"After the light bulb": accelerating diffusion of innovation in the NHS

David Albury (Innovation Unit) and Amanda Begley (UCL Partners)
with Paul Corrigan, Sarah Harvey (Loop2) and Laurie McMahon (Loop2)

Executive summary

As has been heavily documented for over a decade, the NHS is good at 'invention' but poor at 'diffusion': innovations tend to stay locked in their location of origin, failing to scale or spread, be adopted or adapted by other healthcare organisations, to achieve system-wide, population-wide change or impact. This is now an even more pressing issue as financial, social and demographic pressures mount on the NHS and innovation is key to simultaneously increasing quality, productivity and prevention, to increasing value – outcomes that matter to patients for pounds spent.

In recognition of the limited effectiveness of traditional approaches to diffusion, UCL Partners on behalf of NHS London is undertaking the *After The Light Bulb* project to achieve a breakthrough in thinking and action leading to more rapid and effective diffusion. The first stage was to bring together a group of experts from a range of disciplines and perspectives to cast light on why the problem of diffusion might exist within the NHS and what characteristics and conditions might need to be developed within the NHS to address this problem.

This paper builds on the rich and powerful insights and perspectives of these experts and draws on the extensive research on diffusion of innovation in various sectors, systems and countries as well as the authors' experience of working in and with organisations throughout the NHS to make a set of recommendations:

A. Strengthen and exploit **provider autonomy**

B. **Incentivise and reward** scaling and spreading

C. Actively **decommission and disinvest**

D. Encourage **competition**

E. Focus **investment and risk capital**

F. Engage and mobilise **patients and carers**

G. Build **alliances** across internal and external networks

H. Provide granular, accessible comparative **performance information**

I. Acknowledge necessary **instability and fluidity**

Background and context

The problem and urgency of diffusion

The NHS is facing an unprecedented, and well-rehearsed, set of challenges:

- An increasing number of people living with long-term conditions – and combinations of long-term conditions – resulting from an ageing society, lifestyle choices and advances in acute care
- Rising public expectations of quality, choice and accessibility and a decline in deference to authority and expertise. This is also fuelled by experience of other sectors and by an explosion in the availability and usability of information on health and healthcare
- The opportunities and issues presented by advances in technology and science
- A massive tightening of public funding.

While continuous, incremental improvements in existing services is important, without the widespread and rapid adoption of radical innovations, innovations that produce significantly better outcomes for significantly lower costs, the healthcare system is at risk of becoming financially and socially unsustainable.

The problem, however, is not lack of innovation or about increasing the pipeline of innovations. You can visit virtually any hospital or locality and find examples of successful innovative practices, services or facilities. But all too often – and perhaps with the exception of drugs and discrete clinical procedures – these innovations are localised, fragmented and marginalised, locked in their location of origin and failing to spread to, or be adopted by, other departments in the same organisation, other organisations in the same locality, let alone to other localities. Hence population health gain is not maximised: innovations that result in improved clinical or patient reported outcomes benefit only the few and not the many. And the full potential savings from cost-reducing innovations are not realised. The pressure is increasing to move away from a healthcare system which supports well-tested, 'proven' innovations residing within 'pockets of excellence' or at 'beacon sites' to a healthcare system which stimulates the spread of innovations, for the benefit of entire populations.

The problem is one of *diffusion*: the spread, adoption and replication of high potential innovative practices, services, facilities. And the problem needs addressing urgently for two reasons. The first is, as already indicated, to meet the challenges for quality improvement, productivity increase and prevention enhancement (the 'QIPP' agenda). The second is the emergence of the new architecture within the NHS: the National Commissioning Board, universalising Foundation Trust status, new remits for national regulatory bodies, and the emergence of 'clinical commissioning groups'. How these (and other) organisations act and operate will have a significant impact on the rate and effectiveness of diffusion. It is therefore timely and appropriate that the NHS Chief Executive has established a Review on the Diffusion of Innovation. This paper, and the learning from the simulation for which it is background, will be a contribution to this Review.

Limitations of traditional approaches

This problem of diffusion in the healthcare system in the UK is not new. It has been recognised for over a decade. Two major approaches have been used by the Department of Health and the NHS – in common with other parts of the public sector – to try to tackle the problem, to increase the rate of diffusion.

The first and predominant is 'dissemination', using websites and workshops, exhibitions and pamphlets, beacons and prizes to publicise successful innovations, on the assumption that the provision of information about particular innovations and their benefits will persuade individuals and organisations to adopt and adapt them. Even a cursory review of proposals and project plans for the numerous innovation funds over the past few years reveals how embedded 'dissemination' is as the favoured mechanism for diffusion. And yet there is considerable evidence that awareness of, and information about innovative practices and services, does not translate into widespread adoption and adaptation, even when accompanied by toolkits and training. Furthermore, only early adopters, predisposed to innovate, make real use of the information. Though, for example, attendees often express high levels of satisfaction at an exhibition, the follow-through action is minimal. Similarly, while a hospital or primary care centre may purchase a toolkit on how to implement a new set of practices, all too often such toolkits remain on the desk or the bookshelf.

At least in part, driven by frustration with lack of pace of diffusion through 'dissemination' methods – and the urgency of addressing the challenges – politicians, officials and senior managers turn to the second approach: 'insistence'. Central insistence on adoption through frameworks, guidance notes and audit has proved effective for specific innovations. Whereas 'dissemination' is of limited effectiveness, 'insistence' is highly effective but in a limited, or limiting, way. Healthcare professionals and healthcare organisations can be instructed to implement particular new practices and procedures. But there are three significant adverse consequences of this approach. It requires highly resourced inspection and monitoring functions to ensure the instructions are being obeyed. It de-motivates professionals. And because a new set of instructions have to be issued for each new practice or procedure, it does not build systemic adoptive capacity or propensity for diffusion.

In recent years there has been more use of 'collaboratives' and 'communities of practice', where potential early adopters work with the innovators on issues of implementation. These have been shown to increase the rate of initial diffusion, through helping to over come the 'not invented here' syndrome. However, they generally fail to impact on system-wide adoption, that is the 84% of organisations Everett Rogers in his classic text on diffusion labelled the early majority, the late majority and the laggards[1].

Despite the intensive use of these mechanisms, either singly or in combination, and despite the establishment of a plethora of organisations tasked exclusively or in part with the diffusion of innovation in the NHS, diffusion remains slow and ineffective.

---

[1] Everett Rogers *Diffusion of Innovation* 2003

After The Light Bulb

Given the urgency of addressing the problem (of diffusion) and the limited effectiveness of traditional approaches, UCL Partners is leading an initiative on behalf of NHS London to analyse the issues and to explore potential breakthrough solutions. This project – *After the Light Bulb* – is managed by Amanda Begley, Director of Innovation and Implementation at UCL Partners, and has been undertaken with David Albury, an internationally acknowledged expert on innovation in public services and Director of Innovation Unit, Paul Corrigan, former health policy adviser to the Prime Minister, and Laurie McMahon and Sarah Harvey of Loop2, experts in the use of simulations in healthcare.

The project consists of two major phases. In the first we brought together ten experts on diffusion of innovation from a variety of sectors and disciplines [see Appendix 1] to pitch their recommendations for increasing the rate and effectiveness of diffusion of innovation. At the workshop, they presented to a panel and audience of respected professionals and managers from a range of health and healthcare-related organisations. The insights and learning from this workshop have, together with the extensive experience and research on diffusion of innovation in healthcare[2] and other sectors, in the UK and other countries, formed the basis for this paper.

This paper forms the background for the second phase of the *After The Light Bulb* project, an open, behavioural simulation. The system conditions and dynamics, and actions and behaviours identified in the first phase will be tested during the simulation, to understand how they might increase the rate and effectiveness of diffusion, and how they might be developed and applied in the NHS in London. The insights and learning from the simulation will be submitted to the Chief Executive's Review as well as promulgated widely within the healthcare system.

Challenges to traditional assumptions

At the workshop, the experts offered four challenges to the assumptions which pervade thinking and action about diffusion of innovation in the NHS and the healthcare system more broadly.

Scale and spread

It was argued that the underpinning model for diffusion in the NHS is of the transfer of a 'proven' innovation from one organisation or service to another, for example, from hospital A to hospital B, or from primary care centre Y to primary care centre Z. Although such transfer can be found in other sectors (sectors with higher rates of diffusion)[3] particularly for incremental innovations, the primary mechanism of diffusion of radical and game-changing innovations in such sectors is through 'scale'

---

[2] For a summary of the research related specifically to healthcare see Trisha Greenhalgh et al *How to Spread Good Ideas: a systematic review of the literature on diffusion, dissemination and sustainability of innovations in health service delivery and organisation* 2004

[3] John Bessant & Tim Venables (eds) *Creating Wealth from Knowledge: Meeting the Innovation Challenge* 2010 brings together recent research on the factors affecting the dynamics and rates of transfer and adoption

and/or 'spread'. One of the experts, Charles Leadbeater, a leading authority on innovation and creativity, characterised 'scale' as the McDonalds approach. Through franchising, branching and high fidelity to standardised operating protocols McDonalds takes their particular innovations to ever-increasing scale. Whereas 'spread' was illustrated through the growth of Chinese restaurants. In this case there is no central template (though most Chinese restaurants are remarkably similar) but a compelling proposition virally carried through new entrants (in this case also new immigrants) into the market.

Several features of this argument are important. Firstly and critically, the experts argue, and the research reinforces, that, in general, diffusion happens more through 'displacement' – successfully innovative organisations displacing lower performing organisations (and meeting new demands) – than through 'transfer' from higher to lower performing organisations. Secondly, radical innovation or, even more the case, systemic and paradigm-shifting innovation tends to come from outside of the existing system and not from incumbent players and providers (the work of Clayton Christensen at Harvard Business School on this issue in general and on healthcare specifically is particularly illuminating here). Finally, the current assumption limits the NHS to a single (i.e. *transfer*) solution to diffusion of innovation in healthcare, and ignores the potential of *scaling* or the *spread* of new providers as potential diffusion mechanisms.

Indeed the structure and dynamics of the NHS are very different from those common to sectors with higher rates of diffusion. In those sectors, the majority of provision is dominated by a relatively small number of large organisations (albeit often with many, many 'branches') – an oligopolised core – but there is also a very wide periphery of niche suppliers, specialist providers and innovative start-ups. And further there is significant fluidity both across the inner boundary between the 'core' and the 'periphery' (merger and acquisition leading to scaling of innovations, and de-merger and spin-offs fostering further innovation) and at the edge of the periphery with under-performing organisations exiting (or being exited!) and unsuccessful innovative start-ups dropping out.

These are not just characteristics of private sectors but of healthcare and public services in countries where there are more 'chains' of providers and in dynamic 'third' sectors in some countries where aggregation is not impeded by law or regulation.

'Innofusion'

This neologism was used by two of the workshop experts – John Bessant, Director of Research and Professor of Entrepreneurship and Innovation at Exeter University and Steve Woolgar, Professor of Marketing in the Said Business School at the University of Oxford – to challenge two further assumptions in the thinking and action about diffusion of innovation in the NHS. The first assumption is that diffusion is a process that takes place after an innovation has been 'proven': on the contrary they, and others have argued that innovation is a continual process of adaptation, refinement and reconfiguration by an expanding and often differentiating group of users. And, secondly and relatedly, because radical innovation almost invariably involves changes in working practices, different relationships between

providers and users (on which more below), new professional roles and identities, the process of innovation is a social process not (just) a technical development process.

To emphasise these points Steve Woolgar defines innovation as "the art of interesting an increasing number of allies who will make you stronger and stronger".

Hence, we can begin to understand why the traditional 'dissemination' approach that treats the diffusion of innovation as mainly an information or skills training process is of limited effectiveness. And why another of the workshop experts, Dave Snowden, Founder and Chief Scientific Officer of Cognitive Edge, propounded the view that story-telling and narrative databases were more powerful in moving knowledge around organisations and communities (and battlefields!) than guidance notes, instructions and codes of practice.

Gunfire at sea: an illustrative case study

In 1898 naval gunnery was revolutionised by Admiral Sir Percy Scott, an English officer, who - through the novel combination of instruments already available (the gun, elevating gear and telescope) - devised 'continuous-aim firing'. This innovation improved gunnery accuracy by up to 3000% over 6 years and to elevated the status of the 'artist' gunner to a 'trained technician'.

In 1900, Scott shared with William S. Sims, an American junior officer all there was to know about continuous-aim firing. Following modification to his own ship and training, Sims began demonstrating remarkable improvements in gunnery accuracy. Having proven the innovation, Sims sought to inform the US Navy of the new approach. Over a two-year period, Sims detailed the evidence from his own and Scott's ships, and the methods and training used within thirteen official reports. He also detailed in these reports shortcomings of the mechanisms on board the American ships, compared with those in the British Navy. These reports initially went to bureaus within Washington, where they were ignored. Sims then circulated the reports to fellow officers to stimulate discussion about the gunnery claims. This stirred the men in Washington to respond with rebuttal based on the 'logic' that (1) continuous-aim firing is impossible and (2) since the American equipment is as good as the British, the fault must lie with the men. Sims was labelled as a falsifier of evidence and 'crackbrained egoist'.

Why was an innovation, which significantly improved the core business - fighting effectiveness - of the Navy, so resolutely rejected by those in leadership positions? Sims' criticism of the mechanisms which the men in the bureaus had themselves designed raised defence mechanisms against his innovation. And the innovation presented to those in senior positions a disruption to their craft, history and position, a threat to their power, identity, status and skills.

This case study was introduced by John Bessant at the experts workshop. More detail can be found in Elting Morrison "'Gunfire at Sea: A Case Study of Innovation" in *Men, Machines and Modern Times* 1966

Interfaces

Several of the experts at the *After The Light Bulb* workshop were struck in their encounters with and hearing about the NHS as to how siloed it was: not just between organisations, but between specialities, and between, often very powerful, professional groups. One of the experts with many years experience of working with organisations in a variety of sectors and countries said, "The NHS is well defended against disruptive innovation. It tends to be self-referential, not to look outside, with a very traditional 20th century model of innovation (lots of stuff in the lab) and with multiple tribes at war with each other". They were therefore unsurprised about the slow pace of diffusion given, as discussed above, that radical innovation challenges existing power relations and professional practices. This becomes an even more intense issue when it is acknowledged that significantly cost-saving, quality-improving innovations are likely to arise from work across interfaces between specialties but even more between secondary, primary and community care, and between the 'system' and its 'users'.

Importance of 'users'

It became clear during the workshop that perhaps one of the major reasons for the low rate of diffusion in the NHS (and in public services more generally) was that most of the policy interventions regarding innovation were supply-side policies –stimulating the generation of innovative ideas, investing in innovation projects, offering prizes to innovators, increasing the flow of information about particular innovations – and that insufficient attention had been given to the demand-side. What incentives and prizes were there for individuals and organisations to adopt and adapt innovations developed in other organisations? How do the tariff and funding mechanisms reward organisations that search out and implement innovations generated elsewhere?

But perhaps more profoundly than these intra-system demand issues, there were several examples given by experts in the workshop of user networks and organisations being active in demanding particular innovations, of users mobilising or being mobilised to create and develop new services, products, programmes and facilities and becoming strong 'pullers' of innovations through systems and organisations.

In the NHS over recent years we have got better at engaging patients and carers in the re-design, the co-design, of new pathways and procedures but these are generally the immediate and local users not regional or national networks and organisations. Though there are some strong and pertinent exceptions. For example, the care and treatment of people living with HIV/AIDS has been radically reformed on a wide scale by interlocking networks of patients, carers and health and social care professionals. And individual or personal health budgets were put on the innovation agenda and developed by the disability rights movement and, more recently, by organisations of people living with disabilities such as In Control.

Hence rather than seeing innovation and the diffusion of innovation as a technical process plus change management, there is increasing interest in the theory and practice of building social movements: how

ever expanding communities of users (patients and carers)and professionals can be mobilised and empowered to *pull* radical innovations through the healthcare system. As Dan McQuillan, another of the experts at the workshop, noted, the widespread availability of digital mobile technology and digital platforms enable this mass engagement through quickly combining and connecting people and organisations and supporting crowd sourcing.

It is important that professional knowledge as well as user knowledge is valued within such networks as previously, *some* social movements have resulted in activities potentially detrimental to health and well-being, for example, reducing uptake of immunisations around MMR and the flu pandemic. Through a stronger and more trusted connection between internal and external networks, knowledge transfer from professionals would mitigate against some of the unintended consequences.

Heterogeneity of NHS

Most of the discussion thus far in this paper has referred to the NHS as if it were a single homogeneous entity. Of course, this is not the case. What might stimulate the diffusion of innovation in acute and emergency care could well be different from what might be effective in the care and treatment of long-term conditions or in primary care. Not only might the types of innovation vary, with perhaps more technical and clinical innovation in acute care and more service and organisational for chronic conditions, but the relationship of the patient to the service is generally very different. For many patients receiving acute or emergency care their relationship often consists of a small and limited number of episodic contacts – unlikely to be the basis for deeply engaging them in the re-design of those services, especially if the issues involved are highly technical, let alone finding relevant regional or national networks of patients[4]. Whereas for the person living with one or more long-term conditions they both have a continual relationship with health and social care services and are much more likely to be part of or form networks with others with similar conditions. The perspective of different clinicians also varies with a GP accountable for population health while a surgeon is responsible for particular operations. In addition, the ways in which funding, and hence incentives, for these different types of services are likely to evolve in different directions.

---

[4] Interestingly and importantly one exception to this is maternity services where networks such as Netmums and Mumsnet can be powerful allies in the development and diffusion of innovations

Recommendations for stimulating more rapid and effective diffusion of innovation

Building on the insights and proposals from the *After The Light Bulb* experts' workshop, and in the light of experience of diffusion in the NHS and research on diffusion in other sectors, including health systems in other countries, we would recommend the following nine sets of actions. For several of these sets there are already policies and practices in train, or at least directions of travel identified; in these cases we are recommending that they be reinforced and carried through with determination. For other sets new approaches will need developing.[5]

The following are not in order of priority or significance. Neither are they discrete recommendations in that it is through the interactions between them (for example 1-5 plus 8, or 6,7 and 8 together) that the most powerful effects on the diffusion of innovation may occur

1. Strengthen and exploit **provider autonomy**

2. **Incentivise and reward** scaling and spreading

3. Actively **decommission and disinvest**

4. Encourage **competition**

5. Focus **investment and risk capital**

6. Engage and mobilise **patients and carers**

7. Build **alliances** across internal and external networks

8. Provide granular, accessible comparative **performance information**

9. Acknowledge necessary **instability and fluidity**

---

[5] This paper focuses on the diffusion of innovation but many of these recommendations would apply equally to accelerating the spread of existing best practice not just that of innovative 'next' practice

Strengthen and exploit **provider autonomy**

The evolution of the NHS architecture such that all providers of secondary, tertiary and mental health care will be Foundation Trusts is a positive move: a characteristic of sectors and systems with rapid and effective diffusion is that the individual organisations have full responsibility for their own performance and thus feel the need to search and seek out innovations that can help maintain and improve that performance (and suffer consequences of poor performance). Necessarily in public services and in healthcare this will be within a regulatory framework. It is critical that regulators (Monitor and CQC) not only enforce basic standards and the terms of license – police the threshold for becoming and remaining a provider – but also ensure and encourage space for innovation. Equally, commissioners, both nationally (the National Commissioning Board) and locally (Clinical Commissioning Groups) need to move towards commissioning for outcomes, including value for money, rather than commissioning activity and transactions.

Incentivise and reward scaling and spreading

Commissioners, regulators and policy-makers – and senior managers and lead professionals within organisations – also need to enable successfully innovative organisations and units to enlarge their sphere of operations and serve bigger populations (either through branching or franchising – using standardised operating protocols – or tele-provision) and, simultaneously, to have funding, pricing and tariff regimes that encourage teams and organisations to adopt and adapt successful innovations developed elsewhere[6]. The initial phases of scaling for an organisation – developing protocols, setting up outposts, etc – require investment and capital (see below) but the experience of other sectors is that as the level of scaling (number of operating sites) increases , the costs of set-up can be reduced and operating efficiencies obtained.

Actively **decommission and disinvest**

For the above to be effective, especially in a highly resource constrained environment, there has to be much more active decommissioning of outdated and under-performing services and practices. Historically, even when new services have been developed, all too often they are running alongside existing and lower performing services, leading to both duplication of costs and inferior services for some sections of the population. In addition, regulators have often intervened with failing or under-performing organisations to restore them to frequently only marginal viability thus discouraging higher performing and innovative organisations from taking over and improving provision in that area. The proposed new economic regulator's duty to promote "competition *and collaboration*" can be a powerful platform for a new approach: re-balancing from organisational regulation towards sectoral regulation.

---

[6] The adoption of day case surgery was, for example, significantly accelerated by alterations to the relevant tariffs

Encourage **competition**

The combination of the above three sets of actions will encourage greater levels of competition, though this needs to be managed differently in different areas of care and activity. In, for example, some areas of elective care, especially in large urban areas, guided patient choice between alternative providers will be appropriate – competition within a market. Whereas for many long-term conditions integration of services is critical. For these cases, commissioners will need to make periodic decisions as to the best provider – competition for a market – conscious that fully integrated local services may, on the one hand, increase the likelihood of diffusion of innovation among the services concerned and, on the other hand, hinder the entry of new and innovative providers for particular services.

Focus **investment and risk capital**

Even for 'proven' innovations, there are costs (implementation, service re-design, workforce training and development, etc), human resource requirements and risks in adoption, adaptation and scaling. To lubricate these processes, investment and risk capital is needed. However, providing the appropriate incentives are in place (see 2 and 3 above), such funds can be replenishing with risks and rewards shared between the funder and the recipient.

Engage and mobilise **patients and carers**

As discussed earlier in this paper, patient and carer networks and organisations can be powerful agents of diffusion, mobilising and expressing demand for innovations that produce better clinical and patient reported outcomes. Such networks and organisations can be either formal organisations (eg MS Society, Asthma UK) or informal, often on-line, networks (www.patientslikeme.com is particularly interesting, or www.childrenwithdiabetes.co.uk). The value of these networks and organisations has not always been fully recognised by the NHS, and have too often historically been seen as campaigning groupings, special interests, and/or sub-contractors of services the NHS does not want to, or cannot, provide.

However, there are a growing number of examples where the dialogue with such networks and organisations has been focused on improving outcomes within an honest appreciation of resource constraints. And where these organisations have led, or been deeply engaged *early* in the processes of generating and developing innovations, they have become powerful advocates for the spread of those innovations.

Such work is difficult and complex, but empowering and strengthening patient and carer organisations – in a deliberative way and within the clear context of population health – both enriches the innovations, drawing on their experience and knowledge, and mobilises demand for those innovations.

Build **alliances** across internal and external networks

A strong message that came through from several of the experts on the *After The Light Bulb* workshop was that some of the most powerful and game-changing innovations in a variety of sectors have come through alliances between networks of professionals within the sector and user organisations. Although there are often linkages between the many, well-established clinical and professional networks internal to the NHS and patient/carer organisations, it is rarer to find strong alliances built round the development and diffusion of services innovations. Such alliances, around specific conditions and issues, need to built and fostered.

Provide granular, accessible comparative **performance information**

The last two decades have witnessed an explosion of information comparing the performance of healthcare organisations: Government and regulator ratings, organisations like Dr Foster, and user-generated views such as www.patientopinion.org.uk. Most of this information has been at the level of the organisation which, while of use to managers, auditors and policy-makers, is not as valuable to patients and professionals. More granular, comparative performance information at the level of the specialty, clinic or clinician has advantages for both professionals and patients.

Such information drives peer-to-peer, reputational pressure, harnessing the professional and public service moral purpose that motivates most of those who work in healthcare – the desire to do best for their patients. Doctors' primary identity is with their specialty rather than their employing organisation and, though they may be influenced in their career decisions by the ranking of a Trust or employing organisation, they are more likely to adopt innovations on the basis of how well or badly they fare against their professional colleagues and deliver measurable outcomes for their patients. Such information, provided it is made public, also enables informed commissioning and patient choice, with the threat of even a small percentage of patients switching provider being a strong impetus for organisations to adopt and adapt relevant innovations. Patients want granular information. They want to know how good (or bad) is the doctor they are seeing, the clinic they are attending, the ward they are on, the treatment they are being offered.

Acknowledge necessary **instability and fluidity**

Finally, and perhaps with most difficulty, it needs to be acknowledged that dynamic, innovative and high-performing sectors tend to be characterised by instability and fluidity. People with or fearing illness and injury, disease and disability have an understandable desire for security and stability. Managers and policy-makers find it easier to operate within relatively fixed or slowly changing structures. And yet, systems and structures where innovation flourishes and diffuses rapidly show high levels of movement of personnel across organisations and continuous shifts in the organisational landscape with new entrants, large organisations incubating and spinning-off innovative enterprises, and partnerships and joint ventures forming and dissolving.

Diffusion does not occur rapidly and effectively within stable, rigid, hierarchical systems. Diffusion requires a level of instability and fluidity where new innovative practices can displace more traditional ways of working. For innovations to diffuse at pace and scale, Dave Snowden argued at the *After The Light Bulb* workshop, sectors and organisations within those sectors need to operate as 'complex adaptive' rather than 'ordered' systems, with 'resilience' rather than 'robustness'. Leaders of organisations and specialties need to encourage informed and well-managed risk-taking and counter embedded cultures of risk aversion.

Appendix 1: Expert presenters at the *After The Light Bulb* workshop January 2011

John Bessant	Director of Research and Professor of Entrepreneurship and Innovation, Exeter University
Peter Bonfield	Chief Executive, Building Research Establishment
John Hargreaves	Director, Indepen and expert in regulatory strategies
Charles Leadbeater	International innovation adviser and analyst
Dan McQuillan	Founder of the Social Innovation Camp and expert in campaigning and social movements
David Napier	Department of Anthropology, University College London
Ben Page	Chief Executive, Ipsos-MORI
Carol Propper	Professor of Economics and Head of the Healthcare Management Group, Imperial College
Dave Snowden	Founder and Chief Scientific Officer, Cognitive Edge
Steve Woolgar	Professor of Marketing, Said Business School, Oxford University and *Which?* Council member