

ESRC Centre for the Evaluation of Complexity Across the Nexus (CECAN): Project Report, February 2023



ESRC Grant reference number: ES/N012550/1 and ES/S007024/1

Name of Centre or Group: Centre for the Evaluation of Complexity Across the Nexus (CECAN)

Centre or Group Director (PI): Professor Nigel Gilbert

Host research organisation: University of Surrey

Grant start and end dates: March 2016 - February 2023

Contents

Declaration	2
Introduction	3
Centre aims and objectives	5
Centre activities, outputs and impacts	8
Notable Highlights	9
<i>Contribution To Science: Methodological Innovation</i>	9
<i>Case Studies</i>	11
<i>Capacity Building</i>	12
<i>Contribution To Science: Debating And Disseminating Complexity Appropriate Methods</i>	13
<i>Impact On Evaluation Practice: Embedding Complexity Into The Magenta Book And Other Official Guidance</i>	14
CECAN's Legacy	15
<i>Shifting The Culture</i>	15
<i>Building Capacity And Competency</i>	15
<i>Operationalisation</i>	15
The Director's role and Centre management	16
Forward look	18
CECAN Ltd	18
Related Projects	19
Legacy Funding	20
Lessons Learned	20
Future Research Priorities	21
Appendix A: Research projects	23
Appendix B: Key personnel	27
Appendix C: List of CECAN publications	33
Appendix D: Seminars and Webinars	39

Declaration

1: The Project

This Report is an accurate overview of the project, its findings and impacts.

2: Submissions to Researchfish

Outcomes information has been submitted to Researchfish. Details of any future outputs and impacts will be submitted as soon as they become available.

3: Submission of Datasets

No datasets were proposed or produced from this grant.

Introduction

Designing policies that can respond to the problems facing society is challenging. Not only are policies difficult to design, but it can often be difficult to know whether a policy worked. This is especially true with policies that aim to have an impact on urgent matters such as loss of biodiversity, climate change, poverty and health, where many factors are entangled in complex ways. Evaluating whether changes have been caused by a specific policy or for other reasons can be hard. For example, designing and evaluating a policy on the risk of flooding needs collaboration between specialists, local authorities and citizens on issues such as coastal erosion, drainage, farming, housing and transport, which may all interact in unexpected ways. Policies need to be flexible and robust, to respond to changing situations and manage conflicting interests. Evaluating the effectiveness of policies in such complex areas requires new solutions and special kinds of methods and approaches.

The Centre for the Evaluation of Complexity Across the Nexus (CECAN) was launched in March 2016 in response to a longstanding need to develop a culture of evaluation and evidence-based decision-making across government, thereby helping civil servants to more effectively address the frequent gap between policy development, implementation and subsequent evaluation. This need was recognised in the UK Government's 2012 *Civil Service Reform Plan* and in the National Audit Office's 2013 report, *Evaluation in government*. The latter described the government's approach to policy evaluation as "incomplete", "unclear" and "often not robust enough to reliably identify the impact"¹ while the former pledged to "ensure that staff have the skills and expertise they need to develop and implement policy, using up to date tools and techniques, and have clear understanding of what works in practice"².

With an extensive track record of successful interdisciplinary projects that used innovative computational methodologies applied to socio-environmental issues, Professor Nigel Gilbert was well placed to convene a network of academic and practitioner experts to address this need. Hosted from Professor Gilbert's Centre for Research in Social Simulation ([CRESS](#)) at the University of Surrey, CECAN brought together members spanning multiple universities - primarily based in the UK but also including one from Germany and another from USA - as well as a range of professional organisations. There are approximately 40 members, past and present, of the CECAN Team plus a further 20 CECAN Fellows (see [Appendix B](#)). Initially, CECAN was funded jointly by ESRC, NERC, two government departments: Defra and DECC, and two Arms Length Bodies: the Environment Agency and the Food Standards Agency. From 2019, funding came only from ESRC.

¹ National Audit Office, (2013). *Evaluation in government*. London, p.10.

² HM Government 2012a, *The Civil Service Reform Plan*. London: HM Government, p.16

From its launch in 2016, CECAN's primary aim has been to make policy makers' and evaluators' work easier and more effective, and to reduce the risk of evaluations being inadequate. To that end, CECAN has been working with government departments, academics and evaluation experts in complex policy areas across the food-energy-water-environment 'Nexus' to pioneer, test and promote innovative evaluation methods and approaches. CECAN has developed a suite of 'complexity-appropriate' approaches to evaluation by refining existing methods and developing new ones; for example, exploring ways in which computer models can be used to investigate the interconnections between elements and their consequences. By testing these methods on the ground through a series of co-produced case studies of practical evaluation, CECAN has innovated alongside its stakeholders to develop ideas that will work in the real world. This truly collaborative approach is one of CECAN's most distinctive features; CECAN combines outstanding 'real world' complexity expertise in applied social settings while using an agile project organisation with co-design at its heart.

In March 2019, CECAN transitioned into its second phase with the aim of not only continuing and extending the work begun in 2016, but also of deepening and accelerating the transformation of complex policy evaluation. This transition saw a shift in focus, with the priority becoming consolidating and embedding the work of the Centre in practice, all the while maintaining its original aim to develop better evaluation and more effective policy for an improved environment.

Centre aims and objectives

CECAN 1 (March 2016 – February 2019)

In its first phase, CECAN's overarching aim was to integrate complexity into policy evaluation to enable more effective policymaking, and to catalyse a step-change in the development and application of policy evaluation methods that can address complexity across the food-energy-water-environment Nexus, all the while developing the capacity of policy makers, evaluation practitioners and researchers to understand and use these methods.

At the start, the key objective was to establish a sustainable interdisciplinary Centre that would pioneer, test and promote innovative and inclusive evaluation approaches and methods where complexity presents a challenge to policy interventions, and thus contribute to more effective policymaking. In order to achieve this, a number of objectives were initially identified under the categories of Leadership, Methodological Development, Methodological Application and Capacity Building. CECAN's work throughout its lifetime has fallen into these four main areas.

Leadership:

- Provide practical and intellectual leadership and an international focus for the development of innovative approaches to policy evaluation and complexity;
- Become the 'go-to' Centre nationally and internationally for advice on the design of complex evaluations;
- Provide an expert methodological hub in the application of complexity science to policy evaluation;
- Effective initiation of the Centre's programme of activity with a particular focus on ensuring the delivery of substantive quick wins in its first year.
- Generate momentum and sustainability for the Centre and its focus of work during and beyond the initial three-year funding period.

Methodological Development

- Develop concepts and methods for complex policy evaluation based on an understanding of user needs and policy attributes in the Nexus;
- Bring together, compare and innovate evaluation methods and approaches from the full range of relevant disciplines, policy domains and research fields;

- Produce new methods and approaches that facilitate co-production of research and evaluation delivery across a range of different experts;
- Develop new interdisciplinary methodologies that can be applied not only to a wide range of Nexus domains, but also to other policy areas (e.g. education, health etc.);
- Co-construct a methodological 'tool-kit' suitable for 'beginners' and 'advanced' users to know which methods and approaches to apply under different sets of circumstances and for particular policy issues;

Methodological Application

- Test new evaluation designs to address complexity in applied policy settings;
- Pilot new methods to support new kinds of policy evaluation, design and application;
- Compare and contrast through 'real world' applications which methodological approaches are more or less suitable for particular aspects of policy evaluation across the Nexus domains;
- Conduct pilot studies across the Nexus subject areas in conjunction with the Co-Funding Departments to explore how well methods can be 'transported' or 'repurposed' across many different contexts;
- Explore the application of new methods with policymakers and analysts in departmental and agency settings in order to further refine methods and learn directly from key users and policy participants.

Capacity Building

- Build capacity to use these methods among policymakers, evaluation practitioners and researchers;
- Provide advanced training to PhD and early career researchers working across the social and natural sciences on policy evaluation methods from a complex systems perspective;
- Deliver advanced training and develop the capacity of policymakers, practitioners and researchers to apply these methods to the areas they are working in;
- Co-construct an interdisciplinary, cross-sectoral, learning network of evaluation users, practitioners and researchers;
- Co-create, document and disseminate new policy evaluation methodologies and knowledge;

- Collate and disseminate knowledge on emerging methods for complex policy evaluation

CECAN 2 (March 2019 – February 2023)

In its second phase, CECAN shifted its focus to prioritise a deepening and acceleration of the transformation begun in 2016, by:

- 1) Extending complexity appropriate approaches and methods across the policy cycle, providing a coherent and agile approach to the development, monitoring, implementation and evaluation of policy;
- 2) Broadening the reach of CECAN innovations from the Nexus to other policy areas;
- 3) Promoting joined-up governance and agile policy making across government and non-governmental organisations;
- 4) Ensuring the long-term sustainability of the Centre.

In doing so, the Centre aimed to continue and extend its work in the same four key areas it identified from the start: leadership, methodological innovation, methodological application, and capacity building.

Centre activities, outputs and impacts

A major achievement of the first phase of CECAN was to develop a novel approach to running a research centre that has embedded researchers in policy settings to address real world challenges. We have utilised a co-production process between researchers, evaluation practitioners, policy makers and analysts. This has jointly explored, framed and responded to the challenges of integrating complexity and Nexus thinking into real world policy evaluation. The novel approach has resulted in, firstly, direct innovation and impacts on the conduct of policy evaluation in government and research, and secondly, wider evaluation insights relevant to users in government, evaluation practitioners and academic researchers. Our co-production approach has been a learning experience for both CECAN and practitioners and ensured policy analysts and evaluators are more aware of, and use, more powerful, complexity appropriate methods to tackle their evaluation challenges. CECAN has also fostered new partnerships and relationships within and between departments and more widely, providing an extensive network for the exchange of expertise and best practice.

CECAN transitioned into its second phase with the aim of not only continuing and extending the work begun in 2016, but also of deepening and accelerating the transformation of complex policy evaluation. Building on the solid foundations established in the first phase, the CECAN Executive Group devised and refined a programme of work mapped to five strategic workstreams, each with an overarching objective:

- **Workstream 1: Complexity-appropriate evaluation methods across the policy cycle:** To explore the contribution complexity-appropriate evaluation methods can make across the full policy cycle.
- **Workstream 2: CECAN Methods Innovation Lab:** To deliver innovation in complexity-appropriate evaluation methods by exploration of the full range of new and emerging methods.
- **Workstream 3: Real world testing and refining of complexity-appropriate evaluation methods:** To co-produce solutions to the evaluation challenges posed by complexity with policymakers, analysts and evaluation practitioners.
- **Workstream 4: Building capacity to deliver complexity-appropriate policy analysis:** To build, and understand how to build, individual and institutional capacity to conduct complexity-appropriate policy analysis.
- **Workstream 5: Securing CECAN's future:** To use ESRC Centre Transition Funding to deepen existing partnerships and build new ones to secure long-term funding for CECAN

Notable Highlights

A unique coalition of academic experts and senior practitioners, CECAN has proven itself to be ideally positioned for bringing academic depth and breadth to the development and understanding of complexity appropriate evaluation, while maintaining a strong practitioner perspective to the work. By the end of its first phase (2016 – 2019), CECAN had already made a substantial impact on public policy evaluation, making significant advances towards its long-term ambition of catalysing a step change in the research, evaluation and practitioner community and their understanding and application of complexity appropriate evaluation. Work included a programme of methodological prototyping and research, a portfolio of pan-governmental policy case studies, an ambitious programme of capacity building, seminars, events and professional development (CPD), and the recruitment of a large and cohesive cohort of interdisciplinary Fellows and doctoral students. CECAN's second phase (2019 – 2023) focussed on consolidating learnings and embedding our work in practice. Work included the publication of CECAN's supplementary guide³ in HM Treasury's official evaluation guidance (the *Magenta Book*) and other guidance; an increased focus on academic publication, including a Special Edition in the journal, *Evaluation*; and concerted efforts to secure CECAN's future, for example through the spin-out company, CECAN Ltd.

Contribution To Science: Methodological Innovation

CECAN has advanced the development and testing of new methods for complex policy evaluation. The Centre has contributed to methodological innovation in several ways:

- 1) **Adding new or alternative methods** rooted in complexity thinking to the existing palette of approaches, e.g. bringing together different kinds of systems mapping or dependency modelling approaches to tackle complex evaluation questions
- 2) Applying or **adapting existing methods** to new settings, e.g. developing QCA for meta-evaluations
- 3) **Combining existing methods in novel ways**, e.g. Bayesian Updating and Process Tracing
- 4) **Extending existing methods** in new and different ways, e.g. considering the use of counterfactuals in agent-based simulation
- 5) **Creating tools** for navigating and selecting methods to enhance understanding of methodological connoisseurship

³ HM Treasury (2020) *Magenta Book Supplementary Guide: Handling Complexity in Policy Evaluation* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879437/Magenta_Book_supplementary_guide_Handling_Complexity_in_policy_evaluation.pdf

- 6) **Providing insights** into the ways in which evaluation research design might be adapted from the outset of a policy programme (at appraisal) using an approach that acknowledges the adaptive and processual nature of a complex evaluation.

We have used case studies as the catalyst for understanding existing methodological cultures within policy units and for identifying, developing and testing innovations. In this way, CECAN's approach to methodological innovation has been primarily co-constructed by the policy evaluation community and analysts, resulting in practice-based methodological innovation which is fit for purpose in particular settings for particular programmes.

Participatory Systems Mapping

CECAN's Participatory Systems Mapping approach has continued to grow in popularity, leaving a lasting impression on those who engage with it. For example, through CECAN Ltd (CECAN's spin-out company that was launched in Summer 2018) we have worked with Mott Macdonald on a project, Systems Analysis of Water Resources, funded by Defra. The project used CECAN's Participatory Systems Mapping approach to explore how whole systems and complexity-appropriate approaches can be used to provide insight on, and inform management of, river catchments. Defra described CECAN as "*pivotal to the success of the project*" and Mott Macdonald requested repeat engagement with CECAN when they were commissioned to work on a different project with Water Resources South East.

CECAN has also been addressing the broader challenge of turning systems maps into something actionable for evaluation purposes. A team from CECAN – including complexity and system mapping experts and evaluation practitioners – has developed a methodology that plots a path through from systems mapping to a Theory of Change (ToC), which evaluators can use to frame their evaluations. This allows evaluators to develop practical ToC maps that take into account feedbacks, wider context, and potential negative or unexpected outcomes. A paper⁴ describing this has been included in the Special Edition of the journal *Evaluation*.

A book⁵ about Participatory Systems Mapping was published in 2022, authored by CECAN researchers, Dr Alex Penn and Dr Pete Barbrook-Johnson. The book explores a range of new and old systems mapping methods, focussing on practical insights for mapping in real world contexts.

⁴ Wilkinson, H., Hills, D., Penn, A., & Barbrook-Johnson, P. (2021). Building a system-based Theory of Change using Participatory Systems Mapping. *Evaluation*, 27(1), 80–101. [DOI: <https://doi.org/10.1177/1356389020980493>]

⁵ Barbrook-Johnson, P., Penn, A.S., 2022, *Systems Mapping: How to build and use causal models of systems*, Palgrave Macmillan Cham [DOI: <https://doi.org/10.1007/978-3-031-01919-7>]

Tools

CECAN has developed a number of practical tools and toolkits to facilitate uptake of our methods. They are all open source and free to run online or download. They have all been successfully used in real-world situations.

- [“Choosing Appropriate Evaluation Methods”](#) (Dr Barbara Befani): an accessible aid to help users understand evaluation methods and choose the right ones for their purposes.
- [COMPLEX-IT](#) (Professor Brian Castellani and Dr Pete Barbrook Johnson): designed to increase access to the tools of computational social science (e.g., artificial intelligence, micro-simulation, predictive analytics) through its visually intuitive learning environment.
- [Participatory Systems Mapping Toolkit](#) (Dr Alex Penn and Dr Pete Barbrook Johnson): a practical guide that shows how to design a Participatory Systems Mapping process.
- [PRSM](#) (Professor Nigel Gilbert): a Participatory Systems Mapping app that enables groups of people, each using their own device, to collaborate in the drawing of a system map in virtual workshops.
- [The Complexity Evaluation Toolkit](#) (Martha Bicket, Professor Brian Castellani, Dr Corinna Elsenbroich, Professor Nigel Gilbert, Dr Dione Hills, Dr Frances Rowe and Dr Helen Wilkinson): collates the advances CECAN has brought about in the area of complex evaluation and covers key issues in commissioning, designing and managing an evaluation.

Case Studies

CECAN has conducted an ambitious programme of policy case studies in Defra (e.g. the Rural Development Programme for England), BEIS (e.g. Energy Trilemma, Renewable Heat Initiative and Energy Investment Programmes), Food Standards Agency (e.g. Regulating Our Future) and Environment Agency (e.g. Waste Crime). Spanning a multi £Billion policy portfolio, each case study has been carefully co-produced with stakeholders to identify evaluation needs and solutions and has involved sustained dialogue and an orchestrated succession of activities and relationship building. They provided experiments in bringing together the expertise of evaluation practitioners, methods and domain specialists, social and natural scientists and policy analysts to develop shared understandings of evaluation challenges, potential methods, and application domains in a participative way. CECAN has taken an active developmental approach for diagnosing and addressing evaluation challenges, designing and testing methods, and scoping future needs and policy directions.

Case Study participants have confirmed that the work carried out with CECAN generated a deeper understanding for them of the interaction of multiple policies, how their aims and mechanisms overlap, the potential for unintended consequences, and identified evaluation priorities and opportunities. The gains from our case study work have been two-way: participants have learned about better approaches to their evaluation tasks, and the Centre has profited from the opportunity to develop and apply new or modified evaluation methods to real and practical issues: a true instance of ‘knowledge exchange’.

Further details of CECAN’s case study work is available in [Appendix A](#).

Capacity Building

The CECAN network comprises over 1000 government representatives, practising evaluators and researchers, academics, evaluators, policy analysts, method and domain specialists, professional organisations (e.g. UK Evaluation Society and the Cross Government Evaluation Group (CGEG)), think tanks and the media. The network benefits from CECAN’s comprehensive programme of capacity building seminars and professional development events. Some of these courses have been run in association with the UK Evaluation Society to increase their reach. With additional funding from the ESRC Impact Acceleration Account, we have also produced training modules on *Handling Complexity in Policy Evaluation* (based on CECAN’s *Supplementary Guide* in the *Magenta Book*), which have proved to be very popular. In addition to being provided publicly, bespoke versions have been commissioned by several government departments and agencies (e.g. MoJ, Natural England).

To date, sixty seminars and webinars have been hosted on topics such as Complexity Theory, Realist Methodology, Dependency Modelling, Theory of Change, Dynamic Pattern Synthesis and Micro-Simulation. Attendance has averaged 50 people, and we often have had participants from overseas as well as from all over the UK. A full list of the seminars with attendance figures is in [Appendix D](#).

To address the needs of future policy analysts and evaluators, CECAN developed a Syllabus on Evaluation of Complex Policy and Programs⁶, which has also been used as a basis to develop bespoke Continuing Professional Development (CPD) training.

To assess impact across our network, a fellowship at The Tavistock Institute was commissioned to conduct a self-evaluation linked to CECAN’s Theory of Change. Respondents indicated that CECAN’s activity has helped to reduce cultural and institutional

⁶ CECAN (2017) *Evaluation of Complex Policy and Programs: A CECAN module for future policy analysts and evaluators*. November 2017, Version 1.0. Online at www.cecan.ac.uk

barriers and entrenched organisational practices and has improved mutual understanding of evaluation framings, languages and models held by different sectors. CECAN has forged new relationships within partner organisations in tackling evaluation challenges and instigated novel relationships and learning between departments, policies and organisations. CECAN's capacity building portfolio has created a large cadre of policy analysts and evaluators who – through exposure to complexity appropriate evaluation tools and methods – have been left with enhanced skills, understanding and ability to apply complexity appropriate evaluation.

CECAN PhD Studentships and Fellowships

Through their PhD projects, CECAN's postgraduate researchers have built their own and wider partners' knowledge and capacity to deal with complexity. The projects were:

- “Interfacing scientific data and complexity policy” (Lisa Stoltz, Warwick)
- “Building policymakers' capacity to evaluate complexity” (Anna Kaxira, Westminster)
- “A case study of the Marine Pioneer: investigating local management and natural capital valuation” (Betheney Wills, Surrey)

CECAN ran a funded Fellowship Scheme from March 2016 to February 2019, after which it continued to support a no-cost Fellowship Scheme. A list of CECAN Fellows and their projects is available in [Appendix B](#). Outputs from the CECAN Fellowships continue to be produced. These have included blogs, seminars, conference presentations and academic publications.

Contribution To Science: Debating And Disseminating Complexity Appropriate Methods

The Centre has published in a range of formats that has allowed for learnings to be disseminated effectively and appropriately to a large and varied audience, which includes academics and practitioners. Across the CECAN team, multiple co-authored papers are in press or development and presentations have been given at over 30 conferences or other events, including the British Sociological Association (BSA) and UK Evaluation Society (UKES) Annual Conferences. CECAN has also published a series of [Evaluation Policy and Practice Notes](#) providing accessible introductions to complex methods and which also feature policy case studies.

CECAN was invited to compile a Special Issue for the journal *Evaluation* (Sage) and this was published in January 2021. The [CECAN Special Issue](#), ‘Policy Evaluation for a Complex World: practical methods and reflections from the UK Centre for the Evaluation of Complexity Across the Nexus’ consists of six papers plus an editorial, which draw not only on our case study work

but also on our broader learnings, e.g. reflections on developing our guidance for HM Treasury's *Magenta Book*, our work on Systems-based Theory of Change, and the application of our COMPLEX-IT app.

A list of CECAN's published works is available in [Appendix C](#).

Impact On Evaluation Practice: Embedding Complexity Into The Magenta Book And Other Official Guidance

CECAN was invited by government evaluators to contribute an Appendix for the 2020 revision to the *Magenta Book*, the central guidance for all UK government departments on evaluation. The CECAN Supplementary Guide, [Complexity in Policy Evaluation](#), demonstrates CECAN's expertise in evaluation theory and practice, complexity science and experience in new methodologies. It serves as a guide to complexity-appropriate evaluation for the whole of government, and has also been influential in the design of policy evaluation in other sectors (e.g. by charitable funders, Research Councils and businesses). Compliance with the *Magenta Book* is a requirement for government evaluations and is referred to by commissioners and practitioners alike, hence its strategic importance and potential to have national impact on evaluation practice across government.

Timed to coincide with the publication of the revised *Magenta Book* (April 2020), CECAN held a series of interactive launch events that ran in-person and, due to the start of the Covid-19 pandemic, online. More than 200 policy analysts, evaluation professionals and other stakeholders participated. CECAN has further encouraged uptake of its guidance by providing a series of associated training workshops ('Handling Complexity in Policy Evaluation') comprising three modules based on the Supplementary Guide.

Arising from this work, Defra contracted CECAN Ltd to produce a bespoke Complexity Evaluation Framework (CEF) to provide specific guidance to their policy analysts on the issues to consider when scoping, designing and commissioning policy evaluation studies. This provides a tailored guide relevant to socio-environmental evaluation for Defra social researchers. Following peer review, the CEF was published by Defra in January 2020.

Further information about CECAN's work on the *Magenta Book* Supplementary Guide and the Defra Complexity Evaluation Framework is available in [Appendix A](#).

CECAN's Legacy

Shifting The Culture

Through its sustained close working with government stakeholders, CECAN's influence can be identified well beyond the original group of case study participants (i.e. Defra, BEIS, Environment Agency, FSA). One example is how CECAN's approach to participatory systems mapping has been picked up across government e.g., HMRC, Natural England and DfT. CECAN has also been explicitly referenced in formal Invitations to Tender (ITT) including specific references to CECAN's online published materials (e.g. briefing notes, reports and fellowship outputs such as "The visual representation of complexity"). Complexity, with regard to evaluation, has been mentioned with increasing frequency in government documentation over the years, which is indicative of a general growing interest across government and in CECAN's approaches specifically, e.g. in the Food Standards Agency's Areas of Research Interest document (April 2017), CECAN was identified under "Strategic science partnerships".

CECAN's influence has grown and spread to reach across multiple areas of government, contributing to a culture shift that is increasingly ready to embrace complexity and acquire or refine skills in complexity-appropriate evaluation.

Building Capacity And Competency

Alongside its efforts to reduce cultural and institutional barriers, CECAN has succeeded in improving mutual understanding of evaluation framings, languages and models across government, as well as between government and evaluation practitioners and consultants. The increasing popularity of CECAN's capacity building provision, spreading organically via both its research-based and commercial arms to new areas of government, is testament to its success and effectiveness. CECAN has been able to ensure the correct use of the complexity-appropriate policy evaluation methods that it has been pioneering since its start.

CECAN has contributed to a civil service that is better equipped to tackle their complex evaluation challenges, building a more open-minded and capable audience of policy professionals and evaluation practitioners.

Operationalisation

CECAN has embedded its consolidated learnings in official government guidance on evaluation (e.g. HM Treasury's Magenta Book and Defra's Complexity Evaluation Framework). Compliance is often stated as a requirement for evaluations, referred to by commissioners and practitioners alike, hence its strategic importance and potential to have national impact on evaluation practice across government. **Having laid the groundwork to create a generally receptive culture with a better prepared workforce, CECAN has ensured the operationalisation of its methods and approaches by contributing directly to government guidance, which is key to creating wide-scale operational change.**

The Director's role and Centre management

CECAN is a broad consortium of academic, professional and government institutions each with differing organisational structures and capabilities. The Centre is hosted at the University of Surrey in the Centre for Research in Social Simulation (CRESS) led by Professor Nigel Gilbert who is the project's Principal Investigator and CECAN's Director. Professor Gilbert's experience of managing and coordinating multi-million pound, interdisciplinary projects, and his considerable academic expertise, has without doubt added value and contributed to CECAN's success, leading to high quality and impactful research outputs across the Centre. This has been further complimented by the experience and expertise of CECAN's Deputy Director, Ben Shaw, former Director of the Policy Studies Institute at the University of Westminster, and Visiting Fellow at the University of Surrey. CECAN has been supported by a team of professionally qualified and highly experienced Centre Managers – a full-time role that is shared between three people – and an Impact Manager, all of whom are based at the University of Surrey. This has allowed for a strategic and structured approach to CECAN's knowledge exchange and engagement activities; the ongoing expansion of its network; and continuous dialogue with stakeholders and users of the Centre's expertise to generate meaningful impact from the work.

In order to maximise the benefits of the Centre's multi-organisational and multi-disciplinary nature, and to avoid 'silos', the Centre's work has been organised into tasks, each with defined objectives and outputs and an agreed schedule for completion. Tasks groups have cross-institutional and cross-disciplinary membership, each with a Co-Investigator as the accountable lead. These are:

- Project management and coordination of task groups (Director and Centre Managers,)
- Case studies – first port of call for those interested in running case studies, maintain overview of progress (Deputy Director)
- Encouraging and recording impact (Impact Manager)
- Methods development – maintaining an overview of methodological innovation across the project (Warwick)
- Capacity Building – devising course schedules, syllabi, identifying trainers, advertising courses and evaluating them (Cranfield / UCL)
- Data Management – ensuring that data is kept secure, and making it available for re-use and archiving (York / Sheffield)

- Ethics and IPR – making sure that appropriate ethical standards are kept to, and that intellectual property issues are understood (Newcastle)

The work itself has been distributed across the Centre using an Agile task group approach. Although CECAN has an Executive Board and some centralised governance structures, it nevertheless remains (consciously so) a distributed group of interacting partners. This is an innovative design, fostering creativity and allowing for the different parts of the whole to focus on diverse areas of policy evaluation whilst enabling the whole to retain a degree of direction and cohesiveness. We believe this approach has great potential to be used more widely in research and policy. This mode of working has been remarkably successful in bringing together team members coming from very different disciplinary backgrounds and who are distributed over the UK (and Europe). For example, it is notable that almost all the Centre’s publications and reports (see [Appendix C](#)) are multi-authored and in almost all cases, the authors are from different institutions. This mode of working has been very effective and has achieved results that would have been impossible to obtain without the degree of collaboration that has been the hallmark of the Centre since its inception.

Forward look

CECAN Ltd

In July 2018, CECAN launched a spin-out company, CECAN Ltd, to help with the mobilisation of its knowledge into government and the private sector, and to contribute to the financial sustainability of CECAN's work beyond the period supported by Research Council funding. Through CECAN Ltd, CECAN researchers have been able to continue engaging heavily in real-world testing and innovation, aided by CECAN Ltd's ability to engage in the government tendering process, bidding for government contracts often on short timescales.

CECAN Ltd is a success because it can bridge the gap between research and practice, delivering academic rigour all the while engaging like a consultancy. CECAN Ltd has employed a dedicated team to actively seek out opportunities that fulfil both its commercial and academic interests.

CECAN Ltd is engaged with a range of government departments through contracts and sub-contracts, and with evaluation consultancies (by participating in consortia). Examples of these include:

- BEIS
- Climate Change Committee
- Defra
- Digital Catapult
- FSA
- Health and Safety Executive
- Natural England
- Surrey County Council
- UKRI / Innovate UK
- Collingwood Environmental Planning / Eunomia
- Mott MacDonald
- Risk Solutions Ltd
- Technopolis Ltd

In addition to developing a portfolio of consultancy projects, CECAN Ltd has been designed to facilitate and increase CECAN's ability to offer bespoke training within government and beyond. Some courses have been run in association with the UK Evaluation Society to increase their reach.

Further information about CECAN Ltd's work is available [here](#).

Related Projects

CECAN researchers have been (and will continue to be) engaged in a number of projects that draw on the expertise we have developed. Some examples of these are:

- [ANTICIPATE](#): Actively anticipating the unintended consequences on air quality of future public policies (NERC, February 2019 – August 2022), Prof. Nigel Gilbert
- [LIPSIT](#): Local Institutions, Productivity, Sustainability and Inclusivity Trade-offs (ESRC, October 2019 – September 2021), Prof. Nigel Gilbert
- [“Implementing innovative legal and organisational structures for a just transition: a catchment management beacon project”](#) (University of Surrey ESRC Impact Accelerator Account), Dr Pete Barbrook-Johnson
- [PURE](#): Peri-Urban Resilient Ecosystems (GCRF Pump Priming Grant, January – July 2020, extended due to Covid-19 pandemic), Dr Adam Hejnowicz and Dr Richard Gunton
- Participatory systems mapping (PSM) approaches in population health research (Medical Research Council, 2020), Prof. Nigel Gilbert
- [InSPIRE](#) – Consortium Development Grant. (MRC, 2020) Prof. Brian Castellani
- [TRANSITION](#): Optimising air quality and health benefits associated with a low-emission transport and mobility revolution in the UK, (Natural Environmental Research Council, 2020 – 2023), Prof. Nigel Gilbert
- [SysRisk](#): Systemic environmental risk analysis for threats to UK recovery from COVID-19 (NERC, January –December 2021), Prof. Nigel Gilbert
- [EMPOWER](#): Empowering citizen and community adaptation to systemic risks from climate change (NERC, October 2021 – March 2022), Prof. Nigel Gilbert
- [InSPIRE](#): developing a policy consortium to address the social determinants of clean air and brain health. (ESRC, Impact Acceleration Account, 2021–2022). Prof. Brian Castellani
- [COMPLEX-IT](#): a web-based computational modelling and visualisation platform and learning environment for evaluating public policy and services. (ESRC, Impact Acceleration Account, 2021–2022). Prof. Brian Castellani, Pete Barbrook-Johnson
- [AI FORA](#): Artificial Intelligence for Assessment (Volkswagen Foundation, 2021 – 2024), Prof. Nigel Gilbert
- [InSPIRE](#): A policy and research consortium to mitigate the impact that places have on air quality and brain health, particularly dementia, across the life course. (ESRC, Impact Acceleration Account, 2022), Prof. Brian Castellani

Legacy Funding

CECAN hopes to further cement its impact through a reduced set of ongoing activities supported by ESRC Legacy Funding. As a Legacy Centre, CECAN would be able to continue playing a central role in convening a sizable network of evaluation practitioners, policymakers, and academic experts. Focus would be in knowledge exchange and on educating others to continue the implementation of CECAN methods in the wider policy world.

Drawing on the active community that CECAN has already built, CECAN would plan to::

- Continue its webinar series
- Revive its Fellowship scheme
- Maintain its Newsletter and social media channels (and associated subscribers lists)
- Host an annual public forum on topics of interest to the evaluation community
- Continue contributing to conferences
- Produce more Evaluation Policy and Practice Notes
- Subsidise training for postgraduate researchers and early-career researchers

Lessons Learned

The main conclusions we have drawn from the work of CECAN so far are:

- All government interventions in social and environmental domains are acting on complex systems. The best policy teams, analysts and evaluators in government acknowledge this, and are taking steps to address it.
- Government departments crave the time and space to develop capacity for complexity-appropriate evaluation.
- Practitioners instinctively and intuitively want to evaluate in a complexity-appropriate way but are constrained by practicalities, time, and capacity.
- Without a clear picture of available solutions, government departments may struggle to articulate clearly their complexity-related needs; evaluators must give a strong and creative lead to government for successful complexity-appropriate evaluation.

- There is not enough of a focus on cross-departmental evaluation to deal with unintended consequences and Nexus interactions beyond one policy area (the recent split of BEIS into two Departments is likely to exacerbate this problem).
- Evaluation should be embedded throughout the policy process.
- Users need to be willing to accept and use preliminary or provisional findings, and evaluators must be willing to provide these.
- Commissioning processes and regulations will need to change to be more complexity-appropriate.
- Many methods can be repurposed for complex policies and contexts; the innovation is getting them in the right place, in the right hands, and using them in the right combination, at the right time.
- Evaluation teams, hierarchical structures within and between organisations, and contracts need to be set up to have the capacity to adapt to the emergent requirements of complex-appropriate evaluations.

Future Research Priorities

From our experience in CECAN we have repeatedly encountered demands from government for more effective and efficient policy making. Topics include:

- The policy evaluation landscape is shifting; government is evaluating more varied policies, often made up of multiple projects, delivered in collaboration with multiple stakeholders. This means effective evaluation designs will be more bespoke, co-produced, and flexible; echoing the implications of complexity. New or improved methods will be needed to create, develop and manage policies and these should come from academic research carried out in conjunction with public servants.
- While every jurisdiction carries out policy work in its own way, there is much to learn from how other countries do it. International collaboration to understand the policy process and to spread good practice could be very helpful to the UK, which is facing increasing demands for better policies to tackle issues such as levelling up, climate change, mobility, and the role of agriculture.
- Artificial intelligence brings both opportunities and challenges for policymakers. AI may be helpful to summarise the volumes of data that are now being gathered from administrative processes. AI may also be useful as a component of models that can be used to simulate the effect of policies before they are implemented, to see whether

they are likely to have the desired effect. On the other hand, as is now well-known, AI can impose unexpected and hard to detect biases in decision-making, and can be impenetrable to both the policy maker and to citizens. Further research is needed on how to manage these challenges while taking advantage of the opportunities.

- AI may also be useful in visualising datasets and driving dashboards and monitors to allow continuous evaluation of the success of policies. The next steps in this direction may be to develop [digital twins](#) of policy domains and explore the use of technologies such as virtual reality for comprehending complex policy systems.

Appendix A: Research projects

Below are some examples of CECAN projects:

1. Case Studies

Below are links to brief reports about some of the case studies CECAN has carried out in conjunction with government Departments and Agencies.

- a. [Defra] [Evaluating complex policy for rural development at a time of dynamic change](#)
Alex Penn, Frances Rowe, Adam Hejnowicz, Martha Bicket
- b. [Environment Agency] [Evaluating complexity using Qualitative Comparative Analysis: The Environment Agency and Waste Crime](#)
Amy Proctor
- c. [BEIS] [Negotiating complexity in evaluation planning: A participatory systems map of the energy trilemma](#)
Pete Barbrook-Johnson, Alex Penn
- d. [Food Standards Agency] [Regulating the Future – The Food Standards Agency \(FSA\)](#)
Martha Bicket
- e. [BEIS / DfT] [Mapping complex policy landscapes: the example of 'Mobility as a Service' with the Centre for Connected and Autonomous Vehicles \(CCAV\)](#)
Ben Shaw, Pete Barbrook-Johnson, Alex Penn

2. Other project examples

- a. [Magenta Book Supplementary Guide](#)
Martha Bicket, Ian Christie, Nigel Gilbert, Dione Hills, Alex Penn, Helen Wilkinson
- b. [Defra Complexity Evaluation Framework](#)
Martha Bicket, Adam Hejnowicz, Frances Rowe, Dione Hills, Helen Wilkinson, Alex Penn, Ben Shaw, Nigel Gilbert

Project example: Magenta Book Annex on Complexity

The *Magenta Book*, published by HM Treasury, is the key UK Government resource on evaluation, setting out central government guidance on how to evaluate policies, projects and programmes.

The **Cross-Government Evaluation Group** asked CECAN to provide supplementary guidance for a planned update to the *Magenta Book* (last published in 2011) in the form of an Appendix on complexity in policy evaluation. CECAN's supplementary guide, [*Handling Complexity in Policy Evaluation*](#) was published, alongside the revised *Magenta Book*, on **1st April 2020**.

Based on three years' research and development of evaluation methods by CECAN, the CECAN Appendix explains what complexity is, its implications, and how evaluators and policy makers can plan, deliver and use complexity-appropriate evaluation to work with this complexity.

Developing the Appendix involved multiple stages of work:

1. Acknowledging that considerable work had already been undertaken on the topic of complexity and evaluation in both the academic and evaluation practitioner communities, the team reviewed relevant literature.
2. The team consulted with the wider CECAN network to collect real-world illustrative examples of complexity in action in nature, society and policy.
3. Having identified a key subset of complexity characteristics, in collaboration with a design expert, the team developed a visual representation to help lay people recognise and better understand the implications of complexity.
4. The outputs from these activities were synthesised into guidance iteratively through a series of four author workshops and revised with two key stages of feedback from the Cross Government Advisory Group.

CECAN held an **event** at Church House, Westminster on 3rd March 2020 to introduce the Supplementary Guide to users. The event brought together over 60 policy makers, analysts and commissioners of evaluations, as well as evaluation practitioners including public sector evaluation contractors. The event was repeated later in the Spring in an **online format** due to the Covid-19 pandemic.

Following the publication of the Appendix, CECAN has developed a series of **training workshops** ('Handling Complexity in Policy Evaluation') comprising three modules based on the Supplementary Guide. Offered through CECAN's spin-out company, CECAN Ltd, the course has been run three times per year often selling out, and generating a large number of requests for **bespoke versions of the training** from across government.

Further information:

www.cecan.ac.uk/wp-content/uploads/2020/10/Handling-Complexity-in-Policy-Evaluation-flyer-v1.3-1.pdf

Project example: Defra's Complexity Evaluation Framework

Jan 2019 – August 2019

Arising from CECAN's work to develop an Appendix about complexity in the Magenta Book, the Department for Environment, Food and Rural Affairs (Defra) commissioned CECAN Ltd to develop a bespoke "[Complexity Evaluation Framework](#)" (CEF): a **toolkit** for commissioners of evaluation to support them to adequately consider, plan for and deliver insight through evaluation that helps policymakers navigate complexity.

Built on an existing body of work by CECAN and others in the fields of complexity science and policy evaluation, the CEF was tailored to fit Defra's specific needs and context through five meetings and workshops, a Rapid Evidence Review and a series of interviews with Defra Group evidence leads, policy leads and commissioners of evaluation.

Ten semi-structured expert **interviews** were held with target users of the framework and other key stakeholders from across Defra and two arm's-length bodies, representing different roles and aspects of Defra evaluation activities, including commissioning, undertaking and using the results of evaluation. Collectively, interviewees covered a broad range of Defra's policy domains including: natural environment; environmental land management; farming; marine and fisheries; resources and waste; environmental regulation and enforcement; and official development assistance (ODA) (overseas aid). Interview topics addressed a range of issues relevant to the design of this framework, including:

- The types of complexity that arise in Defra's policy domains and the implications for Defra's work in these areas.
- The role evaluation plays in helping to address complexity in policy development and implementation and how this might be enhanced in Defra.
- The evaluation culture in Defra and any barriers and enablers to the uptake of complexity-appropriate evaluation.
- Useful current resources for evaluating and navigating complexity.

An accompanying **Rapid Evidence Review** explored literature from a range of academic and non-academic sources. Searches sought to identify complex system properties, behaviours and challenges within journals whose breadth of output cut across Defra policy areas. This evidence-base was used to shape the overall way the CEF was framed, and shed light on the implications of complexity for the theory and practice of policy evaluation, the nature and challenges of policy in Defra, and the range and scope of issues within the Defra policy remit.

The project provided Defra with a clear and accessible description of what complexity is and why it matters to Defra, along with the rationale for why complexity-appropriate evaluation is crucial to help, and what this looks like. The CEF has given Defra a framework of key considerations to inform conversations between policy leads, commissioners of evaluation and evaluation contractors.

It is a resource for scoping, commissioning, managing and delivering evaluations in and for Defra, and equips its users with a checklist of core considerations to ensure that evaluations are robust and sufficiently consider the implications of complexity. Furthermore, through interviews, workshops and presentations over the course of the project, the work has contributed to capacity building in Defra and Defra Group by raising awareness of and fluency in complexity concepts and complexity-appropriate evaluation.

In June 2019, CECAN Ltd hosted an **event** to present a first look at the CEF to an audience of policymakers, analysts and commissioners in Defra. The workshop included a discussion with Roisin O'Brien (Principal Social Researcher – Resources and Waste Evidence) and Tom Pye (Senior Policy Advisor – Resources, Waste and Plastics Strategy), hosted by CECAN Deputy Director Ben Shaw.

Following **peer review**, the CEF was published by Defra in January 2020. After its release, Defra commissioned an **independent evaluation** of the CEF, which was carried out by Steer-ED Consultancy. The findings of this impact evaluation⁷ were published in October 2020 and concluded that:

“Overall, there is no question that the main content of the CEF, in terms of the key considerations and questions, is proving useful and is already contributing to adoption of some complexity-aware evaluation practices in Defra.” (from the conclusions, p24 in the SteerED report)

“Interviewees commented that the CEF:

- Gives reassurance, helping them to acknowledge and manage complexity in an evaluation.
- Provides a useful language to communicate complexity, both internally and externally.
- Has helped them to move away from simple linear ‘logic-chain’ approaches and towards a more integrated, iterative approach.” (p17 in the SteerED report)

⁷ Steer-ED. (2020). *Evaluation of the Defra Complexity Evaluation Framework (CEF)*. [online] London: Defra, p.24. Available at:

<https://randd.defra.gov.uk/ProjectDetails?ProjectID=20400&FromSearch=Y&Publisher=1&SearchText=Complexity&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description> [Accessed 7 Feb 2023].

Appendix B: Key personnel

Current and past members of the CECAN Team

Name	Institution	Role
Nigel Gilbert	University of Surrey	Principal Investigator / Director
Ben Shaw	University of Surrey (formerly Policy Studies Institute)	Co-investigator / Deputy Director
Petra Ahrweiler	JGU Johannes Gutenberg University of Mainz	Co-investigator
Stuart Astill	ICILA Ltd (formerly IOD Parc)	Practitioner Associate
Pete Barbrook-Johnson	University of Oxford (formerly University of Surrey / Policy Studies Institute)	Research Fellow / Knowledge Integrator
Barbara Befani	University of Surrey	Research Fellow
Martha Bicket	University of Surrey (formerly Policy Studies Institute)	Research Fellow
Michelle Boath	Risk Solutions	Practitioner Associate
Kelly Boazman	University of Surrey	Impact Manager
David Byrne	University of Durham	Co-investigator
Brian Castellani	University of Durham	Co-investigator
Ian Christie	University of Surrey	Co-investigator
Gail Deason	University of Surrey	Centre Manager
Corinna Elsenbroich	University of Glasgow (formerly University of Surrey)	Co-investigator
Ben Fagan-Watson	University of Surrey (formerly Policy Studies Institute)	Knowledge Integrator
Lisa Fletcher	University of Surrey	Centre Manager
Sue Hartley	University of Sheffield (formerly University of York)	Co-investigator

Kirstie Hatcher	University of Surrey	Centre Manager
Adam Hejnowicz	Newcastle University (formerly University of Sheffield and University of York)	Research Fellow
Dione Hills	Tavistock Institute of Human Relations	Practitioner Associate
Candice Howarth	University of Surrey	Knowledge Integrator
Anna Kaxira	University of Westminster (formerly Policy Studies Institute)	PhD Researcher
Sander van der Leeuw	Arizona State University	Co-investigator
Robert Mackay	University of Warwick	Co-investigator
Alex Penn	University of Surrey	Co-investigator
Jeremy Philipson	Newcastle University	Co-investigator
Amy Proctor	Newcastle University	Research Fellow
Frances Rowe	Newcastle University	Research Fellow
Bazil Sansom	University of Warwick	Research Fellow
Karen Scott	University of Exeter	Research Fellow
Lisa Stoltz	University of Warwick	PhD Researcher
Clare Twigger-Ross	Collingwood Environmental Planning / Eunomia Group	Practitioner Associate
Emma Uprichard	University of Warwick	Co-investigator
Liz Varga	University College London (formerly Cranfield University)	Co-investigator
Julia Warsap	University of Surrey	Centre Manager
Helen Wilkinson	Risk Solutions	Co-investigator
Betheney Wills	University of Surrey	PhD Researcher

CECAN Fellows

CECAN ran a funded Fellowship Scheme from March 2016 to February 2019, after which it continued to support a no-cost Fellowship Scheme

Name	Organisation	Project title	Dates
Sara Giorgi	Brook Lyndhurst & Independent Researcher	How to better the evaluation of complex systems to improve policy making: Learning from evaluating Defra's Reward & Recognition Fund (RRF)	July 2016 – July 2017
Jonathan Baker	CLA & Independent Researcher	Evaluation across the nexus: current context; characteristics; and, challenges.	July 2016 – July 2017
Andrew Darnton	AD Research & Analysis Ltd	Reimagining evaluation to support transformational change	July 2016 – April 2018
Clare Twigger-Ross	Collingwood Environmental Planning	Investigating the value of qualitative comparative analysis in relation to the Defra Flood Resilience Community Pathfinder (FRCP) evaluation	December 2016 – March 2018
Henry Leveson-Gower	Defra	Regulatory Frameworks to Manage Complex Systems across the Nexus: Evaluating benefits of behavioural and institutional regulatory interventions	December 2016 – November 2017
Enric Senabre-Hildago	Open University of Catalonia	Use of agile management methods for research teams	April 2017 – April 2018
David Benson	University of Exeter	Evaluating implementation of the WFD	April 2017 – April 2018
Richard Gunton	University of Leeds	Evaluating complex motives for nature conservation in a growing economy: applications to Defra's RDPE and Agri-Environment case studies	May 2017 – August 2018

Fay Sullivan	NatCen	The evaluation of complexity: Exploring synergies between healthcare and the Nexus	August 2017 – August 2018
Joanna Boehnert	Independent / Uni of Westminster	The Visual Representation of Complex Systems: A Typology of Visual Codes for Systemic Relations	August 2017 – February 2018
Jayne Cox	Brook Lyndhurst	Supporting take up of complexity sensitive evaluation approaches and methods for impact in Nexus fields.	October 2017 – April 2018
Brian Castellani	Kent State University, Ohio, USA	The COMPLEX-IT App: linking agent-based and case-based modeling for credible, relevant and specific ex-post evaluations, counterfactual analysis and policy planning	November 2017 – November 2018
Nick Kirsop Taylor	University of Exeter	Institutional Cultures and Methodological Approaches to Public Policy Evaluation of Complex Nexus Areas... Evaluative methodologies for the transition towards an institutional ecosystem approach 'system-cultures' within Natural Resources Wales and CECAN.	January 2018 – July 2018
Nicholas Elia	Independent	Extending an Online Systems Mapping Tool to Support its Use in Evaluation Including the Participatory Design and Analysis of Complexity Sensitive Theories of Change	January 2018 – July 2018
Tom Woolley	Marine Management Organisation	Developing the approach to evaluation and monitoring of marine planning in English waters	March 2018 – March 2019
Julien Etienne Kate McEntaggart	ICF	Regulating our Future, Food Standards Agency (FSA)	July 2018 – October 2018

Verena Knerich	Ludwig - Maximilians University, Munich	Collaborative Solutions: Using System-Based Suggestions for the Goal-Oriented Exploration of Fuzzy Cognitive Maps	January 2019 - March 2019
Zaira Drammis	Independent Evaluator	Application received, not yet approved ("How do organisations learn from evaluations? Highlighting the role of social complexity.")	February 2019 - August 2019
Jonathan Nichols	University of Bergen (Norway)	Evaluating the Potential for Natural Capital Investment to Reverse Soil Degradation: A Dynamic Simulation Approach Exploring Connections between Soil Health and Money in England	February 2019 - August 2019

Advisory Board

Name	Organisation	Role
Elliot Stern (Chair)	Lancaster University and School of Sociology, Politics and International Studies at University of Bristol	Emeritus Professor of Evaluation Research (Lancaster) and Visiting Fellow (Bristol)
Julian Barr	UK Evaluation Society	President
Phil Bradburn	National Audit Office	Audit Manager
Siobhan Campbell	Department for Transport (DfT)	Head of Central Research Team and Deputy Chief Scientific Advisor
Gareth Harper	Ofwat	Principal Economist
Philip Garnett	University of York	Lecturer in Operations Management and Business Analytics
Penny Hawkins		Independent Consultant

Liam Kelly	Scottish Government - Rural and Environment Science and Analytical Services Division	Head of the Research Sponsorship and Business Unit
Jamie Saunders	City of Bradford District Council	Strategy and Engagement Officer
Dave Stone	Natural England	Deputy Chief Scientist
Jim Watson	UK Energy Research Centre	Research Director
James Wilsdon	University of Sheffield	Director of Impact and Engagement and Director of the Nexus Network

Appendix C: List of CECAN publications

Published Academic Papers, Chapters Etc.

2017

- **RS MacKay**, RJ Low, R Kenna, S Parker, *Calibration with confidence: A principled method for panel assessment*, Roy Soc Open Sci 4 (2017) <https://doi.org/10.1098/rsos.160760>
- **Hejnowicz, A.P.**, Rudd, M.A. *The Value Landscape in Ecosystem Services: Value, value wherefore art thou value?*, Sustainability 2017, 9(5), 850; [doi:10.3390/su9050850](https://doi.org/10.3390/su9050850)

2018

- Dister, C., R. Rajaram and **B. Castellani.**, 2018. “*Modeling Social Complexity in Infrastructures: A Case-based Approach to Improving Reliability and Resiliency.*” In E. Mitleton-Kelly, A. Paraskevas, and C. Day’s (Eds) Handbook of Research Methods in Complexity Science: Theory & Application, chapter 14, pages 267-284, Edward Elgar Publishing; <https://doi.org/10.4337/9781785364426.00025> .
- Muffy Calder, Claire Craig, Dave Culley, Richard de Cani, Christl A. Donnelly, Rowan Douglas, Bruce Edmonds, Jonathon Gascoigne, **Nigel Gilbert**, Caroline Hargrove, Derwen Hinds, David C. Lane, Dervilla Mitchell, Giles Pavey, David Robertson, Bridget Rosewell, Spencer Sherwin, Mark Walport, Alan Wilson, *Computational modelling for decision-making: where, why, what, who and how*, Roy Soc Open Sci, Published 20 June 2018. [DOI: 10.1098/rsos.172096](https://doi.org/10.1098/rsos.172096)
- A.C. Skeldon, F. Schiller, A. Yang, T. Balke-Visser, **A. Penn, N. Gilbert**, *Agent-based modelling to predict policy outcomes: A food waste recycling example*, Environmental Science & Policy, Volume 87, September 2018, Pages 85-91; < <https://doi.org/10.1016/j.envsci.2018.05.011>>
- **Gilbert, Nigel, Ahrweiler, Petra, Barbrook-Johnson, Pete**, Narasimhan, Kavin Preethi and **Wilkinson, Helen** (2018) *Computational Modelling of Public Policy: Reflections on Practice*, Journal of Artificial Societies and Social Simulation 21 (1) 14 <<http://jasss.soc.surrey.ac.uk/21/1/14.html>> doi: 10.18564/jasss.3669
- **Penn, A.S.**, Moving from Overwhelming to Actionable Complexity in Population Health Policy: Can ALife help? (2018) Artificial Life 24(3) 218-219; https://doi.org/10.1162/artl_e_00265

2019

- **Barbrook-Johnson, P.**, Schimpf, C., **Castellani, B.** (2019). *Reflections On the Use of Complexity-Appropriate Computational Modeling for Public Policy Evaluation in the UK*. Journal on Policy and Complex Systems, 5(1), 55-70. [doi: 10.18278/jpcs.5.1.4](https://doi.org/10.18278/jpcs.5.1.4)
- **Castellani, B., Barbrook-Johnson, P.**, Schimpf, C. (2019). *Case-based methods and agent-based modelling: bridging the divide to leverage their combined strengths*. International Journal of Social Research Methodology, 22(4), 403-416. <https://doi.org/10.1080/13645579.2018.1563972>
- **Christie, I., Gunton, R. M., Hejnowicz, A. P.**, (2019). *Sustainability and the Common Good: Catholic social teaching and ‘Integral Ecology’ as contributions to a framework of social values for sustainability transitions*, Sustainability Science, 14(5), 1343–1354 <https://doi.org/10.1007/s11625-019-00691-y>
- Jasper O. Kenter, Christopher Raymond, Carena J. Van Riper, Elaine Azzopardi, Michelle R. Brear, Fulvia Calcagni, **Ian Christie**, Michael Christie, Anne Fordham, Rachelle K. Gould, Christopher D. Ives, **Adam P. Hejnowicz, Richard Gunton**, Andra-Ioana Horcea-Milcu, Dave Kendal, Jakub Kronenberg, Julian R. Massenberg, Seb O’Connor, Neil Ravenscroft, Andrea Rawluk, Ivan J. Raymond, Jorge Rodríguez-Morales, Samartha Thankappan. 2019. *Loving the mess: Navigating diversity and conflict in social values for sustainability*. Sustainability Science 14(5), 1439–1461 [DOI: 10.1007/s11625-019-00726-4](https://doi.org/10.1007/s11625-019-00726-4)

- Valerie Pattyn, Astrid Molenveld and **Barbara Befani** (2019), *Qualitative Comparative Analysis as an Evaluation Tool: Lessons From an Application in Development Cooperation*, American Journal of Evaluation, Vol. 40(1) 55-74 [DOI: 10.1177/1098214017710502](https://doi.org/10.1177/1098214017710502)
- **Enric Senabre Hidalgo**, (2019). *Adapting the scrum framework for agile project management in science: case study of a distributed research initiative*. Heliyon 5 e01447. <https://doi.org/10.1016/j.heliyon.2019.e01447>
- Lippe M., Bithell M., Gotts N., Natalini D., **Barbrook-Johnson P.**, Giupponi C., Hallier M., Hofstede G.J., Le Page C., Matthews R.B, Schlüter. M., Smith P., Teglio A., Thellmann K., (2019). *Using Agent-based modelling to simulate Social-Ecological Systems across scales*, Geoinformatica (2019) 23: 269. <https://doi.org/10.1007/s10707-018-00337-8>
- Bryce D. Stewart, Charlotte Burns, **Adam P. Hejnowicz**, Viviane Gravey, Bethan C. O’Leary, Kevin Hicks, Fay M. Farstad, **Sue E. Hartley**, (2019), *Making Brexit work for the environment and livelihoods: Delivering a stakeholder informed vision for agriculture and fisheries*, People and Nature, [10.1002/pan3.10054](https://doi.org/10.1002/pan3.10054)

2020

- **Barbrook-Johnson, P., Proctor, A., Giorgi, S., Phillipson, J.**, (2020), *How do policy evaluators understand complexity?*, Evaluation, Vol. 26(3) 315–332, Sage. [DOI: 10.1177/1356389020930053](https://doi.org/10.1177/1356389020930053)
- **Kirsop-Taylor, N.A., Hejnowicz, A.P.**, (2020), *Designing public agencies for 21st century water–energy–food nexus complexity: The case of Natural Resources Wales*, Public Policy and Administration, 0(0) 1–21, Sage. [DOI: 10.1177/0952076720921444](https://doi.org/10.1177/0952076720921444)
- **Nick Kirsop-Taylor, Adam P. Hejnowicz, Karen Scott**. 2020. *Four cultural narratives for managing social-ecological complexity in Public Natural Resource Management*. Environmental Management 66, 419–434; <https://link.springer.com/article/10.1007/s00267-020-01320-6>
- Schimpf, C. and **Castellani, B.**, 2020. *COMPLEX-IT: A Case-Based Modelling and Scenario Simulation Platform for Social Inquiry*. Journal of Open Research Software, 8(1), p.25. [DOI: http://doi.org/10.5334/jors.298](https://doi.org/10.5334/jors.298)
- **Befani, B.**, (2020), *Quality of quality: A diagnostic approach to qualitative evaluation*, Evaluation, Vol. 26(3) 333–349, Sage. [DOI: 10.1177/1356389019898223](https://doi.org/10.1177/1356389019898223)
- **Castellani, B.** (2020) *Making the global complexity turn in population health*. In Apostolopoulos, Hassmiller Lich, and Lemke’s *Complex Systems and Population Health: A Primer*. Oxford University Press. [DOI:10.1093/oso/9780190880743.003.0019](https://doi.org/10.1093/oso/9780190880743.003.0019)
- Naghshbandi, SN, **Varga, L**, Purvis, A, McWilliam, R, Minisci, E, Vasile, M, Troffaes, M, Sedighi, T, Guo, W, Manley, E, Jones, DH (2020) "A Review of Methods to Study Resilience of Complex Engineering and Engineered Systems," in *IEEE Access*, vol. 8, pp. 87775-87799, 2020, [doi: 10.1109/ACCESS.2020.2992239](https://doi.org/10.1109/ACCESS.2020.2992239).
- **Bicket, M.** (2020). *Complexity and the circular economy: Systems approaches for change*. In *The Routledge Handbook of Waste, Resources and the Circular Economy* (pp. 142-152). Routledge. [eBook ISBN9780429346347](https://doi.org/10.1080/9780429346347)

2021

- Badham, Jennifer, **Barbrook-Johnson, Pete**, Caiado, Camila and **Castellani, Brian** (2021) 'Justified Stories with Agent-Based Modelling for Local COVID-19 Planning' *Journal of Artificial Societies and Social Simulation* 24 (1) 8 <<http://jasss.soc.surrey.ac.uk/24/1/8.html>>. 10.18564/jasss.4532
- **Barbrook-Johnson P, Castellani B, Hills D, Penn A, Gilbert N.** (2021) 'Policy evaluation for a complex world: Practical methods and reflections from the UK Centre for the Evaluation of Complexity across the Nexus', *Evaluation*, 27(1), pp. 4–17. [doi: 10.1177/1356389020976491](https://doi.org/10.1177/1356389020976491).
- **Bicket M, Hills D, Wilkinson H, Penn A.** (2021). 'Don't panic: Bringing complexity thinking to UK Government evaluation guidance', *Evaluation*, 27(1), pp. 18–31. [doi: 10.1177/1356389020980479](https://doi.org/10.1177/1356389020980479).
- Cox, J. and **Barbrook-Johnson, P.** (2021) 'How does the commissioning process hinder the uptake of complexity-appropriate evaluation?', *Evaluation*, 27(1), pp. 32–56. [doi: 10.1177/1356389020976157](https://doi.org/10.1177/1356389020976157).

- **Barbrook-Johnson, P. and Penn, A.** (2021) 'Participatory systems mapping for complex energy policy evaluation', *Evaluation*, 27(1), pp. 57–79. [doi: 10.1177/1356389020976153](https://doi.org/10.1177/1356389020976153).
- **Wilkinson H, Hills D, Penn A, Barbrook-Johnson P.** (2021) 'Building a system-based Theory of Change using Participatory Systems Mapping', *Evaluation*, 27(1), pp. 80–101. [doi: 10.1177/1356389020980493](https://doi.org/10.1177/1356389020980493).
- **Befani, B., Elsenbroich, C. and Badham, J.** (2021) 'Diagnostic evaluation with simulated probabilities', *Evaluation*, 27(1), pp. 102–115. [doi: 10.1177/1356389020980476](https://doi.org/10.1177/1356389020980476).
- Schimpf, C., **Barbrook-Johnson, P. and Castellani, B.** (2021) 'Cased-based modelling and scenario simulation for ex-post evaluation', *Evaluation*, 27(1), pp. 116–137. [doi: 10.1177/1356389020978490](https://doi.org/10.1177/1356389020978490).
- **Sheate, William Robert et al.** (2020) 'Learning Lessons for Evaluating Complexity Across the Nexus: A Meta-Evaluation of Environmental Projects', *Journal of MultiDisciplinary Evaluation*, [S.l.], v. 16, n. 37, p. 1-19, oct. 2020. ISSN 1556-8180. Available at: <https://journals.sfu.ca/jmde/index.php/jmde_1/article/view/641>
- **Pete Barbrook-Johnson** and Jayne Carrick. (2021). 'Combining complexity-framed research methods for social research', *International Journal of Social Research Methodology*, [DOI: 10.1080/13645579.2021.1946118](https://doi.org/10.1080/13645579.2021.1946118)
- Sedighi, Tabassom, **Liz Varga**, Amin Hosseinian-Far, and Alireza Daneshkhah. 2021. "Economic Evaluation of Mental Health Effects of Flooding Using Bayesian Networks" *International Journal of Environmental Research and Public Health* 18, no. 14: 7467. <https://doi.org/10.3390/ijerph18147467>
- Sedighi, Tabassom, and **Liz Varga**. 2021. "Evaluating the Bovine Tuberculosis Eradication Mechanism and Its Risk Factors in England's Cattle Farms" *International Journal of Environmental Research and Public Health* 18, no. 7: 3451. <https://doi.org/10.3390/ijerph18073451>
- Suno Wu, J., **Barbrook-Johnson, P.**, & Font, X. (2021) Participatory complexity in tourism policy: Understanding sustainability programmes with participatory systems mapping, *Annals of Tourism Research*, 90, 103269. [DOI: 10.1016/j.annals.2021.103269](https://doi.org/10.1016/j.annals.2021.103269)
- **D.S. Byrne** (2021) *Inequality in a context of climate crisis after COVID* London: Routledge. [ISBN 9780367464776](https://doi.org/10.1080/9780367464776)

2022

- **Castellani, B** and R. Rajaram (2022) *Data Mining Big Data: A Complex Critical Introduction*. Sage – part of the Sage Quantitative Methods Kit; <https://uk.sagepub.com/en-gb/eur/big-data-mining-and-complexity/book257490>
- Cheng, X, Hu, Y, **Varga, L** (2022) 5G network deployment and the associated energy consumption in the UK: A complex systems' exploration, *Technological Forecasting & Social Change*, 180, 121672, <https://doi.org/10.1016/j.techfore.2022.121672>
- **Barbrook-Johnson, P., Penn, A.S.**, (2022). *Systems Mapping How to build and use causal models of systems*. Palgrave macmillan. [ISBN: 978-3-031-01833-6](https://doi.org/10.1007/978-3-031-01833-6)

Other Related Works

Dissertations, theses

- **Nichols, J.D.** (2019), *Evaluating the potential for natural capital investment to reverse soil degradation: a dynamic simulation approach exploring connections between soil health and money in England*, Masters Thesis, University of Bergen (Norway), Radboud University (Netherlands)
- **Wills, B.**, (2020), *A case study of the Marine Pioneer, investigating local natural resource management and natural capital valuation*, PhD Thesis, University of Surrey, UK.

Online articles, opinion pieces, editorials, conference proceedings etc.

- **Penn, A.S.**, *A New Home for a Vital Conversation: Introducing the ALife Societal Impact Section and Going Back to Bio-inspiration for the Internet*. (2017), *Artificial Life*, (Editorial for Societal Impact of Artificial Life Section) *Artificial Life*

- **Hejnowicz, A.P., Hartley, S. E.**, (2018), *Looking through a glass darkly: Public goods and agricultural policy*, BrexitEnvironment website, 9th March 2018, available at: <https://www.brexitenvironment.co.uk/2018/03/09/public-goods-agricultural-policy/>
- **Hejnowicz, A.P., Hartley, S. E., Gilbert, N.**, *Build two-way rapport for better policymaking*, Nature 556, 174 (2018), [doi: 10.1038/d41586-018-04167-4](https://doi.org/10.1038/d41586-018-04167-4)
- **Senabre Hidalgo, E.** (2018, October), *Dotmocracy and Planning Poker for Uncertainty Management in Collaborative Research*, Proceedings of the Sixth International Conference on Technological Ecosystems for Enhancing Multiculturality. ACM
- **Hejnowicz, A.P., Hartley, S. E.**, (2019), *New Directions: A public goods approach to agricultural policy postbrexit*, ESRC UK in a Changing Europe website, available at: <https://www.brexitenvironment.co.uk/download/3152/>
- Giabbanelli, P. J., Voinov, A. A., **Castellani, B.**, Törnberg, P. (2019, April). *Ideal, best, and emerging practices in creating artificial societies*. In Proceedings of the Annual Simulation Symposium (p. 2). Society for Computer Simulation International.
- A Dorin, **AS Penn**, JM Siqueiros (2022) *AgTech that doesn't cost the Earth: Creating sustainable, ethical and effective agricultural technology that enhances its social and ecological contexts* In proceedings ALIFE 2022: The 2022 Conference on Artificial Life

Evaluation Policy and Practice Notes (EPPNs)

- **Byrne, D.** (2016). CECAN Evaluation and Policy Practice Note for policy analysts and evaluators - Qualitative Comparative Analysis: a pragmatic method for evaluating intervention.
- **Befani, B**, Rees C, **Hills D, Wilkinson H.** (2016). Testing Contribution Claims with Bayesian Updating. A CECAN Evaluation and Policy Practice Note for policy analysts and evaluators.
- **Wilkinson, H, Gilbert N, Varga L, Elsenbroich C**, Leveson-Gower H, Dennis J. (2016). Agent-Based Modelling for Evaluation. A CECAN Evaluation and Policy Practice Note for policy analysts and evaluators.
- **Uprichard, E, Penn A.** (2016). Dependency Models. A CECAN Evaluation and Policy Practice Note for policy analysts and evaluators.
- Sheate W R, Twigger Ross C. (2017). Learning Lessons For Evaluating Complexity Across the Nexus - A CECAN Evaluation and Policy Practice Note for policy analysts and evaluators.
- Haynes, P. (2017). Dynamic pattern synthesis: a longitudinal method for exploring interventions in complex systems - A CECAN Evaluation and Policy Practice Note for policy analysts and evaluators.
- **Darnton, A.** (2017). Revaluation: a participative approach to measuring and making change - A CECAN Evaluation and Policy Practice Note for policy analysts and evaluators.
- **Scott, K.** (2017). Maximising impact from evaluations in complex policy areas - A CECAN Evaluation and Policy Practice Note for policy analysts and evaluators.
- Kwakkel, J.H. (2018). Managing Deep Uncertainty: Exploratory Modelling, Adaptive Plans and Decision Support - A CECAN Evaluation and Policy Practice Note for policy analysts and evaluators.
- **Rowe F, Hejnowicz A, Penn A**, Martin J, Rios-Wilks A. (2018). CECAN Evaluation and Policy Practice Note (EPPN) for policy analysts and evaluators - Evaluating complex policy for rural development at a time of dynamic change. CECAN online resources.
- **Proctor A**, Greaves J. (2018). CECAN Evaluation and Policy Practice Note (EPPN) for policy analysts and evaluators - Evaluating Complexity in Context using Qualitative Comparative Analysis: The Environment Agency and Waste Crime. CECAN online resources.

- **Barbrook-Johnson P, Penn A, Kaxira A,** Ahmed T. (2019). CECAN Evaluation and Policy Practice Note (EPPN) for policy analysts and evaluators - Negotiating complexity in evaluation planning: A participatory systems map of the energy trilemma. CECAN online resources.
- **Sedighi T, Varga L.** (2019). CECAN Evaluation and Policy Practice Note (EPPN) for policy analysts and evaluators - A Bayesian Network for Policy Evaluation. CECAN online resources.
- **Etienne J, McEntaggart K.** (2019). CECAN Evaluation and Policy Practice Note (EPPN) for policy analysts and evaluators - Regulating the Future – The Food Standards Agency (FSA). CECAN online resources.
- Allen R, **Bicket M,** Junge K. (2019). CECAN Evaluation and Policy Practice Note (EPPN) for policy analysts and evaluators - Using complexity and theory of change to transform regulation: a complex theory of change for the Food Standards Agency’s ‘Regulating Our Future’ programme. CECAN online resources.
- **Bicket M, Christie I, Gilbert N.G., Penn A.S., Hills D., Wilkinson H.** (2020). CECAN Evaluation and Policy Practice Note (EPPN) for policy analysts and evaluators - Complexity and what it means for policy design, implementation and evaluation. CECAN online resources.
- **Barbrook-Johnson P.** (2020). CECAN Evaluation and Policy Practice Note (EPPN) for policy analysts and evaluators - Participatory Systems Mapping in action - Supporting the evaluation of the Renewable Heat Incentive. CECAN online resources.
- **Barbrook-Johnson P, Penn A, Shaw B.** (2021). EPPN No 18. Mapping complex policy landscapes: the example of ‘Mobility as a Service’ - A CECAN case study Evaluation Policy and Practice Note for policy makers and analysts. CECAN website - online resources: CECAN.
- **Astill S,** Henderson S. (2022). EPPN No 19. Outcome Likelihoods and Causal Analysis (OLCA) Structured influence mapping and Bayesian belief networks for evaluating outcome likelihoods A CECAN Evaluation and Policy Practice Note for policy analysts and evaluators. CECAN website - online resources: CECAN.

All EPPNs can be found on the CECAN website at: <https://www.cecan.ac.uk/resources/eppns/>

Project reports

- CECAN, (2018). *A participatory systems map of the Energy Trilemma: A CECAN report for BEIS*. December 2018, Online at www.cecan.ac.uk
- **Penn, A.S., Hejnowicz, A.P., Rowe, F., Bicket, M.,** Jones, C. et al (2019) *Understanding Complexity in the Rural System in England Analysis and Insights from the FF&C Systems Mapping Project*, CECAN & Department for Environment, Food and Rural Affairs. UK Government Internal Report
- **Cox, J., Barbrook-Johnson, P., Christie, I., Uprichard, E.,** (2019), How does the commissioning process inhibit the uptake of complexity-appropriate evaluation? Online at <https://www.cecan.ac.uk/wp-content/uploads/2020/09/Jayne-Cox-Report-final.pdf>
- **Barbrook-Johnson P.** (2019). *Innovative partnerships: a review of innovative public private partnerships in food-energy-water-environment domains in the UK*. CECAN Report. CECAN website.
- **Wills B,** (2019). *Abandoned, Lost or Discarded Fishing Gear (ALDFG) - What is the problem and what are the solutions? A case study in Newlyn, Cornwall, UK [ME5233]*. Internal Report: Defra.
- ICLEI Africa, **Hejnowicz A, Gunton R.** (2020). *Dryland nature based solutions for informal settlement upgrading schemes in Africa*. ICLEI Africa.
- ICLEI Africa, **Hejnowicz A, Gunton R.** (2020). *Socially inclusive urban policy making for climate resilient dryland Africa*. ICLEI Africa.
- **Wills B.** (2020). *Exploring the Intersection Between Local Governance and the Natural Capital Approach in the Marine Pioneer (Summary Report)*. CECAN website.
- Mott Macdonald, **Barbrook-Johnson P, Penn A.** (2020). *Systems Analysis for Water Resources Final Report*. Defra randd site.

- Roberts T, Seymour V. (2021). *PHE Heat Health and Cold Weather Alerting systems – end user engagement, user journey mapping and actions taken at the frontline*. Public Health England (internal report): Public Health England.
- **Bicket M**, (2021). *Digital Catapult Evaluation Framework*. Internal Report: Digital Catapult.
- Garrod G, **Proctor A**, Raley M, **Rowe F**, Shaw J, Venus C. (2021). *Environmental Land Management Test & Trial: Curlew Contracts, Final Report to Defra*. Internal Report: Defra.
- Technopolis and CECAN Ltd, (2021). *Defra Theory of Change (ToC) Tool - Final Report*.
- **Penn, AS., Barbrook-Johnson, P., Rowe, F., Shaw, B., and Boazman, K.** (2023) *Systems thinking at Natural England: An evidence review and options appraisal for the use of systems thinking at Natural England*. Final Report to Natural England, January 2023.
- Mukherjee, A., **Gilbert, N., Boazman, K.** (2023) *Developing a Theory of Change for the Future Role and Market of Biomethane*. Internal report for the Department for Business, Energy and Industrial Strategy, January 2023.

Toolkits and other products

- CECAN (2017). *Policy evaluation for a complex world*. Online at www.cecan.ac.uk.
- CECAN (2018). *Policy evaluation for a complex world*. April 2018, version 2.0. Online at www.cecan.ac.uk
- CECAN (2017) *Evaluation of Complex Policy and Programs: A CECAN module for future policy analysts and evaluators*. November 2017, Version 1.0. Online at www.cecan.ac.uk
- Centre for Rural Economy, Newcastle - Submitted written evidence to the House of Lords Select Committee on rural economies (**Frances Rowe**, Dr Paul Cowie, Guy Garrod, Dr Menelaos Gkartzios, Dr Ruth McAreavey, Katie Aitken-McDermott, **Professor Jeremy Phillipson**, Dr Neil Powe and Professor Sally Shortall, Sept 2018, <https://www.ncl.ac.uk/cre/publications/discussion-papers/>)
- CECAN (2020). *Magenta Book 2020 Supplementary Guide: Handling Complexity in Evaluation*. HM Treasury. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879437/Magenta_Book_supplementary_guide_Handling_Complexity_in_policy_evaluation.pdf [last accessed: October 2020]
- CECAN (2020). *Complexity Evaluation Framework*. Commissioned by the Department for Environment, Food and Rural Affairs (Defra). Available at: http://sciencesearch.defra.gov.uk/Document.aspx?Document=14675_ComplexityEvaluationFramework.pdf [last accessed: October 2020]
- **Befani B.** (2020). *Choosing Appropriate Evaluation Methods A Tool for Assessment & Selection* (version 2).
- CECAN (2021) *The Complexity Evaluation Toolkit*. July 2021. Version 1.0. Online at www.cecan.ac.uk
- **Penn, A., Barbrook-Johnson, P.** (2022), *The Participatory Systems Mapping Toolkit*. Online at <https://www.cecan.ac.uk/resources/toolkits/the-participatory-systems-mapping-toolkit/>

Summary Table Of Outputs

PUBLISHED		NOT YET PUBLISHED
93		28
<i>Journal articles, chapters etc (direct reference to CECAN)</i>	<i>Other related published works</i>	
40	53	

- *Papers, chapters etc. not directly linked to CECAN* [3]
- *Dissertations, theses* [2]
- *Other (online articles, opinion pieces, editorials, conference proceedings etc.)* [6]
- *Evaluation Policy and Practice Notes (EPPNs)* [19]
- *Project reports* [15]
- *Toolkits and other products* [8]

Appendix D: Seminars and Webinars

Event title	Date	Type	Speaker	No. Registered	No. Attended
Reflecting and Learning: Using Contribution Analysis	18-Jan-23	Webinar	Catherine Currie Browne	223	123
Cynefin framework for decision making	18-Oct-22	Webinar	Dave Snowden	150	67
Systems Mapping: How to Build & Use Causal Models of Systems	27-Sep-22	Webinar	Pete Barbrook-Johnson and Alex Penn	210	117
An update of the Medical Research Council (MRC) Framework for Developing and Evaluating Complex Interventions	15-Jun-22	Webinar	Laurence Moore, Kathryn Skivington	86	41
Inequality in a Context of Climate Crisis after COVID	24-May-22	Webinar	David Byrne	104	39
Evaluating government spending: Findings and recommendations from the latest National Audit Office report	15-Mar-22	Webinar	Phil Bradburn	78	37
Redefining Evaluation to Support System Change: Theoretical and Practical Insights	09-Dec-21	Webinar	Emily Gates	191	88
Adam put us in touch with Glenn on 28 Apr - Glenn has advised the Michael Patton will co-host. Awaiting draft abstract from them.	05-Oct-21	Webinar	Glenn Page & Michael Patton	108	46
Developing Systems Approaches in the Water Sector.	21-Sep-21	Webinar	Brendan Bromwich	106	56
Case-Based Modelling and Scenario Simulation for Ex-Post Evaluation	06-Jul-21	Webinar	Corey Schimpf, Brian Castellani and Pete Barbrook-Johnson	52	20
Systems Approaches to Water Management and Infrastructure Planning for Zero-Pollution Targets	17-Jun-21	Webinar	Dr Ana Mijic	66	31
Diagnostic Evaluation with Simulated Probabilities	27-Apr-21	Webinar	Barbara Befani & Corinna Elsenbroich	35	12
Participatory Systems Mapping for Policy Evaluation	31-Mar-21	Webinar	Pete Barbrook-Johnson and Alex Penn	258	143
The difference between Adrenaline and Core Strength – Investing in Resilience as an Organisational Capability	02-Feb-21	Webinar	Jon Ainger & Henrietta Curzon	58	36
A Systems Approach to Environmental	24-Nov-20	Webinar	Tom Oliver	170	103

Policy in Defra					
A new variant of QCA that accounts for time	11-Nov-20	Webinar	Lasse Gerrits & Sofia Pagliarin	140	68
Trophic Analysis of Directed Networks	22-Sep-20	Webinar	Robert MacKay, University of Warwick	49	23
How can System Dynamics Support Policy Evaluation?	09-Sep-20	Webinar	Jonathan Nichols, Environmental Consultant	172	120
COMPLEX-IT: User-friendly computational modelling software for exploring complex policy data	18-Jun-20	Webinar	Corey Schmidpf, Brian Castellani, Pete Barbrook-Johnson	106	57
Handling Complexity in Policy Evaluation – Introducing the new Magenta Book 2020 Supplementary Guide	28-Apr-20	Webinar	Martha Bicket, Helen Wilkinson, Dione Hills	224	162
Mapping the Cognitive Landscape of Productivity in Northern Ireland: A Systems Approach to Understanding Productivity Policy	12-Feb-20	Webinar	Jen Nelles, University of Sheffield	76	29
Demi-Regs and the Characteristics of Realist Evaluation	05-Dec-19	Webinar	Justin Jagosh, Centre for Advancement in Realist Evaluation and Synthesis (CARES)	153	50
The Human, Learning, Systems Approach to Managing in Complexity	01-Oct-19	Webinar	Toby Lowe, Newcastle Business School	137	58
Co-Creation of Innovation: Group Concept Mapping to Value and Engage More Knowledgeable Others in Authoring and Valuing Complex Systems	24-Sep-19	Webinar	Mary Kane, Concept Systems, Inc. (US)	98	35
Using the System Effects methodology to understand the user experience of complex systems	16-Jul-19	Webinar	Luke Craven, University of New South Wales, Canberra	95	66
Citizens' juries: how public policy should be made?	09-Jul-19	Webinar	Malcolm Oswald, Citizens' Juries	67	31
Theory of Change – Getting the most out of it - Insights from a Practitioner	02-Jul-19	Webinar	Bridget Dillon, DFID	302	150
Risk Analysis at the Food Standards Agency post EU-Exit: The role of economics and social science in informing risk management	06-Feb-19	Webinar	Vanna Aldin, FSA	61	25
How to evaluate – or commission an evaluation – when everything is messy	30-Jan-19	Webinar	Helen Wilkinson & Dione Hills	263	103

The Pluralistic Evaluation Framework for Policy Evaluation	20-Nov-18	Webinar	Richard Gunton	106	40
Developing Microsimulation Models to Generate Evidence to Support Policy Change in Public Health	07-Nov-18	Webinar	Abbygail Jaccard	54	28
Handling subjective views and bringing rigour to contribution analysis: Bayesian Belief Networks and evaluating likelihoods in action	16-Oct-18	Webinar	Simon Henderson & Stuart Astill	131	51
Applying Process Tracing Within a Realist Evaluation	05-Sep-18	Seminar	Adam Stiles	53	35
Making policy and making policy work with developmental evaluation	24-Jul-18	Webinar	Martin Reynolds	77	35
The Spectrum of Overwhelming Systems	16-May-18	Seminar	Professor Claes Andersson, Chalmers University of Technology	25	18
Evaluating Policy for Food Security – Before and After Implementation	04-May-18	Webinar	Dr Martine Barons, Warwick University	41	20
Mixed Methods Evaluation, using QCA and NVIVO	20-Apr-18	Seminar	Wendy Olsen	41	29
How evaluation in the SDG era can mislead, and what to do about it	27-Feb-18	Seminar	Zenda Ofir	29	20
Complexity Theory and “Invisible Mechanisms”	31-Jan-18	Webinar	Dr Gill Westthorp, Charles Darwin University Australia	193	---
Evaluation in follow up and review processes of the SDGs: future vision and current practice	16-Jan-18	Seminar	Stefano D’Errico, IIED	46	32
Can We Have Our Cake and Eat It Post-Brexit? Effective Regulation Without Redtape?	06-Dec-17	Seminar	Henry Leveson-Gower, CECAN	47	33
Evaluating sustainability – is it possible? A case for focusing on evaluating decision-making for sustainable development	08-Nov-17	Seminar	Dr Dorothy Lucks, SDF Global Pty Ltd	25	18
We Ask Too Much And Too Little of Program Evaluators	09-Oct-17	Seminar	Professor Saville Kushner	34	24
Understanding Health Policy in the Third Era through a Complex Systems Lens	12-Sep-17	Seminar	Professor David Hunter, Durham University	56	39
Dosage, Timelines and other Considerations for Conducting a Realist Evaluation	06-Sep-17	Webinar	Dr Justin Jagosh, University of Liverpool	---	---

The use of dependency modelling to support evaluation in complex environments – a case study application. Understanding and quantifying the value of flood risk management activities	11-Jul-17	Seminar	Harry Walton & Helen Wilkinson	30	21
The "Context+Mechanism" Association: Mastering a Key Heuristic in Realist Evaluation for Innovating Complex Programmes and Policy	26-Jun-17	Webinar	Dr Justin Jagosh, University of Liverpool	---	---
Learning lessons from practical policy evaluation: reflecting on a meta-evaluation of UK/EU policy and practice evaluations across the nexus	14-Jun-17	Seminar	Clare Twigger-Ross and Owen White	53	37
Choosing Appropriate Evaluation Methods: a Tool for Assessment and Selection	12-Jun-17	Webinar	Barbara Befani	---	---
An Introduction to Theory of Change and How to Design One	16-May-17	Seminar	Richard Allen & Dr Kerstin Junge	58	41
Supporting decision making under deep uncertainty: on adaptive plans and exploratory modeling	11-May-17	Seminar	Jan Kwakkel	46	32
Dynamic Pattern Synthesis (DPS) : A mixed method for exploring longitudinal patterns in social science data	03-Apr-17	Seminar	Professor Phil Haynes	31	22
Realist Methodology for Complexity-Mindful Evaluations in the Food, Energy, Water and Climate Sectors	14-Mar-17	Webinar	Dr Justin Jagosh, University of Liverpool	---	---
Addressing Complexity in Nexus Issues: A Case-Based Approach to Evaluation Research	23-Feb-17	Seminar	Brian Castellani	47	33
What works at the nexus? Evidence, policy and the prospects for transdisciplinary research..	25-Jan-17	Seminar	Professor James Wilsdon	78	55
Improving Environmental Evidence: Barriers and Facilitators of Evaluation Capacity at the US Environmental Protection Agency	09-Jan-17	Webinar	Nick Hart	48	34
Complexity, Power and Evidence in the UK Healthcare Sector: A Case Study of E-Health Research	Nov-16	Seminar	Professor Trish Greenhalgh, Oxford University	58	41
Evaluating Policy Scenarios with Micro-Simulation	Oct-16	Seminar	Professor Peter Davis	---	---
Policy Making Using Modelling in a Complex World	18-Jul-16	Seminar	Bruce Edmonds	55	39
Revaluation: Measuring Paradigm Shift	24-Jun-16	Seminar	Andrew Darnton and Andrew Harrison	41	29