Strategy as Order Emerging from Chaos: A Public Sector Experience

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In 1993 Ralph Stacey contributed to an emerging debate on the usefulness of new complexity science concepts to organisations. Since then interest in the organisational applications of complexity has grown amongst both academics and practitioners. Stacey's work provided a source of ideas for a successful major strategic change intervention in a public sector organisation. Our article presents a case study of that intervention. It describes how concepts from complexity science were used and how the programme was implemented, as well as the 'transitions model' and the principles which emerged from the change programme to assist managers wanting to know how to undertake complexity inspired change.
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Introduction

Ten years ago, Ralph Stacey's article *Strategy as Order Emerging from Chaos* was published in Long Range Planning.[1] It considered the significant implications for planning and strategic activity suggested by new discoveries in science about chaos and self-organisation. Stacey's consultancy work on strategic change issues convinced him that human organisations are dynamic feedback systems, and that research about the nature of these systems should be applicable to organisations.

At this time academics and practitioners were beginning to take an interest in the new sciences. Chaos theory, and later complexity science, offered a new theoretical framework with the potential for developing new concepts and approaches to strategic change, and our article builds on this work. The change management literature offers a plethora of approaches to change, some more successful than others. Our key questions are: *Can complexity ideas also be used to formulate an effective practical approach to organisational change?* and *If so, what does such an approach involve and how could it be implemented?*

We have studied a successful major change programme that took place between 1993 and 1997 at the Open University (OU), and was inspired and influenced by Stacey's work. Since it ended much

has changed, prompting us to revisit the research and ask an additional question: *Did the complexity inspired change intervention confer any lasting benefits?* Not all change is easily discernible. There may be an interval of some years as influences seep into a culture. Re-visiting the central issues and themes that emerged from this intervention in 2005, we found that the changes have mostly had a positive impact and in some areas have been ongoing.

Stacey's research was based primarily on the private sector. But the OU is a complex public sector organisation in which many goals are held simultaneously. However, our case study shows that complexity science may be used just as effectively to generate organisational change in the public and not for profit sectors as in the private sector. We document the process of change and how it was achieved, and suggest that complexity inspired approaches can utilize uncontrollable human change processes to foster positive emergent strategies. In more conventional approaches to change, these uncontrollable processes can be a problem. In this case the understanding of complexity which managers developed in the change programme was an important determinant of success. It provided a rationale for supporting and even suggesting changes which might otherwise have provoked resistance, and inspired positive actions to change the organisation well beyond the point where it was anticipated that the change intervention would have ended.

The need to foster strategic thinking that does not divorce strategy formulation from implementation is widely accepted, and indeed has been discussed in a recent LRP special issue.[2] Our work suggests that complexity thinking is one way forward. It recognizes that most organizational members participate in the creation and shaping of strategic directions, irrespective of whether or not this is acknowledged or planned. Complexity inspired interventions aim to foster interdependent processes of learning and change. They acknowledge the importance of emergent strategy and encourage self-organisation. These processes enable organisations to become more flexible and adaptive and operate more effectively at the 'edge of chaos' in volatile environments.

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Our next section briefly outlines our research and methods. We then discuss the chaos and complexity concepts which were important to the OU, indicating their wider organisational implications. We draw on Stacey's early work because it was formative to the understanding of complexity that managers developed in working on the OU change programme. Next we present our case study, indicating how the change programme was achieved. This is followed by an analysis. We indicate some of the lasting benefits and consider why complexity concepts provided an effective underpinning for change. We reflect on two theoretical frameworks which can now be used to inspire complexity interventions. These are Stacey's 'Eight Steps' framework (which was used in the OU change programme) and MacIntosh and MacLean's 1999 dissipative structures approach, which is offered in the literature as an alternative to Stacey's framework.[3]

Our final sections offer practical guidance on how to use complexity based ideas and concepts in organisational change. 'The Eight Principles' is a list of suggestions for practice that was amended and adapted from Stacey's work by the managers and change process facilitators as the OU change programme progressed. The general feeling was that Stacey's suggestions were *organisationally* focused, whereas they wanted principles on which to base *individual* action plans. While Stacey provided the guidance as to *what* needed to be achieved organisationally, the 8 principles that emerged from the programme help managers answer the question '*how* do we achieve these things?' and thus serve as a practical guide to managers seeking complexity inspired changes in future. Principle number eight refers to the 'Transition Model' that was developed during the research. It was

designed as a tool to help managers reflect on where the organisation was placed in relation to the complexity based model which was emerging from the programme.

Background and methods

The case study was the subject of doctoral research, with the intervention as its focus. The research aimed to discover whether or not the novel complexity approach that was adopted had been effective. The analysis drew on both contemporaneous and retrospective data. Primary data was collected via interviews, workshops and questionnaires, one of which was based on Stacey's work to assess managerial understandings of complexity. Secondary data was drawn from a wide range of internal documents and papers.

The research built on an external case study of the programme undertaken contemporaneously by the Institute for Employment Studies at Sussex University. Their study used interviews, focus groups and a bipolar semantic differential questionnaire to find out how managers learned to manage for change more effectively. The doctoral research commenced soon after the programme ended. It was designed: 1) to use comparative methods to compare contemporaneous Sussex findings with data collected at this time and 2) to help participants advance their strategic thinking and move it forward. In 2005 we revisited the issues and themes of the original programme to assess its longer-term effects. The Appendix provides a methodological summary.

Complexity science

Discoveries in chaos theory stimulated further research into the behaviour of complex systems and non-linear dynamics which have led to the emergence of the new science of complexity. This is a multidisciplinary science, which embraces chaos theory. It is well accepted within the hard sciences and is gaining acceptance within the social sciences. Complexity science is concerned with complex dynamic systems that have the capacity to spontaneously self-organise into even more complex states of being. Such systems can create new structures and new behaviours as they respond to themselves and their environments.

Self-organising principles drive the creation of complex dynamical systems whether physical, biological, ecological, social or economic. If they also adapt and learn from their experiences then they become complex adaptive systems. A laser beam, for instance, is a self-organising dynamic system, which adapts in response to physical changes, but it does not learn from this process. Complex adaptive systems that learn from their experiences actively seek to be opportunistic, trying to use their own internal dynamic models of the world to anticipate the future. These models are highly active and changing as the system constantly tries them out and tests them as part of an ongoing process.[4] The human brain for example, is a complex adaptive system that is continuously organising and reorganising its neural connections as it learns from experience. There is no central controlling mechanism. Complex adaptive systems are built up of many levels of self-organising agents acting as building blocks for the next level. In an organisation an individual complex adaptive human will join a team of employees to create a larger complex adaptive system. Complex adaptive organisational systems have self-organising attributes, learn and adapt to internal and external change and develop emergent strategies that enable them to perform at the 'edge of chaos'.

Complex adaptive systems are self-organising, learn and adapt, and develop emergent strategies to perform at the 'edge of chaos'

Implications for business

Stacey offered four key ways in which chaos and self-organisation have implications for business. First, organisations are non-linear webs of human interactions and feedback loops, and are capable

of stable, chaotic and highly unstable behaviours. If an organisation is too stable it can ossify, but if it is too unstable it can disintegrate. Successful organisations work between these two conditions or states, in what Stacey called 'the chaos zone'. This has implications for managers seeking to sustain competitiveness in changing environments. Rather than seeking to control their organisations to maintain equilibrium coupled with incremental change and innovation, they need to adopt a non equilibrium approach that interacts with their internal and external environments and embraces more flexible and adaptive models of change and innovation.

Second, Stacey defines chaos as '*in its scientific sense an irregular pattern of behaviour generated by well-defined nonlinear feedback rules commonly found in nature and human society*'. Systems in a chaos state are very sensitive to small changes and differences can be amplified over time, and it is thus impossible to predict their long term future. This challenges the notion that the future is to some extent predictable or amenable to long term planning systems.

Third, while chaos may be unpredictable, it has recognisable patterns which we can learn to understand and work with. Thus managers need to think differently about how they understand their organisations, seeking for patterning and using qualitative rather than quantitative data for business interpretation.

Finally, chaos and contention, along with self-organising processes of political interaction and complex learning, create new adaptive strategic directions. The implication is that being too committed to top down visions of the future carries the risk of inhibiting this complex learning and political interaction. Complexity thinking implies that we need a different approach to change management. Table 1 contrasts approaches to change suggested by traditional thinking with complexity inspired approaches.

Complexity inspired approaches recognize that all individuals can make a valuable strategic contribution to the formulation of change programmes. As Balogun points out, employees are not simply recipients of changes initiated by senior management: inevitably, they shape change outcomes.[5] Managers have less control over change processes than traditional thinking implies. Complexity thinking is explicit about this. Complexity approaches to change try to harness uncontrollable human processes to foster and develop emergent strategy through self-organisation.

Table 1. Traditional and Complexity Inspired Approaches to Change

	Traditional	**Complexity Inspired**
How is change initiated?	Change programme is devised at the top	Change programme emerges from a bottom up process
How are teams formed to implement change?	Team members are appointed to formal teams by management	Informal teams are spontaneously formed. The process may be initiated by asking for volunteers
How are roles allocated?	Managers decide who does what	Team members decide who does what
Where does the authority to take action come from?	Individual team members are empowered by senior management	Individual team members are empowered by the team
How are activities controlled?	Team activities are either directly controlled or steered by senior management	Team activities take place within boundaries of discretion which are influenced by senior management
Why are communications important?	Communications are a means of informing and managing meaning	Communications are a means of developing shared interpretations and meanings
How is lack of control over change processes perceived?	It is a potential problem	It is inevitable but provides an opportunity for developing and fostering emergent strategy

Changing the Open University

The Open University was founded in 1969, and by the mid 1980s it had become a very successful international open learning institution. It is a public sector organisation but not a typical UK Higher Education Institution. Its primary focus has never been on conventional face-to-face course delivery and distance learning has always been its core business. From the outset it had a commercial orientation, but more recently, most UK universities have had to become more business orientated in response to their changed environment, and some now offer distance learning as a subsidiary business.[6] As Lapsley and Miller point out, transformation of UK universities from highly autonomous, charitable organisations to organisations which would be more recognisable in the industrial world only began in earnest during the 1980s, and some have been highly successful in making this transformation.[7]

Up until this time, the OU business focus resembled the private sector more than most other UK universities. It was less dependent on traditional sources of higher educational funding, and had different teaching, design and delivery methods that affected its structure and administration. It had production and warehousing facilities, a central office at Milton Keynes and a network of subsidiary regional offices around the UK. However, during the 1980s, some other UK universities responded to the winds of environmental change more effectively, and by the 1990s the OU faced more intense competition.

The rationale for change

In the early 1990s the OU's position as the UK's number one provider of distance education was under challenge from many local providers, and the need for change was recognised. It had become a large complex organization, but it was no longer flexible, adaptive and opportunistic, and had missed opportunities to develop its unique brand of distance learning into new markets. Changes in Higher Education funding arrangements meant that for the first time it was in direct competition with other HE institutions, while greater flexibility from modernisations of delivery patterns and course design at other universities meant that the OU was in danger of becoming a dinosaur. These environmental changes, together with its classical complex and bureaucratic structures, meant the OU risked being left behind in its pedagogical delivery and losing substantial income.

Alert to these dangers, the University produced a strategic action plan: 'Plans for Change'. The plan identified the need to become flexible, adaptive and opportunistic again, and these became the aims for the subsequent change programme. Senior management was aware that if these aims were to be realized they would need the engagement and the support of staff at all levels. The complexity inspired change programme was a means of achieving this.

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Sewing the seeds for change

In early 1993 the Head of Learning and Development responsible for the development of some 3,500 academic and non academic staff, was asked by the Pro Vice Chancellor for Strategy (PVC Strategy) to help design and deliver a strategic consultation process in support of 'Plans for Change'. She had some familiarity with chaos and complexity through works by such authors as Gleick, Lewin, Nonaka, Prigogine and Stengers, Stacey and others.[8] She followed this up by attendance at seminars by Capra, Goodwin and Stacey and further reading of the emerging literature, including Coveney and Highfield, Kauffman, Wheatley, Pascale and Merry.[9] Given the aims of 'Plans for Change', a complexity inspired approach seemed likely to be suitable. At the time Stacey was one of very few UK management studies writers to use complexity concepts in research and consultancy work, and his 1993 article provided a frame of reference for management action.

Thus ideas from complexity thinking underpinned the understanding and actions of one key player from the plan' inception, and she in turn influenced others in the planning and delivery team.

This team decided on a bottom up approach to change, and drew on Stacey's ideas to set up a series of workshops to involve as many staff as possible. Guided by the aims identified in Plans for Change, an understanding of the need for change and a basic understanding of complexity principles, these workshops sowed the seeds for the development of a change programme in which many of the strategies and action plans were developed and implemented by self-organized groups and teams.

The emergence of programme themes and action plans

In April 1993 a short series of two-day workshops was organized to inform and consult with a random cross section of the University's staff. At each of these the PVC Strategy introduced 'Plans for Change', explaining why the University needed to change and how help was needed from everyone to turn plans into activity. Participants worked in groups sharing ideas and visions of a changed University and identifying key themes and supporting activities. Considerable discussion and debate ensued on issues such as student centred learning versus teacher led provision, on the relative merits of traditional and less conventional teaching methods, and the need to develop new multi media methods and more flexible web-based teaching deliveries.

Key themes for strategic and local action were presented to the Pro Vice Chancellor in a plenary session, and he then fed them back to meetings of the senior management team and the University's strategic planning processes. The workshops were the start of an ongoing process in which themes and action plans for the change programme emerged.

As workshops at the OU were normally directed towards particular types and/or grades of staff, these events were atypical developments in its cultural context. They involved a cross section of categories and grades of staff from all areas of the organization, and created new information flows between employees and senior management. Academics, managers and administrators found themselves working together in the same workshop teams, which enriched discussions and encouraged the creation of multiple perspectives. The workshops created a freeform, egalitarian approach to strategic planning and action. They encouraged political interaction and real time learning as people argued and exchanged views. The communications that occurred helped participants to develop shared interpretations and meanings, rather than simply being a means of informing and managing meaning.

The freeform, egalitarian workshops encouraged political interaction and real time learning, and created new information flows between employees and senior management which developed shared interpretations and meanings

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One important feature was that each workshop had a team of facilitators from Learning and Development who had been briefed on several of the key tenets of chaos theory and self-organization. Their understanding of complexity was important, as they used complexity ideas to encourage people to think differently about change and to envisage a wide range of possible futures. Regardless of their status, participants were encouraged to take individual action, as over time this has the potential to lead to major change. Individual action was billed as important, which was a significant message in an organization where a top down approach was the norm, and people were unused to making changes without authorization.

The programme that emerged from the workshops created interest amongst all groups of staff. In response to employee demand more workshops were organized for the autumn of 1993. This unexpected level of response encouraged and created important new feedback loops throughout the

organization. The workshop programme continued into early 1994, dedicated to key strategic themes that had emerged during the previous year, which were explored and discussed with the senior managers responsible for taking them forward. Originally, it was envisaged that the change programme would be an intervention lasting a few months, but the response dynamic unleashed many hitherto dormant internal human forces for change that saw the programme develop a momentum of its own which continued for four years. Figure 1 shows how the programme unfolded over the four year period.[10] After the autumn series of workshops, the programme actively sought to involve everyone in the organization in strategic policymaking and action, which had not been part of the original consultation plan. It was an unpredicted outcome, a spontaneous and beneficial response to the newly emergent dialogue between employees and senior management.

Encouraging self-organisation

In complexity inspired approaches to change teams are encouraged to form spontaneously. The conference planning and staff survey teams which emerged during the OU change programme were high profile examples of what self-organisation can achieve.

The conference planning team developed after a meeting of the programme's planning and delivery team. It was suggested that it might be a good idea to organise a conference to explore major themes from the workshops and to enable staff to put their ideas to the Vice Chancellor and his senior team. The conference was an unplanned and spontaneous response to the swirl of events at the time, and was achieved by a team of volunteers. This was unusual for an institution where careful consideration, reflection and analytical rationality were the decision making norms.

Staff who had participated in the workshops were invited to volunteer to organise a conference for the coming year, and in March 1994 eight volunteers, who had never worked together before,
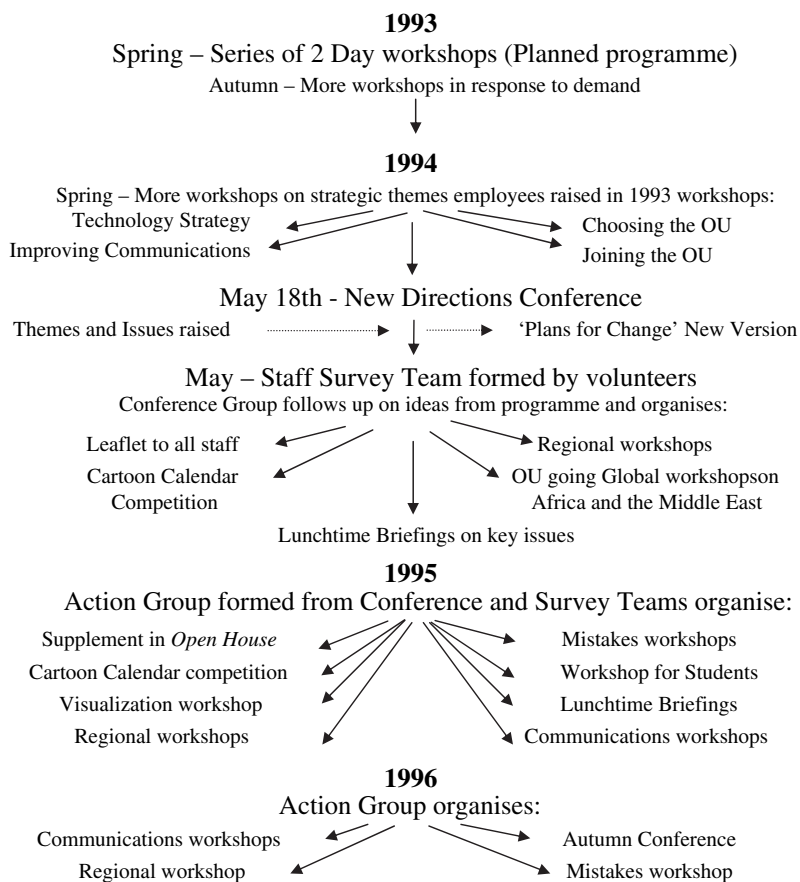
1993
Spring – Series of 2 Day workshops (Planned programme)
Autumn – More workshops in response to demand

1994
Spring – More workshops on strategic themes employees raised in 1993 workshops:
Technology Strategy   Choosing the OU
Improving Communications   Joining the OU

May 18th - New Directions Conference
Themes and Issues raised   'Plans for Change' New Version

May – Staff Survey Team formed by volunteers
Conference Group follows up on ideas from programme and organises:
Leaflet to all staff   Regional workshops
Cartoon Calendar   OU going Global workshopson
Competition   Africa and the Middle East

Lunchtime Briefings on key issues

1995
Action Group formed from Conference and Survey Teams organise:
Supplement in *Open House*   Mistakes workshops
Cartoon Calendar competition   Workshop for Students
Visualization workshop   Lunchtime Briefings
Regional workshops   Communications workshops

1996
Action Group organises:
Communications workshops   Autumn Conference
Regional workshop   Mistakes workshop

Figure 1. The 'Plans for Change' Programme

were given a free hand to organise a one-day conference. Their backgrounds and roles were very different, but they were all enthusiastic about the programme and committed to changing the University. The PVC Strategy, previously a lecturer in systems and familiar with concepts of self-organisation, attended the beginning of the first meeting and briefed the team, setting the boundaries of discretion within which the team could operate. His self-organising model was based on three simples 'rules': he told them what they had to do (organise a one day conference for the programme), when it had to be delivered (in May 1994) and what resources were available (a limited budget and administrative support from Learning and Development). How they did it was entirely up to them - but whatever they chose to do he would support. This was an overt demonstration of trust and commitment to a self-organising approach to project planning and delivery.

The team members decided on their 'roles' in the planning and delivery of the conference, with the authorization for individuals to take particular actions coming from within the team. In just over two months the Conference Planning Team organised a highly successful one-day event on the theme of 'Changing the OU'. The programme of twenty workshops in parallel streams, a mix of internal and external speakers and an exhibition attracted over 100 enthusiastic staff and there was a substantial waiting list. An important feature of the day was the final plenary session when staff presented their suggestions for strategic priorities and actions to the Vice Chancellor and senior management. The event was widely reported by both formal and informal networks and influenced a range of initiatives across the University. Table 2 assesses the impact of the conference, with the final column offering a reassessment from the 2005 perspective.

The Conference Team's success was such that within days of the conference a senior management group decided to use the same team model to produce a staff survey. For two years the University had talked of the need for a staff survey but the proposal had stalled. Conference delegates were asked to volunteer to work with the Director of Public Relations on the design and delivery of a survey for the autumn, and eight came forward to create the Staff Survey Team. The only members with any experience of survey work were the Director of PR and a senior academic. The team selected and briefed a survey company, advised on survey content and design, organised the pilot survey and arranged distribution of the questionnaire to all staff in October, to which there was a very respectable return of 65% without follow-up.

Uncontrolled change processes and emergent strategy

The change processes were largely uncontrolled but beneficial. The conference had been seen as a way of pulling together the themes surfaced by the workshops and presenting them directly to senior management. It had not been envisaged that it would encourage and inspire the continued development and expansion of the programme led by a group of volunteers, but the Conference Planning Team decided to carry on as an action group to follow up on the issues raised at the conference. The programme planning and delivery team, together with the team volunteers and workshop attendees, had created between them an environment where such a self-organising responses could take place.

With support from the PVC Strategy and the Learning and Development team the Conference Team organised a range of activities designed to keep the momentum going and to makes changes a reality (as noted in Figure 1). Workshops, lunchtime briefings, and a whole host of innovative events took place. The lunchtime briefings led by a senior manager were arranged in response to staff claims that it was very difficult to find out what was going on strategically, and later became part of the University's formal communication's programme.

The programme developed it own momentum … unfolding in an unplanned and unpredicted way, via the spontaneous activities of volunteers from all organisational levels

Table 2. The Impact of the Programme

Needs Identified as Conference Themes and Issues	Outcome/follow-up during change programme	The Position in 2005
1. Staff Policy: equalisation of staff terms and conditions: more staff development; need for a Pro Vice Chancellor for Staff	Major progress on equalisation of staff conditions and the PVC Research given responsibility for Staff matters as part of his/her portfolio. More staff development was made available.	There is no longer a PVC for staff, but staff development opportunities have grown. New lunch time training sessions of 1-2 hours are offered on various topics and open to all.
2. Marketing strategy: need to develop a more professional approach to marketing.	A new marketing department subsequently established.	The marketing department has been subject to ongoing change both to maintain a professional approach and make it more responsive to localized needs
3. New Technology Development: fear of being left behind	Establishment of a new Institute for Knowledge Media.	This institute remains. It has expanded and developed into new technology and media areas.
4. Need for improved communications	The conference team suggested ways to improve internal communications — one major suggestion, the Lunchtime Briefings, was adopted by the University. Local improvements in communications were reported.	Lunchtime briefings still occur. The VC also sends regular updating emails to all staff members. Local improvements have continued in many faculties
5. Need for leadership and better people management skills	Subsequently a new Leadership Programme set up to develop the next generation of OU leaders. Evidence of improved interpersonal managerial styles.	The leadership programme continues to be run periodically and more staff have been given an opportunity to participate.
6. Need for flatter organisation structure.	No discernable global progress at the time, some local improvements.	Global progress remains slow, but local improvements have continued.

The programme had developed it own momentum and was now being referred to as the 'people's movement.' Within a year of its inception it was unfolding in an unplanned and unpredicted way, supported by the spontaneous activities of staff volunteers from all levels and areas of the organisation. In January 1995 members of the action group and the Survey Team decided of their own volition to create a 'New Directions' Action Group. They considered some of the key ideas identified at the workshops and the conference and agreed to follow up on them during the following twelve months. With backing from the PVC Strategy and administrative support from Learning and Development the Action Group arranged workshops on a range of topics and a successful cartoon calendar competition, and the following year organised another one-day conference and more workshops.

But by this time the volunteers were losing energy, and the group reluctantly disbanded in January 1997. This was after more than three years of volunteer activity, carried out on top of their existing jobs and without additional resources or time out.

The success of the programme

Learning and change

Learning and changing go together in complex adaptive systems: indeed, Handy suggests that learning is another term for changing.[11] Our research showed that significant learning and change took

place within individuals who participated in the programme. Volunteer organisers reported how their thoughts and behaviours had changed as a result of their involvement. Other participants reported that they had learnt more about the institution and how it worked and more about the roles, contributions and perceptions of colleagues elsewhere in the University. Many felt that they could actively contribute to strategic change and took action to do so.

One interviewee stated that the programme *'brought certain issues to the surface and in some areas made senior managers aware that staff at all levels could contribute to strategic discussions about the OU'*. The programme had encouraged participants to take action and make changes within their own spheres of influence. In so doing it sought to bridge the gap between strategic thinking and action. Some staff described how they had influenced colleagues to take action to introduce changes in working practices. One senior manager described the programme as effective because it: *'got people to understand some of the environmental issues the University was facing and to engage with them, and to recognize that the world had changed.'*[12]

Research by the Institute for Employment Studies that began before the completion of the programme provided more evidence of learning and change. It observed that staff spoke spontaneously about what they had learned about their organisation. It reported that the University had moved from an organisation that was resistant to change to one with a growing awareness of the need to change. It found *'considerable commonality of response describing an organization that had become more flexible and less hierarchical, more sharing and more open with information'*.[13] Our subsequent research confirmed these ongoing trends, as is noted in the last column of Table 2.

In 2005 an Associate Lecturer noted that a new course radically departed from the previously structured modus operandi, and how the response to anxieties about the new guidelines and structure was based on complexity thinking.[14] Other new course developments have not been so obviously influenced by complexity thinking, but course teams have been more innovative and adaptive in developing new materials and delivery approaches. Staff in other areas have also continued to make changes within their own spheres, and there is greater support for individual initiatives than there was before the change programme. Some of the thinking behind the original intervention has seeped into the culture.

Self-organisation

The programme began as a top down strategy that was essentially 'deliberate', but with employee engagement and participation as key implementation themes. It developed into an 'emergent' or 'consensus' strategy making process. Strategy evolved through clusters of individual actions and emerged as 'unintended order'.[15] A co-evolving partnership developed between the planning and delivery team and the informal actions of employees and programme participants. It was a partnership in which senior management was prepared to relinquish control and allow fresh actions and objectives to emerge. It was also a learning partnership that built on ideas and took action in a spontaneous and unplanned way in order to achieve a shared objective - to change the university. The approach was based on principles of self-organisation.[16]

Spontaneity is a key attribute of self-organising systems, and was an important feature of the programme. Organisers and staff picked up on key ideas and responded in an opportunistic and unplanned way.[17] But it was not without order. Self-organising systems have their own internal forms of control and one senior manager described the programme as having 'structured spontaneity'. Although to some outsiders, especially some senior and middle managers, the programme seemed to be anarchic, it was not: order and structure were imposed from within, rather than from outside. The programme had its core purpose (to change the University), its core values (action and egalitarian participation for all) and its patterns of process (exchanging perspectives, discussion and debate, experimentation and innovation). Self-organisation gave it structure. The application of simple, local bottom-up rules underpins the emergence of complex self-organising systems. In volatile environments, top down rules can become too cumbersome to work.

Spontaneity is a key attribute of the programme, but it was not without order. Self-organising systems [develop their own structures and] have forms of control imposed from within

The Conference Team and the Staff Survey team were very different from conventional university project teams. As they were composed of volunteers rather than people handpicked for their expertise or their role, there were no hierarchies of status and they developed their own ways of working without using any of the traditional committee procedures and decision-making processes. They achieved this through experimentation and by learning from their ongoing experiences. Both teams (particularly the Conference Team) could be described as fitting both Stacey's definitions of self-managed and self-organised teams.[18]

The action groups also showed many attributes of self-organisation, arising as they did in response to the events around them. They took advantage of current situations and learnt from their experiences in a novel fashion. Through learning and political interaction they set up fresh feedback loops across the organisation and energised and refreshed information flows, all of which contributed to the creation of emergent new strategies and actions for change. After the programme ended, the practice of inviting volunteers to participate in strategic groups and committees was retained in some areas. For example, a current initiative involving volunteers is shaping a collaborative strategy between the business school and technology faculty.

The edge of chaos

Chaos theory tells us that successful organisations operate at 'the edge of chaos'. One can consider organisations as existing along a continuum ranging from complete chaos to mechanistic stability. In between chaos and stability, organisations can operate as complex adaptive systems. If they become too chaotic they can disintegrate, but if they operate too far from the edge of chaos are in danger of ceasing to exist.[19] At the edge of chaos they are at their most innovative, flexible and adaptive. Organisations that are highly unstable with an overload of feedback, such as many of the early dotcoms, can fail: but large bureaucracies that are slow moving, unresponsive and inflexible (as the OU was by the early 1990s) can also risk failure through being too stable.[20] The 1993 programme created a dynamic that actively disturbed the equilibrium of many areas of the university. Traditionalists were pulling the institution towards equilibrium and the 'modernisers' were pulling towards the edge of chaos. The programme organisers recognised this and encouraged the modernisers to take action.

The complexity approach spawned new networks which led to fresh flows of information and ideas and new feedback mechanisms, many of which challenged the status quo and led to new ways of working

The complexity approach was highly successful in spawning new networks and new self-organising groups. These led to fresh flows of information and ideas and the creation of new feedback mechanisms, many of which challenged the status quo and led to new ways of working. Together with the significant learning that took place in the workshops and in self-organising groups, this pushed the University away from stability and closer to the edge of chaos. Vogel has considered the potential of informal networks for generating significant change of this kind in an earlier edition of LRP, where he explains why they can have energy and focus lacking in formal groups. He states that '*it is important to understand how to trigger collective behaviour of networks*' and that '*research*

needs to identify those factors that bring about the interactive and constructive processes of collective behaviour.[21] The complexity-inspired change programme adopted self-organising principles to trigger these processes successfully.

Complexity, theoretical frameworks and the Open University change programme

Stacey's 'Eight Steps' and MacIntosh and MacLean's 'Conditioned Emergence' model are perhaps the two most prominent practitioner focused frameworks in the literature. We have considered the OU programme and its outcomes in relation to the complexity science-based concepts emphasized in these frameworks. First of all, it is appropriate to clarify the main differences between the two, and why it was found necessary to build on the framework used in the programme.

Stacey's focus is on what organisational conditions are needed to foster new ways of working. Although his steps were used as a frame of reference, more was needed to provide individual managers with an action plan. Stacey's steps answered the question '*what* do we need to do?', but the eight principles we describe in the next section were developed to help answer the question '*how* do we do it?'. MacIntosh and MacLean offer an answer to the '*how*' question, but their focus is structural. Its emphasis is on making structural changes. The MacIntosh and MacLean model was not available to the OU facilitators, but it would in any event have been both politically and operationally difficult to implement structural change in the way that they suggest. Nonetheless, structural issues are clearly important, and some structural changes eventually did take place in the OU.

Stacey's eight steps

Stacey's article lists eight steps which organisations can take to create the conditions for spontaneous self-organisation, innovation and the emergence of new strategic directions. Table 3 shows the OU programme followed steps 1, 2, 3 and 7. These created the conditions for self-organising processes to take place accompanied by individual and group learning and the shifting of mental models (double loop learning).

As step 4 recommends, the programme also provoked multiple cultures by bringing people together from different cultures within the institution, but did not move people around the organisation nor introduce new blood. Step 5 requires the presentation of ambiguous challenges or half-formed issues in order to provoke active searching for new ways of doing things. The programme at the University presented clear-cut and specific objectives, and invited the staff to discuss and debate them with reference to their implementation. However, the understanding of the complexity paradigm which programme participants developed was important because it provided a rationale for these objectives. The case study demonstrates that half-formed issues and fresh challenges may arise from an unambiguous framework, provided employees feel free to challenge senior management proposals about their practicality and delivery. Thus out of a formal clear-cut framework new ways of working can emerge. At the University new ways of doing things arose out of the self-organising responses of programme participants and the deliberate relinquishing of control by the programme organisers.

The University did not deliberately expose the institution to new challenges as required by step 6 as, no longer living in a semi-protected environment, it was already facing many new challenges. Like many private sector organisations it had to be cost effective and highly competitive: for example, in the MBA sector alone, it was competing directly in the private sector sense. What is significant is the University's response. Its senior management recognised the dangers the institution faced, drew up their strategic response and most importantly, decided that this could only be effectively implemented with the full support of all employees. Further, the senior management team was prepared to listen to the comments and proposals of staff and act on many of the new ideas which emerged. The PVC Strategy and other senior key players took real risks in allowing the self-organising process to emerge, which led to fresh and unexpected internal challenges being

Table 3. Creating order out of Chaos and the Open University

Open University Programme	Stacey's Eight Steps
The workshops empowered staff to engage in group learning. The programme encouraged managers to recognise the value of such groups and their self organising facets. The programme organisers were prepared to let go and see what emerged.	1. Develop new perspectives on the meaning of control. Learning in groups encourages a self organising form of control. Encourage managers to let go.
The programme and especially the 1994 conference used power appropriately and encouraged open questioning and the public testing of issues.	2. Design the use of power. Too strong an application of power will restrict open questioning and the public testing of assertions. This inhibits the development of complex learning in groups.
The programme encouraged the formation of self organising groups/teams and 'protected' them. People from different parts of the organisation shared ideas and viewpoints at workshops and conferences.	3. Encourage the formation of self organising groups 4. Provoke multiple cultures. Move people around the organisation and introduce new blood.
The programme presented strategic challenges and half formed issues arose from the workshops and the conferences. These both arose from and at the same time provoked discussion and debate.	5. Present ambiguous challenges or half formed issues instead of clear long term objectives or visions to provoke active searching for new ways of doing things.
The University was already facing strong competition and various challenges and letting the programme unfold as it did showed it was prepared to take risks and to be innovative.	6. Expose the business to challenging situations. Innovation depends on chance and managers must be prepared to compete with the most challenging competitors.
The programme provided many opportunities for managers to work in groups in a supportive learning environment. The exchange of perspectives led to challenges to mental models and long held beliefs.	7. Give explicit attention to improving group learning skills. To develop new strategic directions managers need to work in groups challenging long held beliefs and developing new mental models.
By and large this did not happen. Staff were given time off to attend the programme but otherwise it was business as usual.	8. Create resource slack by the provision of additional management resource.

created which added to an already existing challenging external situation. It is possible, therefore, that the challenging situations Stacey refers to may be heightened by internal risk taking.

Finally, the University created no resource slack as recommended by step 8, although it did create conditions favourable to the emergence of individual initiative, political interactions and group learning, which Stacey judges need additional management resources. In the OU they took place without this slack: team volunteers were given no extra time and their work for the programme was over and above their normal duties. This raises the question of how important is resource slack and the provision of additional resource? The answer may lie in the culture and ethos of an organisation. In this case, the university was supportive of individual participation, and much was achieved: but perhaps more might have been achieved had Stacey's eighth step been followed.

MacIntosh and MacLean

MacIntosh and MacLean use the concept of dissipative structures to explain effective organisational transformation, and propose a three-stage structure of processes for 'Conditioned Emergence' which characterises these programmes. Table 4 compares the three stages of this process with the OU change programme.

Table 4. Conditioned Emergence and the Open University

Open University Programme	'Conditioned Emergence' Framework
Stage 1. Conditioning	
In the workshops and other events there was surfacing and criticism of the OU's bureaucratic structures and complex procedures and processes and calls to simplify and speed up things.	An organisation needs to articulate and surface tacit and deeply ingrained rules and structures by which it operates.
New rules were created on both content and process during the life of the programme. These rejected some of the old rules. They were clear about what had to be done but not how to maintain them or keep them up to date. (Consequently only local areas affected in the longer term.)	It then needs to create new rules and structures which may or may not reject some of the 'old' ones. The new rules may be content or process orientated or both. The new rules typically are about what should be done and how the new rules are maintained and kept up to date.
Stage 2. Creating far-from-equilibrium conditions.	
The right conditions were in place within some groups and some areas of the OU during the programme.	After stage 1 has taken place an organisation needs to move to far-from-equilibrium for the new rules and structure to take hold.
There was no deep crisis or event to push the organisation towards far-from-equilibrium. There is, however, evidence to show that the creation of new informal networks and new positive feedback loops based on determination to change things did push it away from equilibrium.	A deep crisis which involves fundamental changes in the ways thing are done (e.g. a major organisation restructure) is needed to precipitate a move towards instability.
The OU did become more open and flexible in its processes and responses.	At this time the organisation is more open and the new order will have an opportunity to assert itself.
Stage 3. Managing the feedback processes.	
During the lifetime of the programme positive feedback and amplification took place within areas of the OU affected by the programme. A tentative new archetype emerged briefly and locally.	As the new archetype emerges negative and positive feedback will be needed. Managers will need to use positive feedback to reinforce the new rules by amplification - and to dampen down pressure to use the old rules.
This unsettled many traditionalists and for a time there was competition between old and new.	At this time the organisation may be rather unstable as the two sets of rules compete for dominance.
When the programme ended many areas reverted to former practices. There had been short term gains and long term benefits.	Reverting to old practices may realize short term gains.

Reference to the table clearly shows that the Open University did not meet all the conditions required for transforming change as indicated by this model. Significant changes did take place in structure - the setting up of a new Institute for Knowledge Media and a new Marketing Department - but these took place later. There were improvements and changes in communications and local systems, but again these came later. MacIntosh and MacLean cite two illustrative case examples in their paper. One was a small company of some 250 employees, the other the Rover Group, both private sector organisations, significantly different in structure to the OU. They were able to drive through the necessary changes needed to induce transformation in a way which was not possible in the University. The Vice Chancellor could not simply do away with the complex governance structure. Although our research was not specifically directed towards this issue (which in our view would benefit from further research) it *may* be that the dissipative structures approach is less suited to heavily constrained public sector environments.

The Open University changed in many ways, but not via radical transforming dissipative structure change nor in an incremental step by step fashion. We would describe the programme as creating small implicate and explicate 'ripples' of change which emanated from individuals and groups, and which came together over time to create greater waves which affected the whole institution so that it changed recognisably.[22]

Eight principles for creating a complexity based change process

Eight interdependent principles can be derived from the programme at the Open University to provide managers with guidance and suggestions on how to facilitate a complexity based change intervention and 'flows' of change. They build on Stacey's Eight Steps, but with less focus on the question of what to do and more on the question of how to do it.

1. Create a strategic involvement process

Involve employees from all levels and roles in strategic discussion and debate. Select people at random and involve others as they express interest. This will encourage a process of involving all 'the eyes and ears' of the organisation in scanning for current and future challenges and opportunities. Further, it will enrich strategic debate and engage employees directly in strategic action.

2. Use participative and egalitarian workshops

These are key to creating a 'Strategic Involvement Process' involving a broad range of people in discussion and debate on the future of the organisation. Views and suggestions should be treated equally regardless of individual status. A top manager with a strategic role should lay out the current situation and the organisation's current strategic responses, which should then be up for challenge and debate. Workshops provide opportunities for people to develop fresh perspectives on their jobs; learn more about the organisation and the roles of others; and encourage new learning. They will introduce fresh information flows around the organisation and create new informal, and possibly even formal, networks. These will then create new feedback loops and disturb the equilibrium of the organisation, encouraging innovative changes and adaptive responses.

3. Provide overt commitment from the top

It is an established fact that effective change requires strong political support from the top of the organisation. A very senior manager should be nominated as the programme's champion and they (or their nominee) should attend all events. Their presence will serve to convince staff that the organisation is serious about their involvement in strategy. It is vital that this manager listens overtly, and ensures that ideas from the workshops are fed back to senior management and openly incorporated into other strategic processes. Figure 2 shows how the programme linked to other university wide processes in support of strategic change.[23]

4. Create temporary self-organising project teams

Ask employees to volunteer to form self-organising project teams to tackle specific issues or needs. These teams, initially supported by skilled facilitators, will encourage the use of self-organising principles and demonstrate how natural self-organising order can offer a new form of control. Members of the teams will develop effective new ways of working and experience complex learning. Thus they will operate as complex adaptive systems within the organisation, pushing it further into the 'edge of chaos' zone. Some team members will create fresh informal networks that will survive after the end of the project to create new feedback loops and connections across the organisation.

5. Work with enthusiasts

Encourage enthusiastic volunteers to get involved in the programme, join self-organising project teams and/or organise events in support of strategic objectives and ideas that emerge from the workshops. Employees who are frustrated by organisational blockages may welcome the
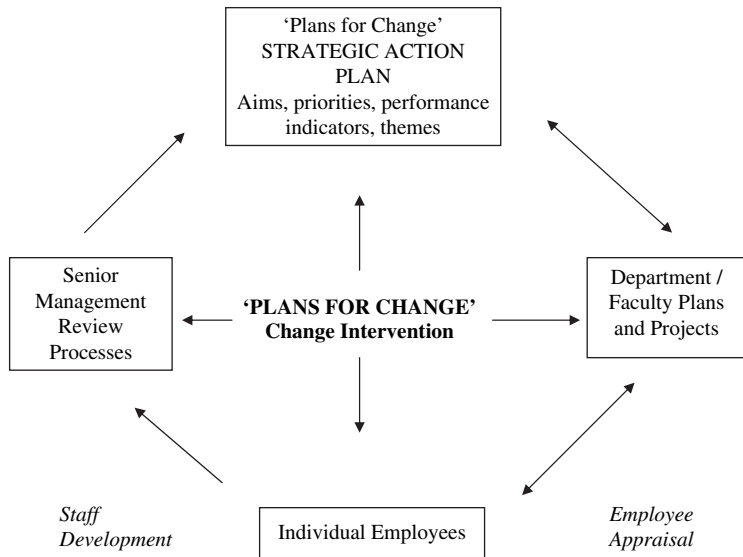
Figure 2. Linkages and feedback

opportunity to channel their energies in a positive way. Such volunteers will tend to be self-policing: any rogue members will be 'managed' by other members of the group.

6. Provide a supportive learning environment
Self-organising processes will not emerge or thrive in organisations that do not provide supportive learning environments.

7. Key people should understand complexity
Key people and facilitators need a good understanding of complexity science and its application in organisations. Our research reveals managerial understanding of complexity, while not an anticipated outcome, to have been a significant factor in the success of the programme, and in helping to provide a rationale for changes that might otherwise have been resisted.

8. Consider the transition model of strategy
The Transitional Model of Strategy, illustrated as Figure 3, is an analytical tool which managers can use to consider where their organisation is currently placed. Is it a highly traditional one espousing 'old world' views and/or is it essentially bureaucratic and mechanistic in nature? Or is it moving away from this model towards a more modern one that embraces innovative approaches such as those advocated by Handy and Morgan, which resonate powerfully with complexity and learning organisation principles? Is the organisation on track to become a learning organisation? Double
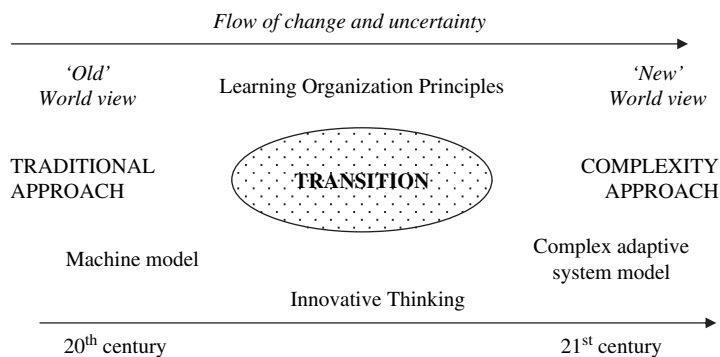

Figure 3. Transition Strategy Model

loop learning and transformatory change are both features of the learning organisation, and are also features of complex adaptive systems. Thus there are overlaps between accepted modern management thinking and practice and some aspects of the organisation as a fully functioning complex adaptive system. A change intervention based on complexity can create opportunities for employees to engage in experimentation and complex learning. This will help raise the level of learning across the organisation, facilitate the development of adaptive skills and move the organisation more towards a Complex Adaptive System model of organisation.

The Transition model shows how to build a bridge between old and new thinking and between traditional, controlling and predictive approaches to strategy and a complexity science based approach. It can be further elaborated on by managers to suggest new ventures or experiment with innovative practices.

The 8 steps derived from the OU programme resonate well with lessons from the established change literature. Steps 4, 7 and 8 however, reflect more specifically the experiences of using complexity to effect change and the need to foster natural processes of self-organisation which can be quashed by formal, controlling bureaucratic procedures.

Conclusion

Some argue that complexity science cannot be readily applied to organisations and that its chief value lies in its use as a new metaphor for considering the dynamics of organisations. The value of our research is twofold. Firstly, it shows that even as a metaphor the complexity paradigm is still of practical use. Secondly, it demonstrates that complexity concepts can effectively be applied to change in organisations.

As a metaphor, complexity has resonance in turbulent 21st century environments, and provides a rationale for objectives that require behavioural change

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As a metaphor, complexity has resonance in turbulent 21st century environments, and can provide a rationale for objectives that require behavioural change. Carlisle and Baden-Fuller have shown that changes in factual belief are a precursor to the deeper changes in ideological beliefs that can lead to a commitment to particular types of changed behaviour.[24] We have stressed that the understanding of complexity that managers developed was an important factor in the success of the OU change programme. Because complexity had resonance in the changed environment, it provided a rationale for objectives which depended on behavioural change for their success.

Our research validates many established principles in the change literature on how to build supportive learning environments, some of which are reflected in Stacey's work, but it also builds on and adds to this work. While Stacey elucidated *what* an organisation needs to achieve, our research has developed practically focused principles and models to help managers with the problem of *how* to achieve. Our complex public sector context complements Stacey's private sector work, and we therefore believe that our work offers useful pointers to managers in both sectors. Our retrospective analysis of the programme in the light of the MacIntosh and MacLean's framework suggests that their framework was less applicable to our context, which we hypothesise as being at least in part because the public sector environment is more constrained than that of the private sector environments they describe. However, our work suggests that a complexity focused change approach that unleashes the power of informally networked groups can go some way towards removing the artificial distinction between strategy formulation and implementation in practice.

Organisations need guidelines to help them cope with the uncertainty and complexity of strategic interactions.[25] It is impossible to determine the best course of action for every scenario. While

complexity offers a metaphor that resonates usefully with current realities, it also suggests solutions. Humans and other complex adaptive systems are the evolutionary result of testing and adaptation over millennia, including in the very harshest of conditions. They are innately adaptive: the problem is how best to harness these adaptive capabilities in organisations. This is a challenging task,[26] and one that our research begins to address.

We offer the Transition Model to help managers analyse organisations and subunits in relation to a complex adaptive systems model of organisation. We also offer guidelines on how to achieve Stacey's 'whats' which we have derived from our study of the OU change programme, which are designed to assist managers in carrying out a complexity based change interventions that harness the democratic aspects of bottom up change.

Too often, strategic change programmes are a crisis response to external threats, and many attempts at major change or transformation fail in one way or another.[27] One reason is that the top-down cultures of many organisations can stifle the natural innovative and adaptive capabilities of those lower down the organisation's hierarchy.

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many attempts at major change fail …. One reason is that top-down cultures stifle the natural innovative and adaptive capabilities of those lower down the hierarchy

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Complex adaptive systems are by definition flexible and responsive. They are constantly reorganising their structures, constantly repositioning themselves on the chaos spectrum, constantly speculating about the future and how they may turn events to their advantage, and constantly experimenting and exploring all their adjacent environments in an ongoing dance of changing and learning from experience. There is no dualism between transformatory/radical/disorderly change versus incremental/orderly change, as complex adaptive systems engage in both appropriately and seamlessly, creating an ongoing flow of implicate and explicate change.

In theory, organisations that operate as complex adaptive systems should have little need for strategic change programmes designed as a crisis response to unanticipated external or internal threats. Our research has shown that complexity inspired change programmes can bring complex adaptive system properties to the fore in organisations where they have been hitherto suppressed. Socially organised insects, mammals and many other living species, including humans, engage in complex, adaptive learning activities in order to increase their chances of survival. Organisations, composed as they are of complex adaptive humans, can also use this model to improve their chances of survival and success.

Acknowledgement

Appendix

Empirical data was derived from a longitudinal case study of a four-year change intervention at the Open University from 1993—96. Primary data was obtained from semi-structured interviews of all the volunteers who formed the two project teams, as well as other key players. Two questionnaires, one with a Likert scaled scoring structure, were used with these groups. A number of half-day workshops were held with a range of participants in the programme who were drawn from different areas of the University and from different roles and levels of responsibility.

Secondary data was collected from a range of internal Open University documents including training and development records; internal correspondence; diary notes; internal reports; strategic documents; electronic messages; a detailed report on the 1994 Conference; and various University publications. The research built upon work carried out by the Institute for Employment Studies, Sussex University and its methodologies allowed for a comparative analysis of findings. This outside study used semi structured interviews of a number of programme participants, drawn from different departments and different roles. They completed a bipolar semantic differential questionnaire and used focus groups consisting of the managers of those who had participated in the programme and those who either worked alongside them and/or were junior to them. Finally, in 2005 we revisited the key issues and themes of the programme to find out whether or not there had been any lasting benefits (See Table 2 column 3).

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