ARTISANAL

Martin Reynolds · Sue Holwell   *Editors*

Systems Approaches to Making Change: A Practical Guide

Second Edition

The Open University

Springer

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Editors
Martin Reynolds
School of Engineering and Innovation
The Open University
Milton Keynes, UK

Sue Holwell
(Retired)
The Open University
Milton Keynes, UK

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This book forms part of the Open University module TB871 *Making Strategy with Systems Thinking in Practice* (previously TU811 *Thinking Strategically: systems tools for managing change*). Details of this and other Open University courses can be obtained from the Student Recruitment, The Open University, PO Box 197, Milton Keynes MK7 6BJ, United Kingdom (tel. +44 (0)300 303 5303, email general-enquiries@open.ac.uk). www.open.ac.uk

Preface to the Second Edition[1]

The second edition initiative was prompted by an invitation from the publisher Springer to the authors on the back of favourable reviews, with an accompanied agreement for the publisher to arrange for more widespread availability and readership. Several other opportunities were presented. First, there was an opportunity to improve some presentational and layout issues to help readers better experience the text through both online and paper-based versions. Second, the contributing authors of the five core approaches had space to update their contributions whilst also providing a postscript overview of developments associated with respective approaches.

There are no changes to the essential substance of each systems approach covered in this edition. The underpinning rationale for choosing the five systems approaches (expanded on further in Sect. 1.4 of Chap. 1) based on robustness coupled with versatility remains. Indeed, the rationale has been reinforced within a period of significant changes, including changes in the prominence of systems thinking since the first edition in 2010. These changes can generically be referred to as the flux of events, people and ideas (cf. Vickers, 1970[2]). The flux is typified by three stories chosen by the editors at the time and retained for bookending this publication. The three stories referred to in Chaps. 1 and 7 in terms of 'the way of the world' provide short vignettes of the complex world to which systems thinking approaches are relevant. They capture issues prevalent at a particular time – Easter 2009 – and in particular places: firstly, issues of seeking justice and proper accountability for bereaved families of victims in the Hillsborough football stadium tragedy in the UK; secondly, issues of personal security and plight of refugees amidst people smuggling piracy in the seas of Somalia; and, lastly, the threat of Orangutans as an endangered species in the forests of Indonesia. Whilst the stories are time-

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[1] Since the first edition, my friend and coeditor, Sue Holwell, has retired. Whilst preferring not to engage with further editorial work, Sue has provided full endorsement and encouragement for this second edition.

[2] This builds on the influential Systems Thinking Practitioner, Sir Geoffrey Vickers, who originally referred only to the flux of events (happenings) and ideas. I'm grateful to Christine Blackmore for suggesting the inclusion of 'people' within the flux.

context-specific exemplars of complex issues, they are clearly interconnected, interconnecting with each other and with an ongoing flux of contemporary issues.

As I write in 2019, manifestations of each story are evident. Issues of 'fake news' and what may be regarded as a growing deficit in public 'trust' (not to be confused with less tangible notions of 'truth') have become prominent. Global turbulence and conflict associated with trade wars, terrorism and destabilisation have been significantly accentuated in the past 10 years. Finally, issues of sustainability are prevalent. These range from extensive deforestation of Amazonia for economic growth in South America to contentious use of fracking for continued fossil-fuel extraction amongst more industrialised nations predominantly in the northern hemisphere. Other manifestations of the sustainability crisis include ongoing challenges of implementing global sustainable development goals (SDGs) in an integrated manner,[3] amidst significant increased civil activism on climate breakdown, particularly amongst young people.

Ten years on since the first publication, the underlying circumstances of the 'way of the world' remain. Our world remains complicated (with interdependent variables), complex (compounded by variable human perspectives) and conflictual (with contrasting perspectives based on inevitable partiality and bias). The ongoing 'way of the world' challenges are evident at national and global level but also at the level of organisations and communities. The challenges increasingly invite attention from government, business and civic organisations for people with the requisite systems thinking in practice capabilities to help resolve such turmoil. In 2019, the Institute for Apprenticeships in the UK formally recognised an occupational professional role as a Systems Thinking Practitioner (STP), attracting significant government funding support for training of STP apprentices at postgraduate level.[4] For the first time, practitioners with requisite knowledge, skills and behaviours associated with being an STP can have their capabilities institutionally recognised by employers. Systems thinking in practice (STiP) tools and ideas associated with this edition therefore have greater chance of exercising leverage.

Amidst the ongoing flux of events, people and ideas associated with growing uncertainty and complexity, there are also many ideas which may not evidently be referred to explicitly by the terminology used in this compilation. One such idea is the introduction of the acronym VUCA (volatility, uncertainty, complexity and ambiguity) as a new way of describing the flux. Whilst some 'new' ideas and tools may be cynically viewed with providing little more than a contemporary managerial gloss for previous ideas and tools – a 'reinvention of the wheel' – most initiatives are genuinely innovative adaptations of ideas and tools that serve particular circum-

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[3] Particularly relevant to the final 17th SDG – the goal of integrating SDGs through partnership.

[4] Details of the IfA Standard for STP Apprenticeship can be found on the following website: https://www.instituteforapprenticeships.org/apprenticeship-standards/systems-thinking-practitioner/

stances (particular situations of use and particular users) at particular times.[5] Where such adaptive tools serve the purpose of enhancing systems thinking in practice as outlined in Chap. 1 (understanding interrelationships, engaging with multiple perspectives and reflecting on boundary judgements), there is reason to be hopeful. Within The Open University postgraduate STiP programme, we like to refer to such praxis as bricolage, the continually innovative methodological practices of adapting tools to contexts of use, and users' prior experiences, in order to make purposeful change for improvement.[6] Since the first edition, nearly 1000 mature-age postgraduate students from the OU have undertaken one or both of the core modules associated with the STiP programme.[7] Bricolage is an integral part of their study, where opportunities are provided for students as Systems Thinking Practitioners to innovate with the tools suggested in *Systems Approaches* for improving situations of interest relevant to students' own particular areas of (often professional) practice. The outputs of bricolage might be referred to as 'artisanal' products, the manufactured craftwork of STiP. An accompanying reader *Systems Thinkers* (Ramage and Shipp, 2020) provides some inspiring bibliographical accounts of 30 systems thinking practitioners along with sample short extracts from each to give the readers a sense of who is most relevant to their own practice.

Changes in the second edition can be summarised. Its name has slightly changed, from systems approaches to *managing* change to systems approaches to *making* change. The change reflects an ongoing better appreciation of systems thinking as a constructivist endeavour that actively shapes reality through shifting our epistemological furniture, an endeavour beyond the often presumed ontological endeavour associated with equating systems thinking with systems analysis. The change in name reflects a design-turn shift in attention from using 'systems' merely just as an analytical tool towards more purposeful proactive use of the systems idea. The mission here is captured in part by the sentiment of the young Swedish Activist Greta Thunberg 'What we need is Systems Change not Climate Change'. Rather than managing 'systems' in a continuing business-as-usual mode as though such systems are somehow disembodied reified extant entities, what we really need are systems to *make change* for the better. Hopefully, you will find some tools in this book to help you construct such systems.

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[5] Some good examples of such innovative practices based on systems thinking can be found with the experimental and dissemination endeavours of the Observatory of Public Sector Innovation (OPSI) sponsored by the OECD.

[6] Bricolage is derived from the description of skills associated with travelling craftsmen in eighteenth-century French rural society, from French anthropologist Claude Lévi-Strauss.

[7] The two core modules each had OU module codes TU811 and TU812 which have since been revised and renamed, respectively, as 'Making strategy with systems thinking in practice' (TB871 previously TU811) and 'Managing change with systems thinking in practice' (TB872 previously TU812). TB871 will continue having both *Systems Approaches* and *Systems Thinkers* as Set book and reader, respectively.

Postscripts provided by the authors supplement any minor changes to the substantive text. The practical guide remains essentially the same, with clear guidance on how tools might be enacted rather than prescribed. With each approach, the enactment of tools is principally subject to you the user, rather than an assumed prescriptive use irrespective of the context. Each postscript outlines general areas where tools of the systems approach have been more widely used, followed by incidences of complementarity with other tools in interventions for making change and lastly incidences of any particular innovations that may have come to authors' attention. The postscript is not exhaustive but rather indicative of developmental matters particularly since 2010.

The first edition has been well-received. For example, Mike Jackson (2019) in the preface to *Critical Systems Thinking and the Management of Complexity* lists a number of books which he claims provide a useful overview of the field of systems thinking as a whole. The list begins:

> From the Open University, that long-time bastion of systems thinking, have come Reynolds and Holwell, eds, Systems Approaches to Managing Change: A Practical Guide (2010), and Ramage and Shipp, Systems Thinkers (2009). They are both very good.

This second edition of *Systems Approaches* is part of a four-book series including *Systems Thinkers* (second edition) (Ramage and Shipp 2020), *Systems Practice: How to Act in a Climate Change World* (second edition) (Ison 2017) and *Social Learning Systems and Communities of Practice* (Blackmore 2010) which together support The Open University postgraduate qualifications in Systems Thinking in Practice. In the more promising years to come in the field of systems thinking in practice, we might all look forward to more systems thinking practitioners working as bricoleurs, using the tools in this publication for continual innovation towards making purposeful change in the way of the world.

Milton Keynes, UK   Martin Reynolds

References

Blackmore, C. P. (Ed.). (2010). *Social learning systems and communities of practice*. London: Springer.

Ison, R. L. (2017) *Systems practice: How to act* (2nd ed.). London: Springer.

Jackson, M. J. (2019) *Critical systems thinking and the management of complexity*. Chichester: John Wiley.

Ramage, M. and Shipp, K. (2020) *Systems thinkers* (2nd ed.). London: Springer.

Preface to the First Edition

We live and work in a highly complex and interconnected world. Small decisions made by individuals may have large effects in a wider context. Actions taken within one organization can have an impact upon many different organizations, on government, on society and on the natural environment. This book has been motivated by a recognition that complex questions are increasingly asked of institutions and individuals in situations of change and uncertainty. The book addresses such questions not by offering 'new' tools, but rather by providing five approaches – systems tools – each embodying at least 25 years of experiential use. They not only provide robust methods, but moreover with the benefit of time and experience, the evolution of these approaches in different contexts has exposed new offerings; new enlightenment on how to use these approaches better in the light of experience. The five systems approaches presented in this compilation are presented not as 'new' tools to replace 'old' tools, but rather as evolving radical ways of thinking that have been nurtured in different contexts to complement and give added value to existing practices. They are specially updated for this publication, with each approach authored by the originators and/or experienced practitioners. This book is about intervention, or more precisely how to improve human intervention to help change situations for the better, to navigate the interrelated dimensions of making more effective strategic decisions in the twenty-first century.

The Open University, UK   Martin Reynolds
                                                                  Sue Holwell

Acknowledgements

Contents

Contributors

Fran Ackermann is a Professor of Strategy and Risk in the School of Management at Curtin University having previously been Head of the Department of Management Science (Strathclyde University) and Dean of Research (Curtin Business School). She is also an Honorary Professor at Manchester University (England) and Visiting Professor at Strathclyde University (Scotland). She has been engaged as a Consultant by many top management teams in a wide range of countries including but not limited to the USA, Canada, France, Australia and Italy – in both public and private sector organisation

Her major research interests are the development and implementation of strategy particularly in areas such as stakeholder management and distinctive competence analysis, supporting multi-organisational negotiation and collaboration within the areas of strategy development and competition, the design and use of group support systems and complex project management particularly in the area of systemic risk modelling and disruption and delay.

She has coauthored 5 books and over 100 journal articles/book chapters in operational research/management science, strategy, group decision and negotiation and project management. She has been awarded the INFORMS GDN Section Award 2016, four best paper prizes at the Academy of Management and best paper prizes at the Australian and New Zealand Academy of Management and at the British Academy of Management. She is a Fellow of the British Academy of Management and a Graduate of the Australian Institute of Company Directors. She has also been awarded ~AUS$5.1 million in research grants.

Peter Checkland is currently Professor Emeritus of Systems at Lancaster University. After 15 years as a Manager in the synthetic fibre industry, he joined the Postgraduate Department of Systems Engineering at Lancaster University. There, he worked with colleagues, including Dr. Brian Wilson, in what became a 30-year programme of action research in organisations. Initially, this work explored the use of systems engineering in dealing with management issues, rather than the traditional technically defined problems. The early work stimulated a clear direction that ultimately yielded soft systems methodology (SSM) as an approach to tackling the

multi-faceted problems which managers face. In doing this, it also established the now well-recognised distinction between 'hard' and 'soft' systems thinking. SSM is now taught and used around the world. Its development is described in many papers and five books: *Systems Thinking, Systems Practice* (1981); *Soft Systems Methodology in Action* (with Jim Scholes, in 1990); *Information, Systems and Information Systems: Making Sense of the Field* (with Sue Holwell, in 1998); *Soft Systems Methodology: A Thirty-Year Retrospective* (1999); and *Learning for Action: A Short Definitive Account of Soft Systems Methodology and Its Use for Practitioner, Teachers, and Students* (with John Poulter, in 2006).

His work has been recognised in a number of awards: honorary doctorates from City, University of London, the Open University, Erasmus University (The Netherlands), Prague University of Economics and Linnaeus University (Sweden), a Most Distinguished and Outstanding Contributor Award from the British Computer Society, the Gold Medal of the UK Systems Society, the Beale Medal of the OR Society, the I+M (Information and Management) Award of Amsterdam University, the Pioneer Award of the International Council on Systems Engineering and election to the Omega Alpha Association of the Systems Engineering Honor Society.

Colin Eden worked as an Operational Researcher in the engineering industry following his PhD, subsequently becoming Operational Research Manager. This was followed by a period as a Management Consultant specialising in small business problems. He then worked at the University of Bath until becoming Professor of Management Science at Strathclyde Business School in 1987. Until 2006, he was Director of the University of Strathclyde Graduate School of Business.

He is internationally known within the field of management science, management and research method through his research and publications. He has published over 180 articles in general management, management science and project management journals and published 11 books. He has received research grants from the Leverhulme Trust; British Telecom; ICL; the Northern Ireland Office; SSRC; EPSRC; Bombardier, Inc.; EU; and ESRC.

His major research interests are into the processes of making strategy; the relationship between operational decision-making practices and their strategic consequences; the use of group decision support in the analysis and making of strategy; managerial and organisational cognition; 'soft OR' modelling approaches and methodologies, including particular emphasis on the role of cognitive mapping; the process and practice of 'action research'; and the modelling of the behaviour of large project disruptions and delays, including issues of the dynamics of productivity changes, and learning curves.

Sue Holwell has qualifications in accountancy, computing and information systems (IS). Before embarking on an academic career, she worked for the Australian Public Service in Finance, Personnel and IS. The last few years were as the IS Manager, responsible for all aspects of IS in a mixed mainframe, PC technical environment with both commercial and design applications. A mid-career break brought her to the UK and a new career. Since 1988, she has worked on research and consultancy

using soft systems methodology in the NHS and multi-national companies in Europe, completed her PhD in Soft Systems Methodology and IS and coauthored a book of 'conceptual cleansing' of the fundamentals of the field of IS. She joined Cranfield University as Senior Lecturer in 1998, teaching on the MSc in the Design of Information Systems and MBA. In April 2002, she joined the Systems Department at The Open University, and retired in 2010. She has published on soft systems methodology and action research.

Patrick Hoverstadt has worked as a Consultant since 1994 with organisations internationally in both the private and public sectors, specialising in using systems approaches for strategy, diagnosis and design of organisation and governance structures and for organisational change. He is a Specialist in working with very large complex organisations including whole sectors. He has developed systemic approaches to several intractable business problems: strategy, strategic risk, large-scale organisational change, measuring management performance and collaborative governance. He has worked in on many restructuring projects, diagnosing structural weaknesses, designing appropriate solutions and practical change plans.

He has written over 30 research papers and articles and contributions to four books on organisation and management, is a Regular Keynote Speaker at conferences, is the Author of *The Fractal Organization: Creating Sustainable Organizations with the Viable System Model* which is the best-selling book on the viable system model published by Wiley in 2008 and is Coauthor of *Patterns of Strategy* published by Routledge in 2017 which describes the first systemic approach designed specifically for developing strategy. He chairs the largest group of systems practitioners in the UK and is a Visiting Research Fellow at Cranfield School of Management.

John Morecroft is Senior Fellow in Management Science and Operations at London Business School where he has taught system dynamics, problem structuring and strategy in MBA, PhD and Executive Education programmes. He served as Associate Dean of the School's Executive MBA and codesigned EMBA-Global, a dual degree programme with New York's Columbia Business School. He is a Leading Expert in strategic modelling and system dynamics and has written numerous journal articles. He has coedited three books and published a widely used system dynamics textbook, *Strategic Modelling and Business Dynamics: A Feedback Systems Approach* (Wiley 2015, second edition). He is a Recipient of the Jay Wright Forrester Award of the System Dynamics Society for his work on bounded rationality, decision-making and information feedback in models of the firm. He is a Past President of the Society and one of its Founding Members. His research interests include the dynamics of firm performance and the use of behavioural models and simulation for strategy development. He has led applied research projects for international organisations including Royal Dutch Shell PLC, AT&T, BBC World Service, Cummins Engine Company, Ford of Europe, Harley-Davidson, Ericsson, McKinsey & Company and Mars, Incorporated. Before joining London Business School, he was on the Faculty of MIT's Sloan School of Management where he

received his PhD. He also holds degrees in Operational Research from Imperial College, London, and in Physics from Bristol University.

John Poulter is a Practitioner of SSM. He first used SSM formally when working with Peter Checkland in the UK's National Health Service in 1993. A Founder Member of the Soft Systems Research Group, he has presented papers and other publications on the use of SSM.

Martin Reynolds is Senior Lecturer at The Open University and Qualifications Director for the postgraduate programme Systems Thinking in Practice (STiP). He is a founding member and Lead Academic Liaison for the Applied Systems Thinking in Practice (ASTiP) group at the OU. His teaching and research focus on issues of (critical) systems thinking and (developmental) evaluation in relation to international development, environmental management, health systems support, public sector management, business administration and educational studies. He has published widely in these fields. Many of his papers – including his own chapters from books where he has acted as Lead Editor – are available free of access on his Open Research Online list of publications.

He provides workshop support and facilitation for professional development in systems practice and for his specialist field of critical systems thinking. He has designed and facilitated professional development workshops for Conferences of the European Evaluation Society (EES) and the American Evaluation Association (AEA). He has worked closely with Systems Thinking Africa (STA), based in Johannesburg, providing numerous co-facilitated workshops with Director Samuel Njenga. In 2011, he was Keynote Speaker at the international conference hosted by the UK Systems Society on 'Systems Learning: Where to Next?'. In 2012, he gave the keynote address to the Hellenic Society for Systemic Studies on 'Systemic Crises? Why Strategic Thinking Needs Critical Systems Practice' and also gave the David Blockley Lecture on 'The Iron Triangle: Systems Thinking and Relations of Power' under invitation from The Systems Centre at Bristol University.

Since 2015, he has been Principle Investigator working with colleagues from ASTiP, STiP alumni including doctoral students and employer representatives on a series of action research initiatives associated with enhancing postgraduate post-study STiP capabilities in the workplace. The work has contributed towards official recognition in 2019 by the UK Institute for Apprenticeships for the occupational role of a Systems Thinking Practitioner (STP).

Werner Ulrich is *Ancien professeur titulaire* in the Faculty of Arts and Humanities of the University of Fribourg, Switzerland, where he was Professor of the Theory and Practice of Social Planning (including evaluation research, poverty research and critical systems thinking). He also held teaching and research appointments at a number of other universities, amongst them the University of Hull (Centre for Systems Studies) and the University of Lincoln (Centre for Systems Research), both in the UK, and has extensive experience as a Chief Evaluator and Policy Analyst in the public health and social welfare sectors. From 2005 to 2010, he was Honorary

Visiting Professor in the Faculty of Technology of The Open University, Milton Keynes, UK (Open Systems Research Group). In 1999, he was an Erskine Science Scholar at the University of Canterbury in Christchurch, New Zealand. From 2001 to 2013, he was Founding Director of the Lugano Summer School of Systems Design at the University of Italian Switzerland, which together with an international faculty offered continuing education in systems thinking and reflective practice for researchers and professionals from different fields of expertise and with different cultural backgrounds, a truly rewarding experience.

Werner's main interest is in the philosophical and methodological issues of applied science and expertise, with special regard for reflective professional practice. A specific contribution consists in his work on 'critical systems heuristics' (CSH) and its methodological core principle of 'boundary critique'. One of his major current interests is in bringing together the methodological ideas of applied science, reflective practice, discourse ethics, pragmatist thought and CSH within a 'philosophy for professionals'. His work on 'critical pragmatism' explores the ways these sources of critical thought can contribute to competent and responsible professional practice and, at the same time, can give a new critical competence to citizens, so as to promote the idea of a living civil society.

Chapter 1
Introducing Systems Approaches

Martin Reynolds and Sue Holwell

Abstract The five approaches covered in *Systems Approaches to Making Change* – System Dynamics (SD) Viable Systems Model (VSM), Strategic Options Development and Analysis (SODA: with cognitive mapping), Soft Systems Methodology (SSM), and Critical Systems Heuristics (CSH) – are introduced. The rationale for their inclusion is described based on their (i) common historic emergence in dealing with complex situations of change and uncertainty, (ii) shared potential and actual constructivist use of the systems idea, and (iii) pedigree of adaptability and versatility of tools in working with other approaches to making change.

1.1   Overview

Systems Approaches to Making Change brings together five systems approaches to managing complex issues, each having a proven track record covering many decades. The five approaches are:

1. System Dynamics (SD) developed originally in the late 1950s by Jay Forrester
2. Viable Systems Model (VSM) developed originally in the late 1960s by Stafford Beer

M. Reynolds (✉)
School of Engineering and Innovation, The Open University, Milton Keynes, UK
e-mail: martin.reynolds@open.ac.uk

S. Holwell (Retired)
The Open University, Milton Keynes, UK

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3. Strategic Options Development and Analysis (SODA: with cognitive mapping) developed originally in the 1970s by Colin Eden
4. Soft Systems Methodology (SSM) developed originally in the 1970s by Peter Checkland
5. Critical Systems Heuristics (CSH) developed originally in the late 1970s by Werner Ulrich

The accounts of the approaches that follow draw heavily on the extensive experience of the contributing authors. They are more than experienced practitioners, they bring the added quality of academic rigour to the reflection on practice that characterises their work. Drawing on the extensive experience of these contributing authors, some of whom are primary originators, this volume is an accessible exposition of the fundamentals of five compatible but different approaches, and in addition provides an opportunity to update guidance on the use of each approach.

We begin by examining, first, the nature of the complex situations to which systems approaches generally make a claim towards improving. Second, we examine how systems thinking might help manage complex situations more effectively. Third, some perspectives on the nature and development of systems thinking underpinning contemporary systems approaches are explored. Fourth, we provide our own perspective and rationale for the selection of the five approaches chosen. Fifth, a brief description of each approach is given. Finally, we outline the common framing behind each of the core chapters.

1.2   The Way of the World

It is Easter week 2009. A quick glance at the news media reveals several stories arising from complex situations calling for better human intervention. Here are just three such stories:

2009 is the twentieth anniversary of the Hillsborough football stadium disaster. Many people in the UK are joining with the families of the ninety six football supporters who were crushed to death shortly after the start of a FA Cup semi-final match between Liverpool and Nottingham Forest at the Hillsborough football ground in 1989. Although in reaction to the tragedy many improvements in the safety of football grounds have been generated, there remains a considerable sense of injustice amongst the families and friends of the deceased that no one has been held to account. In 1990 an official inquiry, which many considered flawed because it failed to give due voice to junior police officers and eyewitnesses, handed down the verdict of accidental death. Harrowing stories about victims who might have been saved continue 20 years on amidst growing evidence of confusion, non-communication, and general lack of leadership amongst emergency services, of police mismanagement and a subsequent police cover-up (senior police officers vetting statements presented to the inquiry), as well as some misguided tabloid news provocation. Aside from the bereaved families, for many groups of people associ-

ated with the football industry including the police, the circumstances of that afternoon, remain highly problematic.

The second story relates to a continuing saga of sea piracy – apparently the biggest industry for the troubled African country of Somalia. Individual pirates are among Somalia's wealthiest men. Using sophisticated equipment and modern weaponry, the pirates hijack sailing boats and large cargo ships, treating the ship, its cargo and its crew as hostages for ransom. Given the open seas in which they operate, there appears to be little hope of such attacks being curtailed: there is little chance of an effective military reaction, and little chance of the sea bandits ever facing justice. Although the Easter headline news focused on the deaths and rescue attempts of European and American victims of piracy, the effects of Somalia's sea bandits are far reaching. For the Seychelles it involves the loss of fishing grounds. For Kenya, there have been significant effects on tourism. Cruise ships have begun avoiding East Africa because of the piracy risk, thereby rendering thousands of Kenyan tourism workers jobless. Longer sea routes around Africa to avoid using the Suez Canal have increased costs for shippers and consumers. And Somalia itself is affected because ship owners are reluctant to take on UN contracts transporting the food aid that feeds half of Somalia's eight million people. Only with an expensively deployed European Union naval force were ships' crews willing to make the dangerous aid run into Mogadishu.

The third story is at first sight, and in fresh contrast, more agreeable and hopeful. In the mountainous forests of Indonesia environmentalists have discovered a population of Orangutans – one of the world's most endangered species of apes. Since the 1990s the rainforests in Indonesia have been systematically destroyed by burning at an alarming rate as plantation owners want more land for the production of Palm oil. Palm oil has become very lucrative because it is classed as a clean burning fuel. This fuel is at a premium as an ever demanding global population wants a source of fuel energy not dependent on the politics of crude oil supply and/or having the 'label' of being environmentally benign. The discovery of the Orangutans brings in to sharp relief the politics of food production, energy production, local livelihood strategies (including the widespread very poor working conditions of plantation workers), and of course conservation. Some experts estimate that the animals could be wiped out within two decades given the current rate of habitat destruction.

1.2.1   Big, Big Issues

So what might we learn from these three contrasting stories about the situations in which systems approaches might be helpful? Firstly, they illustrate how localised issues have causes and consequences that have a much wider impact. The Hillsborough disaster represents not just 'a problem' or 'difficulty' of infrastructure design and safety, but invites concerns ranging from basic community relations and policing methods, emergency service training, right through to the responsibilities of the media, politicians, and those financially benefiting from the football industry,

even including football sponsors. The Hillsborough story continues to unfold and its consequences on the culture of football are not bounded by national frontiers. Similarly, the localised 'problem' of piracy in a country torn by war and conflict over the past 20 years is not one confined to the offshore waters of Somalia or one that can be easily 'fixed' by military or policing actions. There are many interrelated and interdependent factors involved, with contrasting perspectives on the situation that range from the rights of law-abiding Somali citizens wishing to develop livelihoods, to traders and tourists wanting to travel freely and safely, to sections of a community brutalised and attracted by greed into criminal activity. For the threatened communities of Orangutans, and conservationists concerned with their survival, the 'difficulty' is not just located in the mountainous forests of Indonesia but extends nationally and globally; to national logging concessions and the displacement of villagers from their forest dependent livelihoods, to global trade agreements on fuel. The ongoing, and growing, international concern and high level conversations over climate change suggest that matters of nature and conservation can no longer be regarded as localised issues, but rather are matters that should concern all of us.

In short, our three stories taken from a single day's news coverage over an Easter week-end in 2009 illustrate how localised issues can be translated into many big, big issues. They also illustrate how big issues are characterised by multiple and often conflicting perspectives. There are of course other big issues confronting us on a daily basis. As a backdrop to Easter 2009 we were continually reminded of the world crises of banking collapses, alongside increased abject poverty, and ecological dilemmas alongside increasing demand on natural resources. The G20 group of world leaders from the world's most powerful 20 economies attended an economic summit in London in March 2009. This was a meeting to tackle the worst economic situation since the 1930s Depression, a situation that is affecting both developed and less-developed countries. Also in the news at that time and now are the increasingly familiar stories on the melting of huge swathes of the Antarctic ice shelf and predictions of growing shortages of fresh water supply that will have consequences more far reaching than the shortage of oil.

These are big, global issues and could be categorised as issues of sustainability and development, but categorizing such issues does not give any indication about how they may be resolved. At the same time on a national level we face issues in our societies: children living in poor and violent neighbourhoods, an aging population with growing demands for care, how to manage policing in times of terrorist threat and still maintain civil liberties that have been hard won. In our organisations we are constantly trying to adapt to changing circumstances, whether it is for the public sector organisation new government legislation and/or targets forcing re-thinking of process, staff and structure or for the private sector organisation engaged in fierce competition beset by consumer demands and expectations. And for all, rapidly developing technologies can and do significantly change the environment for many organisations and their members.

And as individuals we face our own challenges, whether they be confronting our family concerns of 'what to do about grandpa' or overcoming substance abuse or,

on a more fortunate footing, deciding where to go on holiday given some of the big issues above.

Human life is not often simple and straightforward, either professionally or personally. So what is the relevance of this to a book about systems approaches? To answer this, look at the kind of issues above; there are no obvious answers about what to do, different people will see different priorities, and when we begin to make changes unintended (and sometimes unwelcome) consequences emerge.

1.2.2 Messes and Difficulties

Issues of concern to us vary enormously in terms of their complexity and seriousness, from minor hiccups to near-catastrophe, and we can think of all issues falling somewhere on a continuum between minor and straightforward to very complex and crucial. We can label one end of the continuum as being a 'difficulty' and the other a 'mess' (the term coined by Ackoff 1974). We can distinguish between the concept of a mess, and a difficulty, in several ways.

Messes usually have more serious implications; more people are likely to be involved; they include *many interlocking aspects* and may appear in different guises. As our three stories illustrate, messes usually have a longer time-scale; and they are often more complicated in terms of having many interdependent factors, than a difficulty. In addition to these broad characteristics there is a crucial difference between a difficulty and a mess and that is the extent of *uncertainty*.

If a situation is a mess there is much about it that is uncertain. The uncertainty starts with the situation itself: a mess is hard to pin down; it's difficult even to say what the situation of concern actually is, or what the source of the unease is, and yet things feel not right. With a difficulty we know roughly what an answer will look like: with a mess, we are not at all sure, not least because there are likely to be multiple possible trajectories. Indeed, with a mess it usually doesn't make much sense to talk about 'an answer'. It's more a matter of coping with the circumstances as best one can. With a difficulty we can take for granted the overall context and purpose of the activity; it's simply a matter of how it can best be done. But a mess calls into question priorities and assumptions; and raises questions about how much weight to give to different elements and viewpoints. Moreover, with a mess more aspects are beyond direct control. In short, a mess includes many different and changing perspectives and consequential actions, which contribute towards the overall level of uncertainty.

Some authors characterise a mess in terms of two dimensions, rather than a single continuum. Firstly, there is the multitude of factors that contribute to the scale of the situation. All three stories above have considerable histories attached to them as well as invoking multiple dimensions in terms of interrelated and interdependent human and natural variables, ideas and events. Secondly, a mess is characterised by significant levels of uncertainty, and this in turn is associated with there being multiple and, as evident in the three stories, often conflicting, perspectives on the situa-

tion. The first dimension alone signals the continuum from a simple difficulty, where few variables are involved, to a complicated difficulty. When the second dimension comes into play – dealing with uncertainty and multiple perspectives – this signals an engagement with a complex mess. Whereas difficulties, no matter how complicated, can be conceptualized in a straight-forward way and then worked upon, messes are experienced as being much more difficult to get to grips with conceptually.

Systems approaches aim to simplify the process of our thinking about, and managing, complex realities that have been variously described by systems thinkers as messes (Russell Ackoff), the swamp (Donald Schön), wicked problems (Horst Rittel), or in relation to environmental issues, resource dilemmas (Neils Röling). You may have come across the acronym VUCA (volatility, uncertainty, complexity, and ambiguity) sometimes used in management speak to describe messy situations. Systems thinking provides ways of selectively handling the detail that may complicate our thinking in a transparent manner, in order to reveal the underlying features of a situation from a set of explicit perspectives.

1.2.3   Traps in Conventional Thinking

Before examining how systems thinking might help our engagement with messes, let us look at how more conventional thinking can be counterproductive in resolving complex issues. Many aspects of our traditional thinking stem from confusing what is a mess with a simple or even complicated difficulty. For example, it is not unusual to approach the situations described in the three stories by adopting one or more of the following positions.

- Interconnections can be ignored – imagining that the survival of Orangutans has nothing to do with our own lifestyles – rather than looking at the bigger picture.
- A single cause may be assumed – tragic deaths of football supporters from inadequate physical football stadium physical infrastructure – rather than there being multiple interrelated causation.
- It may be assumed that an individual is to blame – a villainous pirate – rather than attempting to understand the ways in which a situation arose that led to a problematic outcome.
- There may be a focus on outcomes (and thus only on what can be measured) – numbers of Orangutans, all-seated football grounds, prosecution of pirates – rather than the processes by which beneficial change might best occur.

This last feature of traditional thinking has widespread relevance in Western societies blighted by the culture of targets, performance indicators and 'best' practice. Simon Caulkin, commenting on targets in the British National Health Service in a piece titled 'This isn't an abstract problem. Targets can kill' in the Observer newspaper on March 22, 2009 wrote:

> The Health Commission's finding last week that pursuing targets to the detriment of patient care may have caused the deaths of 400 people at Stafford between 2005 and 2008 simply confirms what we already know. … [T]argets distort judgment, disenfranchise professionals and wreck morale. Put concretely, in services where lives are at stake – as in the NHS or child protection – targets kill. Targets make organisations stupid. Because they are a simplistic response to a complex issue, they have unintended and unwelcome consequences – often, as with MRSA [infectious disease picked up in hospitals] or Stafford [hospital], that something essential but unspecified doesn't get done. So every target generates others to counter the perverse results of the first one. But then the system becomes unmanageable.
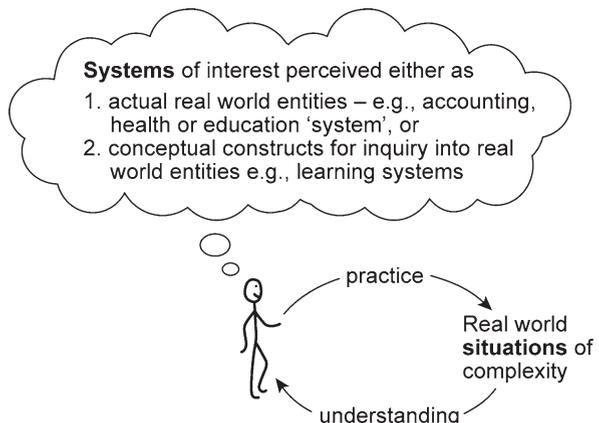
In summary, the traps of non-systems thinking lie in two simple dimensions; firstly avoiding the inevitable interconnectivity between variables – the trap of *reductionism*, and secondly, working on the basis of a single unquestioning perspective – the trap of *dogmatism*.

1.3   Systems Thinking Can Help

1.3.1   Systems Are Social Constructs

There are two major standpoints on the nature of *systems* that shape and distinguish different systems approaches. Cabrera et al. (2008) describe them in terms of the distinction made between 'thinking about systems' (e.g., accounting systems, personnel systems, ecosystems, health systems, legal systems, etc.) and 'systems thinking'. Elsewhere these traditions have been similarly referred to in terms of 'hard' and 'soft' systems thinking (Checkland 1978; Jackson 1982). Both traditions have relevance and significance. More formally, the distinction is expressed in terms of the relative emphases of ontological traditions (systems as representing real world entities) and epistemological traditions (systems as learning devices to inquire into real world entities).

Fig. 1.1 Systems thinking and thinking about systems in a constructivist tradition

Systems of interest perceived either as
1. actual real world entities – e.g., accounting, health or education 'system', or
2. conceptual constructs for inquiry into real world entities e.g., learning systems

practice

Real world **situations** of complexity

understanding

There is now agreement amongst systems practitioners that systems are *ultimately* conceptual constructs, and as such contemporary systems approaches can be regarded as belonging to a constructivist tradition. In short, 'systems' are constructs used for engaging with and improving situations of real world complexity (see Fig. 1.1).

Keeping this constructivist idea in mind, we can then examine two key aspects of systems thinking.

1.3.2   Two Aspects of Systems Thinking

> The core aspects of systems thinking are gaining a bigger picture (going up a level of abstraction) and appreciating other people's perspectives (Chapman 2004, p. 14)

The perspective on systems thinking that we use builds on this simple distinction made by Jake Chapman, which in turn builds upon the distinction made by Richard Bawden in identifying two transitions implicit in the history of systems thinking: one, towards holism, and another towards pluralism (Bawden 1998). The two transitions counter reductionism and dogmatism respectively. These two aspects are referred to in many guises by systems practitioners and writers. One of the most influential of these is C. West Churchman (1913–2004). Churchman described systems both as a process of unfolding, by which he meant heroically 'sweeping-in' as many factors as possible to our systems of concern, and as a process of looking at things from different viewpoints or, as he first coined the term, 'worldviews'. In this latter aspect, his description of a systems approach – *"A systems approach begins when first you see the world through the eyes of another"* (Churchman 1968, p. 231) – remains one of the most frequently quoted descriptions of systems thinking.

So how might we characterize these two aspects of systems thinking? Firstly, systems thinking is about gaining understanding by looking at the relationships between things. Most formalised thinking, including most scientific thinking and indeed most academic endeavour, tries to understand something by pulling it apart. By focusing on relationships you discover how something works by its effects on what surrounds it. Most people recognize they have been in situations where they 'can't see the wood for the trees'. Systems thinking is precisely about changing the focus of attention to the forest, so that you can see the trees in their context. Understanding the forest gives new and powerful insights about the trees. Such insights are completely inaccessible if one concentrates on the individual trees. So, systems thinking is a way of looking at (and making sense of) the world. It is based on an understanding that if one considers a situation as a whole, rather than focusing on its component parts, then there are properties which can be observed which cannot be found simply from the properties of the component parts.

Secondly, systems approaches start with the situation, with its complexity and uncertainty, where an acknowledged part of the problem is to establish and agree

what the problem is, and where there will rarely be a single 'right' resolution. So the language of systems is about problem-situation rather than problem, and of resolution (improving the situation) rather than solution (solving the problem). Within complex situations involving multiple interrelated factors including multiple human interests, progress can be made as part of a process of inquiry in searching for, or thinking of relevant wholes, what in systems terminology are sometimes referred to as *systems of interest*. These are *sets of activity which could be described as being organised around a single/particular purpose.*

Such wholes are not pre-determined or existing. Rather they are selected, or identified by someone for a purpose – generally to learn about the complex situation in order to do something about it (change it, improve it). Given that when dealing with a 'mess' what counts as resolution is not clear at the outset then progress in a systems inquiry comes partly from learning what will count as resolution as the inquiry progresses.

1.3.3 Four Perspectives on Systems Thinking

Systems approaches have a rich historical tradition. Systems thinking in terms of promoting holistic views – particularly emphasising the integral relationship between human and non-human nature – can be traced back to the ancient spiritual traditions of Hinduism (e.g., through ancient texts like the Upanishads and Bhagavad Gita), Buddhism (oral traditions of the Dhama), Taoism (basis of acupuncture and holistic medicine), sufi-Islam (in translations of the *Kashf al-Mahjûb* of Hujwiri, and the *Risâla* of Qushayri), ancient Greek philosophy (particularly Hericles and Aristotle), as well as being prevalent through the oral traditions of many indigenous tribal spiritual traditions which have existed for tens of thousands of years. The term 'systems' as recognised in contemporary usage, predominantly in Western cultures, was explicitly used first in eighteenth century European philosophy rooted in the works of Immanuel Kant (Ulrich 1983).

Bawden's two aspects of systems thinking – being holistic and being more pluralist – can be used to review systems approaches themselves. There are many different strands of systems thinking, and different perspectives on how to group them. So much so that whilst professing to deal with the complexities of real world situations in a manageable manner, we may well have inadvertently created a complex clutter of systems approaches. There have been many publications about systems thinking and practice in the 70 years since Bertalanffy published his first papers on systems theory. The four volume publication *Systems Thinking* by Midgley (2003) has nearly 100 chapters each dealing with a particular method and in 2001 Eric Schwartz identified 1000 "streams of systems thought (http://www.iigss.net/gPICT. jpg). The 1997 International Encyclopaedia of Systems and Cybernetics (François 1997) had 3000 entries. So in the systems field there is no shortage of approaches; it is diverse with many concepts,, methods and techniques.

With the large number of 'systems approaches' it is not surprising that there are several ways of thinking about how systems approaches relate to each other and doing this produces different typologies. Typologies can themselves be regarded as system models; particular perspectives on organizing the interrelationships between different entities, each associated with a particular purpose. Here we briefly look at four 'typologies' or perspectives. As with any model, viewpoints are inevitably partial in the sense of being both incomplete and of being viewed from a particular or partisan perspective necessarily based on its own particular purpose. The following short overviews of these four perspectives represent a gradual shift in focus from the systems approach itself, to the situations in which they are used, and finally to the user.

Perspective 1: Three Traditions of Systems Thinking (West Churchman, Peter Checkland, Werner Ulrich, Mike Jackson and Others)

That traditions of systems thinking categorized as three sets – 'hard', 'soft' and 'critical', is perhaps the most widely used way of classifying systems approaches. It is intended to recognise prevailing systems approaches whilst also legitimizing new ways of thinking. The distinction is one that builds on Peter Checkland's earlier distinction between hard and soft systems. Checkland (1978) suggested that systems thinking prevailing at the time had rested on an unspoken assumption that systems exist in the real world. Checkland's questioning, and subsequent abandonment, of this 'hard' systems assumption paved the way for an extensive and influential program of 'soft' systems action research based on the position that systems are epistemological constructs rather than real world entities. Meanwhile Churchman's student, Werner Ulrich, and others including Mike Jackson and colleagues at Hull

Table 1.1 Three traditions of systems thinking

Systems 'type'	Selected systems approaches
Hard systems	General systems theory (Bertalanfy 1956)
	Classical (first order) cybernetics, 'mechanistic' cybernetics (Ashby 1956)
	Operations research (Churchman et al. 1957)
	Systems engineering (Hall 1962)
	Socio-technical systems (Trist et al. 1963)
	RAND-systems analysis (Optner 1965)
	System dynamics (Forrester 1971; Meadows et al. 1972)
Soft systems	Inquiring systems design (Churchman 1971)
	Second order cybernetics (Bateson 1972)
	Soft systems methodology (Checkland 1972)
	Strategic assumption surface testing (Mason and Mitroff 1981)
	Interactive management (Ackoff 1981)
	Cognitive mapping for strategic options development and analysis (Eden 1988)
Critical systems	Critical systems heuristics (Ulrich 1983)
	System of systems methodologies (Jackson 1990)
	Liberating systems theory (Flood 1990)
	Interpretive systemology (Fuenmayor 1991)
	Total systems intervention (Flood and Jackson 1991a)
	Systemic intervention (Midgley 2000)

University, identified the need for a distinct third systems thinking strand. Critical systems thinking (CST) shares the same epistemological shift as the soft systems tradition but addresses some of the perceived inadequacies in both hard and soft systems thinking, most notably the inadequate consideration of power relations. Table 1.1 is an example of grouping systems approaches using this schema.

Gerald Midgley uses the three distinctions in Table 1.1 to describe the historical evolution of current ideas of systems thinking and practice as evolving through a series of three "waves", or phases of inquiry (Midgley 2000). Each wave relates to a particular focus of the systems field which brought with it a new set of methods. Wave 1 focused on concrete issues of 'problems' and problem solutions for issues where there was perceived unity of purpose. Wave 2 began with the wider soft systems perspective on people and their perspectives on issues. And Wave 3 introduced added emphasis to power relations and how they affect what problems are addressed, and how they are perceived.

Whilst the three-part model remains very influential, not least because it addresses similar discourses in other disciplines, particularly those sharing ideas from critical social theory and Habermas' three knowledge constitutive interests (Habermas 1972, 1984), some difficulties are associated with the terminology of 'hard' and 'soft' as these have particular gendered connotations which can be difficult to discard. Other terms from critical social theory like functionalist, interpretivist, and emancipatory are sometimes substituted (cf. Jackson 2000). Another perceived difficulty is the limitation of defining systems thinking only in terms of these three categories. Does it not close up space for other potential synergies?

A question arising from this characterisation of systems approaches is what guidance would a practitioner find useful for using the different approaches in different situations. The focus here shifts towards the situation.

Perspective 2: Systems Thinking for Situations (Mike Jackson and Bob Flood)
The perspective here addresses the question of how might practitioners in different situations be guided in making use of the range of systems approaches available. System of systems methodologies (SOSM) builds on the triadic model associated with Perspective 1 with the primary aim to create a classification of systems methodologies that would allow for their complementary use in specified problem situations (Jackson 1990). The important shift in focus here is towards the situations in which systems approaches are applied. SOSM provides a matrix for classifying systems methods on two dimensions: one, the level of complexity of the problem situation (simple or complex), and the other, the degree of shared purpose amongst participant stakeholders (unitary, pluralist, or coercive relationships). It is this latter dimension that draws on the hard, soft, critical typology using metaphors as guiding principles – machine for the 'hard', living organism for the 'soft' and the metaphor of prison for the 'critical' situations. The classification yields a six celled matrix as illustrated in Table 1.2. Each cell defines a problem situation which then invites particular suitable systems methods.

The two dimensions of situations are helpful in delineating the two aspects of systems thinking described above. The simple/complex dimension relates to levels

Table 1.2 System of systems methodologies (Adapted from Jackson 2000, p. 359)

		Participants		
		Unitary 'hard' systems based on machine metaphor	Pluralist 'soft' systems based on organismic metaphor	Coercive 'critical' systems based on prison metaphor
Problem situations	Simple	Simple unitary: e.g. systems engineering	Simple pluralist: e.g. Strategic assumption surfacing and testing	Simple coercive: e.g., critical systems heuristics
	Complex	Complex unitary: e.g., systems dynamics, viable systems model	Complex pluralist: e.g. soft systems methodology	Complex coercive: (non available)

of interrelatedness and interdependencies, and the unitary/pluralist/coercive dimension relates to levels of engagement with multiple perspectives. Again such a model has been helpful in prompting systems practitioners to think more clearly about the nature of the problem situation – the 'mess' – in a simplified manner. It has helped with the appreciation that different systems methods might complement each other and indeed complement other approaches used for similar problem situations. Later, SOSM was adapted and became embedded in total systems intervention (TSI) by (Flood and Jackson 1991a, b) – a methodology for drawing different methods together through a three-fold process of (a) creatively exploring problematic situations, (b) choosing an appropriate systems approach, and (c) implementing it.

There are two significant difficulties in using this model. One is in assuming from the outset that a problem situation can somehow be easily identified as constituting one of the six 'problem situation' types depicted in the cells of the matrix. Another difficulty is in the 'fixing' or pigeon-holing of particular systems approaches as being only suitable for specific types of situation. First, there may be different opinions on where different systems approaches 'fit' based upon actual experiences of using the approach. Many approaches, though understood as having roots in particular traditions, can be used for different purposes (Reynolds 2015). So for example, whilst some may classify VSM as a 'hard' approach – in the tradition of classic first order Cybernetics – others would describe the VSM as an interpretivist or even an emancipatory approach. Similar arguments may be expressed in relation to other approaches, particularly socio-technical systems and systems dynamics, both of which have many 'softer' and more 'critical' dimensions depending on the context of use and the user. Second, such pigeon-holing detracts attention from the potential for systems approaches to evolve and develop through use in different contexts by different users.

The perspective here and in the previous model prompt questions about other related traditions and approaches that might influence systems thinking, along with the influence of their domains or situations of interest. How might systems approaches draw upon and develop synergies with complementary traditions of practice and theory?
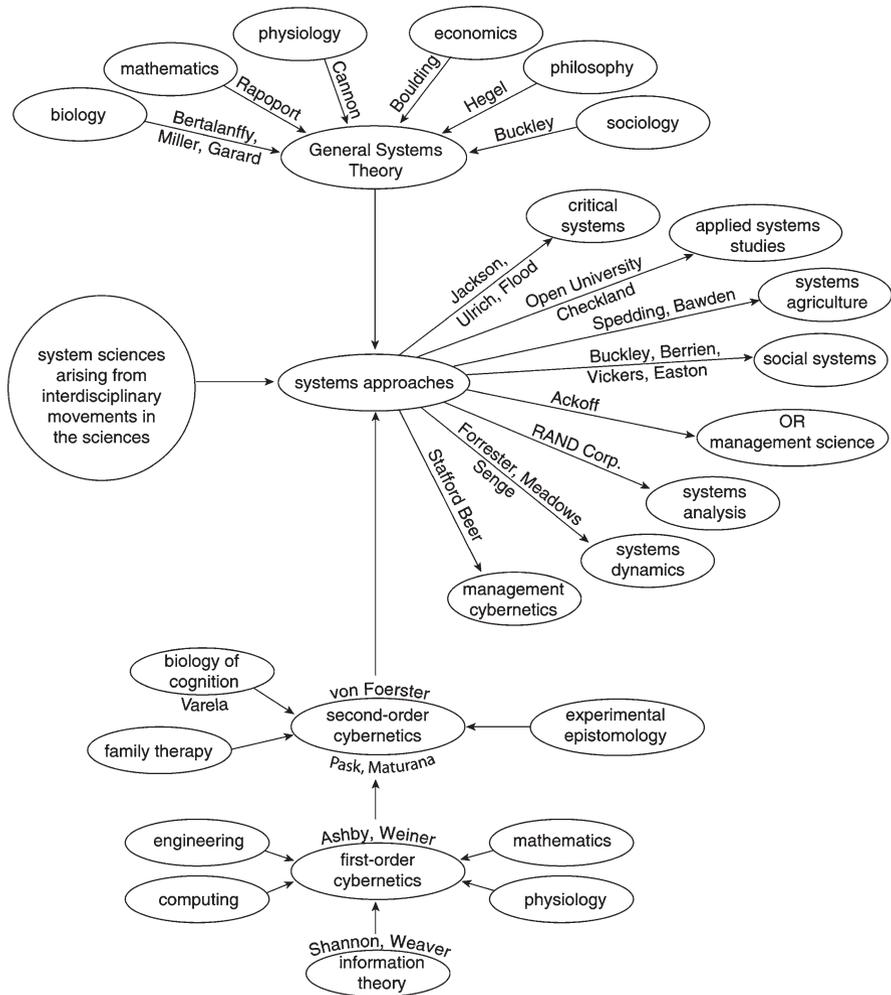
Fig. 1.2 An influence diagram of different systems traditions which have shaped contemporary systems practice (Maiteny and Ison 2000). Reprinted from Ison, R.L., Maiteny, P.T. and Carr, S., 'Systems Methodologies for Sustainable Natural Resources Research and Development', *Agricultural Systems*, p259, Copyright (1997), with permission from Elsevier

Perspective 3: Influences Around Systems Approaches (Ray Ison and Paul Maiteny)

This perspective illustrates some key relationships between different systems approaches and other closely related traditions. The authors were particularly concerned about the tendency of systems practitioners to be self-referential and insular. They wanted to recapture some of the wider influences and cross-fertilisation that continues to generate innovative development of systems approaches. The aim was to broaden the understanding and practice of spheres of influence both with respect

to other *approaches* outside the traditional systems toolbox, and to other *situations* of interest in which such approaches were evident (Fig. 1.2).

Some difficulties arising from such a perspective can be mentioned. Firstly, there are only one-way influences, whereas of course influences tend to be more dynamic (for example, family therapy has been significantly influenced by systems approaches). Secondly, whilst arguably casting a wider net than prevailing perspectives (Tables 1.1 and 1.2), some significant contributors such as C. West Churchman appear not to be present. The difficulties raise some important questions though. A key question is how might systems practice develop synergies with other practices in different domains in order to keep alive its essential dynamism, and to maintain or raise its profile as being relevant to a range of complex situations in contemporary society. How might we ensure that systems thinking is not just sectioned off as just another academic discipline amongst the number of candidates vying for attention in ever-more challenging circumstances? Another question relates to the role of individual users of systems approaches and the influences that they can bring to bear on contributing towards developing systems approaches.

Perspective 4: Groupings of Systems Thinkers (Magnus Ramage and Karen Shipp)

The question regarding the contextual influence of individual systems practitioners is one addressed in the fourth perspective presented here. In *Systems Thinkers* (Ramage and Shipp 2009 [2020]) the authors uniquely focus on the life and work of individuals behind the systems approaches rather than the systems approaches themselves. It is perhaps for this reason that their demarcation of systems approaches using the diagram below might be even more controversial. The prime intent behind this typology as acknowledged by the authors is to provide a foothold for the readers' engagement with the 30 systems thinkers covered:

> We had arguments with colleagues about the idea of providing any sort of 'map' of the territory. Of course there is no 'true' map – an individual might lay out the connections between these authors in any number of ways, to reveal a different pattern. By providing a model we emphasise certain connections, but underplay others. Yet to offer no map at all – no structure – is to deny the explorer a vital aid to their journey. Without some sort of map, the learner cannot even start to lay down the interconnections in memory. This map, which over time they will refine, extend, amend, embellish, and colour with their own experiences, preferences and insights, can only ever be an approximation, a starting point from which the individual can set out. (ibid, Afterward, p. 309)

Figure 1.3 illustrates the seven groupings: early cybernetics, general systems theory, system dynamics, soft and critical systems, later cybernetics, complexity theory, and learning systems.

As the authors suggest, the perspective here is unconventional and provocative, but was made with the intention of privileging the individuals rather than some abstract notion of either *systems* approaches (schools of thought) or perceived *situations* of interest: "The groupings were created from the starting point of our chosen authors rather than schools of thought, and thus they do not represent a comprehensive guide to a particular school of thought (for example, there are many more thinkers who have contributed to general systems theory than the four we cover)" (ibid).