Valuing FSA Research and Development:

Final Report

A report for the Food Standards Agency

March 2020

Issue 4

Valuing FSA Research and Development: Final Report
A report for The Food Standards Agency
March 2020
Report reference: J0046

https://doi.org/10.46756/sci.fsa.wyo220

This document has been prepared by Risk Solutions in connection with a contract to supply goods and/or services and is submitted only on the basis of strict confidentiality. The contents must not be disclosed to third parties other than in accordance with the terms of the contract.
Risk Solutions is a trading name of Risksol Consulting Ltd.
© Risksol Consulting Ltd 2020

Risk Solutions
Dallam Court
Dallam Lane
Warrington WA2 7LT
United Kingdom

☏ 01925 413984

www.risksol.co.uk

Project summary

Background

In recent years, government departments and agencies have aimed to better understand the range of impacts arising from public funding for Research and Development (R&D) activities. The FSA funds R&D across a broad spectrum of areas aimed at improving public health and consumer confidence and developing more flexible approaches to regulation that deliver effective assurance.

The intended benefits from FSA funded research can be hard to measure and attribute, such as new food safety standards which may lead to positive social change.

Previous attempts to assess the benefits delivered by FSA research have met with limited success, and the FSA's own review of the literature concluded that none of the published valuation methodologies met FSA's need. The current project was therefore commissioned to develop a new, bespoke, valuation methodology (the R&D valuation approach – RDVA) that could be used to inform the prioritisation of future R&D investment.

Approach

The work was carried out between October 2018 and January 2020 by Risk Solutions, with Live Economics Ltd and CECAN Ltd working with FSA. An initial draft version of the RDVA was developed based on the findings of a literature review, workshops and interviews. This was then tested by project officers, who applied it to a sample of FSA projects, some in the early stages of planning and some that were currently 'live'. As well as helping to test and validate the RDVA, this resulted in a library of project case studies, which can be referenced by future R&D project officers.

Results

This work has developed a methodology for valuing FSA R&D projects, and other projects with benefits that are uncertain or difficult to describe – the RDVA. The process of completing the RDVA is designed to prompt deliberative thinking about the pathways to benefit and the design of the project.

The RDVA consists of the following elements:

- Determination that the methodology applies
- Categorisation of the project based on the fit with FSA's Strategic Objectives and the Research Topic area
- Provision of a brief narrative description, using a theory of change type structure, of how outputs from the research are intended to lead to intermediate outcomes and beneficial impacts through one or more delivery pathways

- Scoring of semi-quantitative valuation criteria for research quality, potential research utility (timeliness and usability of outputs), potential reach and significance of impacts, and risk and reward balance.

Funding decisions for projects should then be based on consideration of both the narrative (which has limits on the length allowed) and the scores, within the wider context of FSA needs. The report provides recommendations for further developing the RDVA, and implementation and governance of the process.

Executive Summary

Introduction

The FSA identified a need for a new, bespoke, methodology that will allow it to more effectively compare and prioritise research and development (R&D) projects and make sure the research budget is spent with greatest impact. This project carried out research and development to produce a first working version of this methodology, referred to as the R&D Valuation Approach (the RDVA).

The purpose of this final report is to share the findings of this work, including our final recommendations for the RDVA and its implementation and governance. It is provided in two volumes. This volume contains the main body of the report, with the first working version of the RDVA described in an annex (a full version is provided as a separate document). The second volume provides detailed supporting information as appendices. A library of case study applications of the RDVA is also provided separately.

Approach

The specification for this project recognised that this was a complex problem. We therefore proposed an agile, collaborative development process. The RDVA was developed, tested, and refined iteratively through consultation and application to case studies in two phases:

- Phase 1: A methodology development and proof of concept testing phase, including literature review, workshops and interviews, and
- Phase 2: A testing and refinement stage, during which the RDVA was applied to a sample of FSA R&D projects at different stages of development.

The research was carried out by Risk Solutions, Live Economics ltd and CECAN Ltd between October 2018 and January 2020.

Conclusions from the project

Design of the RDVA

The research in Phase 1 established a set of requirements for the RDVA which were agreed with the steering group. An important conclusion was that the RDVA should adopt a more holistic approach to valuing projects than is included in the current ‘five case’ business case system. Scoring of semi-quantitative, criteria-based valuation should be included, but equally important would be a narrative element that describes the pathways that enable research outputs to deliver benefits. A narrative approach should encourage a more deliberative process that would promote a deeper understanding of the benefits and risks of a piece of work. Decision makers would then reach decisions on which projects to prioritise based on consideration of both the scores and the narrative.

Testing and developing the RDVA

Proof of concept testing in Phase 1 involved applying the initial draft RDVA to three FSA projects covering different types of research. In Phase 2 we developed the RDVA to reflect the findings of this testing and feedback from the steering group. We then invited the project officers of a sample of 13 further FSA research projects, at different stages of development, to apply it. Findings of each of two waves of testing were presented and discussed with the steering group. Our conclusions are summarised here, recommendations for improving the RDVA are presented at the end of this summary:

- Usefulness: The overall conclusion of the steering board was that the outputs of the RDVA were useful. The semi-quantitative scores provided concise information for decision makers that complements the narrative description, but there were concerns about whether the self-assessment process would lead to bias. The steering board agreed that the narrative and justifications supporting the scores are, therefore, equally important for decision making. Thought would need to be given as to whether, and how, scores should receive any additional, independent validation.
- Usability: Users generally did not find the RDVA hard to apply but did find the process took longer than anticipated. The most challenging task was describing the pathways to benefits. This may be because project officers are more used to focussing on how project outputs will be delivered, rather than thinking how these then lead to outcomes and impacts, especially before the work has been commissioned.

Summary of the RDVA

The RDVA is described in more detail in Annex 1 to this report and in full in a separate document provided to FSA[1]. It is designed to be compatible with the Microsoft Power Apps implementation of the 'five case' business case system (screen shots of which are presented in Annex 2 of this report). For projects where meaningful benefits are difficult to estimate, the Benefits Management part of the updated Economic Case is not completed because quantitative success measures would not generally be available[2]. Instead, the more holistic, and semi-quantitative, assessment described below is proposed. It comprises four steps:

---

1 Valuing FSA Research and Development: Download of the version of the RDVA used in Wave 2 of the Phase 2 testing

2 Note that when this work started, the Benefits case was compulsory for all projects. It is no longer necessary to complete the benefits management section for research, in-part due to discussions held at workshop 1.

1. Applicability of the RDVA

To determine whether the RDVA is applicable, this section asks whether the benefits are **uncertain** or otherwise **difficult to describe**[3]. If the research is also **Novel,** and may lead to new findings, and **Creative**, original and not obvious, then the work is also likely to be classified as R&D under the Office for National Statistics (ONS) criteria. This information is collected to help FSA complete ONS returns.

2. Research categorisation

To enable FSA to assess how its research funding is being spent, the research is categorised according to:

- Whether it is funded with **very limited discretion**, for example because it is part of a statutory duty/legal obligation
- The **Strategic fit** i.e. which of FSA's strategic objectives the research is applicable to
- The **Topic** i.e. the particular policy area or public health risk, or cross cutting theme.

3. Benefit delivery pathways

This step elicits a brief, narrative description of the benefits anticipated in terms of contribution to FSA's strategic objectives and how. It uses a theory of change type structure, of how outputs from the research are intended to lead to intermediate outcomes and then beneficial impacts through one or more delivery pathways:

- Policy development and/or regulatory change
- Industry action (voluntary, non-regulatory)
- Change in consumer behaviour
- Broader influence (e.g. international collaboration or improving the evidence base for a strategic issue or an emerging risk).

This step is designed to:

- Prompt deliberative thinking about how benefits will be delivered, and
- Provide information to help allocate meaningful scores in the qualitative ranking.

4. Semi quantitative valuation criteria

In this step the following criteria are scored, using a star rating system:

- Likely quality (fitness for purpose) of the research approach envisaged
- Potential research utility
- Potential reach and significance of impacts
- Risk and reward balance.

Very few FSA projects would be expected to achieve the highest score in any category. The ratings should follow from, and be consistent with, the benefits realisation narrative in Section 3. They must be supported by a short justification,

---

[3] The RDVA could be applied to all projects if required, including those with a quantified Benefits Management case.

which where appropriate, should consider any risks and issues to realisation of benefits, as well as any other impacts that might accrue including negative and unintended impacts.

Use of the outputs of the RDVA

We have deliberately avoided the suggestion that funding decisions for projects should be based on any simple summation of scores. This will over-simplify what will often be a complex decision, and lead to gaming of scores. Instead we recommend that the decision boards reach their decision based on consideration of both the narrative (which has limits on the length allowed) and the scores, within the wider context of FSA needs.

Recommendations

We have made recommendations for improving the RDVA and its implementation in Section 4. These address:

1. **Implementation and governance of the RDVA**: We recommend that:
   - The RDVA should be incorporated within the existing business case system at the Full Business Case stage.
   - Use of the RDVA should be encouraged from the early stages of project planning to help develop the project and its business case, not a hoop to jump through at the end.
   - Given the variation in quality of returns some light touch support to project officers and governance of the process is recommended.
2. **Final refinements to the RDVA:** We have recommended changes to encourage consistent responses and reduce the time to completion on users.
3. **Wider suggestions:** We have identified a number of issues related to organisational and cultural factors that impact effective identification and appraisal of R&D projects.

Table of contents

Introduction

1.1 The FSA conducts research and development (R&D) on a wide range of topics, both externally (through funding or co-funding commissioned research projects) and in house (research conducted by FSA employees). The overall aim of this project was to develop and test a new methodology that can be used to compare and prioritise projects and make sure the research budget is spent with greatest impact. We refer to this methodology as the R&D Valuation Approach (the RDVA).

1.2 The specification for this project recognised that this was a complex problem, requiring a bespoke solution. Previous attempts to assess the benefits delivered by FSA research have met with limited success, and the FSA's own review of the literature concluded that none of the published valuation methodologies met FSA's need. We therefore proposed an agile and consultative development process. The RDVA was developed, tested, refined and its value demonstrated iteratively through consultation and application to case studies in two phases:

- Phase 1 was concerned with developing an initial draft version of the RDVA, based on synthesis of evidence from interviews, workshops, document review and a high-level literature review, and testing the approach as a proof of concept.
- Phase 2 applied the RDVA developed following the proof of concept testing to a sample of projects, to further test, validate and develop the methodology and supporting guidance and build up a library of case studies.

1.3 Following completion of the Phase 2 testing, we presented our findings and recommendations to the steering group.

1.4 This report, the final report of the project, is structured as follows:

- Section 2 summarises the findings of Phase 1 including a summary of the proposed RDVA and the results of concept testing
- Section 3 describes the findings of the work carried out in Phase 2
- Section 4 presents our conclusions and recommendations
- Annex 1 describes the final version of the RDVA used in the last wave of testing
- Annex 2 provides screen shots from the Microsoft Power Apps implementation of the 'five case' business case system.

1.5 The appendices, presented in a separate document, provide more detail including:

- Appendix 1 summarises our research approach
- Appendix 2 is a report of the literature review
- Appendix 3 summarises key findings from the document review
- Appendix 4 briefly describes the workshops and summarises the outputs
- Appendix 5 describes key themes emerging from the interviews

- Appendix 6 presents the methodology specification developed at the end of the initial research phase
- Appendix 7 provides more details of the Phase 1 proof of concept testing
- Appendix 8 provides the findings of the Phase 2 testing and development.

1.6 A library of case study applications of the RDVA and a full copy of the final RDVA developed by the project are provided separately.

Phase 1: Design and conceptual testing of the R&D valuation approach (RDVA)

2.1 In Phase 1 we developed the RDVA informed by:

- Initial research carried out through interviews, literature review and workshops
- Preparation of a specification for the RDVA
- Preparation of the first draft of the RDVA
- Concept testing of the RDVA.

2.2 In this section we briefly summarise the results of this work. More details are provided in Appendices 1 to 7.

Phase 1 approach

Initial research: interviews, literature review and workshops

2.3 The initial research involved:

- A light touch review of published literature on research valuation – this took the form of a directed review, focused on the particular needs of the project
- A review of documentation provided by FSA
- Two half day workshops – a specification workshop and a system mapping workshop, and
- Interviews with a range of senior officials, project officers and external research users.

2.4 The research was carried out between October 2018 and February 2019. The approach was collaborative, informed by regular telephone update meetings with the FSA's project officer. The ongoing interview programme and literature review were informed by these interactions and the outputs of the workshops.

Preparation of a specification and initial draft RDVA

2.5 Emerging results from the research were issued in an interim report, which also presented a draft specification for the RDVA developed on the basis of the research, in January 2019.

2.6 The specification was discussed and agreed with FSA, and developed into the first draft of the RDVA. This was shared with FSA through a report and presentation and comments incorporated into the developing RDVA prior to proof of concept testing.

Proof of concept testing

2.7 Proof of concept testing was carried out in June 2019 by applying the RDVA to three FSA projects covering different types of research.

2.8 The tests were carried out as facilitated conversations with project officers and aimed to establish:

- If the RDVA captured the required information
- If it prompted deliberative consideration of the issues – this is not designed to be a process of 'jumping hurdles' but one of discussion and constructive challenge, to improve proposals as well as prioritise
- Whether it required adjusting, and
- Where more guidance/explanation was required.

2.9 The tests provided participants with the opportunity to comment more generally on its structure and future application based on their experience, and also aimed to gather examples that could be used in guidance on how to apply the methodology.

2.10 More details of the design and implementation of the tests are also provided in Appendix 1.

Phase 1 findings

Key themes from the initial research

2.11 In this section we present the key themes that emerged from our synthesis of the initial research (the literature and document review, workshops and interviews). The findings of these individual activities are presented in more detail in Appendices 2 to 5. The RDVA specification derived from the research and subsequent discussions is presented in Appendix 6.

What are the main requirements from the outputs of the RDVA?

2.12 There are two decision making bodies where the RDVA could be applied: at the Investment Board, where most project funding decisions are made; and at the Strategic Evidence Fund for projects that are closer to basic research and speculative in nature.

2.13 The overall aim stated in the ITT was for a methodology that could be used by these users to:

- Compare the potential impact of FSA R&D projects in different areas
- Evaluate the potential impacts of FSA R&D, using a set of standardised criteria
- Produce evidence the FSA can use to make a value for money statement about its investment in R&D.

2.14 At the project initiation meeting, it was emphasised that the FSA believes it does not have sufficient evidence on the expected impacts of its R&D to (i) properly prioritise future project funding requests or (ii) make a convincing case for its research spend. The focus of the project, however, is primarily point (i), that is to inform future R&D spending decisions to ensure funding is

focused where it can make the greatest impact, rather than to routinely evaluate the performance of current or past projects.

2.15 Through discussion with FSA we refined the aims of the research, agreeing that the RDVA should:

- Provide a method of categorising work to determine if the RDVA should apply
- Enable projects to be compared and prioritised fairly
- Provide evidence to support the FSA's decision making, to ensure the research budget is spent with greatest impact.

2.16 In the method specification workshop and interviews, opinions were mixed on whether the RDVA should address both project prioritisation and portfolio analysis when making funding decisions. A lot of expert judgement is involved at executive level to get to a portfolio with an appropriate split of effort across the different policy areas. This is not thought to be something that could (or should) be tackled through a formal portfolio ranking methodology. It was agreed with FSA that portfolio analysis is outside the scope of this project but the outputs of the RDVA will provide useful input.

2.17 Other key requirements emerging from the workshops and interviews were that:

- It should provide a clear definition of what counts as FSA research
- It should focus on the potential beneficial impact of research
- It should encourage attention towards how benefits will be realised
- It should treat innovative / risky projects fairly compared with lower risk projects that have easily realised benefits
- It should make it easier (not harder) to build a business case
- It should help challenge historical priorities, and research viewed as a continuing obligation.

Who will use the RDVA?

2.18 Discussions with FSA indicated that the principal users would be:

- Research proposers, with support from the Economics Branch, Analytics Unit or other relevant persons (e.g. the Benefits Manager) who help to prepare business cases for R&D projects
- Any independent assessors of research proposals, and
- The two decision making bodies: The Investment Board and the Strategic Evidence Fund, who make decisions about which R&D projects to fund.

What counts as an FSA R&D project?

2.19 FSA recognise that R&D work (and often other types of work) may involve some element of novelty or risk and will require a different approach to developing and testing the business case, as there is likely to be insufficient data to evidence a standard business case. The RDVA is designed to address this need. The initial intention was that it would be applied to R&D work carried out by FSA commissioned externally (it could also be applied to in-house

research). It was therefore considered important to understand what counts as FSA R&D for this purpose and for the RDVA to contain questions that would allow FSA to allocate a project as R&D or not.

2.20 The Office for National Statistics (ONS) in its annual government research survey uses the basic Frascati definitions of research shown below. The method specification workshop agreed that we should not try to force projects into this structure.

Figure 1: Frascati definitions

Basic research	Work directed toward the acquisition of new knowledge without necessarily having any particular application in view
Applied research	Work directed toward a specific practical aim or objective
Experimental development	Work directed at developing new materials, products, devices, processes, systems or services or substantially improving existing instances

2.21 The Office for National Statistics (ONS) include some more detailed criteria for R&D on their annual survey forms, based on Organisation for Economic Co-operation and Development (OECD) definitions:[4]

Figure 2: ONS criteria

R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge meeting all of the following five criteria:

1. Novel	New findings that support new concepts, products and processes
2. Creative	Original and not obvious
3. Uncertain	The final outcome cannot be predicted
4. Systematic	Planned, budgeted and outcomes documented
5. Transferable / reproducible	Results that could be reproduced

2.22 Workshop and interview discussions were largely consistent with using these criteria, as the basis for determining what counts as FSA research in the RDVA and therefore what work should be subject to the RDVA.

[4] 2018 Annual Government Expenditure on Research and Development, Office for National Statistics

Conclusions for the initial draft RDVA

2.23 In the initial draft RDVA we used the ONS criteria (Figure 2) as the basis of our definition of FSA R&D. We asked users to tick all the ONS criteria that applied.

2.24 As testing and development proceeded, the focus of this question was changed because:

- Concept testing found that users struggled to identify whether some of the criteria applied to their work (see Appendix 7)
- Subsequent discussions with FSA, suggested that there would be benefit in applying the RDVA to other science or wider projects that, while not strictly R&D according to the ONS criteria, also have benefits that are difficult to quantify. This would also enable a meaningful comparison with research projects, or an assessment of an overall programme of work, containing a mix of different types of project.

2.25 We therefore moved away from asking users whether their work met a particular definition of R&D to establishing whether the benefits were uncertain, and therefore whether the RDVA should apply. We also asked users whether the work was novel or creative, to help FSA with the process of filling in ONS returns.

What is the best way to categorise R&D to aid decision making?

2.26 FSA wished to have a method for categorising research to help:

- Check alignment of the project aims with strategic objectives, and periodically to
- Assess the balance of the research portfolio as a whole, across broader research areas – e.g. campylobacter versus allergens; this is particularly useful where funding allocation is done on a project by project basis rather than having pre-defined budgets for each area of work.

2.27 The literature review (Appendix 2) highlighted how processes to categorise and value research (see next section), are organisation specific. Organisations design and apply a method relevant to their circumstances depending on their sector, the timescales within which they operate, data availability, and their aims and objectives etc. The box describes an example:

Example of organisation focused R&D selection process

In the pharmaceutical industry the management of the research portfolio is aligned with business objectives. These include the Return on Investment and the innovativeness to which a business aspires. In addition, each company will have a disease area or areas of interest on which they focus and within which there are remaining medical needs it has identified. Bode-Greuel and Nickisch state that "Depending on the size of the organisation, either a corporate or therapeutic area strategies need to be developed, approved, and endorsed by the entire organisation."

This means that each pharmaceutical company will have a specific set of research areas of interest which will lead to specific portfolios of research projects.

Source: Bode-Greuel, Kerstin M. and Klaus J. Nickisch Value-driven project and portfolio management in the pharmaceutical industry: Drug discovery versus drug development – Commonalities and differences in portfolio management practice in Journal of Commercial Biotechnology, Vol 14. No 4. 307–325 October 2008

2.31 The literature review therefore endorsed the view that a bespoke process, using categorisation and valuation schemes based on FSA's specific needs, was the most appropriate approach.

2.32 Our document review revealed a number of categorisation schemes currently used by FSA. Some have been applied to all projects, and some to the subset of projects that have been identified as Science or R&D. The method specification workshop discussed the pros and cons of various schemes for FSA R&D projects including those based on:

- The rationale for the research – aligned with the FSA's strategic outcomes and objectives
- The type of research activity (social research, biological research etc)
- The R&D topic or programme area (e.g. improving regulation, monitoring foodborne disease, campylobacter, allergens)
- For Science projects, the split between core spend (not likely to be R&D); investment spend (some will be R&D) and strategic spend (the majority will be R&D)
- The type of benefit (e.g. improved inspection processes, improved consumer food safety, improved consumer information), and
- The beneficiaries of the research (e.g. FSA policy development, FSA science, FSA operations, end consumers, industry).

2.33 Overall the interviews and workshop revealed a strong preference for categorisation based on:

- The contribution made towards the ultimate beneficial impact expressed in terms of FSA's strategic outcomes e.g. improved public health, food authenticity etc (see later).

- The main beneficiaries of the research outputs and the benefit delivery pathway (e.g. via consumers, industry or policy makers).

2.34 This focus would enable the fit with FSA's strategic outcomes and objectives to be tested. It doesn't exclude particular types of research (e.g. short term, long term, low risk, high risk) and it allows a package of research projects to be considered together. It is also understandable for economists and social researchers as well as scientists.

2.35 We were told during the interview programme that currently each business case must be mapped to one (or more) of the FSA's strategic objectives. However, the most recent Microsoft Power Apps Business Case system (used for the 2019/20 project submissions) does not appear to have a mechanism for capturing a classification automatically; instead the Strategic Case screen has two narrative boxes for (i) why FSA wishes to do this work and (ii) what will be produced or delivered from it.

2.36 In addition, identifying the topic area of the research would also enable the balance of work in different areas to be assessed and potentially challenged – a list of research types was provided by FSA.

Conclusions for the initial draft RDVA

2.37 Based on the workshop and interview evidence, we concluded users should categorise research in terms of:

1. the FSA's strategic objectives the research was relevant to
2. the topic of the research – asked at this stage as an open question, and also
3. whether the project is being funded with limited discretion (a 'must-do' project), this was based on the research described in the next section.

2.38 This information would enable FSA to ensure that work was focused on their strategic objectives and assess the overall balance of their research programme over different research topics.

2.39 Information on the main beneficiaries of the research would be elicited through the pathway narrative described in the next section.

On what basis should projects be valued?

2.40 Many different organisations prioritise their science spending. This includes those in the public sector, charities, national and multinational business. As noted above, the literature review found that most do this on the basis of criteria selected to be relevant to their success, be this in policy or commercial objectives or objectives set for a not-for profit organisation. The specific criteria choice depends on the method used for prioritisation.

2.41 Below we first introduce the prioritisation methods identified in the literature, then summarise the results of the interviews and workshops with respect to decision criteria, and finally present our initial conclusions and recommendations, based on these, on how projects should be valued.

Prioritisation methods

2.42 The literature review revealed three main categories of prioritisation method:

- Must do-criteria (i.e. work that is funded with very limited discretion, for example because it is part of a statutory duty or legal obligation)
- Economic approaches, and
- Multicriteria approaches.

2.43 These are described below. We also summarise FSA's experience of them revealed through the document review, interviews and workshops.

2.44 **Must-do criteria** are used where research is funded with very limited discretion, for example because it is part of a statutory duty.

2.45 Interviewees told us that FSA does currently apply some must-do criteria, because some of its activity that counts as 'core science' is a statutory requirement, but that this could potentially be challenged.

2.46 There are also cases where an unforeseen research need arises during the year, bypassing the normal annual planning round and prioritisation process. This would not normally be considered a sufficient reason to classify the project as 'must-do' however.

2.47 **Economic approaches** use different variants such as payback period, internal rate of return, benefit cost ratio (used mainly in Government), net present value or cost effectiveness analysis. Which variables (and thereby criteria of relevance) are included in the economic approach depends on the sector within which the organisation operates and the available data. The methods applied include:

- Using published data to value the economic outcomes at the population level. This can include wages to approximate the productivity of a healthy worker, cost savings to the NHS due to reduction in disease, etc. These methods are summarised well in the literature review previously conducted by the FSA.
- Using case studies to follow through the detailed impact of different interventions in different circumstances. For example, the Medical Research Council (MRC) uses the case of treatment of cardio-vascular disease (CVD) to demonstrate the cost beneficial outcomes of treatment. The measures are the economic benefits of a healthy workforce, the value to society of a health gain and commercial development.
- Using econometric models to estimate the macro-economic effects, for example the link between public sector R&D spending and the total factor productivity of the UK economy.

2.48 In FSA, the previous business case (BC) process uses a largely economic approach. FSA have found it difficult to apply for research as the benefits are often indirect and intangible. The current 2019/20 Microsoft Power Apps business case system (the Full BC Process) includes a benefits measurement screen in the Economic Case section. Here, the benefits measures need not be economic or fully quantified, but they do need to be in some sense countable, because for each measure description the project officer needs to

record a baseline measurement and a target value for the measure after successful implementation of the project. Because of the difficulty of doing this for projects where the benefits are uncertain or difficult to describe, this screen does not now need to be completed for R&D projects.

2.49 **Multi-criteria approaches** may include quantitative and qualitative criteria. Generally they try to take a broader approach, recognising that 'value' can be difficult to monetise and that there are often trade-offs between different criteria that need to be considered. Quite often the criteria are summarised in a decision analysis framework or a balanced scorecard that allows one project proposal to be compared with another across a range of criteria. Typical criteria found in the literature (see Appendix 2) include:

- Financial and economic return
- Non-financial impact (e.g. countable health and environmental benefits)
- Research quality (sometimes assessed independently)
- Utility of outputs
- Gap analysis (filling a gap in a portfolio of research)
- Strategic fit (addressing a particular risk, opportunity or policy need)
- Operational need (including urgency)
- Technological innovation
- Accessibility of the innovation (can the organisation make use of the innovation)
- Riskiness of the project
- Timeliness of the project
- Availability of alternatives (e.g. doing nothing, a market solution, collaboration with other research organisations, other funding routes)

2.50 An example is an academic institution that uses a scorecard approach that includes four components in the decision making process: academic management perspective, stakeholder perspective, internal business perspective, and innovation and learning perspective.

2.51 Other organisations focus on process and governance as well as structure. They link R&D explicitly to the business strategy, clarify how R&D interfaces with other functions, and ensure that all relevant functions of an organisation are included (operations, strategic as well as science). They use a transparent process to evaluate options, pressure test using realistic situations and manage hearts and minds carefully. In this approach detail and big picture are clearly linked and the governance and decision making structure needs to address and embrace this. In Government Departments this often translates into a hierarchy of objectives with relevance to policy making being the most important followed by the expected results.

2.52 FSA have also explored using multi-criteria approaches including the Payback Framework, described in Appendix 2, and an earlier prioritisation scheme in use from 2007 to 2011.

2.53 Issues identified in the FSA's Notes on the Payback Framework, and in the interviews with senior management, included comments that previous methods were:

- Too complex to apply, with insufficient information available to feed them (especially economic impacts and the problem of attribution)
- Vulnerable to 'gaming', consciously or sub-consciously, e.g. by overestimation of the likely economic impact of the research
- Constrained by insufficient resources to challenge and then oversee project proposals
- Difficult to apply to projects where the need for the research and the anticipated benefits had not been articulated sufficiently clearly.

Which criteria should FSA use?

2.54 The literature review confirmed that decision criteria should be bespoke to an organisation (see above) and aligned to the organisations aims and objectives.

2.55 The senior managers interviewed agreed that the main role of FSA research was to support the organisation in its role of protecting the consumer and to answer policy related questions. The main decision making criteria they listed were:

- Priority – with reference to policy needs
- Research quality – fitness for purpose of the proposed or likely research approach
- Utility and timeliness – usefulness of the outputs to the policy need
- Potential beneficial impact – a clear story about e.g. the public health benefits.

2.56 There was a strong preference among all the officials we consulted for the RDVA to focus on the ultimate beneficial impacts focussed on FSA's strategic outcomes.

2.57 This focus on beneficial impact expressed in terms of FSA's strategic objectives and the ultimate beneficiary (e.g. improved consumer food safety), rather than on project delivery or improvements in some intermediate outcomes (e.g. improved inspection processes), was an important consideration for the design of the RDVA.

2.58 The workshop noted that science business cases currently tend to focus on how the science would be done rather than what benefits (or other impacts) could accrue to the ultimate beneficiaries. Telling the story of how the spend on R&D contributes to public health is often missing. This is potentially a cultural or skills issue (for example, research officers can feel more comfortable articulating projects in terms of the outputs they will produce and how the work will be done rather than in the ultimate impacts they will deliver).

2.59 The 'pathway' to the realisation of beneficial impacts could be (for example) via industry action; via policy or regulatory change; or via a change in consumer behaviour. The literature review revealed the importance of considering the pathway to impacts when designing and appraising research,

particularly where a behavioural change is required to secure beneficial impacts, as there is increasing recognition that consumer behaviour is not always rational.

2.60 Our second workshop was designed to see how feasible it would be in practice to identify the pathways to benefits for a sample of six example case studies. The overall conclusion from the workshop was that it was a useful process, and pathway mapping had the potential to help improve the narrative of how a research project delivers benefits.

How should projects be valued?

2.61 All the project discussions concluded that it was very difficult to quantify the benefits in terms of FSA's strategic objectives and the ultimate beneficiaries. Even for very well-established projects such as the Food and You survey for example, it is hard to tell what value the food industry places on the open datasets that are published. For more risky projects that might fail to deliver their objectives, officials understand that we learn from failure, and this has a value, but it is not quantifiable.

2.62 Focusing on quantitative measures of value can also lead to inappropriate weight being placed on those criteria and projects where quantification is more straightforward and less uncertain, and that methods that rely on quantification (including e.g. Multi Criteria Analysis based methods) can be easier to 'game'.

2.63 A summary of our assessment of each of the most common valuation methods described above, and their strengths and weaknesses for this application, is provided in Table 1.

Table 1: Summary of different approaches to project valuation and prioritisation

Approach	Description	Reason for exclusion
Must do	Only commission programmes that legally have to be done	Too narrow for the breadth of responsibility. There are some projects which will be must do projects, but FSA responsibilities are also forward looking and strategic.
Economic approaches	Identify the economic monetisable benefits and aggregate. Chose the projects with the highest Cost Benefit Ratio	Not all benefits of FSA can be monetised. Non-monetisable benefits and wider impacts can be the most important. Economic analysis for each programme can be resource intensive. Strategic objectives and policy responsibilities not fully covered.
	Identify the projects with the highest expected financial return and fund these.	As above, also FSA is not a for profit organisation.
Multicriteria Decision Analysis	Identify the criteria relevant to the organisation, establish weights and use a decision conference to select projects. Highest scoring projects are chosen until budget is spent.	Criteria can be unclear and the system can be gamed. Need to have set of projects which are then compared against each other. This does not fit with the FSA's ongoing commissioning process. Decision conferences are resource intensive.

Conclusions for the initial draft RDVA

2.64 Based on this assessment, we proposed that the RDVA should adopt a more holistic approach to valuing projects than is included in the current 'five case' business case. In addition to simple scoring of criteria-based valuation equally important would be a narrative element that describes the pathways that enable research outputs to deliver impacts that contribute to public health outcomes.

2.65 The approach should encourage and enable articulation of a clear story about:

- The pathway to the realisation of benefits including how this will be delivered via industry action, policy or regulatory change, a change in consumer behaviour, other broader influences, or a mix of these, and

- The barriers and risks to delivering benefits, which may be technical or socio-political, and how these will be addressed, including consideration of other wider, negative or unintended impacts that might result from the work.

2.66 Project officers should be asked to assess their project in terms of four criteria allocating a semi-quantitative star rating.

2.67 The recommended criteria were derived from the interviews and workshop discussions, informed by the literature review, and concerned: the quality of the likely approach, the utility of the outputs if the research if successful, the potential reach and significance of the work, and the balance of risk and reward (the degree to which the risk to realisation of benefits is commensurate with the potential rewards).

2.68 The star ratings should follow from, and be consistent with, the benefits realisation narrative.

What organisational factors could affect implementation?

2.69 The interviews and mapping workshop highlighted a number of organisational and cultural issues that would need to be taken into account if the RDVA is to be successful, included:

- The shortage of experienced project officer scientists, or shortage of time available to those who deliver this role, to propose and run research projects
- The difficulties research officers can have articulating projects in terms of the ultimate beneficial impacts they will deliver, rather than the outputs they will produce and how the work will be done
- Perceptions among some research managers that the process for submitting ideas for funding has been getting more burdensome, and low levels of awareness of the support available, particularly regarding the commercial aspects
- Cultural barriers between the science, policy, communications and field operations teams.

2.70 Interviewees identified the need for:

- Research proposals to have a business sponsor, and for opportunities to be provided for the person who submitted the proposal to be available to answer questions (e.g. by attending the relevant investment board) – all Investment Board business cases submitted through the new Power Apps portal require a policy lead sponsor to sign off the strategic case before the rest of the case can be submitted
- An open environment that allows and encourages new research needs to be identified by anyone (not just the science teams) including identifying research needed to support longer term issues that are not connected to an immediate policy need
- Better recognition and use of work conducted outside of FSA
- Wider dissemination of research proposals outside of traditional silos.

The proposed RDVA

2.71 The research described above was used to develop a specification for the RDVA (Appendix 6). This was agreed with the steering board and the initial draft RDVA drawn up. This was subject to concept testing, the results of which (see Appendix 7, which also includes a rational for each question in the RDVA) were implemented in the final draft version of the RDVA used as input to Phase 2.

2.72 The RDVA consists of the four steps described below. It is designed to be compatible with the new Microsoft Power Apps implementation of the 'five case' business case model (the Full BC Process). A fuller description of the final RDVA is provided in Annex 1 to this report. Screen shots from the Full BC Process are included in Annex 2 for information. While the detail of the RDVA changed during Phase 2 testing – the core elements described below have remained essentially unchanged.

1. Applicability of the RDVA

2.73 To determine whether the RDVA is applicable, this section explores whether the benefits (expressed in terms of FSA's strategic objectives and ultimate beneficiaries), are **uncertain** or otherwise **difficult to describe**. If this is the case the RDVA can be used instead of the quantified Benefits Management part of the Economic Case[5]. If the research is also **Novel,** and may lead to new findings, and **Creative**, original and not obvious, then the work is also likely to be classified as R&D under the ONS criteria.

2. Research categorisation

2.74 To enable FSA to assess how its research funding is being spent, the research is categorised according to:

- Whether it is funded with **very limited discretion**, for example because it is part of a statutory duty/legal obligation
- The **Strategic fit** i.e. which of FSA's strategic objectives the research is applicable to
- The **Topic** i.e. the particular policy area or public health risk, or cross cutting theme.

2.75 We also ask in this step whether the project depends on other projects to deliver benefits – but note that this is also asked in the Full BC Process, so would not need to be repeated when the RDVA is implemented as part of this process.

3. Benefit delivery pathways

2.76 This section elicits a brief narrative description, using a theory of change type structure, of how outputs from the research are intended to lead to

[5] The methodology could be applied to all projects if required, including those with a clearly defined and quantified Benefits Management case.

intermediate outcomes and beneficial impacts (contributing to FSA's strategic objectives) through one or more delivery pathways:

- Policy development and/or regulatory change
- Industry action (voluntary, non-regulatory)
- Change in consumer behaviour
- Broader influence (e.g. international collaboration or improving the evidence base for a strategic issue or an emerging risk).

2.77 The stages in the benefits pathway are defined as follows:

- Outputs are the direct product of project activities and typically are tangible and countable e.g. Reports, datasets, conference presentations and briefing notes.
- Intermediate outcomes are the intended direct results and consequences of project activities and outputs, e.g. better targeted policy and interventions due to improved quality data on trends in the occurrence of severe, food-induced allergic reactions.
- Beneficial impacts are then the contribution these outcomes are expected to deliver towards an improvement in something that is related to one of FSA's strategic objectives, e.g. a contribution towards reducing the incidence of allergic reactions. Impacts tend to lag outcomes. In the RDVA terms such as benefit and benefit delivery refer to these potential impacts (rather than to intermediate outcomes). Impacts can also be negative or unintended.

2.78 This step is designed to:

- Prompt deliberative thinking about how benefits will be delivered
- Provide information to help allocate meaningful scores in the semi-quantitative ranking.

4. Semi quantitative valuation criteria

2.79 In this step the following criteria are scored using a star rating:

- The likely quality (fitness for purpose) of the research approach envisaged
- Potential research utility
- Potential reach and significance of impacts
- Risk and reward balance.

2.80 Very few FSA projects would be expected to achieve the highest score in any category. The ratings must be supported by a short justification. The justification should follow from, and be consistent with, the benefits realisation narrative in Step 3. Where appropriate, it should also describe any risks and issues to realisation of benefits, as well as any other impacts that might accrue including negative and unintended impacts).

2.81 The scores:

- Provide a way of summarising succinctly the pathways' narrative
- Help users focus on where their project design needs further thought, and

- Provide information, along with the narrative pathway description and justifications, to support funding decisions.

Use of RDVA outputs

2.82 We have deliberately avoided the suggestion that funding decisions for projects should be based on any simple summation of scores. This will over-simplify what will often be a complex and nuanced decision process and lead to gaming of scores. Instead we are proposing that the decision boards reach their decision based on consideration of both the narrative and the scores, within the wider context of FSA needs.

Phase 2: Testing and development of the RDVA

3.1 Phase 2 applied the RDVA, as developed following proof of concept testing in Phase 1, to a sample of FSA research projects at different stages of development to:

- Provide more comprehensive testing and validation, and
- Build up a library of case study examples for future reference.

Phase 2 approach

3.2 We implemented the RDVA in an online survey tool (SurveyGizmo), to closely mimic the user experience of the Microsoft Power Apps business case system. We took into account all comments received up to 31 July 2019.

3.3 Testing was carried out using two waves of FSA projects, giving an opportunity to refine the methodology between the first and second waves.

3.4 Volunteer projects were sought from across the Science, Evidence and Research Division (SERD). The final list of projects was selected by the FSA project officer for this research to provide a range of case studies covering different:

- Research topics and strategic objectives
- Experience and background of the project officer/FSA team – more experienced project officers were selected for the first wave
- Project status – e.g. funding approved, to be commissioned, ongoing, and
- Funding routes – e.g. Investment Board, Strategic Evidence Fund.

3.5 A list of the projects selected is provided in Appendix 1.

3.6 Project officers of the selected projects were invited to attend a webinar to introduce the methodology, demonstrate the survey tool, and answer any questions and then sent a personalised link to the online survey tool.

3.7 Project officers were asked to keep notes about any questions they found difficult to answer or unclear in anyway, and provide feedback at the end of the survey.

3.8 Following completion of the first wave of seven projects the returns were analysed, and presented to the steering group. The tool was updated to reflect both the results of the analysis and the subsequent discussions.

3.9 The updated RDVA was then tested on a second wave of six projects and the results again shared with the steering group.

Phase 2 summary of findings

3.10 We have set out key findings from the testing carried out in Phase 2 below under each of the RDVA steps in turn. The findings of both waves are presented in more detail in Appendix 8.

Step 1: Applicability of the RDVA

3.11 On the basis of the testing and feedback, no changes were considered necessary to this section. Projects provided clear responses.

3.12 Most respondents stated that their projects' benefits were uncertain or difficult to describe, a smaller number indicated that the work was novel or creative, for example:

- [Novel or creative: Yes] "Understanding of how different players in the supply chain react to delays of imports is currently scarce. This research aims to fill the knowledge gap and could lead to new policies or regulatory changes."
- [Novel or creative: No] "We rely on a well-established methodology."

3.13 This step also sought information on dependencies. Some projects (about a third) indicated that they depend on other projects to deliver benefits. Descriptions explained the nature of the dependency, for example:

> "The outputs of the research will be used by the FSA's Analytics Unit to build a model to estimate the value of food spoilage and value depreciation at ports. The realisation of benefits therefore depends on the availability of internal resources and project delivery."

3.14 This question is also included in the current Full BC Process, so does not need to be repeated in the RDVA once implemented as part of the Full BC Process – however, in the Full BC Process we note that it is asked towards the end. In the RDVA it was asked earlier to prompt thinking about dependencies along the pathways to delivery of benefits.

Step 2: Project categorisation

Strategic objectives

3.15 Only one change to this step was identified during Wave 1 testing. One comment noted that Strategic Evidence Fund (SEF) projects have a different set of strategic objective categories. The steering board advised that we add a sixth objective to our list of strategic objectives 'Strategic Evidence (SEF project)'. This was implemented for Wave 2.

3.16 There were no Northern Ireland projects in the sample and no SEF projects in Wave 2 – but all the other categories were ticked at least once.

3.17 Following advice from FSA[6], a modification to the Northern Ireland objective has been proposed. We have noted this in the recommendations section.

Research topics

3.18 Six of the topic areas were selected once each. Two projects specified other topic areas beyond those suggested on the list: the additional topic areas were *'Food Crime and Enforcement'* and *'Food Safety Culture'*. These suggest the possible need for a wider societal or cultural category or categories that should be added to the list.

3.19 However, at the steering group presentation of the Wave 2 findings it was agreed that it would be useful, in the Full BC Process, to replace the current set of research topic categories, with the FSA ARI categories[7]. This should address this point.

Step 3: Benefit delivery pathways

3.20 Respondents found this section of the RDVA the most difficult to complete and in some places repetitive. To try to address this some changes were made to the structure and questions prior to Wave 2 testing (these are detailed in Appendix 8) and more help and worked examples were also added.

3.21 As it was not clear to what extent the separate guidance document provided in Wave 1 was used, we incorporated guidance directly within the RDVA for Wave 2.

3.22 The changes were designed to help project officers distinguish between the different stages in benefit delivery, through to the final impacts to the ultimate beneficiaries, and articulate these clearly. However, while outputs and risks to outputs were often well described, responses to the intermediate outcomes and impacts questions remained variable.

3.23 From the feedback we concluded that replacing the current examples with easy to access links to a single worked example selected from the case studies could be very helpful, if this is possible within the Microsoft Power Apps application.

3.24 The quality of response to questions about risk also varied. Risks to outputs were often well described, but with some focusing only on risks to delivery of outputs and not on quality, for example:

> "The risks to delivery of outputs are minimal, as the research is desk-based."

> "Risks are minimal as it is desk work, using existing data."

3.25 Risks to outcomes and impacts were generally less well described, while some respondents did think through risks and barriers to the delivery of

---

6 Communication from David Kane, FSA Project Officer.

7 ARI are Areas of research interest, which give details about the main research questions facing government departments

ultimate impacts, others continued to focus on outputs and more immediate outcomes. Mitigations were not generally proposed. The following examples of responses show the range:

> "Risks: - Analysis might not identify a specific problem which needs to be addressed Barriers: - If a problem is found, we need internal resources to address it. - If a problem / big cost is found, there could be resistance from industry (ports) to tackle it (need to make sure we are not publicly blaming anyone) Mitigation strategies: - early engagement with industry about the project, getting their buy-in and views to inform government policy. This will depend on policy networks and engagement, not just AU. - build good relationships with other analysts across government to make sure our outputs and insights are used."

> "As noted, the risk to the delivery of outcomes is not large. Additionally, the risk to impact comes down to the extent to which recommendations are considered (which is in the hands of others)."

3.26 The pathways to benefit narrative elicited in this section is a key source of decision information, but it was clear that this presented a challenge to users. The challenges identified here were discussed at some length with the steering group and a number of potential changes to this section were discussed. These were designed both to reduce the burden on users and improve the quality of responses. The proposed changes were carefully considered. A summary of the discussion and our conclusions are provided in Appendix 8.

3.27 The key conclusions we reached, informed by additional discussion with the FSA project officer, were:

- As the information entered at Question 13 of the RDVA in the 'Potential impacts' and 'How outcomes contribute to impacts' columns was often repetitive, these two columns could be merged.
- While tick boxes could be used in this step, in place of a narrative approach, we concluded that the narrative approach should be retained as it is a central element of how the RDVA elicits information.
- While it would make sense to align the language used in the RDVA (based on Theory of Change (TOC) language) with the process improvement language used in the FSA, the TOC language has advantages in this application. We recommend that the split between outcomes and impacts recognised in TOC language is retained in the benefits pathway section. We recommend changing 'outcome' to 'intermediate outcome' and making clear that when benefits are referred to these relate to the beneficial impacts to the ultimate beneficiaries (principally consumers) expressed in terms related to FSA's strategic objectives (not to intermediate outcomes).
- We noted that references to benefits and benefits delivery pathways implies positive impacts only are of interest. However, it is possible that the application of research may lead to unintended, negative impacts. We recommend that the focus of the benefits delivery pathways section should

remain on positive impacts, but that we should ask users to think about potential negative and unintended impacts in the question on risks and issues

- We discussed the inclusion of a specific question about current baseline performance, however, this is how the benefits management section (Q28) of the Full BC Process is framed – and this section is considered too difficult to fill in for R&D projects because of the uncertainty around benefits delivery. We therefore would recommend retaining the current RDVA approach, which captures information about the baseline implicitly. For example, the following description of outcomes clearly implies that the current data on trends etc is too poor quality:

  "The project would give us better quality data on trends in the occurrence of severe, food-induced allergic reactions, which will help FSA to target policy and interventions in key FBO issue areas."

  We note that the Full BC Process includes a question (Q15) 'Why are we doing this work' and this would be the logical place to discuss the current situation and why the new work was needed.

3.28 Changes to how and where the risk questions are presented were also discussed. These are described under Step 4 below.

Step 4: Semi quantitative valuation criteria

3.29 Following the Wave 1 testing no changes were considered necessary to this section.

3.30 In Wave 1* Respondents mostly answered 3* - 'wholly appropriate for FSA', with a small number assessed as 2* - 'some weaknesses'. Justification was provided for most scores. The justifications and Step 3 narrative appeared to us to support the scores.

3.31 In Wave 2, scores ranged from 2* to 4*. Justifications were not always supplied, but where they were, they did explain why the project officer thought the score was appropriate and revealed more about the strengths and weaknesses of the project.

3.32 Following feedback from the steering group we considered a number of changes to this section. A more detailed discussion of these is provided in Appendix 8. Our key conclusions were:

- The star ratings were useful, providing concise information for decision makers that complements the narrative description, the justification should be made compulsory
- The star rating for 'Quality' is difficult to assess but should be retained with some rewording to make the difference between Quality and Utility clear and to reflect that the fact that the detailed approach will not always be available until a tender document has been issued and a bidder selected.

3.33 We discussed with the steering board the option of eliciting risk information in this section as part of the justification for the scores – specifically project risks and risks to delivery of benefit. This should help reduce repetition and

cognitive burden. The text of each risk question should emphasise that we want people to think about risks specific to the project. Links to the worked example should be used to illustrate good responses.

Overall conclusions on usefulness and usability

3.34 The overall conclusion of the steering board was that the outputs of the RDVA, as presented in the case study reports, were useful. The star ratings provided concise information for decision makers that complements the narrative description. The narrative and justifications supporting the scores were equally important decision information, providing richer information and helping the decision boards assess the validity of the scores.

3.35 Overall, feedback on the RDVA suggests it was not difficult to use, but it took longer than anticipated to complete all the sections. Most respondents found the template 'easy to use' or 'neither easy nor difficult to use', and 'agreed' or 'strongly agreed' that the answers they had given accurately reflected the anticipated benefits from their project.

3.36 In Wave 1, four respondents completed the template in one sitting, taking between 25 minutes and one hour 20 minutes. Three respondents started the survey one day and came back to it one or more days later. A similar pattern was observed for Wave 2.

3.37 As this is intended to be a deliberative process that prompts additional conversations with colleagues, these times do not appear unreasonable. However, the changes suggested above should reduce the times to completion. Examination of the responses throughout the tool suggest to us the following areas where improvements could be made to reduce the cognitive load on users:

- The explanations should be expressed in plainer English "some of the explanations were very convoluted / lengthy so that I had to read them twice to understand".
- The introductory text should explain the context and requirement more clearly
- There is a lot of reading to do to complete the process – care should be taken to minimise this as much as possible.

3.38 The variation in the quality of responses, especially those relating to pathways and risks suggests to us that some light touch support to, and governance of, the RDVA will be needed (this is discussed further in the next section).

Conclusions and recommendations

Conclusions

4.1 This work has developed a methodology for valuing FSA R&D projects, and other projects with impacts that are uncertain or difficult to describe – the RDVA.

4.2 The RDVA consists of the following elements:

- Determination that the RDVA applies
- Categorisation of the project based on the fit with FSA's Strategic Objectives and the Research Topic area
- A brief narrative description, using a theory of change type structure, of how outputs from the research are intended to lead to intermediate outcomes and beneficial impacts through one or more delivery pathways
- Semi-quantitative valuation criteria for research quality, potential research utility (timeliness and usability of outputs), potential reach and significance of impacts, and risk and reward balance.

4.3 Funding decisions for projects should be based on consideration of both the narrative (which has limits on the length allowed) and the scores, within the wider context of FSA needs.

4.4 Testing demonstrated that while the responses generated through application of the RDVA often contained gaps, the narrative was generally sufficiently developed for an impression of projects' strengths and weaknesses to emerge. The outputs were considered useful to support decision making.

4.5 The RDVA requires the project officers to engage with the deliberative process and to think beyond the immediate outputs and outcomes of the work towards delivery of impacts to the ultimate beneficiaries. The pathways section still presents the greatest difficulty to respondents – in part this may be because thinking about projects in these terms is new to project officers – especially perhaps those with less experience.

4.6 While some of the improvements suggested below may help address this, FSA should give thought to governance and to how project officers can be supported through the process, especially in the early days. The case study library will also be a useful source of worked examples, so we encourage a careful review of these to ensure they are as complete as possible.

4.7 Our recommendations presented below address implementation and governance of the RDVA, refinements to the questions and guidance and some wider suggestions relevant to the whole process of identifying and prioritising research.

Recommendations

Implementation and governance of the RDVA

1. **Integration with the business case process:** The tool should be incorporated in the Microsoft Power Apps implementation of the 'five case' business case model at the Full Business Case stage. Attention should be given to the following:
   - We suggest Q3 and Q4 of Step 1 of the RDVA are inserted ahead of Q17 of the Full BC Process. For projects where meaningful quantitative benefit measures are difficult to estimate (Q4 of the RDVA), routing should direct the user to Step 2 of the RDVA, omitting Q17 of the Full BC Process
   - The questions regarding outputs in Step 3 of the RDVA (Q10) may be omitted, but adequate signposting should be provided to remind users of earlier inputs made in this respect (Q15 of the Full BC Process) (see also recommendations on risks to outputs below).
   - The question on dependencies Q6 of the RDVA is already asked in the Full BC Process, so does not need to be repeated in the RDVA once implemented as part of the Full BC Process – however, in the Full BC Process we note that it is asked towards the end (Q29). In the RDVA it was asked earlier to prompt thinking about dependencies along the pathways to delivery of benefits
   - The pathways section should include logic routing to 'grey-out' or hide pathways not selected by the user at Q12 of the RDVA in subsequent questions
   - Users should be encouraged to use Q14 of the Full BC Process 'Why are we doing this work' to briefly describe the current situation (the baseline) and therefore why the new work is needed.
2. **Encouraging deliberative thinking:** To promote deliberative thinking, communication around the RDVA should:
   - Emphasise that the tool should be used from the early stages of project planning to help develop the project and its business case, not a hoop to jump through at the end
   - Encourage consultation with, and include clear signposting to, colleagues including the benefits manager, policy colleagues and communications
   - Encourage consultation with others outside the project as appropriate to the project.
3. **Developing and maintaining good practice:** It will be important to ensure that there are sufficient resources to champion and then maintain the RDVA. The focus on the ultimate beneficial outcomes and the pathways to realisation of these is new; evidence from testing the RDVA suggests that project officers can find this challenging. FSA should provide ongoing support via, consideration could be given to the following:

- Webinars to introduce new project officers to the RDVA
- Clear sign-posting to people who can provide support in applying the RDVA
- Maintenance of a library of case study worked examples
- Appropriate governance arrangements (see below)
- Light touch periodic refresher training of project officers, line managers, providers of support responding to the findings of checks.

4. **Governance of the process:** FSA should consider the following:

- Routine provision of feedback to project officers demonstrating that the information has been used in the decision making process and how - routine use of the pathway descriptions in decision making will encourage project officers to engage fully with the process and could also in the medium term change the way FSA thinks about why research is conducted
- Review and endorsement of the benefits pathway descriptions and semi-quantitative star ratings by someone other than the project officer, e.g. a line manager or the FSA benefits manager
- Independent audit of a sample of submissions, especially in the early days, to ensure consistency; this sample could be weighted towards e.g.:
  - Higher cost projects (a level of £100k was suggested as a potential cut-off point
  - Higher risk projects

  Reviewing a sample, rather than say all projects excluding some financial limit (a level of £100k was suggested as a potential cut-off point), reduces the likelihood of gaming.

Final refinements to the RDVA[8]

General

- Review the wording of the guidance and questions throughout, to ensure they are in Plain English and that examples aren't too technical in language.
- Provide a single, strong worked example (from the case study library) available (via clicks) and signposting to assistance (as in the current Full BC Process).
- Retain in the introduction test to encourage deliberative thinking (and also in the introduction to the pathways section (Step 3).
- Set expectations of the length of time the process will take to complete appropriately in the introduction.

---

[8] See also Appendix 8 where these recommendations are mapped onto screen shots from the RDVA as implemented in Survey Gizmo for Wave 2 testing in Phase 2.

- Review text throughout to remove reference to the separate guidance document – guidance should be incorporated directly in the system as far as is possible.

Step 1: Confirmation that the RDVA applies

- Include an introductory sentence explaining that the FSA will seek to implement this method for projects where benefits are difficult to quantify, subject to confirmation from John Brookes.
- Make the requirement to justify the response to Question 4 of the RDVA: 'Are the benefits your project aims to deliver **uncertain** or otherwise **difficult to describe**?' compulsory.
- In Question 5 of the RDVA, include an example of a project which would NOT be classed as novel or creative for example, the project relies on a well-established methodology.

Step 2: Project categorisation

- In Question 7 of the RDVA, add an example of a must do project to the definition of this type of project – as shown underlined below:

  Work that is funded with very limited discretion, for example because it is part of a statutory duty or legal obligation – An example of this would be official control lab work.

- In Question 8 of the RDVA, update the Northern Ireland strategic objective to read: '(Northern Ireland only) - Working with key partners, including the food industry and other government departments, to provide and promote healthier food and nutrition information for consumers in Northern Ireland.'
- Replace the current set of research topic categories included in Question 9 of the RDVA with the FSA ARI categories.

Step 3: Benefit delivery pathways

- Retain the current approach based on narrative, rather than simplifying to a set of tick boxes, but review this after the RDVA has been in use for a period and after UKRI has developed and tested their new approach to research appraisal, to enable learning from this to be considered by FSA.
- Change references to 'outcomes' in the RDVA to 'intermediate outcomes' to differentiate it from the way outcomes is used in FSA process improvement language (which appears to cover both outcomes and impacts as used in the RDVA).
- Ensure that it is clear that when benefits are referred to these refer to impacts, expressed in terms related to FSA's strategic objectives not to intermediate outcomes.
- It will be particularly important in this section to ensure that logic routing is enabled to hide pathways the user did not select in Question 12. This was not always possible in the survey tool.
- Remind users in the introduction to this section that the purpose is to prompt a deliberative process of thinking.

- Consider merging the ‘impacts’ and ’outcomes to impacts’ columns (Q13).
- If the outputs question (Q10) is retained in its current form add ‘utilising’ before ‘publishing’ in the following: ‘Describe the expected outputs and the plans for publishing, communicating and sharing the findings inside and outside FSA to ensure outcomes are delivered’ as the FSA can use outputs internally or with OGDs without communicating and sharing.
- For recommendations on changes to how and where the risk questions are presented see under Step 4 below.

Step 4: Semi quantitative valuation criteria

- We recognise that the star rating for ‘Quality’ (Q15) can be difficult to assess but recommend that it should be retained with some rewording to Questions 15 and 16 to make the difference between Quality and Utility clear and to reflect the fact that the detailed approach will not always be available until a bidder has been selected. We suggest:

  Likely Quality of the anticipated project approach: Thinking about the aims of the research and the available resources (including budget, data and skills) can we have reasonable confidence that the proposed approach will be fit for purpose and not over-designed, and that the findings of the research will be repeatable and conclusions robust?
  Potential utility of the project outputs (if successful): Will the research deliver useful information; will the results be available in the right format and at the right time to deliver (or substantially contribute to) the anticipated outcomes?

  The descriptions of the star ratings will also need reviewing and updating. An example of what this might mean is provided in Appendix 8.
- Question 11 concerns project risks (risks to outputs), but this is already elicited in the Full BC Process – and does not need to be asked twice. However, we note that this question falls at the end of the Full BC Process (Q28) and requires a detailed response. For R&D projects it may be better to move it to the RDVA section, and reduce the detail requested.
- If retained:
  - The text should refer to risks and issues (as in the current Full BC Process)
  - Users should be prompted to think about risks specific to the project rather than general risk descriptions such as ‘delay’ or ‘lack of data’
  - Links to the worked example should be used to illustrate good responses
  - The wording of the ‘Tell me more’ help should be revised to more positively prompt for risk management information.
- Question 14 on risks to intermediate outcomes and impacts could also be moved to this section and merged with the justification question (Q18). An

example of how this might be done is shown in shown in Appendix 8[9]. The text should prompt the user to think about any negative or unintended impacts. Links to the worked example should be used to illustrate good responses.

Wider suggestions

4.8 The research identified a number of recommendation related to organisational and cultural factors that impact effective identification and appraisal of R&D projects:

- Research proposals should have a business sponsor, and ideally opportunities should be provided for the person who submitted the proposal to be available to answer questions (e.g. by attending the relevant investment board).
- An open environment that allows and encourages new research needs to be identified by anyone (not just the science teams) should be encouraged. This should include identifying research needed to support longer term issues that are not connected to an immediate policy need.
- Better recognition and use of work conducted outside of FSA is needed.
- Wider dissemination of research proposals outside of traditional silos is needed.

[9] The examples provided in Appendix 8 are for illustrative purposes only as we would recommend these are developed with FSA by applying to one of the case study examples to ensure that the approach is practical.

Annex 1: Description of the RDVA

In this annex we present a description of the version of the RDVA used in Wave 2 of the Phase 2 testing. A download of the full RDVA, including all the help files and logic routing implemented, is available as a separate note.

The RDVA is designed to be compatible with the new Microsoft Power Apps implementation of the 'five case' business case model used for investment board decisions (referred to as the Full BC Process here). It could also be used as an additional part of the strategic evidence fund application form.

The 'five case' model considers:

a) The Strategic Case for conducting the work
b) The Economic Case (including options appraisal and benefits management)
c) The Financial Case (funding requirements)
d) The Commercial Case (procurement strategy)
e) The Management Case (governance, milestones, risks, dependencies).

For projects that qualify for the RDVA, the benefits management part of the Economic Case does not need to be completed because quantitative success measures would not generally be available[10]. Instead, the more holistic assessment described below should be completed. This should be incorporated into the online system as separate screens, with branch points. Our recommendations – described earlier in this report, provides guidance on issues that will need to be taken into account when integrating the two systems. Screen shots of the Full BC Process are provided in Annex 2.

The RDVA should be reviewed in light of the recommendations presented in Section 4 of the main report prior to implementation.

1. Applicability of the RVDA

In the following questions we ask about the benefits your project is designed to deliver. Here benefits are defined as the contribution made towards the achievement of FSA's strategic objectives, with the ultimate beneficiary being the consumer.

Are the benefits your project aims to deliver uncertain or otherwise difficult to describe?

[10] Note that when this work started, the Benefits case was compulsory for all projects, The Economic case has since been updated, and it is no longer necessary to complete the benefits management section for research, in-part due to discussions held at workshop 1.

Select 'Yes' if you do not believe it is possible for you to complete the Quantified Benefits Management part of the updated Economic Case with any degree of confidence

Yes/No

Is the work novel (may lead to new findings) or creative (original and not obvious)?

We ask this question to determine whether the work is also likely to be classified as R&D under the ONS criteria.

Yes/No

Does your project depend on other projects to deliver impacts?

If your project is part of a programme that relies on other projects to deliver the intended benefits, please describe briefly here, as it is important that this is taken into account when considering funding. Where other projects are still in planning, or to be planned, please consider the strength of the dependencies and whether one or more of the projects should be considered with this project as a single package of work for the purposes of this process.

Yes/No

Is the work funded with very limited discretion, for example because it is part of a statutory duty or legal obligation?

Yes/No

2. Research categorisation

Which of the FSA strategic objectives does the work contribute to?

All R&D projects

Food is safe

Food is what it says it is

Consumers can make informed choices

(Northern Ireland only) Consumers have access to an affordable, healthy diet, now and in the future

Strategic evidence (SEF projects)

Which topic area(s) does the research address?

Antimicrobial resistance (AMR)

Allergens

Foodborne diseases (FBD)

Consumer research

Market research

Regulatory research (inc. operations)

Nutritional (NI only)

Scientific governance and capability

EU Exit

Novel foods

Chemicals: supplements / additives / natural

Chemicals: contaminants / pesticides / veterinary medicines

Radiological

Other microbiological (inc. TSE)

Other (please specify)

3. Benefit delivery pathways

The following questions are designed to prompt a deliberative process of thinking about how benefits might be delivered (and what might prevent this), aimed at strengthening the project design, and understanding and capturing information around what needs to happen, outside the project, to ensure the potential benefits are realised.

Describe the expected outputs from the project and the plans for publishing, communicating and sharing findings inside and outside FSA

Outputs are the direct product of your activities and typically tangible and countable. In principle you should have full control over the outputs you produce. Outputs may include reports, datasets, conference presentations and briefing notes.

What are the risks and barriers to delivery of outputs, and how will these be managed?

Through which of these pathways do you expect the work to deliver outcomes?

Policy development and/or regulatory change

Industry action

Change in consumer behaviour

Through broader / other influence and further research (e.g. international collaboration, or improving the evidence base for a strategic issue or an emerging risk)

Describe how outcomes contribute to impacts for each pathway identified above

	What potential outcomes are expected and how will these be delivered by the work?	**If successful, what potential impacts might the work contribute towards?**	**How and why will outcomes contribute to impacts?**
	Outcomes are the intended results and consequences of activities, e.g. • Better quality data on trends in the occurrence of severe, food-induced allergic reactions will help FSA to target policy and interventions in key FBO issue areas. • Industry will be encouraged to act and put in place measures of best practise learning. • Consumers and clinicians will become more aware of risk factors.	Impacts are the contribution towards FSA's strategic objectives. Impacts tend to lag outcomes, e.g. • Reduced incidence of allergic reactions. • Reduction in hospitalisations and primary care visits. • Reduced cost/burden on NHS.	e.g. • Improved advice to clinicians, patients and consumers is hoped to reduce risk-taking behaviour. • Locations, foods and circumstances that lead to severe allergic reactions can be targeted by providing advice to local authorities on e.g. sampling plans and premises inspections.
Policy development and/or regulatory change			
Industry action			

Change in consumer behaviour			
Through broader / other influence and further research			

What are the risks and barriers (technical or socio-political) to delivery of outcomes and impacts? How will these be managed?

4. Semi quantitative valuation criteria

The following criteria should be assessed using a qualitative star rating. This will be a self-assessment initially, but there is the potential for the line manager, the benefits manager, an independent assessor, the investment board or the CSA (for strategic evidence fund projects), to modify the star ratings.

Quality of the anticipated project approach

Is the anticipated project approach (methodology) fit for purpose and will it generate outputs that are fit for purpose?

★	★★	★★★	★★★★
Poor The approach has significant weaknesses that should be addressed	**Some weaknesses** The approach has some areas where improvements could be made, or may be moderately over designed, actions to address identified issues need to be identified and included in the project plan	**Wholly appropriate for FSA** The approach is fit for purpose and not over-designed, project risks have been identified and a credible plan to address them set out	**Exceptional** The approach is an example of best practice in this field, project risks have been identified and a clear plan to manage them set out that gives confidence that good quality outputs will be delivered

Justify your assessment, identifying any areas where the project design needs attention

Potential utility of the project outputs (if successful)

Will the anticipated outputs be timely, useful and useable to help deliver (or substantially contribute to) the desired outcomes?

★	★★	★★★	★★★★
Poor The work is unlikely to deliver, or contribute to, the desired outcomes	**Some weaknesses** The outputs will require additional work to achieve the desired outcomes, a credible plan needs to be developed to achieve this	**Wholly appropriate for FSA** The outputs should deliver the desired outcomes. Some additional work may be required before they can be effectively used but there is a credible plan to achieve this	**Exceptional** The outputs should support effective action and deliver the desired outcomes of the project. In some cases, they may also deliver additional value

Justify your assessment, identifying any areas where the project design needs attention

Potential reach and significance of the work (if successful)

The likely number or diversity of beneficiaries, the degree to which beneficiaries may be benefited

★	★★	★★★	★★★★
Poor The potential impact is low	**Some weaknesses** The potential impact is modest	**Wholly appropriate for FSA** The potential impact is material in terms of numbers benefited, or degree of benefit	**Exceptional** The project has potential to deliver benefits to a significant number of people or organisations, or high levels of benefit to a smaller number of at-risk people or organisations

Justify your assessment, identifying any areas where the project reach or significance needs attention

Risk-reward balance

Is the risk to realisation of benefits proportionate to the potential rewards (e.g. high risk, but high potential reward)?

★	★★	★★★	★★★★
Poor The risks are too high given the potential reward	**Some weaknesses** The rewards are unlikely to justify the risks; there are flaws either in terms of managing risk, or ensuring that delivery of outcomes and impacts are optimised	**Wholly appropriate for FSA** The rewards are proportionate to the risks; there are clear plans for risk management and benefits optimisation	**Exceptional** The rewards clearly out-weigh the risks; plans for risk management and optimising benefits delivery are well thought through and credible

Justify your assessment, identifying any areas where risk management needs attention

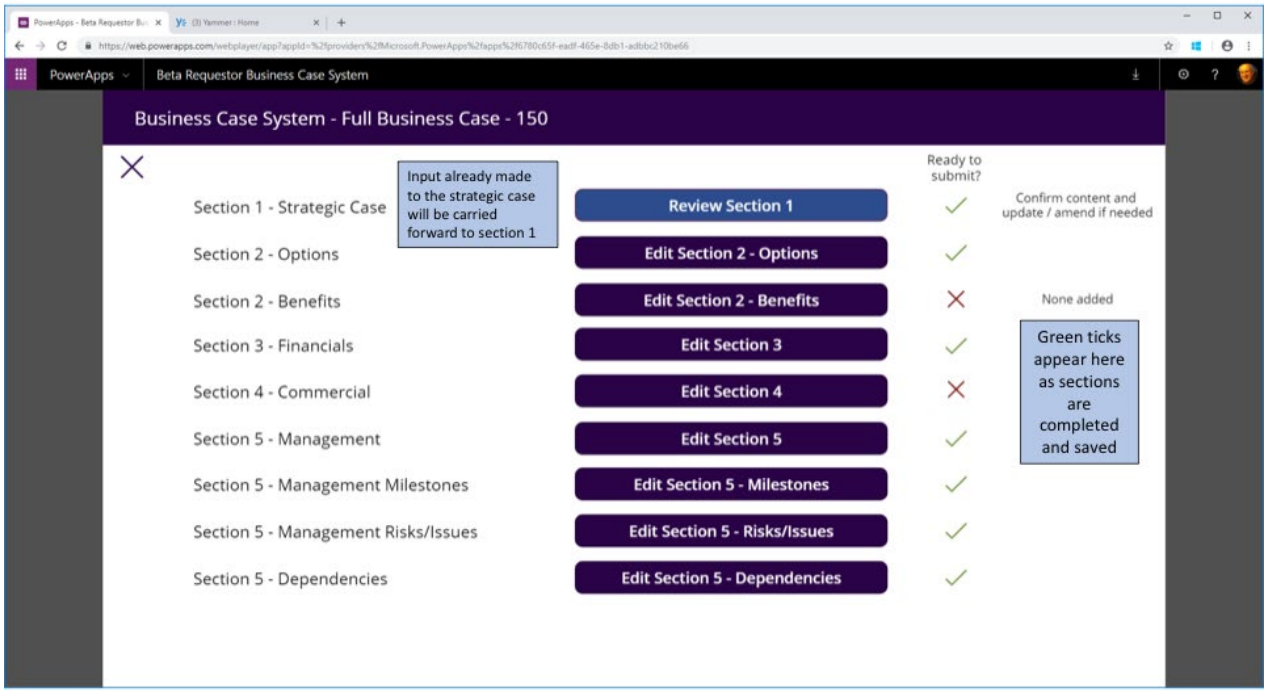
The star ratings should follow from, and be consistent with, the benefits realisation narrative in Section 3.

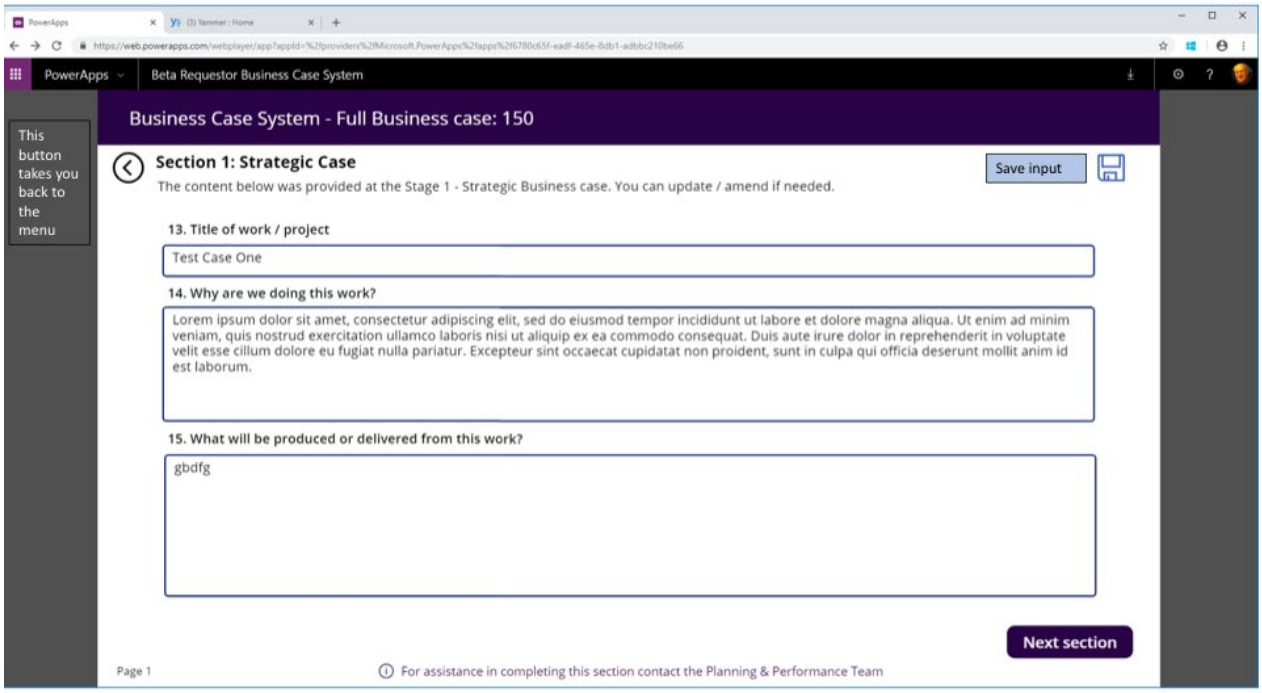
Using the outputs of the RDVA

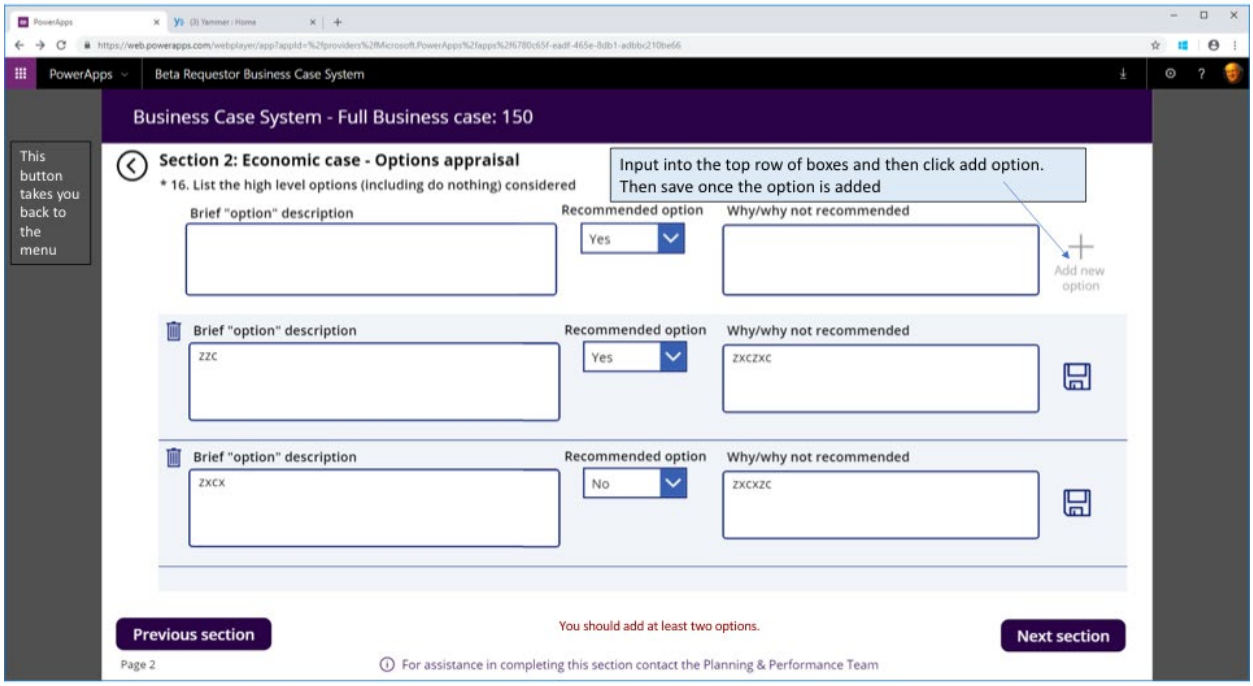
The scores are not summed, or otherwise combined. Decision boards reach their decision based on consideration of both the narrative and the scores, within the wider context of FSA needs.

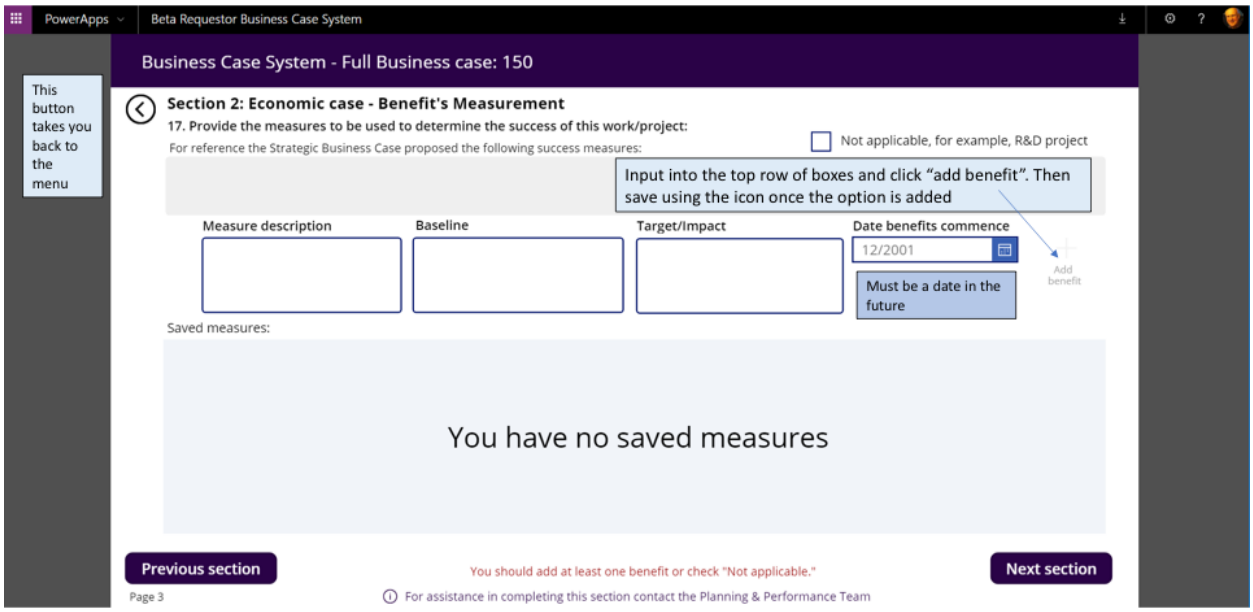
Annex 2: The 'five case' business case system

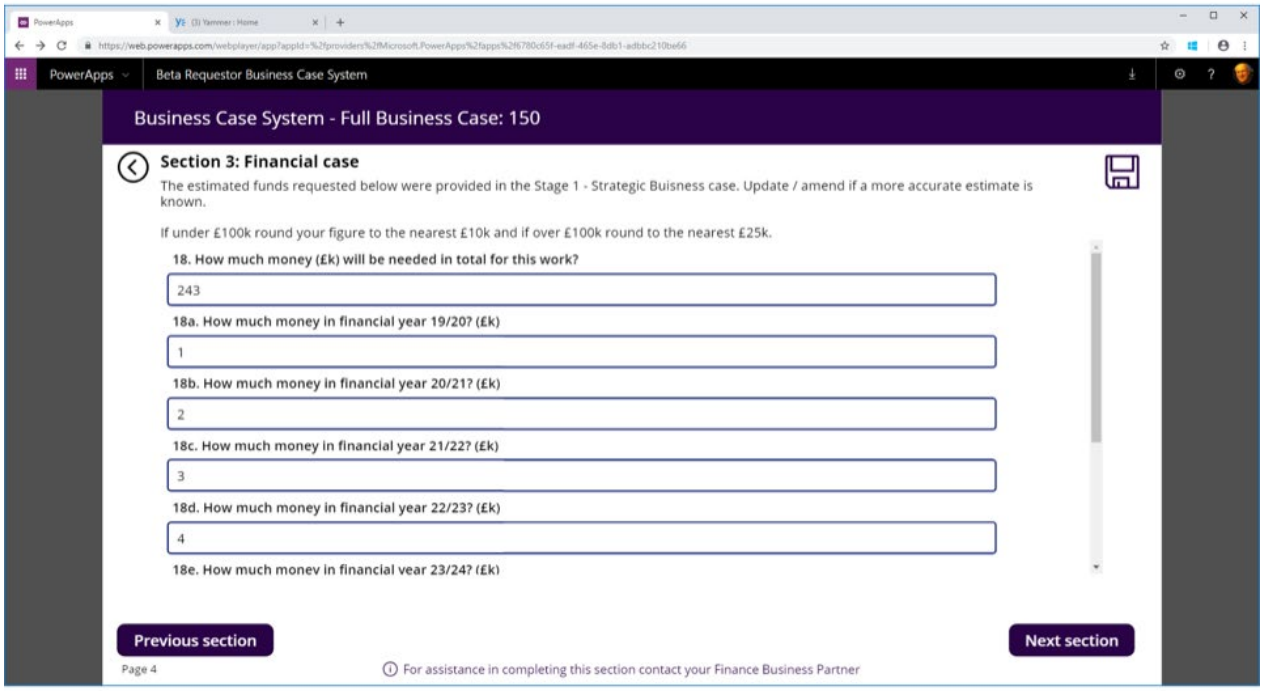
Screen shots from the Microsoft Power Apps implementation of the 'five case' business case system.

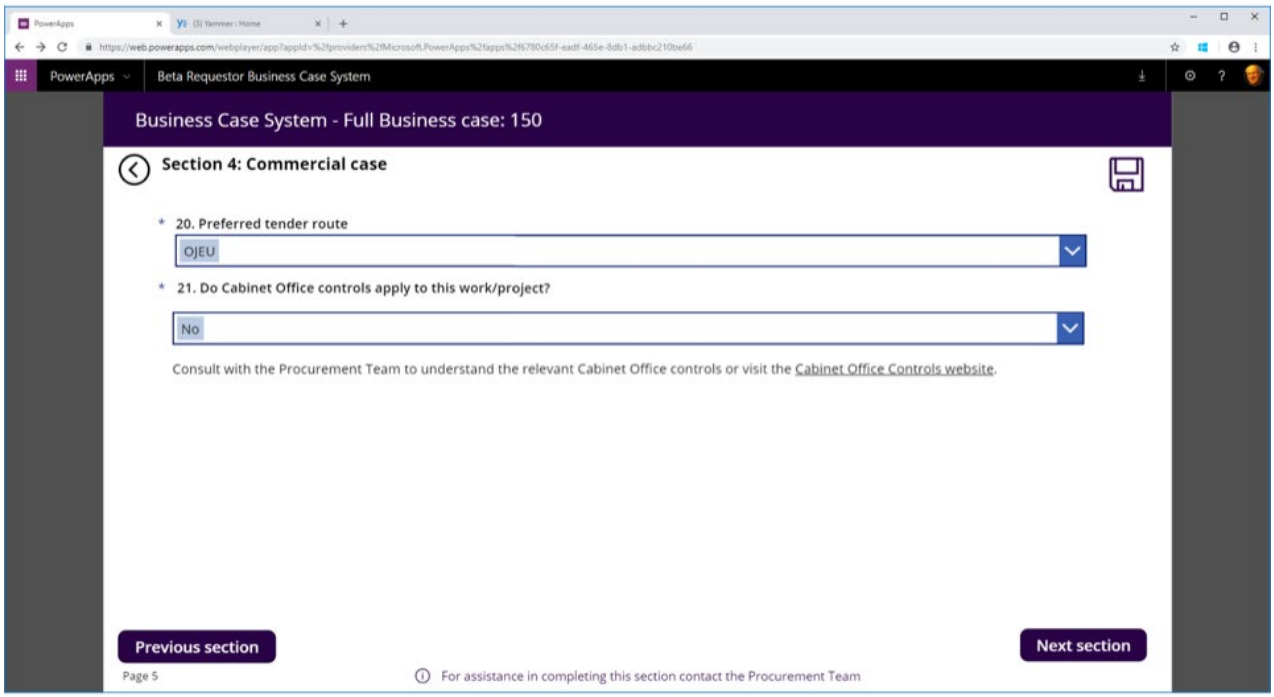


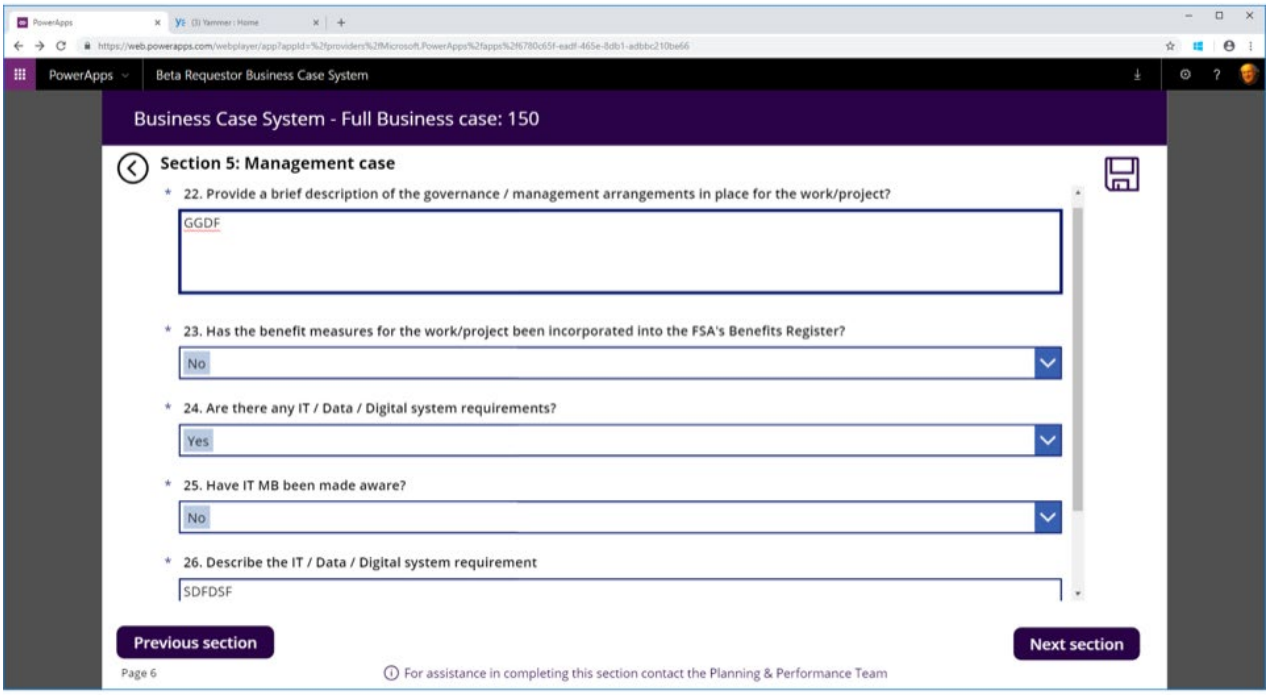


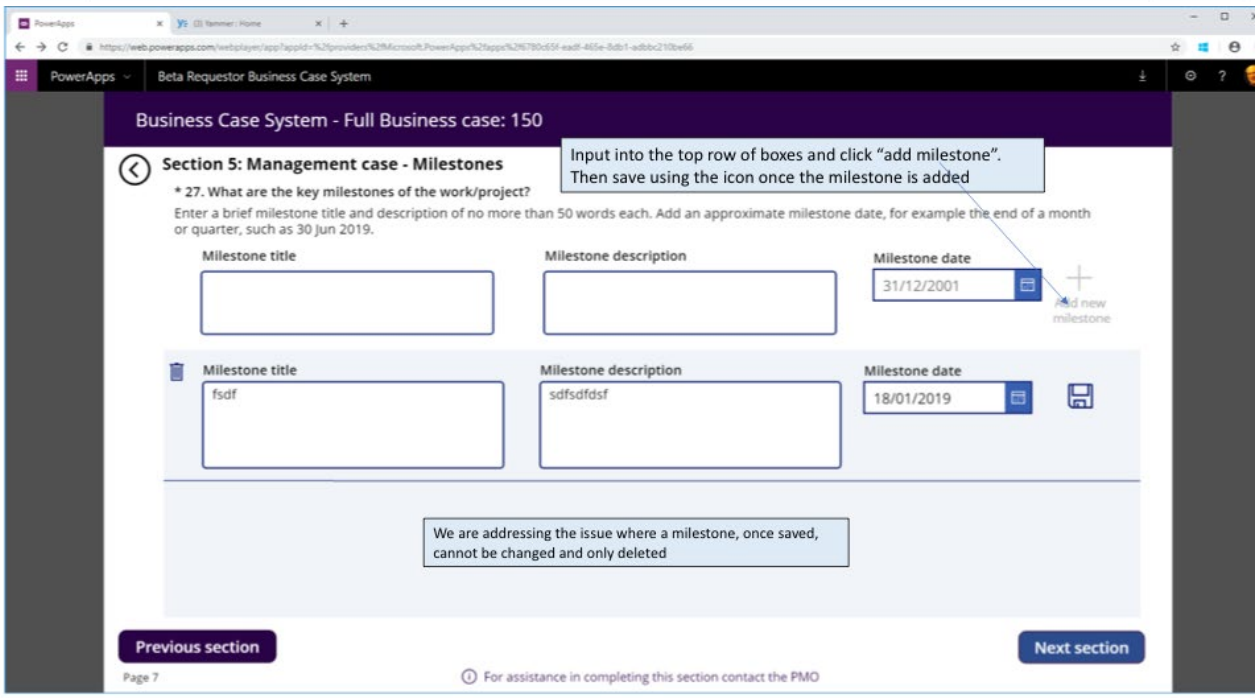

PowerApps
Beta Requestor Business Case System
Business Case System - Full Business case: 150
This button takes you back to the menu
Section 2: Economic case - Options appraisal
* 16. List the high level options (including do nothing) considered
Input into the top row of boxes and then click add option. Then save once the option is added
Brief "option" description
Recommended option
Why/why not recommended
Yes
Add new option
Brief "option" description
ZZC
Recommended option
Yes
Why/why not recommended
ZXCZXC
Brief "option" description
ZXCX
Recommended option
No
Why/why not recommended
ZXCXZC
Previous section
You should add at least two options.
Next section
Page 2
For assistance in completing this section contact the Planning & Performance Team

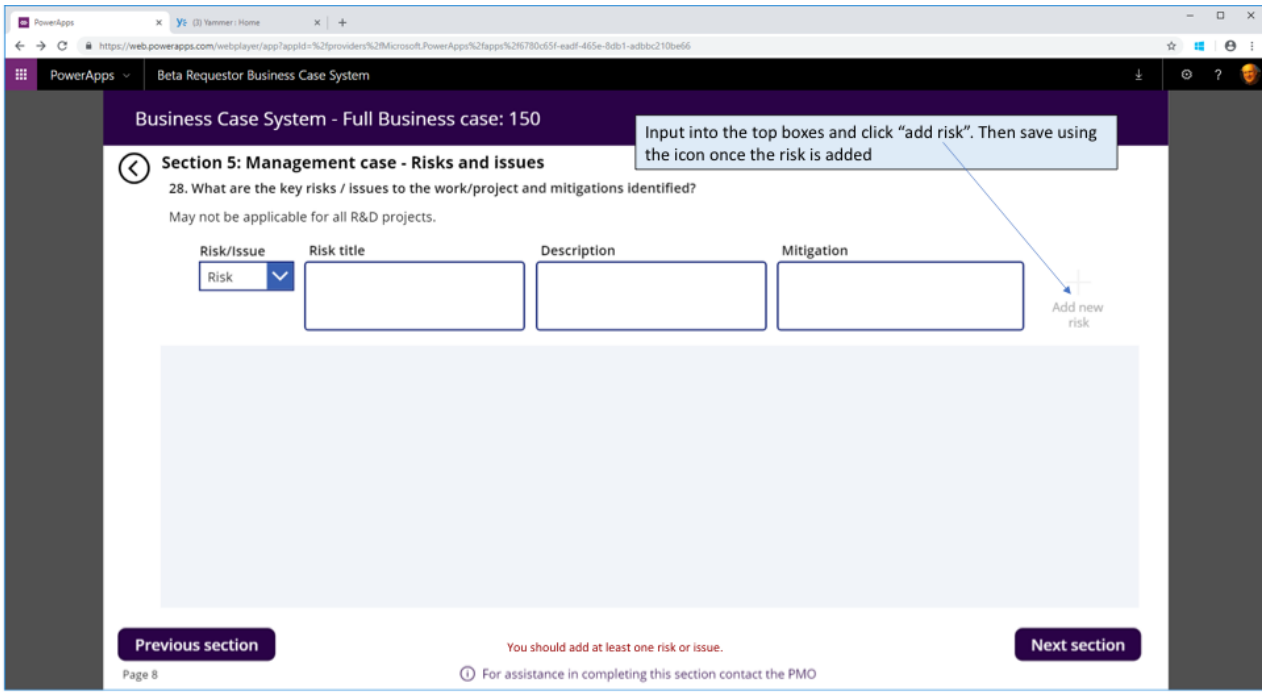

PowerApps
Beta Requestor Business Case System
Business Case System - Full Business case: 150
This button takes you back to the menu
Section 2: Economic case - Benefit's Measurement
17. Provide the measures to be used to determine the success of this work/project:
For reference the Strategic Business Case proposed the following success measures:
Not applicable, for example, R&D project
Input into the top row of boxes and click "add benefit". Then save using the icon once the option is added
Measure description
Baseline
Target/Impact
Date benefits commence
12/2001
Must be a date in the future
Add benefit
Saved measures:
You have no saved measures
Previous section
You should add at least one benefit or check "Not applicable."
Next section
Page 3
For assistance in completing this section contact the Planning & Performance Team

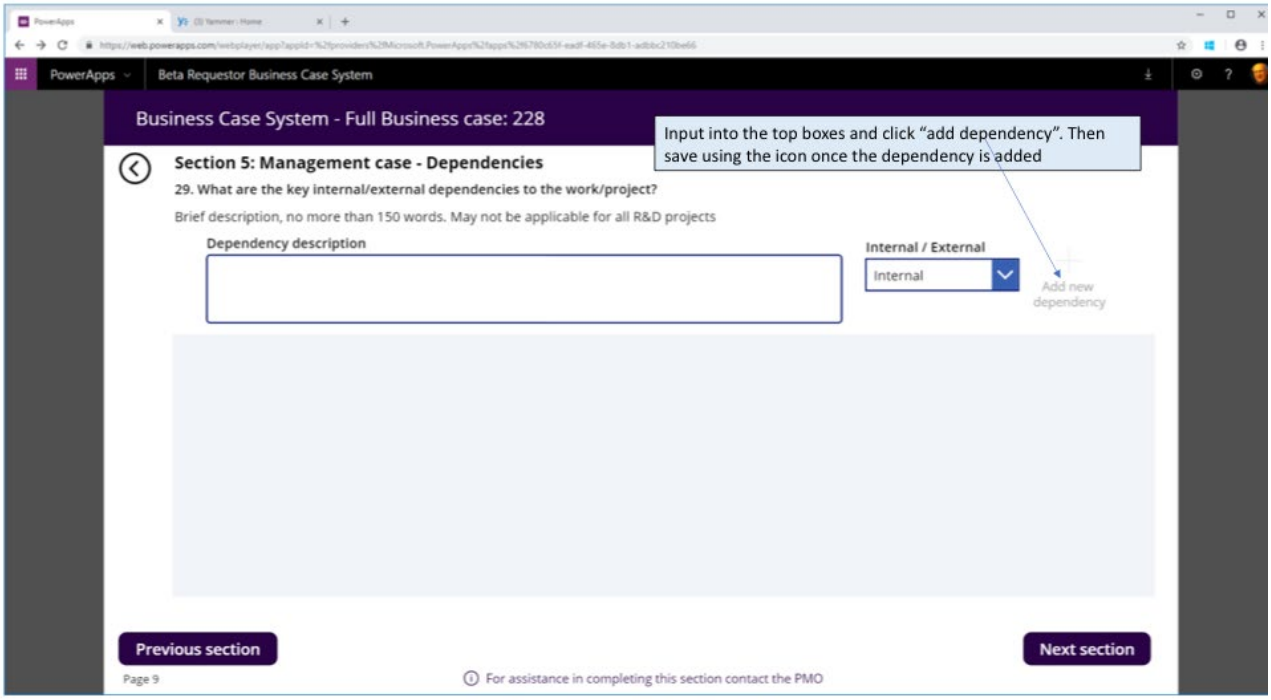

PowerApps
Beta Requestor Business Case System
Business Case System - Full Business Case: 150
Section 3: Financial case
The estimated funds requested below were provided in the Stage 1 - Strategic Buisness case. Update / amend if a more accurate estimate is known.
If under £100k round your figure to the nearest £10k and if over £100k round to the nearest £25k.
18. How much money (£k) will be needed in total for this work?
243
18a. How much money in financial year 19/20? (£k)
1
18b. How much money in financial year 20/21? (£k)
2
18c. How much money in financial year 21/22? (£k)
3
18d. How much money in financial year 22/23? (£k)
4
18e. How much money in financial year 23/24? (£k)
Previous section
Next section
Page 4
For assistance in completing this section contact your Finance Business Partner


PowerApps
Beta Requestor Business Case System
Business Case System - Full Business case: 150
Section 4: Commercial case
* 20. Preferred tender route
OJEU
* 21. Do Cabinet Office controls apply to this work/project?
No
Consult with the Procurement Team to understand the relevant Cabinet Office controls or visit the Cabinet Office Controls website.
Previous section
Next section
Page 5
For assistance in completing this section contact the Procurement Team


PowerApps
Beta Requestor Business Case System
Business Case System - Full Business case: 150
Section 5: Management case
* 22. Provide a brief description of the governance / management arrangements in place for the work/project?
GGDF
* 23. Has the benefit measures for the work/project been incorporated into the FSA's Benefits Register?
No
* 24. Are there any IT / Data / Digital system requirements?
Yes
* 25. Have IT MB been made aware?
No
* 26. Describe the IT / Data / Digital system requirement
SDFDSF
Previous section
Page 6
For assistance in completing this section contact the Planning & Performance Team
Next section


PowerApps
Beta Requestor Business Case System
Business Case System - Full Business case: 150
Section 5: Management case - Milestones
Input into the top row of boxes and click "add milestone".
Then save using the icon once the milestone is added
* 27. What are the key milestones of the work/project?
Enter a brief milestone title and description of no more than 50 words each. Add an approximate milestone date, for example the end of a month or quarter, such as 30 Jun 2019.
Milestone title
Milestone description
Milestone date
31/12/2001
Add new milestone
Milestone title
fsdf
Milestone description
sdfsdfdsf
Milestone date
18/01/2019
We are addressing the issue where a milestone, once saved, cannot be changed and only deleted
Previous section
Page 7
For assistance in completing this section contact the PMO
Next section


PowerApps
Beta Requestor Business Case System
Business Case System - Full Business case: 150
Input into the top boxes and click “add risk”. Then save using the icon once the risk is added
Section 5: Management case - Risks and issues
28. What are the key risks / issues to the work/project and mitigations identified?
May not be applicable for all R&D projects.
Risk/Issue
Risk
Risk title
Description
Mitigation
Add new risk
Previous section
You should add at least one risk or issue.
Next section
Page 8
For assistance in completing this section contact the PMO


PowerApps
Beta Requestor Business Case System
Business Case System - Full Business case: 228
Input into the top boxes and click “add dependency”. Then save using the icon once the dependency is added
Section 5: Management case - Dependencies
29. What are the key internal/external dependencies to the work/project?
Brief description, no more than 150 words. May not be applicable for all R&D projects
Dependency description
Internal / External
Internal
Add new dependency
Previous section
Next section
Page 9
For assistance in completing this section contact the PMO

Glossary and abbreviations

Areas of research interest (ARI)	Give details about the main research questions facing government departments
Benefit cost ratio (BCR)	A ratio that summarises the overall relationship between the relative costs and benefits of a proposed project
Cost benefit analysis (CBA)	An analysis where the expected costs and benefits of an intervention are estimated and the trade-off between costs and benefits is considered
Cost effectiveness analysis (CEA)	An analysis that compares the costs of alternative ways of producing outputs
Econometric models	An econometric model specifies the statistical relationship that is believed to hold between the various economic quantities pertaining to a particular economic phenomenon.
FSA	The Food Standards Agency
Full BC Process	Abbreviation for the Microsoft Power Apps implementation of the “five case” business case system
Internal rate of return (IRR)	The expected compound annual rate of return that will be earned on a project or investment
MCA	Multi Criteria Analysis – A two-stage decision procedure. The first stage identifies a set of goals or objectives and then seeks to identify the trade-offs between those objectives for different policies or for different ways of achieving a given policy.
MRC	The Medical Research Council
Net present value (NPV)	The difference between the present value of cash inflows and the present value of cash outflows over a period of time. NPV is used in capital budgeting and investment planning to analyse the profitability of a projected investment or project
OECD	Organisation for Economic Co-operation and Development
ONS	The Office for National Statistics (ONS) include some more detailed criteria for R&D on their annual survey forms, based on OECD definitions
Payback period	The **payback period** refers to the amount of time it takes to recover the cost of an investment. Simply put, the **payback period** is the length of time an investment reaches a breakeven point
R&D	Research and development

RDVA	Research & Development Valuation Approach
SEF	The FSA's Strategic Evidence Fund
Theory of change	Theory of Change is a description of how and why a desired change is expected to happen in a particular context. It is focused in particular on mapping out or 'filling in' what has been described as the 'missing middle' between what a program or change initiative does (its activities or interventions) and how these lead to desired goals being achieved