food imports.

Risk assessors who advised national governments, as well as the Codex secretariat, advocated the more prescriptive approach. They acted as risk analysis 'experts', of the kind who circulate and defend models, guard against too strong deviations, maintain their coherence and integrity in an attempt to harmonize the world. They also judge on how the model evolves, by integrating or excluding new elements of practice. Such experts are helpful actors for professional associations, inter-governmental bodies or regulatory bodies that seek to standardize further than what their formal powers allow. This prescriptive approach was counter-balanced by the recognition that the relation between science and politics is managed in different ways in different contexts. In the 'working principles' eventually elaborated in the Codex Alimentarius, the codified form of risk assessment sits side by side with a shopping list of principle-like practices, to be incorporated 'as appropriate' in particular national designs.

Managerial models thus provide legitimacy to a plurality of strategies of standardization. Strategies are neither local nor global. They are negotiated between actors that have different relations to projects of world-level harmonization. Models show that standardization is not only about diffusing or translating standards. Standards contain politics, even if the common use of the semantic of risk management suggests the opposite.

David Demortain is an ESRC Research Officer at CARR



Communicating risk

David Spiegelhalter looks at how institutions communicate with publics and argues that the presentation of health risks frames their perception.

Whenever I talk about risk I ask the audience to pretend that I am an omniscient being (which I am not) and can tell them when they are going to die, and then ask how many would like to know? My subjective estimate is that around 1 in 20 put their hands up, across all ages, and these people would like to have everything planned and sorted before they say goodbye, perhaps propped up on crisp white pillows surrounded by tearful loved ones.

Clearly the great majority prefer to live with uncertainty about the circumstances of their inevitable decline and death. Nevertheless we are constantly reminded of the risks we face, both in general as a member of a population and, increasingly, at an individual level. How those personal risks can be communicated, and what the impact might be, is one of the topics being examined by the Winton programme for the public understanding of risk at the University of Cambridge.

I shall use myself as an example. Last year I went to my GP and had the usual blood tests and examination, and he put me through an algorithm on his computer and out popped the conclusion that I had a 10 per cent chance of a heart attack or stroke in the next 10 years. I was fairly taken aback by this bald statement, although as a statistician I could easily check that an average 55 year old man (my age) has a 9 per cent chance of dying before his 65th birthday, and in fact I cheered up considerably when I found my risk of a heart attack or stroke was less than average. Which goes to show I am as subject to the more emotive responses to risk as everyone else.

If my risk were 20 per cent or more then NICE guidelines suggest I go onto statins, but even my fairly low risk could be reduced by around 30 per cent if I were to take statins every day. This decision led us to develop an animated programme, *Spinning the Risk*, which explores the ways these risks might be communicated.

The simplest *relative risk* statement could be expressed as:

Statins reduce your chance of experiencing a heart attack or stroke in 10 years by 30 per cent.

This makes the statins sound quite attractive. But if we consider the *absolute risks* then it does not sound such a good option:

Your chance of experiencing a heart attack or stroke in 10 years without statins is 10 per cent, which is reduced to 7 per cent with statins.

Psychologists have found that terms such as 'chance', and the use of percentages, can be off-putting and so a popular format is to use natural frequencies within a population, say:

10 out of 100 people like you will experience a heart attack or stroke in 10 years without statins, which is reduced to 7 out of 100 with statins.

An issue with this format is known as the *ratio bias*, which is a very consistent finding that many people view '10 out of 100' as a higher risk than '1 out of 10', and so it's vital to keep the denominator constant. But we can also change the framing of the statement from a negative to a positive frame, to produce an equivalent statement such as:

90 out of 100 people like you will be free of a heart attack or stroke in 10 years without statins, which is increased to 93 out of 100 with statins.

which makes statins look even less attractive. Framing can be very effective: a recent *Nature Genetics* paper that reported a gene variant associated with a reduced risk of hypertension in 10 per cent of people received international coverage when a clever press officer realised they could report it as a gene that increased the risk of hypertension in 90 per cent of people.

Graphics provide another medium to manipulate the risk message, and we have provided pie charts and bar charts that can alter the impression by

changing the scaling and framing. However our main emphasis has been on the use of icons, since these are being increasingly recommended for risk communication. For example, Figure 1 shows a 'smiley' image for my decision problem.

Our programme provides the option of scattering the icons and changing their colour, since it's been shown that such adjustments can affect the perception of the magnitude of a risk.

Personally, I am not keen on the artifice of embedding me in a population of similar people in order to explain risk. I am a unique individual, and the mental image of me being just one of the smileys encourages me to believe that I will be one of the lucky ones. My own preference is to be upfront about the fact that we are thinking about the unique me and, out of all the possible ways things may turn out for me in the future, some will involve me having a heart attack or stroke before I am 65, and some won't.

We have developed two ways of making this idea concrete. First is to use the language of 'possible futures', so that we say:

Out of 100 possible outcomes for you, 10 will involve experiencing a heart attack or stroke in 10 years without statins, which is reduced to 7 out of 100 with statins.

Second, we have enabled the programme to use images of the individual, as in Figure 2 which shows 100 possible versions of me in 10 years time.

What might this mean for organizations that wish to communicate with a range of audiences? It is well known that the way in which risk is perceived depends on both the topic and the subject, and that numerical statements about probabilities can have minimal impact relative to the feelings the individual has regarding the threat, based on their personal experience, their trust in the source of information, their dread of the event in question and so on. But the fact that people (including



Figure 1. 'Smileys' for my decision problem as to whether to take statins or not: only 3 out of 100 people like me will benefit from taking tablets every day for 10 years.

myself) have immediate responses based more on emotion than 'rational' weighing of evidence does not mean that quantitative assessments of risks are pointless: rather it is an argument for *more* attention to be paid to risk presentations in order to make sure, as far as is possible, that a fully informed decision is made, even if the individual exercises their right to take little notice of the information being provided.

We are currently working with a number of organizations that wish to feature these type of graphics – these include healthcare providers, patient-support groups, and official agencies. These ideas are particularly valuable when risk information needs to be tailored to individual circumstances, such as in genetic counselling or

predicting survival after severe head injury. We are also working with experimental psychologists to see whether the 'possible futures' representation is (a) attractive to users, (b) enables them to understand and remember the risks, and (c) changes their behaviour. However, a number of studies have shown that these three objectives are not necessarily related and that people vary greatly in their preferences and understanding for alternative risk representations – for example, in some experiments it has been found that a majority favour bar charts to 'smileys'. Therefore

it is unreasonable to expect that any single format can either satisfy the majority of people or the multiple objectives. That is why we believe that any tool for communicating risk must be capable of using a variety of representations, from text to tables to graphics to animations.

So far I have only dealt with applications from health, but the basic idea of 'possible futures' is of course applicable to any context. For example, we are developing animations to display the possible weather tomorrow and the relative likelihood of different results of a football match. Possible futures for an organization, community or even the world could also be displayed in order to bring home the potential consequences of our actions, while also making clear what is very unlikely to occur. A pressing issue is how uncertainty about risks would best be displayed. This could be done using density of colour or dynamic changes in the display. Psychological experiments have suggested that while some people may welcome such a forthright expression of uncertainty, for some it can further decrease the trust in the source.

All our animations can be adapted by users to their own area and embedded on external websites using their own icons and language – it will be interesting to see whether there is an enthusiastic audience for this type of exercise.

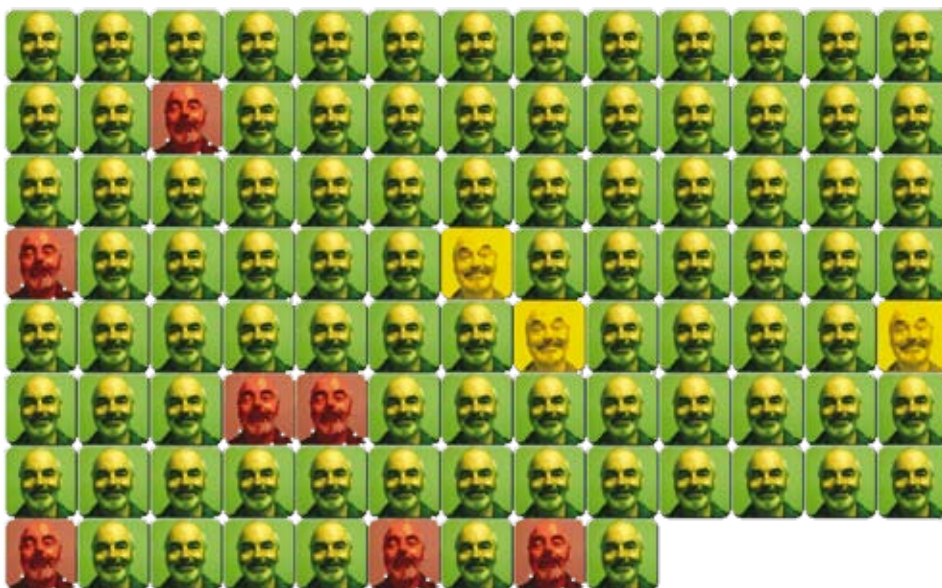


Figure 2. Images of 100 possible ways things may turn out for me in 10 years time.

David Spiegelhalter is Winton Professor of the Public Understanding of Risk, University of Cambridge

The Winton programme is based in the Statistical Laboratory of the University of Cambridge: its website is www.understandinguncertainty.org

Predictive Surveillance: Precogs, CATCHEM, and DNA databases

Michael Lynch discusses the complex questions that arise when genetics meets the justice system.

In Philip K. Dick's 1956 short story *The Minority Report*, a future society develops a system of predictive surveillance for identifying and arresting perpetrators before they commit crimes. 'Precrime', the police agency charged with arresting these pre-criminals, uses a set of three idiot savants ('Precogs') with enlarged brains and barely functioning bodies who have the amazing power to visualize future crimes and identify their perpetrators. After the protagonist – a police chief – turns up in a precog report of a murder, the story becomes a play on paradoxical relations between present and future. Precogs are, of course, sheer fantasy, but predictive surveillance of criminals, in a *probabilistic* sense, has long been an objective of policing agencies. Consequently, we can treat Philip K. Dick's precogs as a metaphor for complex distributed systems used by policing agencies for collecting and searching biometric data to identify individuals, connect them to past crimes, and prevent them from committing future crimes. As the term implies, biometric data are systematically organized measurements and analyses of bodies and bodily traces, which police use for identifying individuals. Their use for police investigation dates back to the 19th-century systems designed by Sir Francis Galton and Alphonse Bertillon to identify criminals and track recidivists.

Galton and later enthusiasts for biometric indices hoped to find genetic and other evidence of (potential) criminality. These hopes were dashed as one after another phenotypic, chromosomal, or genetic index of criminality turned out to be spurious, and often prejudicial as well. Despite such failures, fingerprint files and other biometric indices proved useful for police investigations, even though they had dubious value for classifying criminal types on hereditary grounds. Fingerprints (now encoded in digital form) remain very much in use, but DNA databases, exemplified by the National DNA Database (NDNAD) of England and Wales, which currently holds DNA profiles from more than five million individuals, receive far more publicity.

Like older forms of biometric indexing, DNA profiles are useful for comparing traces found at crime scenes with evidence derived from known individuals, such as suspects in custody. However, even though the dogma was long ago established that each individual's fingerprints are unique identifiers, fingerprint files were not easily searchable when suspects were unknown. It was a laborious task to sort through an extensive file of fingerprints in search of a possible match with latent fingerprints recovered during investigation of a crime scene. The task was especially difficult when there was no guarantee that the perpetrator's prints were on file. DNA databases (and, with lesser precision, digital fingerprint databases) have the advantage of being instantly searchable. The NDNAD includes digitally encoded DNA profiles as well as other individual information for each person in the database, as well as profiles collected during investigations of unsolved crimes. The Home Office conducts daily 'speculative searches' of the database in order to identify matches between new profiles and existing profiles.

A DNA profile is a selection of genetic markers that are known to be highly variable in the human population. In theory, the probability that two individuals who are not identical twins would have identical profiles decreases to the vanishing point as the number of independent markers increases. With the systems currently in use in Europe and North America, estimates of the odds that two randomly selected unrelated individuals from the relevant population would have the same DNA profile are much less than one chance in a billion.

Both the popular press and technical literature emphasize the precision and scientific reliability of the molecular biological techniques and probabilistic calculations used for forensic DNA profiling. What is not as well known is that the initiative to develop the NDNAD was spurred by an effort to predict future criminality with the less precise arts of forensic psychology. In the 1980s, the British police compiled psychological profile information on repeat offenders, and identified a

typical career pattern that begins with relatively minor offenses and escalates to increasingly violent assaults, including murder and rape. Peter Sutcliffe, known as The Yorkshire Ripper for his multiple murders and assaults, was a notorious case in point. One such index compiled information from child murder cases dating back to 1960, and was given the memorable acronym CATCHEM (Centralised Analytical Team Collating Homicide Expertise and Management). Though CATCHEM had limited value by itself for crime control, it encouraged two related ideas: first, that a relatively small proportion of the population was responsible for repeated, and particularly violent, crimes; and, second, that if such individuals could be identified, tracked, and deterred early in their criminal careers, worse crimes would be prevented.

Coincidentally, in the mid 1980s, the first method of forensic DNA profiling was developed by Sir Alec Jeffreys of the University of Leicester, and it was not long before his method was used in criminal investigations. DNA profile methods underwent controversy and change over the next several years, but in 1994 the Home Office proposed that the technology was sufficiently reliable and cost-effective for building a searchable national database. The database was launched in 1995, and has steadily expanded since then. At the time, the Association of Chief Police Officers (ACPO) projected that the database eventually would include information from around five million convicted offenders. They estimated that this number would be sufficient to include persons responsible for more than half of crimes committed. In line with the CATCHEM project, ACPO recommended that the database should include individuals convicted of 'recordable offenses' (essentially, any crimes more serious than traffic violations), so that recidivists who progressed from minor crimes would be tracked automatically from a point early in their careers, and if they persisted they would be subject to ever-more intensive surveillance and progressively longer periods of incarceration. The database expanded beyond the projected



five million, and also came to include data from a substantial number of individuals besides convicted criminals. As the database expanded, so did the rationales for expanding it further.

It is an open question as to whether or not this scheme is working. Despite the current size of the NDNAD, and the rapidly growing size of databases in the United States and other nations, there seems to be no discernible decrease in recordable offences. While it can always be argued that absence of evidence is not evidence of absence – that crimes prevented may be masked by a general rise in crime and unexpected growth in the criminal population – other possibilities come to mind. For example, illegal markets (for illegal drugs, illicit sex, and so forth) are likely to draw new entrants when others leave the field. If we assume, as criminologists often do, that many (indeed, most) recordable offences fail to be recorded, the criminal database at any given time is likely to be a selective sample that is subject to the many unknown contingencies that lead some individuals, but not others who are equally eligible, to acquire criminal records. What *is* known is that the NDNAD is not a random sample of the British population, and the difference between the two has been subject to considerable debate surrounding proposals for 'universal' databases.

The markers used in most systems of forensic DNA profiling (with the exception of one for sex) are drawn from non-coding regions of the human genome, and do not index phenotypic traits, though some specific alleles correlate with roughly defined 'racial' categories. Unlike dermal ridge patterns (fingerprints), the patterns of markers in DNA profiles can be used to trace lines of inheritance. National and regional DNA databases currently include relatively small proportions of the relevant populations, but they include relatively high proportions of young men from minority groups. In the UK, a 20 year old man of African descent is far more likely to have been arrested and convicted than an elderly Caucasian woman, and thus his DNA profile is far more likely to be on the NDNAD and automatically compared with criminal evidence from thousands of crime scenes during daily speculative searches. Moreover, when a database search turns up a close, but not perfect, match between his profile and crime scene evidence, close family members of his who had no previous contact with the criminal justice system may be subject to police investigation through a controversial practice known as a 'familial search'. Thus both he and his relatives have greater risk of being identified as suspects (and eventually convicted, given the extraordinary weight assigned to DNA evidence), than those

whose relatives are not on it. The skewed makeup of the database along lines of age, sex, and ethnicity has been cited as justification for expanding the database to include all citizens and immigrants to the UK. These concerns are often countered by saying that only the guilty have anything to fear, and that innocent persons who are on the database will automatically be cleared of any suspicion during daily searches. Such arguments make two contestable assumptions: one, that searches are not subject to error; and, two, that a match is not prejudicial unless the person in question actually is guilty of the crime in question.

Errors are possible, and well documented. These include mundane clerical errors, where samples are mislabelled or inadvertently switched, as well as 'adventitious matches' (random matches between profiles from different individuals). With the increased power of current techniques, adventitious matches are often assumed to be nearly impossible, except in cases of identical twins and very close relatives, but this assumption ignores the fact that DNA profiles developed from crime scene evidence are often partial or mixed. Moreover, recent audits in Arizona and other US states indicate that adventitious matches may be more likely than had been estimated.

Database matches can be prejudicial. It is common, not only in the tabloid press but also in some academic reports, to write as though DNA provides unassailable evidence of guilt and innocence. This both exaggerates the certainty of DNA evidence and conflates match evidence with evidence of innocence and guilt. In cases involving DNA evidence, as in any criminal case, judgments of guilt and innocence relate to questions about intentions and the credibility of testimony. The idea that DNA matches are unassailable facts that transcend testimony and judgment can amount to a de facto presumption of guilt. Moreover, persons from minority groups and other groups associated with high crime rates are more likely than others to face such presumptively certain evidence, given the skewed demographic makeup of DNA databases. However, proposals to avoid such skewing by expanding databases to the hypothetical limit of national populations raise problems of their own. Aside from adding yet another powerful surveillance technology to the available arsenal, universal databases would be an administrative nightmare, greatly exacerbating existing logistical problems with clerical errors, case backlogs, and the like.

In *The Minority Report*, the system of predictive surveillance assumes that the precogs have an infallible vision of the future. As the plot unfolds, that assumption unravels. DNA also is said to be infallible by many of its proponents, and even by some of its former critics. Although we have not reached the point of arresting individuals for crimes they have not yet committed, and there is no equivalent to the Precogs' visualization of future crimes, a probabilistic calculus of risk supports the development and expansion of DNA databases to identify and immobilize the active criminal population. Together with other methods for tracking a growing subset of persons in national and international populations who have had encounters with criminal justice systems, DNA databases are designed to prevent crimes before they occur. It is unclear, and may always be unclear, if they are succeeding in doing so.

Michael Lynch is Professor in the Science and Technology Studies Department at Cornell University; editor of the journal *Social Studies of Science*; president of the Society for the Social Studies of Science, and first author of the 2009 book: *Truth Machine: The Contentious History of DNA Fingerprinting*.



CARRSTUDENT

State Actors and Non-Governmental Regulation

the Harkin Engel Protocol

Natalie Seaman compares systems of non-governmental labour regulation.

Since the 1990s, an increasing number of private systems have emerged that set, monitor and enforce standards. These systems are diverse; they include company and industry wide monitoring systems, multi-stakeholder governance regimes and not-for-profit schemes managed by NGOs. What they share in common is that they are designed to manage supply chains where raw materials are grown and processed in one or more jurisdictions and final products are consumed in another. This is sometimes referred to as non-governmental labour regulation. The growth of these mechanisms has ushered in new regulatory responsibilities for non-state actors, but does this mean that governments are ceding administrative authority to private groups?

An examination of one system of non-governmental labour regulation, the Harkin Engel Protocol (HEP), suggests that both weak and strong states may actually enhance their governance capacity when they work with non-governmental regimes.

The HEP is an agreement that was signed between multinational chocolate manufacturers and two American legislators, Senator Tom Harkin and Congressman Eliot Engel. It commits manufacturers to eliminating the worst forms of child labour in the cocoa supply chain.

The cocoa supply chain is unbalanced. Seventy per cent of the world's cocoa beans are grown on smallholdings in Côte d'Ivoire and Ghana, whereas higher value activities are concentrated in developed countries. Mars Incorporated, for example, is based in the United States but accounts for about 12 per cent of the chocolate industry's global market value. Because of this imbalance, the ways that the three governments which ultimately participated in the HEP - Côte d'Ivoire, Ghana and the United States - did so in different ways.

In the United States, cocoa production became a political issue at the beginning of this millennium when prominent news sources such as the BBC published anecdotal evidence that children from Mali and other neighbouring countries were being trafficked into Côte d'Ivoire and enslaved for work on cocoa plantations. The work was reported to

be arduous and attempts to escape were said to be met with severe retribution. This led labour rights groups in the United States to lobby for stricter monitoring systems to prevent the trade of cocoa produced by slave labour. Subsequently, in 2001 Eliot Engel successfully introduced an amendment in Congress to the 2002 Agriculture Appropriations to earmark funds for the Food and Drug Administration to create a slave-free label for cocoa products. Before the amendment was introduced in the Senate, however, Engel, along with Tom Harkin, negotiated an agreement with manufacturers, who faced both legal and public relations pressure.

The agreement stipulated that industry would design and implement a certification system which guaranteed that chocolate was not produced using the worst forms of child labour, as defined by ILO Convention 182. This system was to be implemented by 2005. When it had not yet been fully developed by that date, Senator Harkin, while still endorsing the HEP, secured funding from the US Department of Labor to finance an independent oversight project to monitor the progress of industry towards certification.

In the United States, therefore, legislators were able to orchestrate a non-governmental system of regulation by introducing the matter to the legislative agenda and removing it when industry demonstrated that it was responsive to the idea of self regulation. Once the issue moved out of the traditional legislative process, law makers were still able to maintain oversight of the system by mobilizing supervision through government agencies. This provides an example of how governments of countries with developed institutions and adequate resources can stimulate non-governmental regulation, and how non-governmental systems, in turn, can also help to build institutional capabilities of developing states.

The governments of Côte d'Ivoire and Ghana had economic incentives to comply with the HEP. However, both countries argued that the primary responsibility of controlling problems associated with child labour lay with governments themselves.

Coordinating with donor institutions that were responsible for implementing the HEP as well as other welfare projects in West Africa, governments established committees within a range of ministries that were designed to address the same goals as the HEP. Côte d'Ivoire, for example, established a National Committee to combat child exploitation as well as a child labour monitoring programme. These committees have benefitted from the financial support and technical expertise of donor groups and have gradually taken over responsibility for implementing the HEP certification system in cocoa producing areas.

While the architecture of the HEP was the result of negotiations between American legislators, and American and European multinational corporations as the agreement was implemented, it created an option for Côte d'Ivoire and Ghana to build governance capacity. For instance, the HEP created an opportunity for state actors in Côte d'Ivoire and Ghana to institutionalize control over agricultural labour by introducing and funding state agencies to monitor cocoa plantations and to intervene in cocoa producing communities.

In summary, the HEP is a case where state actors have taken advantage of non-governmental models of regulation in two interesting but contrasting ways. In the United States a unique form of outsourcing occurred when a couple of legislators delegated responsibilities to create a certification mechanism to corporate actors. In Ghana and Côte d'Ivoire, state officials channelled external resources dedicated to implementing child protection and monitoring systems, to supporting national committees and training civil servants.

Natalie Seaman is an LSE PhD Student affiliated with CARR

The Perils of Perfection

John Downer suggests that perfect compliance sometimes has perverse consequences.

A Midair Collision:

Douglas Bader, justly remembered for escaping prison despite having no legs, held that rules were 'for the obedience of fools and the guidance of wise men'. Bader was a pilot, and, as modern aeronautical innovations begin to magnify the obedience of his vocational successors to rules that once just 'guided' them, pilots are relearning the truth of his maxim and discovering the foolishness of rigorously obeying rules that were not written for strict adherence.

Take, for example, a recent mid-air collision. On 29 September 2006, exactly 37,000 feet above the Amazon jungle, a large Embraer business jet collided with a passenger-laden Boeing 737. The Embraer – a brand-new, 25 million dollar *Legacy 600* – swept past the Boeing so close that one of its winglets completely severed the larger jet's left wing. The damaged *Legacy* limped safely to a nearby airport, but the 737, suddenly and uncomprehendingly shorn of a major lifting surface, spiralled violently and ungracefully into the rainforest with the loss of everyone aboard.

Accidents inevitably have many nested 'causes' but perhaps the standout feature of this tragedy was its geometry. Aeroplanes occasionally pass closer than they ought, for varying reasons, but actual collisions are extremely rare, especially at such altitudes. The sky is enormous and aeroplanes tiny in comparison. Even the most talented pilots would struggle to fly two passenger jets into each other at high altitude on purpose. Doing it accidentally, far outside the crowded airspace of a large airport, should be almost impossible.

The impossible was made possible, in part, by a fateful interaction between aviation regulations and aeronautical innovations. The sky might be big, but aviation regulations make it far from unruly: international conventions dutifully divide it into regimented corridors and elevations. In theory, this is to help avoid mid-air collisions but when pilots or ground controllers make errors, as in this case, the prescribed heights have the effect of bringing aircraft closer than chance might by itself.

On rare occasions when aeroplanes were given conflicting courses in the past, imprecise avionics mitigated the danger. Pilots and flight control systems could only judge and maintain a

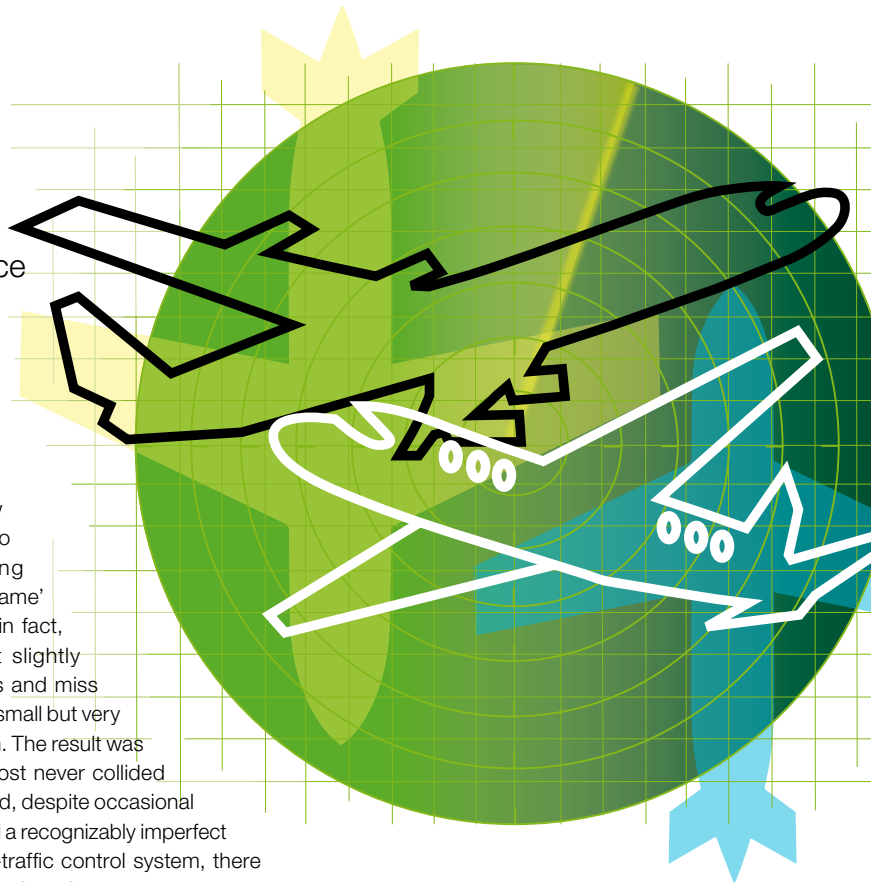
given altitude to within a few hundred feet, so two converging planes at the 'same' altitude would, in fact, probably be at slightly different heights and miss each other by a small but very sufficient margin. The result was that planes almost never collided in open skies and, despite occasional near-misses and a recognizably imperfect international air-traffic control system, there was little impetus for reform.

By 2006, however, this imprecision had all but evaporated, and with it the quiet advantages of small inaccuracies. The 737 and the *Legacy* were state-of-the-art machines with the latest instrumentation. Like most new aircraft, both had avionics capable of discerning altitude with unprecedented accuracy, and each had an autopilot capable of using this information to maintain a precise and steady course. With this equipment an aeroplane can maintain a given altitude to within a few feet. As, fatefully, can the next aeroplane.

The aviation industry has benefitted greatly from modern avionics, which help pilots navigate the busy air corridors around major airports. At the same time, however, their unprecedented precision is revealing some hitherto unnoticed drawbacks of navigational accuracy and, more generally, some dangers arising from the use of highly proscriptive rules in an environment where strict compliance is possible.

Contexts of compliance

The 2006 collision might seem isolated and esoteric but it points to much wider regulatory issues. Across many domains, innovations in both technology and technique are slowly augmenting the ability of different actors both to enforce rules and comply with them, yet rules are always framed to suit specific understandings about the limits of their observance and enforcement. As this 'context of compliance' evolves, so do the effects of the rules it frames, sometimes with perverse consequences.



Successful regulatory regimes often benefit from imperfect observance (much as the system governing air traffic altitudes once did), and so when the accuracy to which rules can be followed and enforced evolves but the rules themselves do not, then a tension can arise that can subvert the rules' wider purpose. In the US, for instance, biometric tracking and integrated databases are starting to limit the illegal economic migration on which some states quietly depend, forcing legislators to re-examine the practicalities of long-standing labour laws.

New regulatory technologies are not to be feared, but as they change our 'contexts of compliance', legislators will need to revisit existing regulations and perhaps rewrite them to retain the oft-hidden benefits of imprecision. More precision, we might imagine, will demand regulations that emphasize principles over rules, and nuance over grand legislative gestures. Aircraft altitudes, for instance, could be broadly assigned to within prescribed limits, much as immigration laws sometimes incorporate complex caveats, such as visa lotteries, to cushion economies from the strict implementation of popular legislation and accommodate the migrant workers they require. After all, as Katherine Hepburn put it, 'If you obey all the rules, you miss all the fun'.

John Downer is an ESRC Research Officer at CARR

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London 2012

– a risk-based Olympics?

Will Jennings explores the risk considerations behind the 2012 Olympics, and the institutions responsible for managing them.

The London 2012 Olympics might be said to be the first 'risk-based' Games in terms of its organizing principles and the wide range of strategies and systems put in place to manage and mitigate the risks associated with its delivery and staging. Formal practices of risk management and insurance have been employed in Olympic governance since the 1980s (although it is arguable that less formal organizing strategies or instruments for the mitigation of risk have been active since 1896). Provisions for risk management for London 2012 appear more comprehensive than in previous Games. The extended lead-in time of preparations (beginning with exploratory feasibility studies by the British Olympic Association and formulation of the London bid documents) has seen an evolution of both organizational and external risks. A wide range of stakeholders share responsibility for managing the diverse collection of Olympic risks. These include government, (in particular the Home Office, Cabinet Office and the Department for Culture, Media and Sport); the Olympic Delivery Authority (ODA); The London Organising Committee for the Olympic Games (LOCOG); the Metropolitan Police; and the Greater London Authority. This article reviews the state of play as 2012 approaches, considering the risk conditions associated with hosting the Games and providing an outline of risk management strategies and instruments in use.

Olympic risk

The Olympics is both a magnet for, and an amplifier of, organizational and operational risks. The event itself increases the probability and consequence of existing hazards and threats, at the same time as generating its own unique set of risks. The immovable deadline of 2012 is another potential source of risk inflation – as delay or postponement is not an option. There are difficulties in learning from other Olympics and sporting events due to the uniqueness of the geographical, political, legal and environmental context of each Games. Nevertheless, a number of risks tend to recur throughout the history of Olympic governance including financial controls, construction, geopolitics, and economics.

For London 2012, just like past Games and other mega events, risks are not stable but fluid across different parts of the Olympic programme and across different organizational jurisdictions. These

are encountered in various forms (eg, security, procurement, environmental, transport) and in different locations (eg, main site, central London, the regions). Continued evolution of the risk environment (such as change in security threats) means that risk management responsibilities are in an ongoing state of monitoring, review and negotiation. Sharing of complex organizational objectives and responsibilities is itself a potential source of risk in Olympic delivery and operations as risks must be 'owned' in order to be managed.

The extended lead-in time from the preparation of the bid to the post-Games legacy planning presents a particular challenge for risk assessments and risk management. To illustrate the changing horizon of risks faced by London 2012, it is possible to identify a number of critical risks that have become known or risks where the estimated likelihood has increased significantly since the bid. For example:

- The increased threat from al-Qaeda and decreased threat from Irish Republicanism.
- Scientific evidence of an elevated risk of a global pandemic (and actual outbreak of the swine flu pandemic).
- Increased likelihood of extreme weather events associated with climate change.
- Risks for the Olympic programme posed by the effect of the credit crunch and economic downturn on public finances, investment from the private sector, and revenue from ticket sales and sponsorship.

The credit crunch has presented a unique challenge to risk management for London 2012. It has increased the likelihood of insolvent suppliers and made the securing of finance from the private sector more difficult. LOCOG recently cancelled a sponsorship contract with Canadian telecoms provider Nortel, which had filed for bankruptcy protection earlier in the year, leading to a shortfall in expected revenues. Despite this there remain opportunities for future revenue generation from the sale of the Olympic village after the Games. With three years still to go, economic conditions might change once again.

Olympic risk management

Provisions for risk assessment and risk management in the organization of the London 2012 Olympics are comprehensive in comparison to past Games. These risk preparations include infrastructure, operations and security, along with contingency planning for environmental hazards and manmade vulnerabilities or threats. This is not to say the



various risk management systems for London are perfect, but there has been a concerted effort on the part of organizers to integrate risk into decision-making processes of all major delivery and operation functions. In the organization of past Olympics, the concept of risk has not been as prominent at both a strategic and operational level. The historical development of Olympic risk governance has often been preoccupied with fighting the last war: through organizers' experience of events such as the Munich Massacre in 1972; the financial deficit incurred at Montreal 1976; the political boycotts in Moscow 1980 and Los Angeles 1984, and IOC corruption scandals in the lead-up to Sydney 2000 and Salt Lake City 2002; along with external events such as 9/11. Each of these incidents has informed the subsequent evolution and reform of organizing strategies. While inter-Games learning is an essential condition for progress, hindsight-bias influences both the identification of threats and hazards, and the implementation of bespoke risk management strategies or tools.

The pre-eminent place of risk management in the organization of London 2012 also reflects the complex mix of risks facing London – with its vast programme of construction and operations, exposure of the UK to both domestic and international terrorism, its dependence upon London's old and fragmented transport network, location of the main site near to high density domestic and commercial populations, and importance of a successful Games to the reputation of the UK. It also reflects growing standardization and sophistication of the risk management profession and its practices, through which the language of risk enables conversation between organizers responsible (for example, for security, legacy, infrastructure, operations and finance) even if that shared language is subject to difficulties of translation across jurisdiction or differences in opinion concerning priorities for risk mitigation.

Specific methodologies and systems of risk assessment and risk management in Olympic-dedicated organizations are not drawn from existing government templates such as the *Orange Book*, but are customized for the purpose of delivering the Olympics. For example, the Office of Government Commerce (OGC) risk profile of the Games informs the design and implementation of the risk management strategy of the Government Olympic Executive (GOE). The management and mitigation of risks in pre-existing areas of government functions, such as security and contingency planning, has been integrated with existing systems and capacities. Some examples of forms of risk management for London 2012 are listed below:

- National risk register (Cabinet Office)
- Audit and management of programme risk (Olympic Board, GOE)
- Risk registers and risk logs (GOE, ODA, Olympic Security Directorate [OSD])
- Audit (ODA)

- Hedging instruments (LOCOG) and insurance (LOCOG, IOC)
- Counter-intelligence, risk assessments (Home Office, Metropolitan Police)

These instruments or systems range from risk assessment and forecasting, such as the national risk register, to contingency responses. Within the general framework, strategic, programme and business risks are each managed at the level of the individual organization. There is not a hierarchical model of risk governance, but a multi-level framework within which risks are the responsibility of stakeholder organizations.

Ensuring the consistency of risk assessments across organizations is one of the greatest challenges for the integration of this general framework. There are also organizational differences in principles of risk management due to different functional demands of components of the Olympic programme. The level of acceptable risk is, for example, quite different in Games security compared to construction.

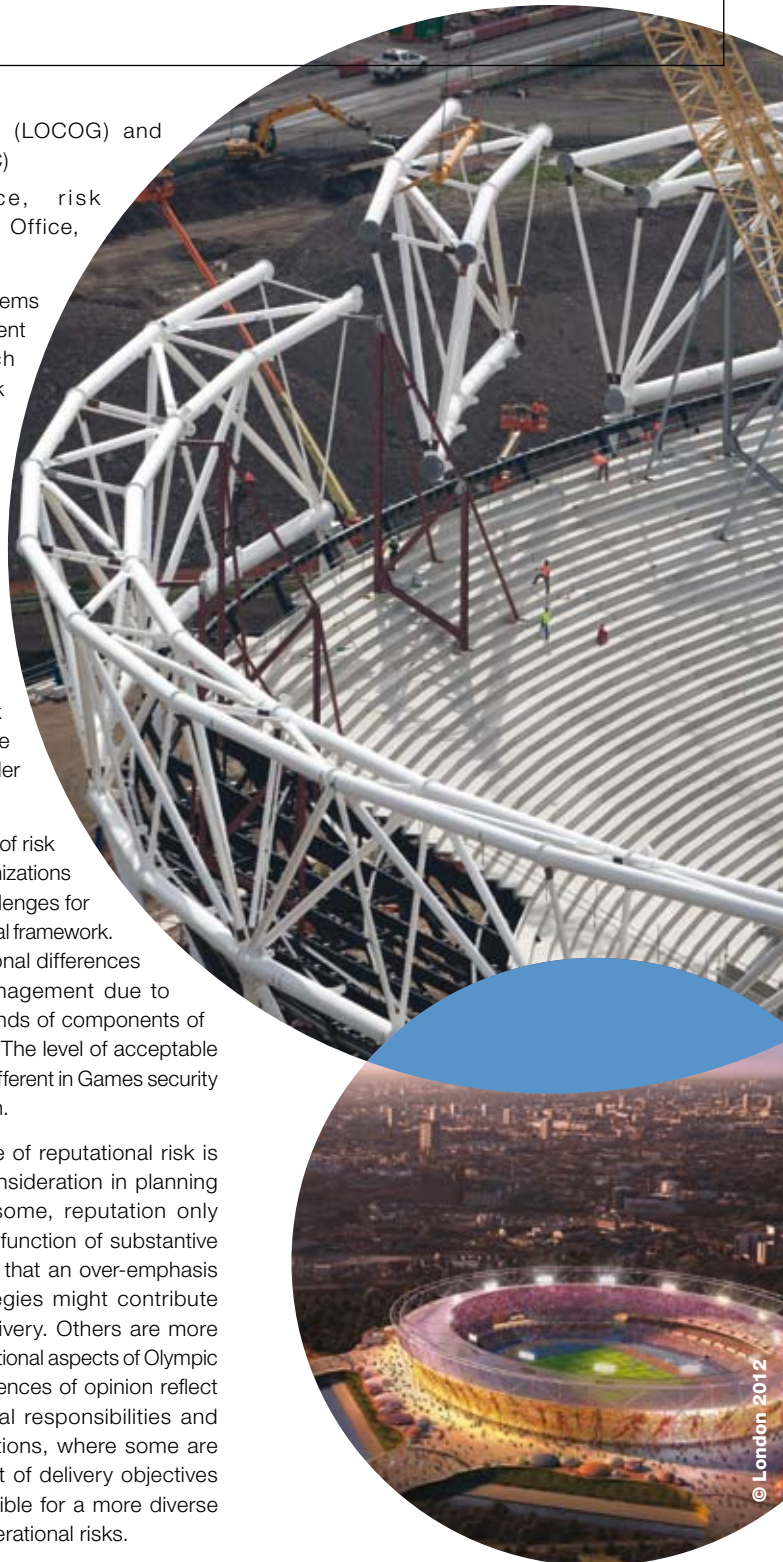
The potential importance of reputational risk is a subject of ongoing consideration in planning for London 2012. For some, reputation only matters insofar as it is a function of substantive operational factors, such that an over-emphasis upon reputational strategies might contribute to under-attention to delivery. Others are more sympathetic to pure reputational aspects of Olympic governance. These differences of opinion reflect variation in the functional responsibilities and jurisdictions of organizations, where some are focused upon a clear set of delivery objectives while others are responsible for a more diverse and ambiguous set of operational risks.

The past experience from Olympic Games and other mega events suggests that preparations occur in a high-stress public environment. This problem is recognized by the register of strategic Olympic risks, but must be highlighted as a risk that is difficult to manage, even with an effective public relations and communications strategy in place. The effects of political risk and threats to a positive working environment in key stakeholder organizations have potential consequences for attrition of senior management, and personnel in general. The positive image of the London Games is crucial for a number of operational requirements, such as recruitment of volunteers to staff the Games and liaison with local communities. There is some optimism for London 2012 in view of the relative

absence of political risk so far despite the initial furore over the original budget estimates. One critical future break-point in the management of organizational risks is the transition from delivery to rehearsals and Games operations, which will observe a transfer of responsibilities and risk between organizations, and has potential for risks to fall through the gaps (even though the current state of strategic planning is cognizant of such a scenario).

Risk and the future

The idea of risk is inextricably interlinked with a belief in the possibility of controlling the future. While London 2012 might be said to be the first risk-based Games in terms of its organizing principles and comprehensive development of specific strategies



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and systems of risk management, these cannot guarantee that the Games will pass without minor or serious incident. Such possibilities remain uncertain because the probability of numerous threats and hazards are difficult to quantify and are matters for qualitative forecasting rather than a hard quantitative science of risk management.

The London experience raises some general questions about the role of risk and risk management in the organization of the Olympic Games and other mega events. Will requirements of risk management at mega events such as the Olympics continue to become ever more intensive and sophisticated as a general function of the scale of events? Or might a tipping point be reached where aversion to risk starts to introduce paralysis into decision-making processes rather than facilitating them, or where the costs of risk mitigation outstrip their economic benefits, as risks such as financial control prove to be highly resistant to management. The revival of the modern Olympics and growth of the Olympic

movement is a perfect example of adaption and evolution of an organization in response to risk. It also illustrates that risk is an intrinsic side effect of success and organizational growth of such mega events.

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Olympics, Risk and Risk Management Workshop

Held at the ESRC Centre for Analysis of Risk and Regulation on 3 June 2009 on the Olympics, risk and risk management. It was attended by more than twenty participants drawn from academia and a range of public organizations with responsibilities for delivering the London 2012 Olympic Games, along with risk and insurance professionals from the private sector. This article summarizes some of the topics of discussion, but should be considered the interpretation and reflections of the author. Thanks to participants for their contribution to discussions and to the ESRC for support of the Research Fellowship: 'Going for Gold: The Olympics, Risk and Risk Management' (RES-063-27-0205).

Events

The GM Nation? Public debate: what was it all about?' CARR

Professor Tom Horlick-Jones

Cardiff School of Social Sciences,
Cardiff University
Seminar: 27 October 2009

Regulating Risk and Organizing Markets: Market Functioning and Market Failure

CARR workshop held on September 24-25 2009, jointly organized with the Stockholm Centre for Organizational Research.

Away Day

CARR staff recently enjoyed an away day at the famous Emirates Stadium where they were treated to a tour of the stadium to include consideration of risk and mega projects. Pictured below.



Regulating Risk and Organising Markets: Market Functioning and Market Failure in the Public Services

Andrea Mennicken reports on the recent CARR / SCORE workshop.

On 24-25 September, CARR and the Stockholm Centre for Organisational Research (SCORE) hosted a workshop to explore the conditions and consequences of functioning and failing markets. The workshop was funded by a grant from STINT (The Swedish Foundation for International Cooperation in Research and Higher Education), which Linda Soneryd (SCORE) and Andrea Mennicken (CARR) attracted in 2008 to build and strengthen linkages between the two research centres.



Like CARR, SCORE is a multidisciplinary research centre. CARR and SCORE both organise their research around interdisciplinary, cross-cutting themes. The disciplines currently represented among CARR and SCORE researchers are accounting, management, political science, psychology, social anthropology, socio-legal studies, science studies and sociology. Research projects conducted at SCORE and CARR are, in various ways, occupied with similar questions concerning, in the broadest sense, the reorganisation of economy and society through markets, new forms of democratic institutions and risk management. Both centres consider it important to study the wider contexts of these processes of reorganisation as well as to analyse the unintended consequences of such processes of reorganisation for markets, public services and risk management. With the financial crisis, the organisation of markets and regimes of risk regulation have received heightened attention. The roles of risk regulation and markets have become questioned. Taken-for-granted ideas of deregulation and free market coordination are now under scrutiny, prompting reconfigurations in the ascribed roles of markets and of governments, and the boundaries between politics and markets.

The workshop looked at how risk regulation and risk management practices have reshaped the governance of markets, and it investigated how different market ideas and technologies have entered and transformed the regulation

and organisation of public services. To this end, particular emphasis was placed on the notion of 'failure', and processes of failing in the regulation and organisation of markets, cutting across private and public sector regimes. While many risk regulation regimes centre on the notion of 'failure' and its prevention, they allow for considerable negotiation as to what constitutes failure, and what the key metrics are that allow it to be pronounced. Recent developments have shown that corporate financial failure can hardly be considered an objective state of affairs. Definitions of failure are as much a political as an economic matter. Failure is negotiable, deniable and reversible. It is constituted out of various expert claims and modes of judgement, and is increasingly politicised.

Yet, the inability of formalised risk management and regulation apparatuses to anticipate or prevent failure has not led to their abandonment. Instead, it has resulted in calls for their amplification, in the same way as the perceived failings of accounting and auditing typically lead to calls for their intensification. While we see more intense demands for tighter risk regulation in the financial sector, renewed emphasis is also placed on regimes of calculation, quantification and accounting in the public services because of the desire for 'transparency' and better ways to make financial and other risks 'visible' and 'calculable'.

The workshop examined different practices of calculating and commercialising risk and the proliferation of market-based regulatory mechanisms (eg, the creation of the European market for carbon emission trade and the rise of management expertise in health care) through such practices. The performance of regulators is increasingly conceptualised and represented in terms of risk and economic success. In the health care sector, for example, market-oriented performance assessment systems have become incorporated in activities of curing and caring with the aim of increasing cross-sectoral transparency and comparability. Penitentiary systems, too, have shifted away from a focus on discipline and rehabilitation to risk and market-oriented risk management. Risk-based strategies and the rise of public-private partnerships have led to the establishment of an increasingly technocratic and calculated system of governing, breaking the individual down into a set of measurable risk factors. The workshop looked at the rise of management knowledge in organising risk regulation, and it investigated the roles of economic and accounting expertise in the elaboration of new risk management schemes (eg, in the health care sector, prison service or pharmaceutical industry).

Finally, the workshop explored implications that such developments have for the (re)definition of governmental accountability. Risk has been a fundamental category for the redefinition of government as governance. Western societies share a progressive focus on the individual as the primary bearer of risk and responsibility, which has fostered the demand and appeal of direct forms of participation in public life by bypassing the traditional institutions of representative democracy as well as welfare state bureaucracies. Key questions that were discussed in this context included: How do notions of risk contribute to the redefining and reconfiguring of publics of relevant 'stakeholders', and how are public engagements with problems of risk in turn affected by blame-shifting dynamics? What expertise is involved in the design and facilitation of public deliberation? How is such expertise validated? And what consequences does this have for the (re)defining of governmental accountability?

For both research centres, the workshop provided a fruitful platform to take stock of each other's research results and strengthen linkages between ongoing projects and research themes. The workshop allowed the centres to explore in more depth cross-national variety and/or likeness in governance, accountability and risk regulation regimes. In the coming year, follow-up meetings are planned between CARR and SCORE to further advance our understanding of how public and corporate governance activities are organised and transformed cross-nationally through categories of risk, risk management and new forms of public-private organisation.

Andrea Mennicken is a CARR Research Associate.



PUBLICATIONS

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RECENT CARR
DISCUSSION PAPERS

[www.lse.ac.uk/collections/CARR/
documents/discussionPapers.htm](http://www.lse.ac.uk/collections/CARR/documents/discussionPapers.htm)

DP 55 Governing Mega-Events: Tools of security risk management for the London 2012 Olympic Games and FIFA 2006 World Cup in Germany

William Jennings and Martin Lodge, forthcoming

DP 54 Watching the Watchmaker: On regulating the social in lieu of the technical

John Downer, June 2009

DP 53 When Failure is an Option: Redundancy, reliability and regulation in complex technical systems

John Downer, May 2009

**Governing the Present: Administering Economic, Social and Personal Life**

Peter Miller and Nikolas Rose
Polity Press 2008

**Internationalisation and Economic Institutions**

Mark Thatcher
Oxford University Press 2007

**Organized Uncertainty: designing a world of risk management**

Michael Power
Oxford University Press 2007

**The Politics of Public Service Bargains**

Christopher Hood and Martin Lodge
Oxford University Press 2006

**Regulatory Innovation: a comparative analysis**

Julia Black, Martin Lodge and Mark Thatcher (eds)
Edward Elgar 2005

**Organizational Encounters with Risk**

Bridget Hutter and Michael Power (eds)
Cambridge University Press 2005

**Regulating Law**

Christine Parker, John Braithwaite, Nicola Lacey
and Colin Scott
Oxford University Press 2004

**On Different Tracks: designing railway regulation in Britain and Germany**

Martin Lodge
Greenwood Press 2002

**The Government of Risk: understanding risk regulation regimes**

Christopher Hood, Henry Rothstein and Robert Baldwin
Oxford University Press 2001

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Sociology of risk regulation; risk management; regulation of economic life; the impact of state and non-state regulation; risk regulation in Asia.

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