

Complex Systems and Why They Go Wrong

Complex Systems in Government

1. After a human tragedy - the Grenfell fire, the Windrush story - there is a rush to judgement. People are looking for simple causes and for people to hold accountable (or to blame). Much later, after inquiries, investigations or judicial process, it usually turns out the problem is complex, with multiple causes of failure and no easy allocation of blame. This discussion paper looks at the factors which make the design and implementation of government policy complicated and why complex systems need to be better understood and managed. The paper:

- looks at the constraints affecting policy making, and why some of the risks to good policy have increased in recent years;
- argues that the design and delivery of complex systems such as building regulations, local government finance or immigration policy are not well understood in government;
- argues for the appointment of system owners for key systems and policies, particularly those concerned with safety;
- suggests a need for better training in personal liability for officials responsible for major systems; and
- looks at whether there are tensions between law and entitlement on the one hand and humanity and empathy on the other

2. The Grenfell fire and the Windrush story may appear to be very different types of policy and operational failure. In fact they share many factors which can be seen in other complex systems which have gone wrong. The unfolding narrative around the Grenfell fire illustrates some of these issues. Initially, the focus of the press and public speculation was on the cladding panels on the building; failures with the cladding were seen as the source of the problem, with alarming videos showing panels bursting into flame with distressing speed. Subsequent reporting began to widen the story, suggesting that whatever the failings of the panels, they needed to be considered alongside other aspects of the structure of the building, for example the gaps through which smoke and flames might move swiftly through a tower block. Then came the stories about the quality of fire-resisting doors, or the placing of pipework while others turned their attention to questions of alarms and counter-measures such as sprinklers. The various Grenfell enquiries will address all these issues and many

more. We will not know until the enquiries are complete, but it seems unlikely that there will be a simple failure and a single person or organisation to blame.

3. Turning to the Windrush story, the narrative began with stories of individuals who had been badly let down by the system. Then we had the suggestion that the cause was the over-bureaucratic application of policy by officials. As the story unfolded, other issues emerged and new considerations have been raised. Did the “hostile environment” designed to deter illegal immigrants somehow influence policy and practice so as to make it almost impossible for those with UK citizenship to prove the fact? Were there targets for removal of migrants and if so, who was accountable for their design and delivery?
4. This paper looks at what these two tragedies and other similar stories tell us about the difficulties of designing and implementing policy. It looks in particular at the special risks and problems of complex systems, suggesting that these systems, particularly systems concerned with safety, need to be better understood and managed.

Challenges in the design and delivery of policy

5. One area highlighted in the press coverage of Grenfell Tower has been the perceived inadequacy of the regulatory regime to protect the safety of a building which undergoes repeated changes over its lifetime. There is a large volume (if somewhat patchily applied) of civil service guidance on the “management of change”. The guidance specifies, for example, the commercial skills required in assessing bids for contracts; how to run an effective consultation; how to conduct impact assessments; and how to write an effective business case. In recent years the Policy Profession in government has worked hard to define what good looks like in policy making and has produced guidance and training for policy makers. For many years policy makers have been encouraged to start from a clear understanding of the environment; to analyse the evidence on what works (from the perspective of users, Ministers, providers etc); to look at recent changes to the policy and study the lessons to be learned from previous change, and so on. Unfortunately this best practice is often undermined by a range of pressures, some inherent in political administration. As a result, policy design too often consists of a detailed analysis of the pros and cons of the latest proposed change, ignoring or downplaying the cumulative impact of years of successive small-scale changes. Some of the factors which make best practice policy so difficult to deliver are discussed here.

6. Making policy in a political environment brings its own particular challenges, such as the very short timescales for the introduction of new policy. A new Minister arriving in a Department with a policy proposal will probably be bidding for a legislative slot when the policy is still in outline; if the service is to “go live” before the next election there will be little or no time for piloting or testing. Conversely, most departments will have issues which are crying out for reform but which do not attract political attention. By the time a Minister has been around long enough to recognise the importance of the issue and is willing to expend

political capital on seeking a resolution it is too late. How many policy proposals have been killed off with the response “An important issue, but one which needs to be tackled at the start of a parliament”?

7. Similarly, in a political environment there will always be a pressure to find rapid answers to intractable problems. Both Ministers and officials are driven by a media and parliamentary agenda which has a low tolerance for complexity. Ministers find themselves promising quick fix solutions, whether at elections or party conferences. Officials are then faced with the choice of appearing obstructive or of devising least-worst solutions to problems which deserve more time for consultation, debate, design and testing.

8. There is little value in railing against these constraints, which have always formed the backdrop to policy making in government, but it is worth noting the changes which have exacerbated the difficulties of policy making in recent years. For example, changes in knowledge management (both paper and electronic). There may never have been a golden age of perfect paper filing, but there are few areas in government which have effective electronic knowledge management. The difficulty of finding relevant previous papers can encourage the tendency to favour *de novo* analysis.

9. The paucity of historical data is compounded by lack of corporate memory because of rapid changes of personnel. The need for, and best organisation of, professional skills in government remains a contentious issue. It is not true to say that British civil servants are generalists, not least because the design, delivery and management of public services within the parliamentary system is a specialism in itself. But the numbers of civil servants who are experts in a particular subject, such as housing or local government finance, are diminishing. Within recent memory most departments could look to a cadre of middle ranking, or indeed senior, officials with a comprehensive understanding of the detail of key areas of policy. This expertise has been diluted as personnel reductions have left policy teams with wider and wider remits. At senior levels, UK civil servants are much less likely than their foreign counterparts to have spent an entire career in one area of expertise.

10. The lack of specialist expertise may also be a factor in discouraging officials from challenging Ministers. It is rarely productive to tell a Minister “we tried that before and it didn’t work”, but officials with the confidence built on years of technical experience are much better equipped to explain what may be difficult to deliver, and why. Finally, the move of technical experts in areas such as building regulations away from policy makers through outsourcing or privatisation may also mean that these subjects do not attract Ministerial attention until something goes wrong.

11. Other factors which make it hard to follow best practice in policy design include the competing pressures on analysts and experts. Economists, statisticians and lawyers are always in high demand and will be busy analysing and advising on the implications of the

latest proposal for change. They will have little time for a literature review of past changes and their consequences.

12. In addition to the demands on analysts there is the cost of long term or wide ranging analysis and research, and the “risks” that such research may produce uncomfortable conclusions at what may turn out to be a politically unhelpful time. Longitudinal research, e.g. on health or social welfare issues, is costly as well as time consuming. Few departments have the resources and the political commitment to devote significant funds to wide-ranging research as against “quick and dirty” studies to help solve a current crisis or policy priority. The combination of pressures on time and costs mean that genuine piloting, where several options are developed and given time to succeed or fail, are rare in public policy in England.

13. A final factor to consider is the perverse or unexpected impact of culture on behaviour. One example is when a relentless focus on cost savings encourages junior officials to believe that there is no point in flagging flaws or errors to their senior managers or to Ministers because they believe that any request for funding will be rebuffed. Civil service leaders have a responsibility to ensure their staff understand that alongside the need to maintain a firm grip on spending there is also a duty to flag up problems and to propose solutions, even if those solutions require more spending. The Windrush story highlights a different type of cultural risk - the danger that an almost exclusive focus on a limited number of targets, will have a distorting effect. The search for quick wins or “low hanging fruit” can mean the complexity of an individual’s personal circumstances is sacrificed to the need for quick decisions and quotas.

Complex and Long Life Systems

14. Ministers will always be in a hurry and there will never be enough time for research or piloting, but the tendency to adopt a “year zero” approach to policy making is both exacerbated by and made more dangerous when it applies to a complex system. When the policy design has been repeatedly tweaked and changed over the years without wholesale revision; when regulations have been re-written and reorganised; and when regulators or providers have been reorganised and re-located, there is the danger of a perfect storm. In the case of the building regulations, both the building standards themselves and the organisation and independence of the inspectors and regulators have been subject to continuing change, mostly with the aim of deregulation.

15. The language of regulation for the past 20 years has been less about safety than about reducing burdens on business, with a requirement for “light touch” regulation, with periodic bonfires of red tape, and with numerical targets for reduction of regulations (a “one in, two out” approach). Immigration control is another area where for decades Ministerial rhetoric has focused on numbers - reducing net migration, reducing the number of foreign national offenders in English prisons, increasing the number of illegal migrants expelled from the UK.

Concerns about performance have led to successive re-organisations of the staff involved, under the political direction of the Home Office.

16. Local government, and especially its financing, is another example of a complex system, about which the BGI has written [before](#). Here a system with a clear rationale to fund local government through a mixture of a simple but regressive local tax and funds from a more progressive national tax system to smooth out disparities in local needs and resources has gradually been eroded as successive governments have tinkered with elements of the package to deal with specific issues. The cumulative result is a system which few can understand and which undermines both local autonomy and accountability and is starting to drive local authorities to insolvency.

17. The Grenfell Tower fire illustrates the dangers of a regulatory regime which relies on analysis of individual components of a system (e.g. exterior cladding panels) rather than assessment of the system as a whole (how various elements of a building can interact to increase risk). While the nature and effectiveness of the Building Regulations has rightly been questioned, there has been less recognition that similar issues arise in very different policy areas. In the case of the RAF Nimrod crash of 2006, the enquiry headed by Charles Haddon Cave QC held the MOD procurement team accountable for failure to maintain oversight of the cumulative effect of changes to the aircraft which took place over several decades. The Guardian's coverage of the report referred to a "devastating 586-page report, published amid apologies from the government and dismay from families of the lost men, [which] suggests the aircraft was doomed years earlier by lamentable and systemic failings on the part of senior individuals and leading corporations, compounded by the MoD sacrificing safety to cut costs".

18. Engineers, software designers and those concerned with safety management systems are experienced in understanding and managing the impact of small changes on whole systems. The Ministers and (many of the) officials who make, design and implement policy are not familiar with these concepts. The Grenfell and Windrush failures suggest that they should be.

19. How should government approach the management of complex systems such as buildings or equipment, where the original design specification may no longer be accessible, the original manufacturer may have gone out of business, and the original design limits may no longer reflect current materials or working practices? In the past, Ministers and officials could look to expert bodies, such as The Building Research Establishment, to provide authoritative and dispassionate advice. Privatisation has reduced the number of technical experts such as engineers working inside government and has established a more formal (and thus, distant) relationship between them and policy makers. Officials with no technical knowledge no longer have expertise immediately available as part of the policy making process. For the policy maker, the Minister or the interested layman, the current regime with

a set of high level principles underpinned by a complex web of detailed guidance is hard to navigate.

20. There are areas where standard-setting appears to have remained both strong and independent, for example in food safety and the regulation of medicines. The regulatory regime for medicines, introduced in the 1970s in the wake of the Thalidomide scandal, rests on a thorough and expensive regime of testing and authorisation, paid for by the sector. What can we learn from the way in which regulation in these areas has retained both teeth and public credibility? Has the focus on deregulation weakened the appreciation of Ministers and civil servants of the risks inherent in complex systems (particularly bearing in mind the lack of engineering expertise within most of government)? Do policy makers and regulators take sufficient account of human factors such as the unwillingness of citizens to abide by rules which are designed for their own safety? What is the role of auditors and of the NAO in highlighting potential risks in system management?

Holding to Account - Questions of Accountability and Criminal Liability

21. In the wake of a disaster it is often painfully apparent that the public officials concerned had a poor understanding of the nature and extent of their own accountabilities and public liability. When responsibility and accountability are diffused through layers of line-management reporting and committee structures individual civil servants may be unaware that they are taking decisions which may leave them personally liable to prosecution for criminal negligence. Following the report into failures in the letting of contracts for the West Coast Main Line, Departments reviewed their systems for decision-making on contracts; this should ensure Departmental Boards, including Ministers, are more aware of who is accountable for decisions on major contracts. But what about lower-level decisions, concerning routine maintenance or minor upgrades to systems? If there are to be increasing demands to hold public servants to account for policy and practice on safety, with implications of potential criminal prosecution, there is a need for better education and training for civil servants in their legal accountability for safety; in and in the development of policy and best practice on how to make policy change in complex systems.

22. While the priority for such efforts should be on systems with safety implications, it is worth noting the major disruption which can occur when there are failings in mission-critical IT systems, such as the benefits system, or IT support for the NHS. There is now a well organised approach to managing large scale risk across government, covering issues as diverse as terrorism, disease outbreaks and resistance to antibiotics. The Cabinet Office runs a horizon-scanning function which provides a focus on the bigger picture which may be missing from similar risk management functions within individual departments. But while attempts have been made within government to go beyond risk management and identify "system owners", to encourage a focus on the efficient, effective and safe operation of key systems, the concept is not widely understood or welcomed. Recent events suggest that the

there is a need to develop a clearer concept of system owners in government, with responsibility for oversight of and advice on the whole system. Individuals appointed to such roles would need terms of reference which entitled - and indeed required - them to give advice when changes are to be made to any aspect of the system.

Humanity and fairness in public service

23. One issue which had limited attention after the Grenfell tragedy but has been more prominent in the Windrush affair is the question of whether and how civil servants running enforcement operations such as immigration control should be expected to display humanity. Although neither the civil service values (integrity, honesty, objectivity and impartiality) nor Nolan's Seven Principles of Public Life (Selflessness, Integrity, Objectivity, Accountability, Openness, Honesty, Leadership) say anything about humanity, it should go without saying that citizens have a right to expect that policy will be delivered with dignity. There is no reason why, for example, letters to people claiming benefits should be drafted harshly bordering on rudeness, as sometimes happens.

24. What about the design of policy? One of the standard pieces of civil service advice to Ministers on a new policy is an analysis of gainers and losers. When plans are being made to cut or reduce a service, officials will look at the groups who will lose and at what mitigation might be put in place. Officials are accountable for the quality of this advice, but if unintended consequences emerge, they have a duty to alert Ministers to the problem and advise on potential solutions. But they also have the responsibility to implement the policy, in the manner prescribed by Ministers. If there are harsh consequences, which have been spelled out to Ministers in advance, it is Ministers who must account for the results. Ministers may chafe at rules which prevent them from making public the basis for individual decisions, or from commenting on a case which is the subject of judicial process, but civil servants should not be criticised for applying a strategy whose implications they may well have pointed out in detail at the policy design stage.