RAND EUROPE METHODS PROSPECTUS

Having certainty about what will happen in the future is impossible. However, every sector and organisation type can benefit from thinking about what might happen and exploring the possible implications of different futures. The ability to look forward and make informed projections about the future is important when setting strategy, preparing plans and evaluating potential courses of action.

Futures and foresight techniques can help visualise what the future might look like, allowing the benefits and drawbacks of different options and actions to be explored.

RAND Europe's Centre for Futures and Foresight Studies (CFFS) uses methods (See Futures Toolkit below) to help clients determine policy, decide what capabilities they will need in the future, and keep abreast of trends and developments. CFFS produces actionable insights across both near- and longer-term time horizons ranging from scenario planning to high-level gaming to horizon-scanning.

About the centre

The CFFS enables RAND Europe to help a wide range of different clients navigate uncertainty.

The CFFS is a cross-team centre of excellence that was established in 2018 to consolidate and further develop RAND Europe's extensive and growing portfolio of futures work, through the development and application of multiple future methodologies and the delivery of bespoke services across the strategy, policy and decision-making spectrums.

The CFFS combines the depth of RAND Europe's methodological expertise in futures techniques with the breadth of its subject-matter expertise from three research groups: Defence, Security and Infrastructure; Home Affairs and Social Policy; and Innovation, Health and Science.

Introduction: RAND's unique 'value add' in futures research

RAND combines the **impartiality and independence** of a not-for-profit, the academic rigour of a university and the agile, client-oriented delivery and robust **project management** of a professional consultancy. RAND Europe is a research organisation with **ISO 9001:2015 certification** – an international consensus on high-quality management practices in knowledge-intensive organisations.

Our **diverse, interdisciplinary and multinational research staff** enables us to assemble bespoke teams for each project. We have approximately 110 staff in our Cambridge and Brussels offices, and can quickly **leverage a network of around 500 researchers** across our US and Australia offices to bring in additional thematic or methodological expertise when needed.

Our internal research programmes in Europe cover areas including (but not exclusively):

- **Defence, Security and Infrastructure (DSI):** Defence (including NATO and national MoDs), international security, arms control, military capability, procurement, counter-terrorism, radicalisation, cyber, AI, future technology, critical national infrastructure, energy, water, transportation.
- **Home Affairs and Social Policy (HASP):** Economics, employment, drugs, crime and criminal justice, policing, education, development, social inclusion, population, migration.
- **Innovation, Health and Science (IHS):** Innovation policy and systems, science of science, open science, future technologies, digital society, health and healthcare, food safety etc.

Our services

Through the CFFS, RAND Europe can deliver a wide range of foresight services to meet the demands of our clients. Examples of the most common services include:

- Full research studies – In-depth studies designed to provide evidence-based analysis on specific research questions.
- Rolling reporting – Provision of information, at regular intervals, on relevant developments in Science & Technology (S&T).
- Deep dives – Concise summaries of key S&T, political or other developments in one or more areas to enhance understanding of their possible implications.

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- Workshops – Structured discussions of key S&T, political or other developments, and their implications, in greater depth with a group of experts to foster better understanding and knowledge.
- Advice – A consultancy-type offering that falls short of a full research report but is broader in scope than a deep dive. Often our advice takes the form of a scoping study and may build on previous RAND work.
- Think pieces – Short briefs on RAND experts' views on future policy challenges.
- Periodic events – Sessions on particular S&T developments for a general audience to educate, stimulate open discussions and raise awareness of their wider economic, societal and political future impacts.
- Scenario development, game design and gaming facilitation – Development of scenarios or modelling potential futures to engage stakeholders in talking about the future and testing policy options.

RAND's Futures Toolkit

Through the CFFS, we deliver continuous innovation in both our methods and their application to new areas of policy. Senior RAND staff also lead the independent multi-disciplinary association for futures scholars, professionals and students, the **Society for Decision Making Under Deep Uncertainty** (http://www.deepuncertainty.org), disseminating good practices and the latest tools.

RAND's own futures toolkit includes a wide array of techniques.

Analytical Gaming	Qualitative and quantitative gaming techniques allow decision makers to approach complex problems in a simulated environment, enabling them to test different policy options. Gaming can be used to encourage participants to develop alternative perspectives on the future, understand the perspectives of various actors in a system, or test the strengths and weaknesses of a particular policy.
Backcasting and Visioning	Backcasting enables participants to determine the steps required to deliver a preferred future. Initially, individuals agree a preferred future and identify the changes that need to take place between their present and the proposed future. They then build a timeline to incorporate any key changes, and identify factors that might affect these changes.
Delphi	Delphi was developed at RAND to stimulate debate, share expertise and gain consensus from experts on topics that are uncertain. Delphi participants complete an iterative survey that gauges their judgement on topics that are uncertain, and requires them to justify their assessments. The findings of the group are then shared with the wider group, along with important reasons for assessments. Experts then undertake the same survey again. The final consensus is determined statistically by analysing the last set of responses.
Economic Modelling	Econometric techniques can be used to estimate economic relationships between variables (e.g. what is the cost of lack of sleep to the UK economy?). There is a variety of potential methods including: linear or non-linear regression, and regression modelling using cross-sectional or longitudinal data. Economic modelling could also involve empirical economic-policy-evaluation methods (e.g. differences-indifferences, instrumental variables or synthetic control methods). This method enables the quantification of the impact of scale and trends in one variable of interest on another.
Horizon Scanning	Horizon scanning refers to the process of exploring what the future might look like by identifying and assessing emerging technological, social, economic and political trends. This approach gathers information about emerging trends and developments, and can be used to foresee the potential impacts and implications of trends prior to their occurrence.
Logic Modelling	Logic models provide a framework for characterising and tracing the operations of an organisation, beginning from inputs (e.g. the factors that influence day-to-day operations of an organisation) and ending with desired end outcomes. The desired outcomes are generally gauged for their alignment with and support of the organisation's mission.

PESTLE and SWOT analyses	PESTLE (political, economic, social, technological, legal, environmental) and SWOT (strengths, weaknesses, opportunities, threats) analyses are ways of understanding various dimensions of a policy challenge that could contribute to policy decision-making. SWOT analysis is useful for determining which actions to prioritise within a policy area, and to identify both barriers to these actions and potential emerging opportunities. PESTLE is useful when considering key drivers (including political, economic, social, etc) that shape current or future policy environments.
Policy Stress-testing and Red Teaming	Policy stress-testing and the use of 'Red Teaming' exercises tests policy or strategy objectives against future scenarios to see how well they cope under different conditions, contributing to the development of a more robust and resilient policy.
Robust Decision Making (RDM) and Assumptions	Robust Decision Making tests strategies to help inform decisions that are robust across a range of future scenarios by quantitatively testing policy options across many plausible futures. Visualisation and statistical analysis can then support decision makers to identify key areas of policy vulnerability, so that policies can be adapted to be more robust. RDM enables the identification of strategies that can support multiple objectives over many scenarios.
Scenario Development and Analysis	Scenario development enables possible, probable or preferable future situations to be explored and analysed. Scenarios are built by identifying a number of factors: the core drivers; the central logic and dynamics of the scenario; critical parameters or leverage elements; and any expected events or major areas of uncertainty. Structured scenario analysis involves impact analysis to identify the key drivers, consistency analysis to identify the relationship between the projections of the key drivers and hierarchical cluster analysis to identify clusters of consistent projections, which become scenarios. These scenarios are then analysed to determine the possible effects of proposed policies to assess their robustness in different possible futures.
Systems Analysis	Systems analysis seeks to help decision makers answer complex questions about technology, organisational systems, or political and social systems. This method examines the purposes of a policy, procedure or decision, and then explores alternative ways of achieving these purposes, including the design of new possibilities. Systems analysis assesses the benefits and drawbacks of various possible actions and compares them over one or more assessment criteria. It provides a framework that permits the use of various mathematical techniques.
STREAM	Developed at RAND, STREAM (Systematic Technology Recognition Evaluation and Adoption Method) is a structured participatory approach that allows participants to analyse the potential impact of emerging technologies for their agency mission. STREAM consists of a five-step process that enables participants to assess and compare both the impact of – and probability of successful implementation of – a range of different technologies across predefined parameters. STREAM analysis enables the successful prioritisation of future policy or strategy directions, as well as the formation of expert predictions on future scenarios, which can inform technology uptake and investment.
Technology Roadmapping	Technology roadmapping shows how a range of technological factors – such as research, trends and policy interventions – will contribute over time to shape the future development of a policy or strategy area of interest. This method enables decision makers to build an overall 'map' of the policy or strategy, allowing them to gain an understanding of the connections between the different factors, their dependencies and how they might influence each other over time.
Technology Watch	Technology watch is similar to horizon scanning in that it is used to monitor emerging technological developments. However, it focuses on a limited set of technology areas, so can be more cost-efficient if the user is able to prioritise a limited set of technology areas.
Three Horizon Analysis	Three Horizon Analysis is a form of horizon scanning that illustrates how strategic issues develop over time. Horizon 1 defines issues that are important now, or in the near-future; Horizon 2 defines issues that will become more important in the medium term; and Horizon 3 defines issues that will emerge, and of which we are currently unaware. Consideration of these issues helps policymakers to determine the main change drivers, and to explore the best policies to respond to this change.

Examples of our work

CASE STUDY #1: RAND'S SUPPORT IN PROMOTING A FUTURES FRAMEWORK AND SCOPING STUDIES FOR THE UK MOD

RAND has extensive experience of 'shaping' activities, both in relation to individual studies as well as multi-year engagements with government clients. A prime example is RAND's role as lead of the Global Strategic Partnership (GSP) with the Development, Concepts and Doctrine Centre (DCDC) in the Ministry of Defence. (DCDC is the MOD's internal 'think tank', and is responsible for the MOD's own futures work, such as the Future Operating Environment 2035 or Global Strategic Trends 2045 programmes). This involves various mechanisms for ongoing support: provision of advice to the Command Board and other research boards through an embedded Academic Advisor within DCDC and liaison with RAND senior staff; and continuous liaison with DCDC and with its own customers across HMG for futures and other analytical services (principally MOD and the FCO) in order to conduct research scoping workshops. These identify a policy challenge or gap, define key terms, begin to map the relevant stakeholders and dependencies with ongoing or previous work, identify potential methods for addressing the articulated research questions and produce costed options.

In addition, RAND and the GSP deliver a 'push' function, i.e. proactively suggesting areas where, based on our own wider expertise and our independent assessment, futures and other research techniques might be usefully employed to address policy challenges and deliver impact. In addition, this collaboration is reflected in stakeholder buy-in at the most senior levels, with RAND and the GSP organising the quarterly CDS Strategy Forum, providing an opportunity to engage leadership at the highest levels in contemplating 'big questions' facing the MOD in the future (e.g. the effect of climate change on Defence, the future of AI or China).

CASE STUDY #2: ADAPTING RAND'S METHODS TOOLKIT TO DIFFERENT SECTORS AND REQUIREMENTS

Recent examples of complex futures and foresight studies that involved a mix of different qualitative and quantitative techniques – adapted to the unique needs of the client – include:

- **Travel in Britain in 2035: Future Scenarios and their Implications (see report here).** This major study for Innovate UK combined horizon scanning of new and emerging science and technology (S&T) that could affect future supply and demand for travel, along with the development of future scenarios using a structured and participatory scenarios methodology. Methods included impact analysis, consistency analysis and hierarchical cluster analysis, and inputs were derived from expert workshops for key activities that generate transport demand – e.g. freight, health, retail – to inform a strategic roadmap for policymakers. This was followed by a similar project for the transport authority in a large city in the Middle East, looking ahead to 2071.
- **Exploring Future Policy Impacts of Anti-Microbial Resistance (AMR) (see reports here).** This series of studies for the Department of Health, the National Institute for Health and Care Excellence, the EU, Wellcome Trust and the Independent Review on Antimicrobial Resistance included: i) Design of an **AMR policy game** for the Chief Medical Officer to educate senior leaders on complex challenges and enable them to explore different policy options. ii) A separate economic-focused study to **develop a dynamic general equilibrium model** to characterise the impact of different global scenarios for AMR (to 2050) on different regions and aspects of economic activity to estimate effects on mortality, morbidity, demographics, productivity and output. iii) A study in conjunction with Exeter and East Anglia universities to **apply 'historical foresight' methods**, identifying lessons from historical and comparative analyses of past responses to similar issues, which were mapped against the future challenges of AMR; iv) An **evaluation** of the European Commission's Action Plan against AMR. These generated extensive impact, directly informing UK and European policy.
- **S&T Horizon Scanning for Defence and Security (see project summary here).** This ongoing 24-month project, following a successful initial 7-month pilot, involved continuous provision of horizon scanning and technology watch support to Dstl. It involved using a bespoke RAND 'scan the scanners' methodology for aggregating S&T news and futures and foresight outputs from different scanning sources, academic journals, news media and social media, as well as French, Chinese and Russian language inputs. We developed this approach through a software tool, as well as from expert assessment of prioritised S&T items, 40 of which are reported to Dstl monthly. In addition, we organised a range of smaller spin-off workshop-based projects for other customers of Dstl (including the UK Home Office and MOD) to examine the future impact of technology and barriers to innovation in a specific area using a variant of STREAM.

CASE STUDY #3: KNOWLEDGE TRANSFER, CLIENT UPSKILLING AND TRAINING BY RAND EUROPE

Part of RAND's corporate mission, as a not-for-profit research institute, is to inform policymaking through our own research, and to empower and enable others to use futures methods. A cross-section of different approaches to knowledge transfer on recent RAND projects includes:

- **RAND Futures Modules at KCL:** We are continuously developing innovative ways of sharing methodological expertise, and have delivered a module on Robust Decision Making (RDM), offered by the International School of Government at King's College London.
- **Training Royal Society officials in Evidence Synthesis for Policy:** RAND, in partnership with the Royal Society (RS), delivered a rapid evidence assessment on the effects of ammonia pollution; a RS official was seconded, so RAND could train them in evidence synthesis techniques.
- **Delivering training at UK Defence Academy:** Due to RAND's methods expertise, we design and deliver the Strategic Exercise module of the Senior Course at the Royal College of Defence Studies (RCDS) in week-long educational games for 110 senior military officials, twice a year.

CASE STUDY #4: CLOSE COLLABORATION BETWEEN RAND AND LARGE/COMPLEX ORGANISATIONS

Department for Transport (DfT). RAND has been working with DfT for over 25 years. Currently we are providing futures expertise to the DfT through a sole-source framework (F/W) contract that commenced at the start of 2019 (led by Mott MacDonald). As part of the F/W, we are involved in shaping work and delivering analysis using a wide range of futures methodologies to identify future uncertainty and risks, and ensure that DfT's policy and investment decisions are robust in countering these.

Vitality. In the private sector, we work with Vitality, an insurance company that encourages its members to take a more active role in managing their wellness. Our work with Vitality started with RAND managing Vitality's 'Britain's Healthiest Workplace' competition, whereby employers and employees participated in a survey to identify Britain's healthiest workplace. Through this we developed a close working relationship that has allowed RAND and Vitality to use the data collected to quantify the impact of wellness programmes, sleep, quality of sleep and exercise on productivity and the economy. This innovative work has had a high impact and has been picked up by, for example, the BBC, the FT, Forbes, The Telegraph and the World Economic Forum.

Core Team Members

Charlene Rohr is a Senior Research Leader and co-Director of CFFS. She leads RAND Europe's involvement in providing a F/W of futures and foresight studies to the UK's Department for Transport. She previously led a study for Innovate UK to develop scenarios for the future of travel in Britain for 2035.

Dr Salil Gunashekar is a Senior Research Leader in the area of science and technology policy. He has participated in projects on the future socio-economic impact of emerging technologies, blockchain technology, the Internet of Things, technology foresight and open science.

Stijn Hoorens is Director of RAND's Brussels Office and a Research Leader. He has considerable experience in conducting foresight research and futures studies on topics including drug policy, migration, climate change, work and inequality.

Dr Marco Hafner is a Research Leader who specialises in the application of econometrics for future economic and policy challenges, such as the cost of Brexit for the UK, the cost of corruption and the cost of insufficient sleep to the global economy.

Erik Silfversten is a Senior Analyst and co-Director of CFFS, focusing on cyber, digital and the impacts of emerging technology on society. He is experienced in futures and foresight methods including horizon scanning, scenario planning, technology roadmapping and technology assessment workshops.

James Black is a Senior Analyst. His research focuses on strategic decision making under deep uncertainty and the future impact of emerging societal and technological trends on defence and security. His futures work has informed the development of UK Combat Air Strategy to 2040, and the Future Land Operating Concept to 2035, as well as UK transport scenarios to 2035. He has managed projects supporting training provision for senior officials at MOD and Defence Academy.

Dr Advait Desphande is a Senior Analyst focusing on emerging technologies, research evaluation, science, technology, and innovation policy, and technology futures.

Dr Fay Dunkerley is a Senior Analyst with a focus on transport economics, health, technology and the use of economic tools and scenarios for futures policy. She has led studies involving hierarchal cluster analysis and scenario tools to explore futures in different sectors.