

From Best Practice to Best Fit: Understanding and navigating wicked problems in international development

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Presented in draft form for comments and feedback.

Ben Ramalingam, Miguel Laric and John Primrose

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This paper synthesises the material and lessons from four background papers, written by Kim Warren (Strategy Modelling to support DFID's Aid for Trade program: Nigeria case-study), Rick Davies (Network perspectives on Girl Hub Nigeria), Isabel Vogel and Greg Fisher (Complexity-informed theory of change for Private Sector Development in Democratic Republic of Congo) and Steve Curram and Dave Exelby (Applying Systems Thinking techniques to the Programme Management process in DFID).

Comments have already been received from Owen Barder, Eric Beinhocker, Stefan Dercon, Anna Gibson, Duncan Green, Olivia O'Sullivan, Chris Pycroft, Patricia Seex, Natalie Skerritt, Tom Wingfield and Michael Woolcock. The perspective and opinions expressed here are the authors and do not represent official views the peer reviewers, DFID or any of the agencies involved in the pilot projects.

Summary

Introduction

The tools of complex systems research are already used and valued by private and public sectors to better analyse and navigate a range of wicked problems across many disciplines. International development is starting to catch on, with a number of initiatives and projects in this area.

Many development partner tools and business processes deal with static, simple or linear problems. There is considerable demand for new methods and principles that can help development partners better navigate the complex, dynamic realities they face on a day-to-day basis.

What we did

This project looked at the appetite for these new methods in DFID and tested a number of tools and principles in 4 small-scale pilots: looking at system dynamics in trade, adaptive management and complexity-informed theories of change in private sector development, network analysis in girls empowerment, and systems thinking in programme management.

What we found

There is a significant appetite for improved tools and principles which can help DFID better deliver on its programming. The pilots contributed to improved analysis and understanding of problems, provided a valuable means by which to engage with the wicked nature of challenges, and created sound insights about the kinds of interventions that might be appropriate. The pilots generated tangible findings that were directly utilised in corporate and programmatic decisions: playing a significant role in the design of two large programmes, and providing the evidence base for a root and branch review of DFID processes.

It wasn't unanimously positive, however: the pilot recommendations were not always tailored to DFID's organisational realities, and needed some reworking. Moreover some of the methods did not fit easily within DFID processes and required some adaptation. The terminology and visualisations were in some places hard to understand for DFID staff.

What next

There are considerable opportunities for doing more programming using these methods. Specific pilot approaches are already being used in other contexts in DFID. There is a real potential for enhancing decision making around wicked problems. There are also opportunities for DFID to strengthen its efforts in operational research, which would involve greater engagement with these methods.

In terms of recommendations we believe that development agencies should improve their understanding of wicked problems, trial and adapt new tools to improve analysis and programming, ensure their internal systems can support these approaches and build linkages with complexity specialists in different sectors.

At the same time, complex systems specialists need to work harder at adapting tools from other sectors to development, simplifying terminology and building the evidence of benefits and costs.

1. Background

1.1 Why do we need to think about complex and wicked problems in development?

International development and humanitarian agencies face some of the most complex and challenging problems confronting humankind (Ellerman, 1999). The social, economic and political improvements that aid agencies focus on are characterised by ‘novel complexity, genuine uncertainty, conflict of values, unique circumstances, and structural instabilities’ (ibid.). Such improvements need to be induced, shaped, facilitated and supported in situations of limited national resources, weak institutional capacity and, in many cases, endemic corruption and protracted conflict. All of this sits within an increasingly turbulent and unpredictable system of global foreign relations.

Historically, the tendency within foreign aid has been to promote and support development through the identification and rollout of ‘best practices’. However, this process has arguably been shaped more by the needs of aid bureaucracies, than by evidence and research. There are clear incentives – common to public administration more generally – for agencies to ‘provide clear blueprints and unambiguous answers’.

Of course, this isn’t always problematic. After all, there may be some development gains that can be achieved *only* through the use of a top-down, ‘plan and control’ approach. To use terminology from the social planning literature, a number of development issues are ‘tame’ – that is, static, bounded, controllable and therefore optimally suited to the identification and rollout of ‘best practices’. A good example is mass vaccination programmes to prevent measles among under fives. The evidence shows that – given the right inputs, including effective medications, trained staff and management protocols – such interventions work as intended in almost all contexts, regardless of time, culture or geography.

However, there is increasing recognition that not all aid problems are like administering vaccinations. Consider, for example, the challenge of strengthening primary health care in developing countries. This has proved a lot more difficult than simply supplementing such systems through aid interventions. The problem is one with many different facets – from the human to the cultural to the political – and cuts across and depends on many other social and economic factors. It also changes over time, depending on the population being served and their health needs. Meanwhile, the existing system often ‘pushes back’ against simple and obvious fixes: short-term improvements may be possible, but many of these prove hard to sustain over time. If administering vaccinations is a tame problem, the features of health systems mean related interventions are better seen as a ‘wicked problem’¹. Table 1 overleaf contrasts which contrasts tame and wicked problems in accordance with various characteristics of a given problem.

¹‘Wicked’ here does not have a moral connotation, but rather means difficult to solve because of incomplete,

Table 1: Tame vs. wicked problems²

Characteristic	Tame problems	Wicked problems
Problem formulation	The problem can be clearly written down. The problem can be stated as a gap between what is and what ought to be. There is easy agreement about the problem definition.	The problem is difficult to define. Many possible explanations may exist. Individuals perceive the issue differently. Depending on the explanation, the solution takes on a different form.
Testability	Potential solutions can be tested as either correct or false.	There is no single set of criteria for whether a solution is right or wrong; they can only be more or less acceptable relative to each other.
Finality	Problems have a clear solution and ending point.	There is always room for more improvement and potential consequences may continue indefinitely.
Level of analysis	It is possible to bound the problem and identify its root cause. There is no need to argue about the level at which to intervene; the parts can be easily separated from the whole.	Every problem can be considered a symptom of another problem. There is no identifiable root cause and it is not possible to be sure of the appropriate level at which to intervene; one cannot easily separate parts from the whole.
Replicability	It may repeat itself many times; applying formulaic responses will produce predictable results.	Every problem is essentially unique; formulae are of limited value.
Reproducibility	Solutions can be trialled and excluded until the correct solution is found.	Each problem is a one-shot operation. Once a solution is attempted, you cannot undo what you have already done.

It has been argued that the *majority* of development problems may well be of the wicked variety. The typical approach to such wicked problems is to act as if they can be simplified, or tamed, and then made amenable to quick fixes. But the evidence in a number of areas – from disease to urbanisation, from conflict to climate change, from economic growth to governance reforms – suggests that the underlying problems remain untamed, forcing programmes to adapt and change, and adding to both managerial challenges and costs. The mismatch between the reality of the problems faced and many of the assumptions that guide analysis and action poses a considerable challenge to the sector.

It is worth noting that this mismatch is not unique to development, or even the public sector. The 2010 IBM Global CEOs Survey, conducted annually, found evidence of a ‘complexity gap’, defined as the difference between the complexity of the challenges being faced in business and the tools and capability available to deal with them. Moreover, for the leaders of FTSE 100 and Fortune 500 corporations who participated in the survey, this complexity gap was the single biggest area of concern about their business.

How best to address this challenge in the context of development work? The scholars who developed the wicked problems framework emphasise the importance of *operational research* methods in understanding such problems and navigating towards improved policy and practice. The argument is that, when dealing with wicked problems, it is essential to use real-time operational research to identify gaps between project designs and emerging

² For a more detailed classification of problems, see Warren Weaver’s 1948 classification into simple, organised and disorganised problems and the range of more recent approaches such as the Cynefin model which distinguish simple, complicated, complex and chaotic.

outcomes, and to inform a ‘learning by doing’ approach to management and decision making.

In parallel, efforts have been on-going in science, business and the public sector to identify new tools and techniques that can support a better understanding of complex problems with wicked features. This has led to growing confidence in a number of policy and research circles that it is indeed possible to address such issues. Even so, it seems doing so is far from easy: research shows it requires not just new methods and techniques but also new collaborative approaches, new organisational processes and – perhaps most importantly – new mind-sets able to deal with the uncertainty and risk inherent in working on such problems.

1.2 From rigour in evaluation to rigour in design and implementation

Wicked problems are not the only challenges facing aid agencies. The past decade or so has seen a concerted movement to enhance aid effectiveness, through three broad and overlapping areas of emphasis: transparency, accountability and ownership; results and new public management; and improved evaluations of aid programmes and projects. The argument is that, through improvements in these areas, aid agencies can weed out ineffective practices while actively promoting those that do work; becoming better attuned to the realities and needs of poor people and their partners and being more accountable to taxpayers and donors.

This ‘accountability revolution’ has made a useful contribution to how we think about and deliver aid, by bringing more focus and rigour to assessments of ‘what works’. But it is not without its problems. Much of the accountability revolution has reinforced the long-established emphasis on identifying and applying the ‘right solutions’ – which presents considerable challenges when dealing with wicked problems. This has led some to call for rigour to be a consideration not just in evaluation and results but also in design and implementation. To put it another way, there is as much need for rigour and science in answering questions of ‘how to work’ as there is in answering questions of ‘what works’.

What might more rigorous and scientific approaches to the ‘how’ of development look like? Answers abound: there have been calls for ‘problem-driven iterative adaptation’, for ‘science of delivery’, for ‘building better feedback loops’, for ‘upside-down governance’, for ‘good enough governance’, for ‘navigating complexity’ and for ‘behavioural approaches’.

What unifies all of these is a shift away from ‘best practices’ towards ‘best fit’ as a core guiding principle for development. ‘Best fit’, a concept stemming from governance efforts, describes aid programmes that are optimally *adapted* to the political, social and economic context. Such programmes can take advantage of a *plurality* of possible solutions, which can be deployed *flexibly*. They often work at *multiple levels simultaneously* – from community to national and even global policy levels – in order to facilitate and bring about change.

While programmes exhibiting best fit can readily be described at a conceptual level, they have proved rather harder to operationalise. This is in part because the policy and operational toolkit aid often employs is still grounded in a best practice paradigm (Chambers, 2011). The numerous innovations and adaptations made in the aid toolkit over the decades have not significantly enhanced the ‘fit’ of aid interventions. Nor have they focused on the challenges wicked problems pose.

This is not to say, however, that suitable methods and techniques are not available. Approaches are being employed in a variety of settings – from academia to business to the wider public sector – that can help us better analyse and navigate wicked problems, and provide insights into the kinds of programmes that might best fit such problems. These include behavioural science, evolutionary economics, complex adaptive systems approaches, adaptive management, evolving strategies, agile programming and so on. As well as drawing on these specific methods, there is an important emphasis on operational research to complement *ex-ante* design and *ex-post* evaluation.

Despite a number of applications, however, there has to date been insufficient investment in or sustained work on these approaches in international development. As a result, their potential to bring rigour to design and implementation, to facilitate the shift towards best fit in development programmes, has not yet been fully realised.

1.3 The DFID Policy Research Fund Complex Systems Tools project

All this provides the background for a small-scale programme of work undertaken in the UK Department for International Development (DFID) over the course of 2013. The starting premise of this work was that in a broad number of programmatic areas - and with a specific focus on wealth creation - DFID was facing problems that were complex and wicked as opposed to simple and tame. Addressing such challenges was placing a number of non-trivial demands on DFID staff.

However, despite an institutional recognition of the importance of this issue, including the inclusion of ‘managing wicked problems’ as a key senior leadership capacity, there was for the most part a lack of structured analytical approaches and corporate processes for dealing with such problem in DFID, and within the aid sector more generally. This is not to say that tools for thinking about and dealing with wicked problems were not used. It is more that this happened on an ad-hoc and case-by-case basis within specific programmes, rather than being supported and encouraged at a corporate level. This increased both costs and delays and diminished the potential for organisations to effectively learn from these efforts.

The relatively modest programme of work, funded by the Policy Research Fund, focused on identifying a range of wicked challenges across the DFID wealth creation portfolio. The aim was to identify and pilot new operational research methods, specifically drawing on and adapting from the diverse body of work that covers *complex systems research methods*. The ultimate goal was to learn whether and how such techniques might help DFID staff better understand and navigate these problems, and thereby deliver better results and value for money.

The Complex Systems Tools project worked with three broad aims:

- To identify how the organisation currently engages with wicked, complex problems;
- To identify the demand for new kinds of approaches to dealing with such problems; and
- To pilot a range of new tools and techniques drawing on complex systems approaches that might help in better dealing with these challenges.

The rest of this Working Paper summarises the project, its rationale and its key findings. Section 2 looks at what complex systems approaches bring to wicked problems, using the example of tackling corruption in trade, before describing a broad family of techniques and methods that might be employed to understand and navigate wicked problems. Section 3 describes the Policy Research Fund project and its rationale, and then Section 4 looks at how DFID currently engages with wicked and complex problems, at what it does well and at

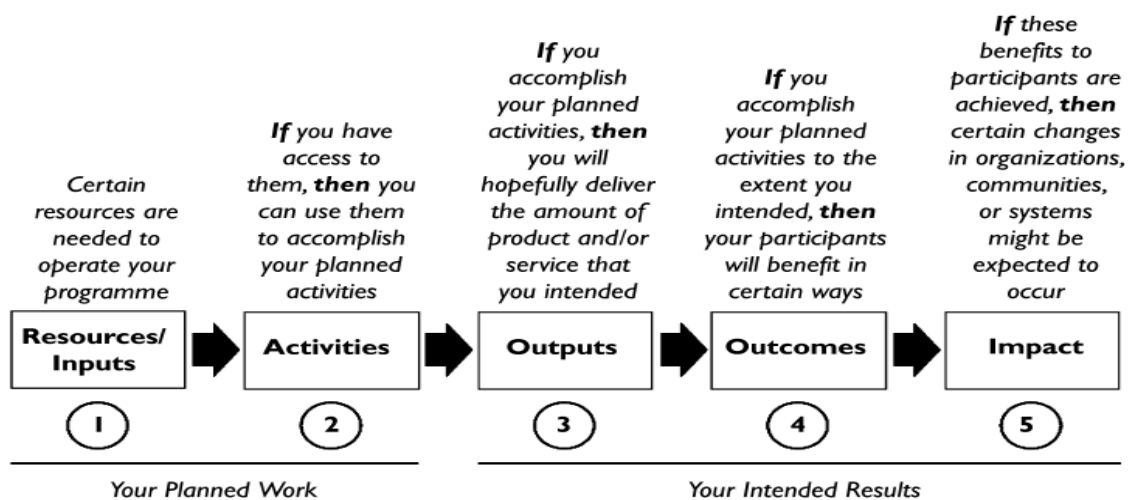
what is more challenging. Section 5 looks at the four pilots that formed the core of the Complex Systems Tools project, and sets out key findings on how these helped DFID better work with a variety of wicked problems in its wealth creation portfolio. Section 6 synthesises lessons learned from the pilots in the form of a 'Strengths, Weaknesses, Opportunities, Constraints' (SWOC) analysis. Section 7 then presents conclusions and recommendations.

2. What does navigating wicked problems look like in practice?

2.1 Learning from what doesn't work: using the logical framework to 'tame' wicked problems

The vast majority of programmes and projects in development are designed and monitored using logical framework analysis (LFA). The established mainstay of development analysis, planning and implementation, developed and honed in the US military in the 1960s, this approach brings both analytical clarity and a clear sequential approach to thinking about change. Figure 1 sets out the 'logic' of the LFA approach, and shows how an investment in a given intervention can move from inputs to activities to outputs to outcomes to impacts.

Figure 1: The logic behind the logical framework (Rogers, 2008)



For some development interventions, like the measles programme described earlier, models like this work well: they provide a clear statement of intentions, help guide implementation and highlight performance indicators that we might use in monitoring and evaluation to prove and improve effectiveness. But for others such as health systems interventions, for example, it is rather less useful.

To explain the limitations, it is worth considering a specific programme and showing how it works. Consider, for example, a programme to reduce corruption in cross-border trade between two Latin America countries, and thereby increase levels of pro-poor trade. Table 1 shows a possible LFA for such a programme. Here, the LFA provides a high-level means by which to understand the aforementioned programme, and to track effectiveness and value for money. But there are also a number of important limitations of using this framework worth noting.

Table 2: A LFA for a trade programme focused on reduction of corruption

Resources/ inputs	Activities	Outputs	Outcomes	Impacts
<ul style="list-style-type: none"> Funds for tackling cross-border corruption Trade management experts Corruption expertise 	<ul style="list-style-type: none"> Training of border staff Design and implementation of new third-party oversight techniques 	<ul style="list-style-type: none"> Knowledge and capacity of staff increases Improved and streamlined regulations and procedures Proportion of trades subject to oversight increases 	<p><i>Intermediate</i></p> <ul style="list-style-type: none"> Number of trades not subject to corruption payments increases Number of traders from poor communities increases <p><i>Overall</i></p> <ul style="list-style-type: none"> Trading volume increases 	<ul style="list-style-type: none"> Increased employment for poor groups Poverty decreases

Five issues arise in relation to the LFA for this fictionalised programme.

Assumption that causal pathways are known in advance of implementation

There is a tendency to assume a great deal of knowledge at the outset about what will deliver the hoped-for outcomes and impacts, and that the LFA designers or its agents have the ability to identify and work on known root causes. In this case, while there is a wealth of evidence that increased trade can deliver improved economic growth, increased employment and a reduction in poverty, it is not easy to specify upfront the causal relationships between training, oversight and the reduction of corruption payments. It is also not at all clear that decreased levels of corruption and increased oversight will lead to increases in trade value, trade volume and numbers of traders – many other factors need to be taken into account.

The LFA supports convenient simplifications of messy realities that then become entrenched in implementation

The assumption of a known causal relationship between the intervention and the outcome means that identification of the ‘right’ activities and outputs is paramount in bringing about change; in this case, the right training programme, or the right form of oversight, should, if applied repeatedly, help bring about the desired outcomes and impacts. The risk is that we misunderstand the very nature of the problem being dealt with; we ignore the dynamic interactions that play out between the various parts of the problem, or deny them for bureaucratic convenience; and the programme ends up irrelevant as a result. In this trade example, focusing efforts on training and oversight assumes that the optimal entry points for tackling corruption are information-based, and that by enhancing staff understanding and improve the monitoring protocols being used, trade volumes would increase. However, it may well be that investing in such efforts does not address the underlying incentives for corrupt behaviour, i.e. the organisational culture at specific crossings. Nor would this address how traders themselves might be able to better navigate such situations. However, the logical framework is not associated with operational flexibility to adapt the programme in significant ways in the face of emerging implementation issues.

The LFA assumes that the problem can be treated in reductionist ways

The LFA structure makes it possible to break problems down into smaller, more manageable pieces, with solutions proposed for each of these, which would then add up neatly to an overall solution. In the case above, the LFA presents trade-related corruption as a gap between ‘what is’ and ‘what ought to be’, with known solutions that can help fill this

gap. Implicit in this is the assumption that what works can be applied in a replicable and reproducible fashion, with more inputs leading to more outputs and outcomes/impacts.

The LFA process typically engages with contextual factors in delivery only, rather than in design

The LFA tends to engage with contextual factors – including implementation contexts, concurrent programmes and the behaviours and characteristics of recipients (Rogers, 2009) – as issues to be dealt with *in the delivery* of outputs, rather than as considerations that need to *fundamentally shape the selection and design* of those outputs. This is a limitation not of the tool itself but rather of the way it is typically used, which tends to emphasise certainty on what is going to be done and then use of the tool to justify the actions. For example, many programmes designed with the best intentions then see failures attributed to ‘a lack of political will’. The general conclusion drawn is that programmes would have worked better if only the local context was more amenable to what was set out, rather than questioning whether what was set out was in fact appropriate and relevant.

Lack of willingness to adapt design over time

Finally, and building on all of these previous points, although the LFA can in principle be adapted over time, the reality is that funding typically gets provided on the basis of doing what the LFA says, with major deviations or corrections from *ex-ante* designs typically viewed as a clear sign of failure. There are strong incentives to deliver what was stated in the log frame, and to use spin and polish to make the programme fit the original design.

The evidence on trade and corruption suggests these limitations are far from trivial. Corruption is best understood as a property of a social, economic and political system, rather than simply as a variable that can be identified, isolated, targeted and reduced. Because it is woven intricately into the wider system, it is hard to draw clear boundaries around it and thus to identify simple, reliable and replicable causal linkages. As a result, it is difficult to say with any certainty that a series of *ex-ante* interventions of the kind set out above will lead to subsequent desired changes in outcomes.

It would therefore be very difficult to respond appropriately to trade corruption using the LFA approach, unless the problem is ‘made to fit the model’ – or the LFA is applied using principles and protocols that are very different to those that shape its typical application. On this basis, it would seem reasonable to conclude that the LFA structure and approach is much more suited to tame problems, as opposed to those that are wicked. Where, then, does that leave us in the context of our trade programme?

2.2 Dealing with trade as a wicked problem: the potential of complex systems methods and techniques

To address problems such as trade corruption more effectively, we must first have a way of understanding the kind of problem we are dealing with, as set out in Table 1 in the introduction, which contrasts tame and wicked problems in accordance with various characteristics of a given problem. On all of these criteria, trade corruption can be shown to be more of a wicked than a tame problem in the following ways: it is difficult to define and explain, and different explanations lead to different solutions; every problem is a symptom of several other problems; it is hard to definitively prove that solutions are wrong or right; there is no clear end point for interventions and formulae are of limited use. Trade is obviously not the only wicked problem, and nor are such problems confined to development. Increasing awareness of the growing ‘complexity gap’ has led to growing interest in approaches

developed in a wide range of different sectors and contexts, in both scientific and policy circles.

Emerging from the natural sciences, complex systems research amounts to a broad set of principles and techniques that researchers and practitioners are using to better understand and deal with a variety of wicked real-world problems. In this, as in any scientific endeavour, there is a great deal of diversity and active debate. Nevertheless, there is emerging agreement about the kinds of techniques and principles involved.

First, there is growing understanding about how best to navigate wicked problems, which means incorporating the following principles into responses:

- Accommodating multiple alternative perspectives rather than specific best practices;
- Looking for multiple intervention points and moving between them dynamically;
- Working through group interaction and iteration rather than 'back office' designs;
- Generating ownership of problem formulation and transparency through participation of stakeholders, especially front-line staff and end users,;
- Developing systematic visual representations of the problem space that enable group-based exploration of the solution space;
- Concentrating on flexibility rather than predictability of solutions.

Second, there are a number of tools and approaches – some of them very well developed, others more emergent – for making sense of wicked problems in a manner that supports appropriate representations, discussions and actions. The areas of wicked problems and complex systems thinking share common roots, and are increasingly being drawn together to analyse intractable problems ranging from urban design to military supply chain management.

Table 3 summarises the four main features of wicked problems and the manifestations of these, and the four complex systems approaches that have been utilised, their potential contribution, as well as specific applications.

Table 3: The value added of different complex systems methods

Feature of wicked problem'	Manifestation and relevance to trade	Approach and potential contribution	Potential for trade example	Wider applications
Systemic challenges	There is a tendency to see development problems as ones that can be boiled down to issues of one or two variables, which can then be dealt with through the application of specific technical solutions.	<i>System dynamics and systems thinking:</i> these approaches enable a more sophisticated understanding of problems through a focus on interactions and feedbacks between components and emergent properties that arise.	The approach should help us take a wide-angle lens on the trade corruption problem and think through the broader factors that will influence programme success.	<ul style="list-style-type: none"> - Extensive use of system dynamics approaches in business strategies - Central role of systems thinking in organisational learning approaches - Numerous applications in health and public services - Military planning approaches

Behavioural challenges	Assumptions of perfect rationality loom large in development, as in much of public policy. It is believed that behaviour can be changed through simple knowledge, attitudes and practices (KAP) approaches – by changing knowledge, one can change behaviours.	<i>Adaptive, agent-based models and behavioural principles:</i> these techniques focus on simulating iterative, trial-and-error behaviours and collective actions, and using these to strengthen outcomes.	The approach should understand the role of behaviours and incentives in sustaining corrupt behaviours, and ways to influence these.	<ul style="list-style-type: none"> - Agile software development approaches in information technology - Agent-based simulations of disasters, economic crises, hospital admittance, retail trade, conflicts - Algorithms in drug design - Computerised trading
Relational challenges	Much of aid analysis tends to underestimate relationships and networks between actors, and focus instead on individualised actors and entities.	<i>Network analysis:</i> such methods allow the mapping of the relationships between actors or elements of a system and analysis of how the structure of relationships affects behaviours.	The approach sheds light on the networks of influence between traders, border officials, suppliers and customers, and different ways the programme could influence the network.	<ul style="list-style-type: none"> - Web-based applications of network analysis, including the Google PageRank model, which underpins the website - Use of social network analysis in security and counterterrorism - Analysis of urban design and infrastructure
Dynamic challenges	Change is typically seen as linear, additive and proportional to inputs and outputs, so that, if an agency generates more of output X, it leads to proportionally more outcomes and impacts.	<i>Dynamic analytical models:</i> these help further an understanding of the non-linear nature of change, including tipping points, thresholds and multiple equilibrium states.	The approach would shed light on the history and evolution of the system over time, and help get a realistic understanding of the 'space of possibilities' for change.	<ul style="list-style-type: none"> - Use of dynamic non-linear techniques in actuarial practices to assess and price risks - Use of threshold analysis to assess tipping points in phenomena such a climate change and conflicts

As Table 3 shows, research has identified four distinct families: systems approaches, behavioural approaches, network methods, and dynamic analysis techniques. These all use different techniques and assumptions, but all help to think about problems in ways that bring the principles to bear on programmatic responses. These four families of approaches are central to the broad interdisciplinary field of complex systems research as applied to social, economic and political contexts.

The evidence from a variety of settings indicates that using these approaches can help us deepen our understanding of the intricacies of the issue at hand. Done well, they can inform the design of interventions that are more optimally suited to the context, ensuring best fit rather than best practice.

Armed with this understanding, policymakers in both commercial and public policy arenas have achieved transformational changes in performance in a wide variety of settings, through both better *understanding* of those systems and better policies and programmes for *navigating* those systems. These approaches have been applied across sectors to help scientists, policymakers and practitioners better comprehend phenomena that have long been challenging when using traditional, reductionist approaches.

For growing numbers of advocates in development, these techniques, individually and collectively, have the potential to address a number of the limitations faced in dealing with wicked problems. Specifically, it is argued that the use of methods, ideas and concepts from complex systems research could strengthen and augment the well-established tools in aid. There is, therefore, a growing movement to bring these ideas and approaches into the mainstream. Applications, including in agricultural development, health programmes, economic analysis and child malnutrition, are already helping aid organisations better deal with uncertainties in complex, challenging, context-specific operating environments (Ramalingam, 2013).

2.3 Applying system dynamics to trade corruption: new models, new principles

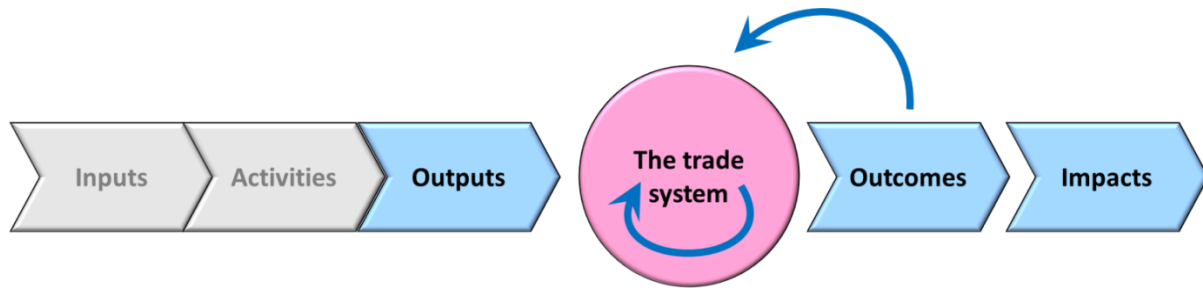
So what might the application of a new approach to a wicked problem look like in practice? Drawing on just one of these fields, system dynamics, it is possible to illustrate the potential in the context of the trade intervention described above. Here, we draw on one of the pilots addressed in Section 5 of this report, which sought to better understand trade across the Nigeria–Niger border and how a new DFID programme might better support and facilitate it.

First, based on our framing of the trade problem using the LFA, and our overview of wicked problems, we can conclude that dealing with issues such as corruption requires us to recognise the systemic nature of the issue; understand the interactions between key actors and their behaviours; identify the dynamics and patterns of the issue; pinpoint the range of possible intervention points; work flexibly with a range of approaches; and adapt over time. Working with such principles means the programme as designed at the outset should not be how it looks like at the end; indeed, such a lack of adaptation should be seen as the true failure in the context of wicked problems.

A range of issues would make the traditional LFA ineffective here, relating both to the intervention logic and to the problem itself. On the intervention logic, system dynamics suggests that, first, the inputs and activities of an intervention do not lead to outputs that are simply ‘delivered’ into a given context; instead, the context profoundly shapes how and what outputs are generated. Second, this context is a trade *system* with its own history, dynamics and behaviours – it is not a fictionalised laboratory for experimentation. Third, this system is not static, but rather responds dynamically to outputs and hoped-for outcomes.

Figure 2 illustrates this in the context of an LFA: the outputs are part of a ‘trade system’, and there are interactions between the different outputs and the system, as well as within the system itself, that ultimately determine how and what is achieved.

Figure 2: Bringing the system into view



Source: Warren (2013).

Thinking about the trade system using a system dynamics lens means focusing on four aspects that are central to how any such system behaves: interdependence, feedback, accumulations and thresholds (see Box 1).

Box 1: What system dynamics tells us about wicked problems

- **Interdependence:** Different activities have an impact on the same or connected parts of the same trade system. So improved road links, for example, may have a substantial effect, or none at all, depending on other factors, such as capacity constraints at border crossings. An input of £X or Y person days into any single change may thus have a substantial impact, none at all or any amount in between.
- **Feedback:** An unavoidable consequence of interdependence is that any input/activity may cause outcomes that feed back to reinforce or disable the initial change. Traders who find good opportunities across a border will encourage (intentionally or not) other traders to engage in the same activity – a reinforcing feedback. On the other hand, quicker border crossing times may encourage more traders to cross, causing those same crossing delays to increase once again – a self-limiting, or balancing, feedback.
- **Accumulations:** Key entities in all such systems accumulate and deplete over long periods of time – the physical capacity of border crossings or ports, numbers and skills of border staff, numbers and activity rates of traders, numbers of businesses, levels of corruption and so on. Outputs and outcomes will therefore reflect changes made many years previously, and continue to do so into the future.
- **Thresholds:** Parts of the system may be unresponsive over a wide range of change to a certain factor, but at a certain point cross the threshold triggering a substantial response. For example, traders may not feel it is worth trying to cross a border if their potential revenue from that effort is £X-3X, but when that potential reaches £4X traders find it sufficiently attractive that many act together

Source: Warren (2013).

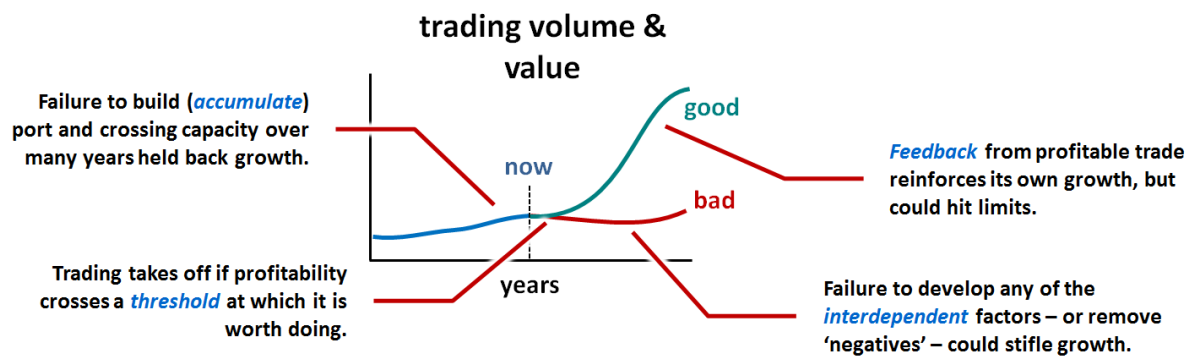
Readers will note the close correspondence between the features listed above and those of wicked problems. As a tool, system dynamics is designed to deal with those aspects of a problem that make it wicked. It has proven ability to capture and explain the behaviour of an extremely wide variety of physical and social systems. What this kind of analysis enables is a way of understanding and working with the real-world features of trade system, rather than assuming they don't exist or can be ignored.

In the context of trade, the features of the system that matter should include road capacity, numbers of traders using the crossing, capacity of the crossing, infrastructure and staffing. The first part of developing a system dynamics model is to develop a series of logical statements about these aspects of the system, and how they relate to each other, for example:

- That trade comes from traders and the frequency with which they trade
- That traders start if they see profit opportunities and if they are able to do so
- That they can make profits if costs of documentation and corruption are low
- That they are able to trade if they can reach a border and if the border has the capacity (physical and human) to handle with little delay the number of crossings traders try to make

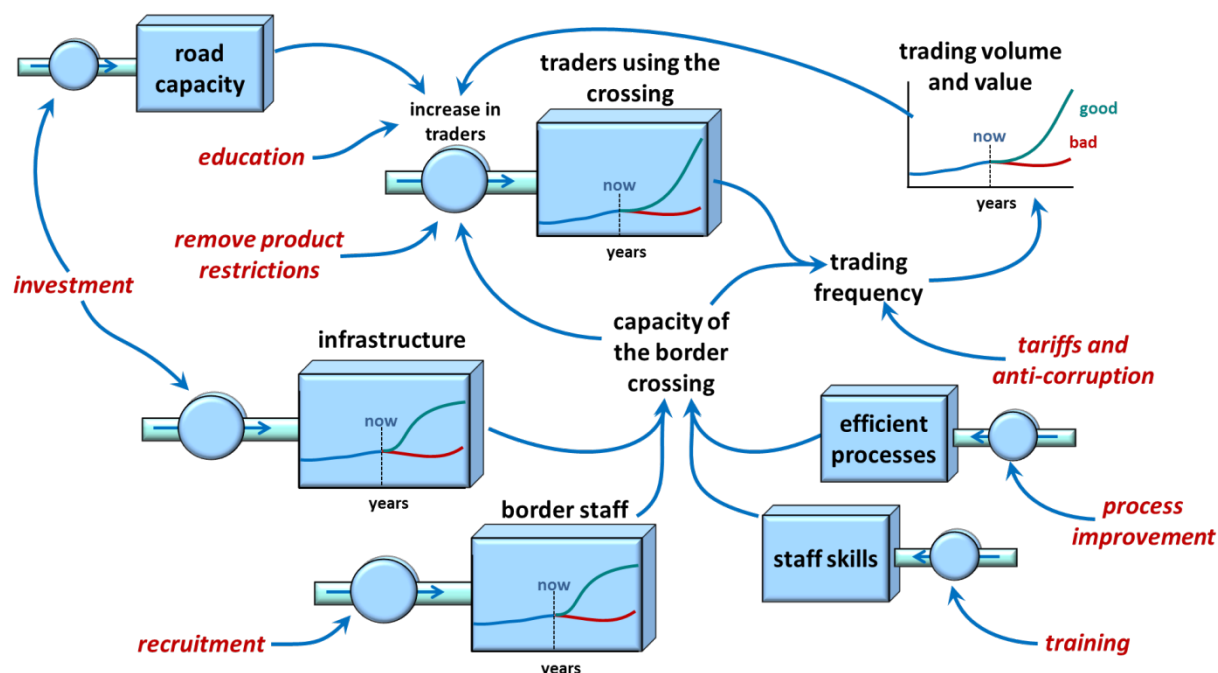
So the starting point for the model is to enable a better understanding of how each element of the system is shaped by the four features above. Figure 3 below shows how accumulations, thresholds, feedback and interdependence might play out for one specific aspect of trade volumes. The time series chart indicates the possible spread of outcomes.

Figure 3: Trading volume as shaped by accumulations, thresholds, feedback and interdependence



The model also enables us to relate these parts of the system to each other in logical and testable ways. Figure 4 illustrates both the possible system structure and, in red, the potential interventions that might have an impact on the behaviour of the system. So using this model of the trade system, we can start to make more logical and evidence-based assumptions about how the system works, and how these might interact with each other over time.

Figure 4: Illustrative architecture of the trade system at a single land border crossing (Warren, 2013)



This overview diagram shows multiple entry points where we might want to focus an intervention, that the points of intervention are connected intricately to a number of other factors, and that whatever is done has the potential to trigger cascading effects through the system. By making these potential scenarios explicit, the model helps to think through the conditions under which a particular intervention would be successful or not. To go back to our log frame example, we can see that training and anti-corruption measures are only two possible entry points, and even if these are successful in their own terms, they may not generate the kinds of changes hoped for. There may need to be more staff, process improvements or investments in infrastructure, if we want to see the hoped-for rise in trading volumes.

From this illustrative starting point, it should become clear that the best way forward, short of trying to analyse and predict the system in advance – which is likely to be impossible, is to employ a portfolio approach: identifying possible entry points for interventions, launching multiple parallel interventions and learn in ‘real time’ to ensure the appropriate sequence and mix of activities. Indeed, the method is designed to support such an evolutionary approach to programming. Together with a continuously refined model of the trade system, and a set of principles for working that are distinct from those underpinning the LFA, this approach will enable real-time tracking and oversight of the portfolio of interventions being put together as part of our imagined trade programme.

Box 2: Programme principles based on applying system dynamics

- A continually evolving portfolio of interventions acting in concert to address the potential entry points: road capacity, trader education, product restrictions, tariffs, corruption, process, staff training, staff recruitment, border infrastructure
- A flexible programme approach to respond quickly to emerging opportunities and to amend, augment or abandon interventions
- An on-going process for identifying and responding to shifts in entry points and interventions
- A process for continually reviewing the understanding of the overall system
- Continual monitoring and evaluation to determine whether interventions are working in concert to influence the system in the chosen direction

System dynamics provides us with just one specific method to better understand and navigate wicked problems – those that involve many variables, intricately interwoven with feedback loops and interdependencies. This operational tool is quite different to the LFA: it is less useful for describing a flow of work akin to a factory production line, but is instead more useful for the kinds of challenges faced by investment managers or agile software developers. The emphasis is less on *ex-ante* design, specification and control, and more on using an adaptive approach to manage an evolving portfolio of activities.

The rest of this paper describes how key tools within the broad family of complex systems approaches were piloted within DFID's wealth creation work.

3. Piloting new approaches in DFID: the Policy Research Fund project

In November 2012, after a successful application to the DFID Policy Research Fund³, a £110k project was initiated to undertake four pilots of 'complex systems tools' across the Department's wealth creation efforts (see Annex 1 for more on the relevance of such approaches for this area of work).

The project began with a scoping phase, to identify windows of opportunity for trialling new methods and approaches within on-going processes. Having developed a long list of potential pilots, these were narrowed down through application of a set of criteria, plus feedback from internal and external advisory groups.

The piloting phase saw four parallel applications of a number of tools and principles within on-going DFID programmes. Each pilot used approximately 25 researcher days plus time from the pilot 'clients' and support from the project managers. As such, the pilots are better seen as short, focused pieces of consultancy work, rather than in-depth and systematic research.

For each pilot, direct work with the clients was followed by a reflection and review exercise for each exercise, including the costs and benefits of the selected approaches, and their contribution to the organisation.

The synthesis and communication phase focused on the write up each pilot, gathering feedback from pilot stakeholders, and using these to write an overall synthesis paper.

³ The PRF supports new policy-relevant research approaches and ideas that are of relevance for DFID and its partners.

4. Preliminary findings

4.1 How DFID *understands* complex wicked problems

Wicked and complex problems, and the challenges they pose, are well appreciated and understood within DFID. A number of staff members use problem assessment frameworks such as ‘wicked-tame’ or ‘simple-complicated-complex-chaotic’ to distinguish the challenges they face. Senior managers are also briefed on wicked problems as a core leadership challenge, including coaching on the distinguishing features of wicked problems, and how to deal with them.

At the level of policy, there is an appreciation among staff that they are working on different kinds of problems, which need tailored responses. There are many examples of this across DFID. Growth specialists highlight the importance of ‘many ingredients, no recipe.’ Governance specialists talk about ‘best fit, not best practice’. Social development specialists talk about ‘context-specific pathways’, while private sector specialists highlight ‘portfolio approaches’. The livelihoods approach, which has seen a renaissance of sorts in recent years with the growing interest in resilience, also incorporates a number of systems thinking principles and concepts.

Attempts to design programmes that can navigate such challenges are also increasing. A number of principles of systems thinking underpin popular methods for programmatic analysis, including growth dynamics, political economy analysis (PEA) and making markets work for the poor (M4P). Tools such as network analysis and systems thinking have been used in a number of settings. There has also been a lot of work on theories of change that seek to go beyond the kinds of assumptions underpinning the LFA to help design programmes that are ‘complexity-aware’. At the other end of the programming cycle, in evaluation and results, work on ‘hard-to-measure benefits’ is increasingly seen as vital for a more rounded understanding of DFID’s successes and failures.

Overall, the scoping phase of the research found good awareness of the ideas of wicked problems, and agreement about the need for more systemic theories and practices across DFID. Most staff members know, from a conceptual and philosophical perspective, that development is not a simply matter of ‘planning and control’. To achieve results in complex environments, DFID staff know that they increasingly need to be flexible and adaptive in their approach, they need to ‘learn by doing’, they need to employ robust, context-specific monitoring and evaluation, and they need to employ and continually update their theories of change.

However, awareness of problems doesn’t mean things are done differently. The key question then becomes: How well is this done in practice, with specific attention to wealth creation work, and how well do corporate systems, processes and culture support such an understanding? This is what we turn to next.

4.2 How DFID *manages* wicked and complex problems

DFID staff do have a demonstrable, instinctive grasp of the need to use the right tools for the right problems. Moreover, in certain areas new and innovative approaches are being developed and tested. It was found that, in a number of pockets of good practice across the organisation, advisors and managers were using a range of concepts, tools and methods, as well as common sense and creativity, to think about and deal with complex problems.

However, all staff interviewed (30+) flagged the need to improve and enhance the toolkit so DFID could better think about and navigate wicked problems.

For example, DFID's internal thinking on fostering growth suggests that approaches need to be context-dependent⁴, and should use approaches that are better suited to addressing complex challenges that underpin the necessary social, economic and political transformations. However, against the context of the planned scale-up of wealth creation efforts, there were also concerns that DFID's existing methods of working may need to be adapted for dealing with the bigger challenges around growth.

This issue was also apparent in other areas of DFID's work, from governance and resilience to health, conflict and innovation. Staff felt that the tools and processes that were most firmly embedded in DFID's cultural and institutional apparatus were those that were best suited to 'tame' problems. In many settings there are no alternatives to existing 'standard operating procedures' such as the LFA, and its variants.

All of the problems with this resonate strongly with the issues set out in sections 2.1-2.3. All interviewees noted that the existing programme management process is a 'one-size-fits-all' approach that emphasises *ex-ante* design and control. Institutionally, changes and adaptations away from pre-specified goals could at times be seen as a signal of failure, which could diminish the willingness among staff and partners to experiment and innovate.

Examples of flexible and adaptable approaches in DFID were seen to happen *despite* corporate processes, rather than because of them. Interviewees saw this, at least in the face of wicked problems, as potentially limiting DFID's ability to deliver relevant and appropriate programmes, and to achieve meaningful results. There was some divergence between those who felt the DFID toolkit needed a 'root and branch' overhaul and those who suggested a more incremental approach to expanding the existing toolkit.

Overall, the implications for the organisation of not doing more work to address this were seen as considerable. A good proportion of interviewees, especially at the more senior levels, suggested that better dealing with wicked problems was one of the most important overarching issues DFID faced. Some talked about a 'relevance gap': the gap between DFID's understanding of wicked problems and the institution's ability to deal with them. (This concept clearly resonates with the language of the IBM CEO Survey cited earlier.) A number of staff members saw this relevance gap as especially pronounced in new programmatic areas such as wealth creation and resilience, and in contexts where DFID was rapidly expanding its operations, such as fragile states. This perhaps explains the widespread view that there was a real and tangible need for the Policy Research Fund project and other similar interventions.

In terms of what this new toolkit would look like, views were again broadly convergent. Most informants suggested DFID staff should have access to a broader menu of tools, a wider network of relevant experts and an institutionally accepted means of analysing and responding to distinct problems in appropriate ways. On this last point there were some emphatic views: a significant number of staff expressed the view that 'problem classification' approaches should become 'hardwired' into DFID's programming and strategic thinking processes. DFID was seen as needing some means, accepted at the corporate level, of interpreting and classifying the nature of the problem being faced and taking different

⁴ See the imminent DFID Economic Development Strategic Framework

approaches depending on this. At present, wicked problems are officially recognised as such only after several failed attempts to tame them.

Although there was clear demand for more sophisticated tools to better understand wicked problems, there was less clarity on what these were, where they might come from and how best to utilise them. Some highlighted the experiments that were already happening in the organisation. These included:

- Efforts to develop and implement systemic approaches, in areas as diverse as markets for the poor and health systems strengthening.
- Small-scale experiments with network analysis, which had the subject of a short methodological how-to note.
- Work on hard to measure benefits, which focused on challenges that are hard to analyse and attribute using a simple linear logic.
- Efforts that focused on 'bringing the system together' into facilitated processes that attempted to tackle wicked problems through collective action.

While there was considerable effort in this broad area, it was seen as preliminary, limited by the lack of joined-up strategies across the initiatives, and not yet widely accepted as the 'way we do business'.

It is also important to note that a minority of staff argued that wicked problems would be best addressed by DFID trying harder to develop the 'right simple models'. Others acknowledged the need for more systemic approaches, but were concerned that such approaches - by their very nature - were not easy to pick up and use.

5. Case studies

Overview of case studies

It was clear from the outset that attempting to apply the full range of possible complex systems tools (as set out in Table 3) across DFID's portfolio was not feasible, given the project's scope and budget. Therefore, a number of criteria were applied to select pilots from a long list of proposed ideas, these were then finalised with inputs from internal and external advisory groups. The process also involved discussions with a range of methodological experts, mostly from private sector settings, who were available in the timeframe, and had relevant thematic experience. The final four pilots were selected after consultation with key stakeholders, including the internal steering group and the external advisory group (see Box 4).

Each pilot was intended address a problem facing DFID staff or by its partners that was not amenable to conventional analytical approaches and processes, and that had either a direct or a traceable connection to wealth creation efforts. Of the four pilots, Nigeria Trade, Nigeria Girls Empowerment and DRC Private Sector all had clear linkages to wealth creation work. The Programme Management pilot was selected because of the relevance of improvements in these systems for future wealth creation efforts.

Box 4: The pilot projects selected

- A pilot of system dynamics principles in Nigeria, intended to apply system principles to the analysis, design, planning, managing, monitoring and evaluating of a range of initiatives in Aid for Trade, with a specific focus on efforts to enhance smaller-scale export activity most likely to directly benefit those in poverty (Nigeria Trade)
- A pilot exercise of network analysis techniques with the Girl Hub project in Nigeria to test the relevance of such approaches for informing stakeholder-based theories of change and strategies for the empowerment of girls in northern Nigeria (Nigeria Girls Empowerment)
- A pilot to develop and apply a process to generate a 'complexity-informed theory of change' for private sector development in the Democratic Republic of Congo (DRC Private Sector)
- A pilot application of systems thinking and mapping techniques to underpin the End-to-End Programme Management Review being conducted across DFID, to analyse and improve way DFID's programme management systems and processes (Programme Management)

As explained in Section 2, complex systems tools are a broad set, comprising a range of formal qualitative and quantitative approaches. The range of possible techniques that could be applied in the pilots were shaped by (i) the nature of the problem being faced; (ii) the time and money available; (iii) the available supplier expertise in terms of the application of specific techniques; and (iv) the timeframe within which pilot clients had to operate. Annex 1 provides more detail on the set-up of the pilots.

The rest of this Section 5 presents each pilot in turn, covering the following four elements:

- Problem / challenge
- Approach and process
- Findings
- Conclusions

5.1 Pilot 1: Nigeria Trade – trade and system dynamics

Problem / challenge

The trade and system dynamics case study focused on Aid for Trade (AfT) and the potential of system dynamics as an analytical tool to inform programme design and delivery. It specifically looked at the potential of system dynamics principles and modelling for planning, managing, monitoring and evaluating a range of initiatives DFID was considering in the context of a new Nigerian AfT programme in cross-border trade facilitation. The challenge the pilot sought to address was to help inform the design of a new programme, which had already been contracted to an external consultancy, and show how system dynamics might help generate specific operational and policy conclusions and inform subsequent decision-making.

Pilot Approach and process

As described in 2.3, all trade takes place in the context of a system. The features of accumulation, thresholds, interdependence and feedback (as set out in Box 1) mean that the benefits of trade programmes may prove slow or hard to realise, and may also generate adverse, unintended consequences. The hypothesis of this pilot was that by making the system a central part of programme analysis and design, system dynamics could help in understanding, anticipating and navigating key programmatic issues. Ultimately, it could also help in decisions about what to do, in what order, to what degree and over what time, in the face of these systemic challenges. Data was gathered through interviews, literature reviews and assessment of relevant data sources.

Findings

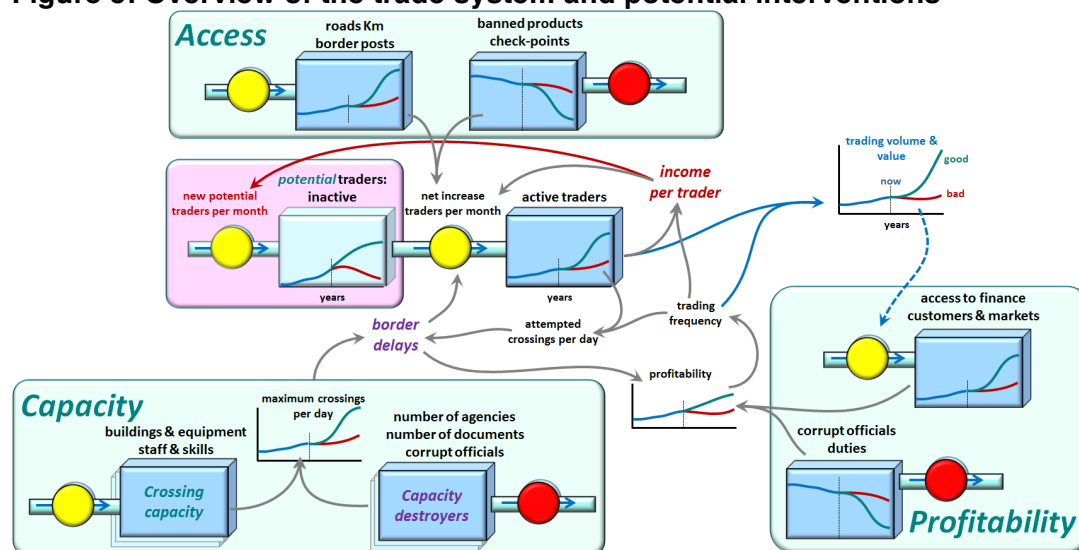
The pilot process began by reviewing the literature on the physical export trade, and identifying the key features of the system. The overall volume of a country's trade was defined as the sum of all exporting activity carried out by all traders through all possible export channels – ports, airports and land crossings. For trade to work, there is a need for *access* for traders to a given crossing facility (proximity, transport links), *capacity* at the crossings (good procedures, trained staff) and demand opportunity for traded goods (markets to trade into, absence of barriers etc.).

The system dynamics analysis revealed a number of desirable factors that would contribute to the effectiveness of the trade system, as well as drag factors that would do the opposite. It also helped identify potential interventions relating to single elements of the system (e.g. adding border posts, training officials or rationalising documentation) or several at one time (e.g. developing land corridors). It showed that a system such as trade demanded a systemic programme response – specifically, the development of an evolving package of interventions that could (a) adaptively build and sustain enabling factors and (b) reduce and eliminate disabling factors.

By developing a working demonstration model of a single land border crossing, the pilot showed how the trade system could be simulated, thereby taking into account the complexities of the export trade system and the potential effects of activities undertaken by the proposed programme, as well as by other agencies and stakeholders. Different starting scenarios could be inputted into the model, as well as different kinds and mixes of interventions. The result was a tool that could provide considerable support to the learning process at the heart of effective programme design. The model was also subsequently developed into an online simulation game to formalise and disseminate this learning.

An example of the high-level architecture of the trade system with a series of such interventions is shown below.

Figure 5: Overview of the trade system and potential interventions



Conclusions This pilot project influenced the design of the trade programme by bringing insights into the extent and nature of complexity of the cross-border trade system, providing more clarity to the programme theory of change, and undertaking a more realistic assessment of risk than a more conventional approach may have done. It proved instrumental in the generation and selection of options.

Specifically, the pilot process and the system dynamics method shed light on the wide range of specific issues that were constraining improvements in the trade system, and how they were both interrelated and dynamic over time. The approach provided a powerful illustration of the system elements and the basic pattern of system behaviour, which could be adapted to different contexts. Understanding the system better, led to more in-depth and systematic analysis of the potential entry points for programme interventions.

The model also provided what could be described as a ‘living theory of change’, with a more detailed understanding of the potential range of outcomes and risks that would need to be taken into account to achieve success.

5.2 Pilot 2: Nigeria Girls Empowerment – girls empowerment and network analysis

Problem / challenge

This pilot worked with Girl Hub Nigeria in its work on empowering girls in northern Nigeria. The Girl Hub project is a joint initiative between DFID and the Nike Foundation, and focused on the use of communication and advocacy as a means of bringing about social change.

At the start of the process, much of Girl Hub's work was directed at girls as central actors, or their immediate peers, with little systematic attention paid to the networks of familial and social connections that might alternately encourage or inhibit empowerment. This was part of a broader tendency in gender empowerment programmes to pay more attention to how individual actors (i.e. women and girls) could behave in ways that would bring about their own empowerment, and less to the structural issues – from socio-cultural, economic, political and historical factors - that might inhibit desired changes in welfare and status.

Approach and process

The objective of the pilot exercise was to develop and test the potential of network analysis approaches to help articulate and improve Girl Hub Nigeria's theory of change. The pilot would build on Girl Hub's strategic objectives, which related to the status of girls in relation to different life choices and events. The work was done in collaboration with the Girl Hub team in Abuja and a number of their national and local partner organisations. Initial data was generated using the existing theory of change and strategic frameworks, and through the in-country stakeholder workshops.

Findings

The first level of network analysis identified different categories of 'first tier' who had *direct contact and influence over girls' lives*, including family members, teachers and friends. The network analysis looked at the influential interactions between girls and these primary actors, and the influential relationships *between* the different 'first tier' actors. Influence was considered in relation to a number of distinct hoped-for outcomes, including educational attainment, age of leaving school, age when married, age when first becoming pregnant, and occupation / economic independence. Using a participatory network approach, a number of different aspects of these actors' influence on girls life outcomes were identified, including:

- How much these actors *agreed* about the hoped-for outcomes for girls;
- How much these different actors directly influenced hoped-for outcomes for girls through their social networks
- How much these different actors influenced each other with regard to their attitude toward hoped-for outcomes for girls;
- The different channels of communication and influence between actors.

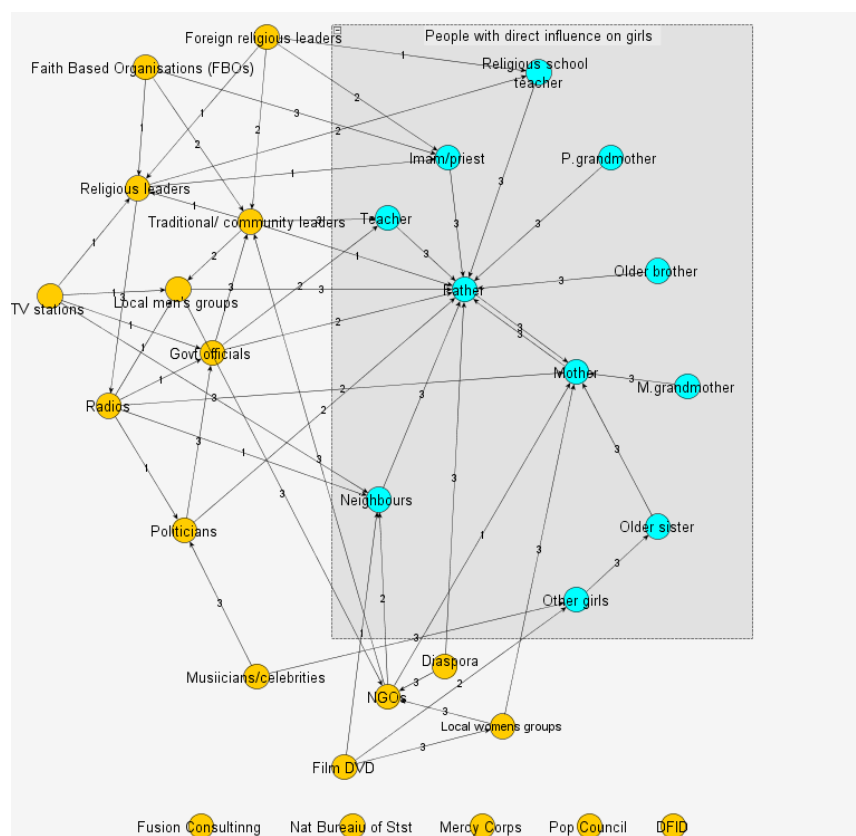
The second level of network analysis focused on those "second tier" actors who were not in *direct* contact with girls but who *were* able to influence the 'first tier' actors described above. Here, too, the network analysis looked at two kinds of relationships of influence: those linking second and first tier actors, and those between different second tier actors.

A number of important patterns were observed through the analysis. Parent and religious teachers had the most influence overall, but all actors had some degree of influence on at least one of the hoped-for outcomes for girls. The specific influence varied by outcome area. It was clear that no single communication channel, involving any one of the nine actors, was likely to be sufficient to influence all aspects of girls' lives that were of strategic concern to Girl Hub.

The results highlighted the complexity of influence processes within girls' immediate and distant social networks, and the need for Girl Hub to think strategically about network effects in the context of their communications and advocacy work. For example, any external

messages from Girl Hub or any other source were likely to be subject to challenge, moderation, amplification or adaptation through these complex social networks of influence. Therefore any strategic outcomes will have relevance only if they take account of such effects. It was clear that it would be important for both accountability and implementation purposes for Girl Hub to identify the main pathways it hoped to use to influence those first and second tier actors who profoundly shape girls' lives.

Figure 6: Networks of influence that shape girls life outcomes



Key: Inner box = first tier actor; Outer box = second tier actor

Conclusions

The network analysis pilot brought a more systematic understanding of how the interactions of stakeholders, with each other and with girls, contributed to girls' empowerment around key life choices. The pilot thereby enabled a multi-stakeholder perspective on the relationships around girls that enable or constrain their empowerment in relation to different life choices and events. The validity of this was supported by feedback from workshop participants, who suggested that this form of analysis form the basis of future empowerment strategies.

Network analysis as undertaken in the pilot was also shown to add value to traditional stakeholder analysis – the network mapping activities could be used as form of stakeholder analysis that goes beyond categorising types of stakeholder and includes attention to the kinds of relationships connecting them, uncovered thorough specific forms of inquiry.

The results of the network mapping exercise provided a potential *conceptual* baseline for the project, specifically a description of Girl Hub's *current understanding* of the nature of relationships influencing girls' lives. As a pilot exercise, the findings are naturally a partial picture of the network reality of girls' lives, but, if incorporated into programme design and

implementation, there was a clear sense that the data and models would become more refined and more evidence-based.

At the time of writing, Girl Hub's theory of change is described in a log frame at the international level; but this is not yet the case at the national level. The network perspective developed could be used to ensure the theory of change developed in Nigeria is clearly articulated, focuses on which actors will be involved and the kinds of relationships that will be connecting them. This would put the actor/network elements and multiple influence pathways central to the theory of change, making for an important improvement on the traditional linear, abstracted organisation of logical frameworks.

5.3 Pilot 3: DRC Private Sector – private sector development and complexity-informed theories of change

Problem / challenge

This case study focused on the design of a major new programme to support private sector development in DRC. DFID’s standard corporate procedures for programme design and management employed a programme logic that progresses in a linear, sequential way from activities to outputs to outcomes. In highly uncertain and rapidly changing contexts such as DRC, and fragile states more generally, such approaches are increasingly being seen as ineffective.

The fundamental challenge was how to use the principles of complex systems thinking to underpin an approach to programme design and management that was more suited to fluid, uncertain contexts. It was clear from the outset that this would need to emphasise adaptive learning and evolving programme strategies, but what was less clear was how to develop this into a coherent programme logic that could be approved by DFID at the corporate level.

Approach and process

The DRC pilot aimed to develop and test out a ‘complexity theory of change’ to guide programme design and planning, working within the frameworks of DFID’s Business Case and LFA while at the same time staying focused on the complexity and uncertainty of the DRC context as a central driver of the required programme logic. The theory of change consisted of a range of tools and principles, including adaptive management approaches, complex systems principles for fragile states programming, a problem typology matrix, strategic planning horizons and resilience principles. The pilot worked with a range of stakeholders across DFID DRC and programme partners to develop the theory of change and identify intervention points and options for management, monitoring and evaluation. The data was generated through the workshop with DFID and the wider stakeholder groups in DRC.

Findings

The starting point was to obtain an overview of the multiple systems that influenced private sector development in the DRC, and how they interacted with each other. A systemic analysis of how change happens in the complex systems of the DRC helped to bring an important ‘reality check’ to the programme analysis and design process (see figure 7).

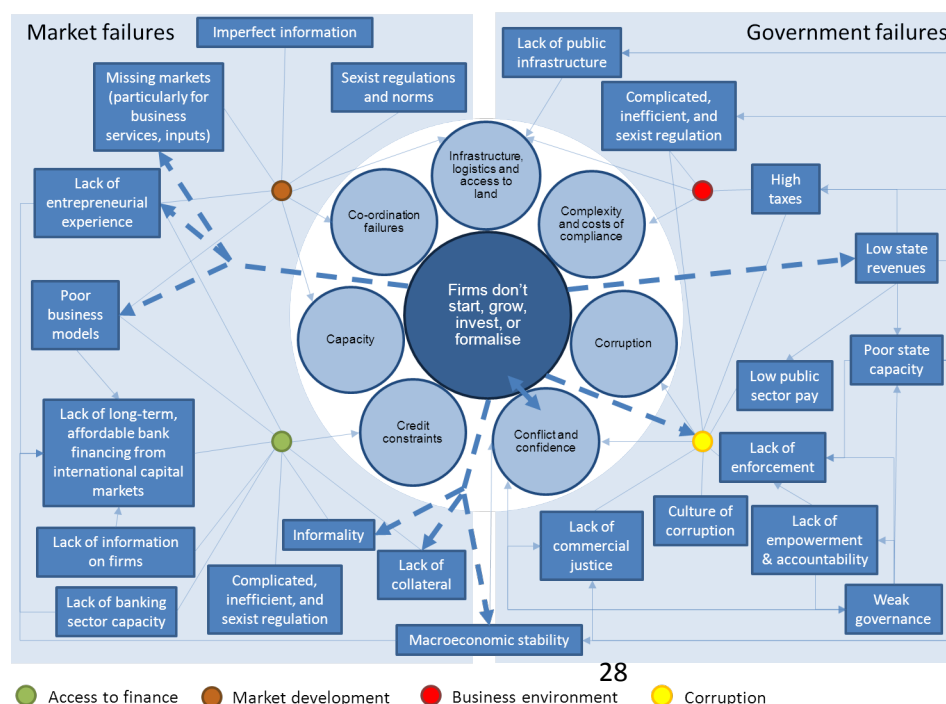
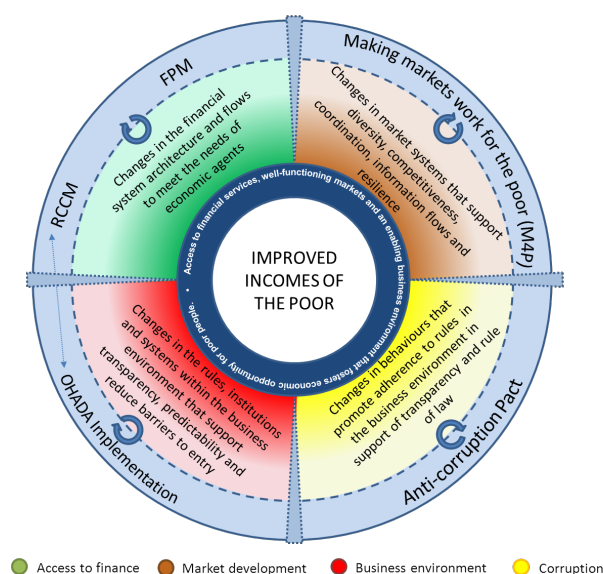


Figure 7: A systemic analysis of the DRC context

This ‘problematique’ helped to inform a series of desired specific programme-level impacts and outcomes. Discussion then focused on the kinds of activities that could contribute to these outcomes. It was determined that there would need to be work across a number of subsystems of intervention, specifically access to finance, market environment, business development and corruption. Each subsystem represented a defined set of changes – the ‘productive patterns’ the programme would like to influence in the future so as to improve incomes for the poor. Productive patterns consisted of behaviours, relationships and institution formation that had the potential to support cohesion and stability and minimise the extremes of exploitation and conflict. In order to represent this, the pilot designed an overall complexity-based theory of change ‘compass’ to guide a responsive, iterative, and non-linear programming approach (see figure 8 below).

Figure 8: Complexity-based theory of change ‘compass’



The impact of the programme is at the centre of the compass and the outside of the circle represents the starting point of the programme. All interventions would ultimately work towards improving the incomes of the poor, moving from the outside of the circle inwards. This impact is nested within the outcome target, which is in turn nested at the centre of a complex system of DRC-specific constraints as identified in the ‘problematique’ analysis: access to finance; market development; business environment; and, corruption. This system is circumscribed by a dashed line representing the ‘short-term planning horizon’ – a future date sufficiently soon that results can be predicted with a reasonable degree of accuracy. Moving from the planning horizon towards the impact circle reflects moving forward in time and deeper into ‘the fog of uncertainty’ – i.e. that space where results *cannot* be predicted with a reasonable degree of accuracy.

The outer ring contains portfolios of interventions in each of the 4 constraint areas. The suggested opening portfolio contains specific interventions, each of which is rooted in a particular constraint, but has the potential to impact on all the others effecting system-wide change. This opening portfolio will be supplemented by further interventions as the programme progresses – identified and designed in response to shifting opportunities and risks, as well as on the basis of constant learning-by-doing.

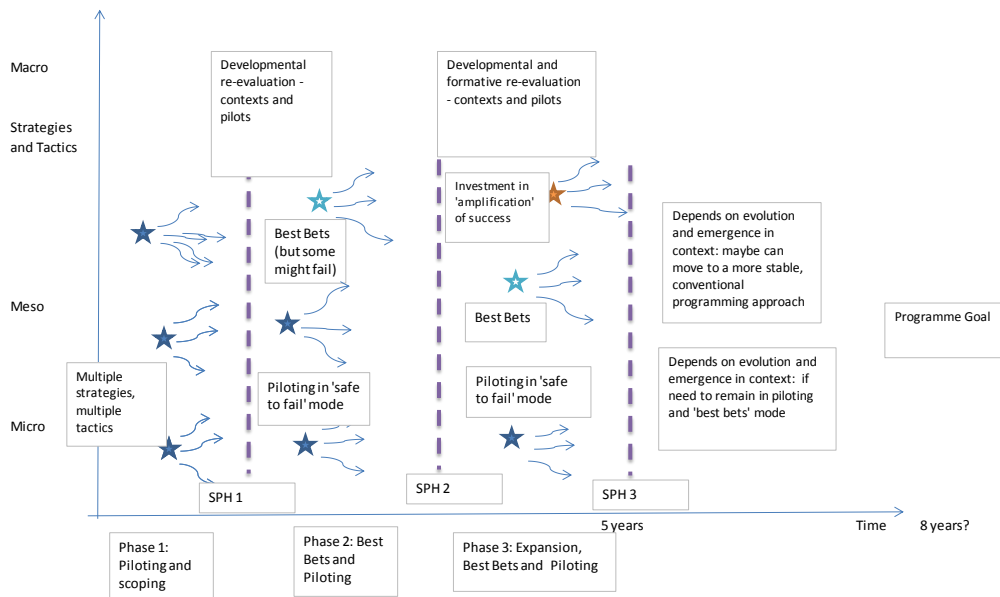
At the heart of the theory of change were a number of key principles:

- That there was unlikely to be any linear progressions in the complex system of the DRC business environment;
- That linear intervention might soon become irrelevant, will miss opportunities and may do harm in a fragile context;
- That the influence of a single intervention should not be overestimated;
- That cause and effect at the system-wide level could not be fully understood upfront, but was the result of multiple changes over time that would gradually bring about systemic change;
- That complexity or wickedness in the environment needs to be respected and uncertainty navigated, not retreated from;
- That the theory of change needed to guide multiple, iterative small-scale interventions at multiple points in the system.

The programme demonstrated a need to employ the complexity theory of change as a compass to guide its work across these multiple systems. Although the type and mix of interventions could change, the focus would remain on supporting changes that ultimately work towards the desired impact: improving the incomes of the poor.

The implementation design was based on the principles of a 'nested approach', with minimum specifications in the opening phase and deliberately short strategic planning horizons shaped by inherent uncertainty. An 'evolutionary' programming approach (see figure 9) was developed, based on piloting, iterations and 'amplification of successes' in multiple domains, and continuous 'learning by doing' and adaptive management principles.

Figure 9: Evolving programme approach



The process illustrated the need for continued investment in strategic and operational intelligence, including the need to track the changing context and emerging effects and to conduct systematic learning and evaluation. The process also highlighted the need for resources for interpretation and continual revision of the complexity theory of change and underlying programme assumptions. It was also recommended that DFID be actively

engaged in programme implementation so as to make the adaptation and responsiveness to change as effective as possible.

Conclusions

The principles and tools employed in the pilot allowed for the articulation of a programme logic and approach that was more suited to the dynamic and uncertain context in DRC than would have been possible using only the techniques previously available to the team. The 'complexity theory of change' was used by the design team as the central plank of the proposed programme. The proposed DRC PSD programme has since been approved for funding, providing important legitimacy to this new and experimental approach to working in fragile states.

5.4 Pilot 4: Programme Management – programme management and systems thinking

Problem / challenge

This pilot project sought to bring a variety of systems thinking tools to bear on DFID's programme management systems and processes. It was different to the other three pilots in that it was focused not on applying complex systems tools to an external issue or challenge in wealth creation but instead on DFID's internal corporate processes.

Approach and process

The pilot was embedded within the End-to-End Project Management Cycle Review called for by the DFID Secretary of State, and the outputs were designed to feed into it. The research specifically aimed to help improve understanding of DFID's programme management approach through the use of appropriate and relevant modelling and diagnostic tools. The pilot used a combination of systems thinking tools including process maps, participatory dialogue, concept mapping, business flow analysis, issue mapping, influence diagrams and causal loop analysis. These tools generated a mass of data that was analysed and presented for use by the End-to-End review team.

Findings

This range of tools was used to generate a series of conceptual and diagrammatic descriptions of DFID's programme management process. The first of these was a process map, which utilised the 'ideal programme management process' as formally described in DFID procedures. The reality of the DFID organisational system was introduced by mapping the range of actors and factors that influence each stage of the process; the different routes through the process; and the interdependencies and feedbacks that shape how the process works in reality. It quickly became apparent that the DFID programme management process could be characterised as a wicked organisational problem.

While the diagrams were an important part of the process, their utility came from how they were able to help structure collective thinking and deepen analysis of issues and solutions. They were used as workshop facilitation tools to provide structure when discussing issues raised by workshop participants, and helped provide focus in such discussions. In fact, the process elements proved as important as the methods employed. In particular, the participatory emphasis proved successful in eliciting cooperation and generating a positive attitude in diverse stakeholder groups. This was critical given the potentially sensitive and conflict-generating topics being discussed.

Figure 10: The DFID Business Case process as a ‘fix that fails’

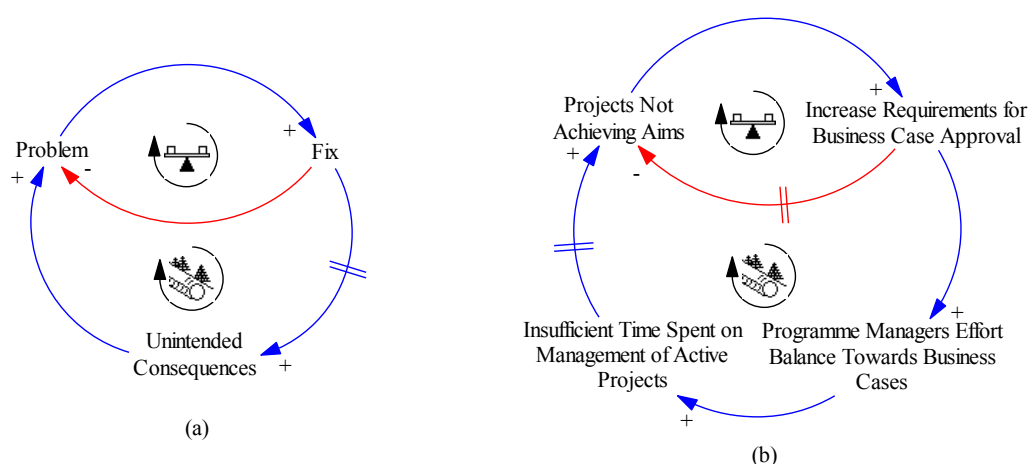


Figure 8 illustrates the systems diagrams developed for the programme management process. The left-hand version gives a generic example of a problem that has a fix applied that reduces the problem but triggers unintended consequences, typically with delayed impact, which also make the original problem worse. Since the fix does not reduce the problem as much as expected, there is a pressure to apply it more, which actually creates more unintended consequences. In this case, the more the fix is applied the worse the problem gets, given the unintended consequences.

The right-hand diagram shows the ‘fix that fails’ in terms of DFID processes. Projects are not seen to achieve all of their intended aims so the approval process is identified as a key leverage point, and submission of more information and work for the approval process is required. More stringent requirements for business cases should result in better-thought-out business cases that produce better results when implemented. The unintended consequence was that more work was required from programme managers in preparing business cases, which reduced the time available for managing existing projects. Eventually, this had an impact in terms of reduced delivery of results by those projects. This then led to further requirements for business cases to improve project outcomes and even less time on management of projects.

The analysis highlighted a number of further challenges. Specifically, the effort that goes into business cases creates a reluctance to cancel projects. This is also exhibited by a reluctance to propose higher-risk projects (with potentially higher gain) and a tendency to stick to lower-risk but lower-gain projects. It also creates a tendency to water down performance targets once a project is in progress in order to protect projects that would otherwise be cancelled.

There is also a lack of flexibility and a tendency towards premature solution selection: business cases are too detailed and rigid and solutions are set too early, because of the requirements to set budgets and specify detail at an early stage. This leads to optimism bias in many programmes, with regular instances of performance targets in LFAs being diluted during the first year of the programme. Clear tensions are also created in the balance of effort between business case preparation and project management.

Common feedback from programme managers is that they spend too much time on business case preparation and not enough on project management. This has been intensified due to DFID’s increased involvement in fragile states: average deployment durations tend to be shorter, resulting in greater churn of programme managers in-country

and thereby degradation of in-country experience at the expense of head office business case preparation.

Overall, the system thinking pilot helped shed light on specific issues that were constraining improvements and provided a better understanding of the potential entry points for potential interventions. While all of the pilots involved some degree of group consultation and discussion, this pilot focused on a series of participatory workshops with diverse groups of DFID staff. This demonstrated the key value of bringing multiple perspectives together to broker a common understanding of the wicked problem being faced. The process proved as valuable as the specific tool itself, although of course the tool then determined how insights were documented and reported.

Conclusions

The systems thinking approach involved developing sound and defensible analysis of the issues being addressed in a more fast, efficient, comprehensive and cost-effective manner than would otherwise have been the case. The pilot formed the analytical framework of the End-to-End Project Management Cycle Review, and very quickly generated an assessment of the programme management process and system that could be presented to senior management in DFID. The body of evidence produced was not disputed in presentations to senior management, and has backed up the recommendations that have been made.

6. Lessons from Pilots

Following the completion of the pilots, a lessons-learned review was carried out, with feedback gathered by the overall project managers. This helped to identify the *strengths* and the *weaknesses* of the pilots, as well as the *opportunities* and *challenges* faced in taking this work forward. These are summarised in the form of a SWOC analysis (Table 4), with the more detailed explanations below.

Table 4: Overview of SWOC Analysis of the Pilots

<p>Strengths: what did the pilots do well?</p> <ul style="list-style-type: none"> - Improved analysis understanding of problems - Valuable engagement with ‘wicked’ nature of problems through sound analysis and insights - Analysis and findings utilised in on-going corporate and programme processes 	<p>Weaknesses: what were the issues and problems?</p> <ul style="list-style-type: none"> - Pilots provided snapshots rather than on-going analysis - Analysis stayed at fairly high level - Pilot recommendations not always tailored to DFID organisational realities
<p>Opportunities: what is the future potential?</p> <ul style="list-style-type: none"> - Specific pilot approaches have wider applicability - Linking methods into on-going processes in a timely manner enhances use - Potential for more engagement with operational research - Good value for money in terms of investment in pilots against return for organisation 	<p>Challenges: what are the obstacles or limitations?</p> <ul style="list-style-type: none"> - Needed more time and resources to fit tools to DFID processes - Concerns about reducing or taming complexity with methods - Some elements of pilots not used, especially the more complex visualisations - Potential for methods to be applied and replicated without due care - Take-up limited by DFID’s role as a commissioning agency - Potential rise in costs for future efforts

6.1 Strengths: what did the pilots do well?

Improved understanding of problems: The four pilots have made a considerable contribution to new and enhanced knowledge of the problems they addressed. The range of tools employed were viewed as especially useful for:

- ‘Getting inside the black box’ of the problems covered;
- Developing a sharper understanding how wider contexts shape and influence a given problem;
- Providing more sophisticated analyses of the potential causal pathways through which a change process might unfold;
- Bringing multiple perspectives together to broker a common understanding;
- Supporting the development of strategies to cope with inherent complexity, thereby giving a more systematic way of working towards ‘best fit’;
- Providing an analytical platform for experimentation and learning and supporting a more adaptive management approach with appropriate evidence-based tools.

Made wicked problems more navigable through sound analysis and insights

A common finding across all the pilots was that they were more effective at enabling an understanding of the inherent complex and wicked nature of a diverse set of problems than

much of the existing DFID toolkit. The pilot clients all felt the pilots were of high importance for their initiatives: they helped establish a way of understanding complex problems and designing relevant interventions that was much more grounded in reality and context. This was seen to be because they were based on sound, credible methods and analysis that 'held water', the outputs of which could be communicated with others in order to support arguments about appropriate ways forward.

In three of the four pilots, the approaches were described as helping staff reach robust analytical conclusions in a more timely and cost-effective manner than would otherwise have been the case.

Good use of analysis and findings in on-going processes All four pilots found the approaches useful for making sense of the existing problems in new ways. The overall effect was an incremental one of clarifying and developing individual and shared knowledge. All four pilots saw this kind of utilisation.

The pilot participants also found engaging in the pilot processes very useful –participating in the process led to individual learning and changes in behaviour, such as improved communication within teams and between partners as well as enhanced understanding and application of new principles. Engagement in the process also increased users' ownership of new ideas and concepts. The DRC Private Sector and Programme Management pilots demonstrated this form of use. In the Programme Management work, a Nigeria country office workshop facilitated without the help of the pilot team used the same process and materials as the team had used.

Three of the pilots - Nigeria Trade, DRC Private Sector and Programme Management – saw direct implementation of the findings of the pilot by pilot clients. This led to new and enhanced decisions around funding, programme design, and engagement with corporate policies and procedures.

6.2 Weaknesses: what were the issues and problems?

Pilots provided snapshots rather than continuous analysis The analyses generated by all of the pilots were snapshots of systems at a given moment, and those systems – by their very nature -will continue to evolve and shift. As such, all the pilot findings should be understood as provisional, rather than final or conclusive. Of course, the wicked nature of the problems faced means that conclusive findings may not in fact be feasible, but even with this qualification, there is a need in all of the pilots for deeper analysis, data gathering and refinement of assumptions. Ideally, this would be done on an on-going basis as part of the monitoring efforts of any interventions that followed.

Analysis remained at a relatively high level

Because of time and resource constraints, the analysis stayed at a relatively high and general level, providing what could be described as a useful basis for generating initial assumptions and ideas and developing emerging hypotheses. While all of the pilots made the case for and provided inputs into the development of more detailed learning frameworks, the available resources meant that this could not be done as part of the pilots. Apart from the data that was available, and that which could be gathered through consultation exercises, none of the pilots moved from the conceptual to the more operational side of things. However, all pilots did provide a framework for data collection for the programmes or initiatives that followed.

Pilot recommendations were not always matched to organisational realities

The specific recommendations from the pilots were also felt to vary in terms of the potential to directly make use of them. For some, this was because the suggestions were not necessarily firmly anchored in an understanding of the institutional and political challenges facing DFID. This typically meant that some rework was necessary by DFID staff to take the original recommendations and fine-tune them for practical application.

6.3 Opportunities: what is the future potential?

Specific pilot approaches have considerable wider applicability All of the pilot processes also triggered subsequent discussions and requests for further support, from the pilot clients and from others across DFID who were seeking similar kinds of methodological innovations.

In DRC, the ‘complexity theory of change’ was directly utilised in the business case for a major new £100 million programme of work, as a theoretical and practical basis for how the programme would operate. As this paper was being finalised the programme has been approved. This is the first time any major programme in DFID has explicitly used complex systems ideas in the design and approval stage. The DFID DRC office is also using the approach to develop new applications in other programme areas, such as health. In addition, the approach has been highlighted as being of potential relevance for private sector development and fragile states work in other settings.

The Programme Management pilot provided the intellectual underpinning for a whole raft of new reforms, including the introduction of a new programme management process and the set-up of a new delivery unit.

Linking methods into on-going processes in a timely manner enhances utility

The value-added of the pilots was ultimately determined by the engagement of the clients with the findings, and, in many cases, how they were able to translate the analysis into improved decisions and enhanced processes. The strongest examples of this were in the Programme Management and DRC Private Sector work. By being successfully anchored in on-going DFID processes, their utilisation was very tangible. Both pilots moved forward sufficiently to show tangible use of the knowledge generated by the pilot.

More generally, there is scope for the tools to be used not just in design, but also in implementation, and management of subsequent interventions, thereby smoothening what is presently a rather sharp transition. Because of the timeframes of the project, it was not possible to assess this aspect of the pilots in detail. Continuing to track how these approaches are used on an ongoing basis is therefore very important.

Potential high value for money of new methods

It is also clear that the pilots were a reasonably high ‘value-for-money’ exercise in terms of the relative investment in the pilots compared with the benefits in terms of improved decisions and processes. Although the DRC Private Sector pilot amounted to relatively small £22,500, it clearly made a significant and relevant contribution to how the new programme would be conceptualised and delivered.

As the annual review noted, ‘We have established an opening portfolio of interventions, and come to the conclusion that, given the complex, unpredictable nature of DRC, interventions further into the future will have to be complexity-theory informed, based on continual horizon scanning and reassessment of the evidence.’ The Nigeria Trade work, for a similar investment helped provide the intellectual platform for the development of a new five-year trade programme. The framework and model are being used at the heart of the design

process. The Programme Management work, again for a similar outlay, helped clearly establish the need for programme management reform, and set out a number of ways forward that will be highly relevant for the organisation as a whole in the short and medium term.

Potential for operational research

It is worth noting experiences across Whitehall, where use of systems tools and techniques tend to reside with Operational Research Professions. This was found to be the case in the Department for Environment, Food and Rural Affairs, Department of Health, the Ministry of Defence, the Home Office and others. The Government Operational Research Service is a cross-government network for these analysts, providing a platform for a thriving community across some 24 Whitehall departments.¹ Of the four pilots, three involved suppliers who had previously worked with these other departments. However, DFID is not currently a member of this network, and there is a perception among the network convenors that the department does not employ any operational researchers. This is a real opportunity for DFID in terms of strengthening its on-going work by building on and learning from the capabilities already present in government.

6.4 Challenges: what are the obstacles or limitations?

More time and resources necessary to fit methods into DFID processes

Despite the value of the new tools and methods for enhancing knowledge, some respondents felt there needed to be more space, time and resources to adapt them to precisely fit DFID's specific needs as a commissioning donor agency, and moreover DFID itself may need to adapt – and get more involved in implementation and delivery - if it is to make full use of the potential of these techniques.

Concerns about reducing complexity with methods

Across the pilots, there was a tension between analysing complexity using new analytical tools and navigating it using adaptive management and decision-making. There were varying views about how to address this. On the one hand, there were those who felt the main value of complex systems tools lay in facilitating a more detailed, forensic and in-depth understanding of systemic issues – the Nigeria Trade programme being a good example. On the other hand, there were those who felt trying to develop a precise, data-driven understanding of complex problems ran counter to the nature of the phenomena in question – that it was a version of trying to 'tame wicked problems' described earlier. Instead, the focus should be on developing principles that supported ways of effectively responding to the inherent uncertainty without trying to reduce or capture it. This is a key issue, and it is important to reflect upon it. From the perspective of the research team, it should not be assumed that the two approaches are mutually exclusive: an iterative and adaptive approach is most powerful precisely when it builds on a solid data-driven analysis of the complexities and interdependencies of a given problem. It is only through deeper and more systemic analysis of problems that DFID can have a solid platform for iterative experimentation and adaptation.

Some elements of the methods were not used by DFID staff

There were numerous examples of this across the pilots. For example, the system mapping diagrams in the Programme Management pilot were felt to be too confusing to share more widely, even though the underlying analysis was extensively drawn on. The modelling work done in Nigeria Trade was seen as very valuable by some, but was not universally appreciated by all DFID staff introduced to it. Meanwhile, the network mapping for Girl Hub in Nigeria Girls Empowerment, while useful and generating new insights around girls' exclusion that informed subsequent work, was not taken forward directly, although it did influence how

the theory of change was conceptualised and developed. More generally, there were issues around the technical language accompanying some of the methods that needed careful attention, to ensure that clients do not get overwhelmed by new and abstract terminology.

Potential for methods to be applied and replicated without due care

Another key challenge is to ensure that the use of these tools and techniques does not become automatic, and less thoughtful and considered than it should ideally be. There was one example given, in the DRC, of the 'complexity theory of change' being adapted for use in another DRC programme, without as much thought into how it would work in practice. The nature of complex systems methods demands considerable engagement and discipline in how they are used. This explains the focus on operational research where these tools have been widely applied, such as in the military and the private sector. However, this is not traditionally one of the areas of strength for development agencies, whose corporate valuation of implementation feedback and learning processes has lagged significantly behind the valuation of approvals and disbursements. The challenge to overcome is to ensure these tools are only used in settings where there is a commensurate investment of time and resources so that programmes that develop from such analyses are able to work in a rigorous yet flexible fashion. Without this, the benefits of these tools will not be realised, and their use will risk creating the same kinds of problems faced by blanket and un-strategic applications of existing tools such as the logical framework or RCTs. While this is a challenge for all methods, including mainstays such as the logical framework, it is worth being aware of such potential risks.

Take-up may be limited by DFID's role as a commissioning agency

Perhaps the most significant issue is that the tools by their very nature focus on how to undertake appropriate design that feeds into programming. As DFID is more of a commissioning donor than an implementing one, there is not a perfect fit between the value-added of the tools and current incentives in DFID, which gear efforts more strongly towards upstream design and approval.

More generally, there may well be structural issues in terms of how much DFID itself can make full use of these tools: in most cases, partners have to be engaged and closely involved. Much of the analysis could be seen as providing a baseline for implementation/operational research; for full utility of the approaches, there is a need for DFID to get the ball rolling but also to ensure implementing partners utilise such methods.

Potential rise in costs for future efforts

There were questions about the tools themselves, and how amenable they are to scale-up in DFID – and the investments required to get to this stage. A number of the pilots were supported at subsidised rates by private sector consultants, which also raised questions about scale-up. It would be sensible to anticipate an increase in costs, were a market to develop, for the provision of methodological expertise in these areas.

7. Conclusions and recommendations

7.1 Conclusions

There is a lot of talk about complex systems in development, a few influential publications, and a number of dispersed applications, the majority led by development researchers. There are also growing numbers of applications within development agencies: UNDP, the World Bank, IMF, USAID, Oxfam, Plan, the Red Cross have all been experimenting with complex systems methods in their research, policies and programmes.

The project documented here presents a modest attempt to undertake such experiments within DFID. The overriding conclusion is that this has seen significant results. Across the board the pilots have helped to increase DFID's understanding of wicked, complex problems, supported a more systemic understanding of the underlying issues, and have directly informed the design of new programmes and processes that are more relevant and appropriate to such problems.

The Policy Research Fund project and related pilots have been a very useful and instructive first step for DFID in exploring a particular path through which its staff may be able to better deal with the diversity of development and humanitarian problems they face. The experience suggests new tools, methods and mind-sets can help in:

- Developing a more rounded understanding of the systemic and dynamic nature of problems, and how this might affect potential strategies and interventions;
- Informing better programme design through the identification of more relevant and appropriate approaches;
- Supporting more flexible, iterative approaches that are urgently needed in many of the challenges and contexts DFID faces.

Together, the methods used in the four pilots amount to a set of new and potentially innovative ways to better understand the inherent wickedness of development problems and to respond to them with more appropriate interventions. The project has reinforced the finding, also raised through other initiatives, that a one-size-fits-all approach to how DFID does its work is not feasible nor desirable. DFID is starting to recognise that many of the systems and problems it works on are not 'tame', and that many of the tools used as standard are simply not useful enough in such contexts.

There is potential for these approaches, along with others, to help make design and implementation more rigorous, and to move towards the goal of 'best fit' described in the introduction. The four pilots did this by testing a range of methods, frameworks and principles that could help DFID staff move beyond existing analytical and operational mainstays.

Perhaps the most important finding is that the tools and principles of complex systems research can indeed be applied in the context of a major development agency, and can fit well into both programming and institutional initiatives. Done right, they have considerable potential to permit staff to be clearer about the kinds of problems they face, to be both explicit about *and* continually testing and probing their intervention logic and assumptions: to work towards programmes that are 'best fit' rather than 'best practice'. These methods can help navigate a middle ground in the face of complex and wicked problems: to ensure development professionals neither have to surrender to uncertainty on the one hand nor construct convenient but false and potentially unhelpful log-frame 'fictions' on the other.

However, it would be remiss to turn this way of working into a ‘best practice’ or a silver bullet. There are also a number of important qualifiers to be made. The tools do need to be adapted for use in development settings – there are issues of terminology, technical issues, and skills. The tools all required active brokerage by individuals who understand both development processes and the technical potential of the methods. The tools require collaboration between those seeking to address complex problems, and those with the necessary methods to develop the necessary dialogue and trust. Finally, because the value of these approaches is less on ex-ante design but on learning-by-doing, there is a need for an emphasis on operational research, which is not yet commonplace in development.

There is a relatively steep learning curve to complex systems approaches, and this was apparent from across the pilots. On the other hand, the investments to date have been very modest in comparison to what DIFD typically spends on analysis and design efforts. Meanwhile, there are other issues about how the tools and outputs can be usefully shared within DFID without being overwhelmed by the complexity of the issues or leading to ‘analysis paralysis’. There are also potential issues about development agencies attempting to establish a ‘cookie cutter’ approach to wicked problems, which would be highly counterproductive.

There are however, enough positive findings to suggest this area of work is worthy of further exploration and investment. The positive results of these initial experiments indicate donors such as DFID should be investing more resources in understanding the range of tools and methods available for analysing and modelling the problems it works on, and bringing these approaches to bear on real-world programmes and interventions. Overall, it would seem to be very much worthwhile for development actors to make an effort to make this an area of innovative programming and research, so as to enhance and improve strategic and operational decision-making. Complex systems approaches are indeed potentially important and relevant for development actors. It will require effort, investment and systematic learning for their considerable potential to be realized.

7.2 Recommendations

A number of recommendations should be considered by way of follow-up to the Policy Research Fund project. The recommendations therefore are at two levels – we need to see development actors engaging more on these issues, and we need to see complex systems researchers working to adapt their approaches for development settings in ways that have not yet happened.

For development actors

Recommendation 1: Improve our understanding of wicked problems in development and the need for new tools and techniques The DFID PRF project focused on wealth creation efforts in one agency, but there is clear indication of demand for new methods and tools from other organisations and other sectors, including environment and climate change, health and governance, as well as work within fragile states. This would lead to the identification of specific entry points across the sector for subsequent experiments and learning in complex systems approaches.

Recommendation 2: Establish further programming to explore the potential of tools and methods within design, implementation and evaluation processes. Based on the entry points identified in (1), there is a need to trial new tools to enhance both understanding and decision-making, ensuring synthesis across initiatives and organisations.

Recommendation 3: Ensure organisations have systems, processes and capacities for dealing with wicked problems There is a need for greater institutional recognition of the challenges posed by wicked problems. This calls for concerted efforts to deal with such problems within policy and operations as well as at a conceptual level. This requires senior management and leaders to embrace and encourage such efforts, as well as investment in staff capacities and skills.

Recommendation 4: Build better and more strategic partnerships and networks within organisations and existing partners, as well as with scientists, the private sector and the wider public sector Interested development actors should be working collaboratively across their organisation as well as with key partners inside and outside the sector to take this work forward. Some form of learning network, which works to bring key actors together to share experiences, and challenges, would be a useful platform for continued work in this area.

For complex systems specialists:

Recommendation 1: Develop a toolkit of complex systems tools and approaches appropriate to development efforts This will involve drawing on existing tools and techniques that are used in the private sector, science and government and will require expertise from operational research in these settings.

Recommendation 2: Adapt methods, representations and terminology based on applications in development contexts For this kind of work to be scaled-up to achieve their potential, there is a need to enhance how the methods and concepts are communicated and the kinds of terminology and language that are used. This will mean working with development actors to trial different approaches, new ways of presenting analyses, and using these to adapt the techniques accordingly.

Recommendation 3: Build the evidence base. Complex systems researchers should be identifying the positive lessons from the use of such tools and techniques in development and further afield, so as to make the argument on a more solid and evidence-based fashion. These tools have both benefits and costs, and both need to be weighed up and understood. This also means developing learning frameworks that can help to evaluate the contribution of these new methods to improved policy and practice.

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Annexes

Annex 1: Wicked complex problems and wealth creation

There are a number of specific reasons for exploring a number of these formal tools in the context of wealth creation efforts. First, there is a track record in applying new and innovative approaches to wealth creation. The Spence Commission's conclusions to influential work such as Dani Rodrik's work on growth dynamics all highlight growth as precisely the kind of non-linear emergent phenomena in which complex systems researchers specialise. There have also been influential books and publications making explicit links between the two areas. In his 2006 book, Eric Beinhocker showed that economic growth can be better understood by using tools of complex systems than by using many traditional economic tools. In particular, he highlighted the importance of systems, networks, evolution and dynamics as critical areas where conventional economic thinking needed to be challenged and enhanced.

More recently, Ricardo Hausmann of Harvard University has led work on the Economic Complexity Index, which analyses the economies of 135 countries using network analysis techniques, and ranks them according to their economic complexity. The Index has been shown to be a powerful descriptive tool, but also as having far greater predictive power than World Economic Forum indicators of competitiveness and World Bank good governance indicators. From a microeconomic perspective, analysis of corporate strategies highlights that conventional efforts suffer from a lack of understanding of interdependencies and feedback effects. The widespread application of system dynamics to business growth strategies is based on addressing precisely these gaps.

Annex 2: The pilot process

There was a lot of enthusiasm for the pilots across DFID. A range of staff members highlighted numerous 'live' they were working on that could potentially be a focus of a pilot, and several made very strong cases for selection. The proposed pilots numbered over 20, outstripping the actual available pilots offer by a factor of more than 5. This indicates that the demand for this project in particular, and for new tools more generally, by some way exceeded the resources available to respond.

In all of the four pilots, a degree of dialogue was needed between the project managers and the pilot clients in order to clarify the exact nature of the problem being faced and the kind of methods that could be employed. Once this was determined, a separate dialogue needed to be initiated with a range of potential suppliers, which then triggered another round of discussion with the pilot clients. The process was less one of identifying a problem that could be matched precisely with a known supplier and tool, and more one of active knowledge brokering in order to reach a mutually agreeable way forward. Although on the surface of it this may seem a prosaic finding, it is worth reflecting on. In seeking to broker a more unconventional approach to a given problem, a number of challenges are highlighted. Specifically, there are issues with:

- How given problems are defined and by whom;
- The kinds of analytical options that are typically considered or ignored in responding to such challenges;
- The kinds of designs and methods that are usually acceptable for downstream use in programming;
- The extent to which the needs of different groups, especially senior decision makers and quality assurance teams, are considered.

This process of identifying the space and potential for new tools and techniques contrasts with usual practice around techniques such as the LFA, which typically involves far less debate and discussion because of fit and acceptance within the organisation.

It was agreed upfront that a set of common *principles* should inform the pilots. Specifically, each pilot should:

- Align with existing and on-going programming or institutional **processes**;
- Apply new and innovative **tools and techniques** specifically designed to address such issues;
- Deepen **knowledge of and insights** into the nature of the problem faced;
- Generate evidence and recommendations that can be **utilised** to move the specific processes forward;
- Generate **value-added** for the pilot clients.

Having identified the problem in question, and the nature of the challenges faced, it was then often necessary to bring in experiences and skills from outside of the traditional development research and consultancy community. While all of the pilots were to some extent supported by development researchers, there was a need to engage private sector specialists, or those with public sector experience from outside of international development. So, for example, Nigeria Trade was led by a business strategy consultant and academic; Nigeria Girls Empowerment involved a development researcher and a leading thinker on network economics; DRC Private Sector involved both a development theory of change specialist and a private sector specialist on finance and complexity; and Programme Management was led by private sector systems thinking specialists.

Each pilot was designed in response to a specific stated need. In order to ensure the work was as targeted and focused as possible, each involved the development of a problem statement and concept note that was reviewed and agreed with the pilot clients. This went through numerous iterations and revisions, in order to gradually 'home in on' the specific focus of the pilot in terms of the challenge faced and the approach that would be taken. At the point that a specific methodology was chosen, it was typically because there was reasonable confidence that it could be applied within the constraints and that it would help move the clients forward in terms of the challenge they faced.