Valuing FSA research and development:

Final report appendices

A report for the Food Standards Agency
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Issue 4

Valuing FSA Research and Development: Final Report Appendices

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Introduction

The FSA identified a need for a new, bespoke, methodology that will allow them 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 final report of the project is provided in two volumes. The first volume contains the main body of the report, with the first working version of the RDVA in an annex. This volume provides detailed supporting information as appendices.

A library of case study applications of the RDVA is provided separately.

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Appendix 1: Research approach

A1.1 The specification for this project recognised that this was a complex problem. We therefore applied an agile, collaborative development process to develop the Research and Development Valuation Approach (the RDVA).

A1.2 The RDVA was developed, tested, refined, and its value demonstrated 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.

Phase 1: Design and conceptual testing of the RDVA

A1.3 Design and development of the RDVA in Phase 1 was informed by:

- An initial light touch review of the wider literature
- A review of documentation provided by FSA
- A half day specification workshop
- Interviews with senior officials at FSA and external users of research
- A half day system mapping workshop

A1.4 The activities were carried out through October 2018 to February 2019 and largely in parallel to allow each to inform the others, for example, discussions at the half day specification workshop were informed by the literature review evidence available at that time and helped direct further interviews.

A1.5 An interim report was produced in January 2019 that described a specification for the RDVA, and the first outline of the RDVA was reported in Output 1 of the project in March 2019

A1.6 Following receipt of comments on the Output 1 report, we designed and delivered proof of concept testing of the RDVA during June 2019.

The literature review

A1.7 The literature review was carried out by Dr Ulrike Hotopp of Live Economics. It followed on from FSA's own review of the literature that concluded that none of the published valuation methodologies met FSA's need. The review was not therefore a systematic review of methods but focused on the requirements of the project. It was guided by the research specification and ongoing programme of workshops and interviews. The search tool was google and google scholar. The search included academic literature, Government and Government agency literature, grey literature including blogs and publications by industry organisations.

A1.8 It started with “prioritisation of” and “value of”, using the key words of ”research” and “science” in combination with “budget”. We also searched for Research Councils, UKRI, BBSRC, ESRC and EU. This search identified “portfolio” and “risk (+management)”, “decision making”, “industry” in combination with “use of”. Some interviews brought up the need for a narrative. We therefore included “non-monetary valuation” and “deliberative” into the search to cover papers that considered different valuation methods to prioritisation.

A1.9 Theoretical considerations about how (and through whom) research and science can make an impact on health in the food space resulted in discussions of impact pathways in the first workshop. This directed the literature research to include “policy makers”, “Parliament” and “consumers”, “food industry” as further search terms in combination with the above and “needs”, “use”, and “management”.

A1.10 Following the interviews, the search term “external innovation” and “public” (in combination with “industry” and “business”) was added to identify literature on the use by industry of research from sources external to their own research department, including Government.

A1.11 The literature review findings are presented in Appendix 2.

Document review

A1.12 In addition to the literature review, we reviewed the following documentation provided by FSA, collating information to inform aspects of the research as shown below:

- Relevant to developing a practical definition of research and development for use by FSA:
  - The Office for National Statistics (ONS) survey returns for FSA Annual Expenditure on Research and Development, and the associated supporting spreadsheets
  - The SERD (science, evidence, research, development) tracker spreadsheet dated May 2018
  - An analysis of R&D spend by category carried out by FSA’s Analytics Unit
- Relevant to building on past experience and the strengths of current approaches, and ensuring that the RDVA fits well with current processes:
  - A process diagram for Investment Board project approval
  - Notes on the earlier attempt to modify the Payback Framework valuation methodology for FSA research prioritisation
  - Ten example business cases and requests for funding for IB and SEF projects using a range of different templates
  - A presentation and PowerPoint slide pack on the new Microsoft PowerApps business case submission system for 2019/20 project submissions.

- Relevant to FSA strategic objectives
- FSA Strategic Plan, 2015-2020
- FSA board paper FSA 18/03/15, FSA priorities and budget for 2018/19
- Food Standards Agency Science, Evidence and Information Strategy 2015-20 - Delivery Plan
- FSA board paper FSA 18-09-17, Science update 2018
- FSA board paper FSA 18-09-09, Risk analysis process, governance, communication
- The document review findings are presented in in Appendix 3.

Workshops

A1.13 The workshops provided an opportunity to seek input from a wider pool of people. The workshop outputs are discussed in Appendix 4. (Note that the RDVA was referred to as 'the methodology' in the workshops.)

Methodology specification workshop

A1.14 This workshop was held on 19 November 2018 in central London. Fifteen people accepted an invitation to attend.

A1.15 The workshop was advertised as a consultation to help us develop an agreed specification for the RDVA, learn lessons from previous attempts to value R&D projects, and identify the key elements that the RDVA should contain. It was professionally facilitated, and was structured around three main questions:

1. What counts as an R&D project?
2. What is the best way to categorise R&D?
3. What must the RDVA deliver?

A1.16 The session concluded with a wider discussion of some of the issues concerning how the FSA might achieve an overall balance in its research portfolio.

System mapping workshop

A1.17 An important theme from the first workshop was the issue of how research leads to benefits. The consensus opinion was that people needed to think this through more explicitly as part of their R&D business cases. Pathway mapping can help with this, so the focus of the second workshop was to see how feasible it would be in practice to identify the pathways to benefits for a sample of six example case studies. If this exercise showed promise, then it could form an important part of the specification for the RDVA.

A1.18 The workshop was held on 28 November 2018 in central London and was again led by a certified professional facilitator. Twenty-two people accepted the invitation to attend, including policy leads; scientists, economists and social researchers; and senior business managers. Participants were asked to develop pathway maps, starting from a generic pathway map (shown in

Appendix 4), derived from a theoretical model informed by our work prior to that date, for a range of projects of their choice.

A1.19 The map considers the complete pathway from initial idea generation all the way through to long term outcomes. The workshop participants were asked to focus particularly on the steps from research outputs through to long term outcomes. The map also acknowledges that benefits and longer-term impacts can be realised via policy maker changes; industry changes; or consumer behavioural changes.

A1.20 The workshop participants chose three projects in well-established policy areas to work on first, but then agreed that a better test of the approach would be to apply it to three more projects that were more uncertain and/or at an earlier stage of development.

Interviews

A1.21 We carried out a series of semi-structured interviews. The interview outputs are discussed in Appendix 5.

A1.22 We interviewed four senior officials during November and December 2018, to understand their perspectives from a more strategic viewpoint and to continue the conversation started at the end of the first workshop.

A1.23 Following these, starting in January 2019 we talked to the Chief Scientist and his office, representatives of the Investment Board and the Strategic Evidence Fund, the communications team, policy teams, the commercial and finance teams, the operational delivery team (meat inspection) and three externals (representatives of food industry, consumers and another Government department). Interviews were identified purposively as our understanding of the issues developed, to enable us to explore requirements from the RDVA from a range of perspectives. In total we have interviewed sixteen people.

A1.24 Each interview lasted between 30 minutes and an hour. The exact structure of the interview was adjusted to each interviewee and in response to interviewees answers.

Figure 1: A typical topic guide*

Discussion guidance for meetings with FSA senior officials
Governance/Overall strategy
How are the strategic decisions on science spending made?
Who is the final decision maker when it comes to research? Does the Board have a role?
How does the Board and the Investment Committee use science (FSA's and others')?
Role of research in FSA
What is the link (if any) between the organisational strategy and the research commissioned?
Why does the FSA commission research?
What is the role of research in FSA achieving its objectives?
What is the role of FSA research compared to others' in achieving FSA objectives?
What is for you the most important result/outcome of a research project?
Decision making
Do you think of research as a number of distinct projects or as a portfolio of projects that hang together?
As an investment board member, what criteria do you use when deciding which research projects should be taken forward? Do these criteria differ from other spending decisions?
Who are the beneficiaries of research?
What are in your view the weaknesses of the current prioritisation system?
Culture
How would you describe the culture/cultures with respect to research in the FSA?
Who reports on science results to senior staff? How are the views, concerns of junior staff communicated?

*External interviewees and those with a specialised role were interviewed following a revised version of the interview guide to ensure it was relevant for their role.

Proof of concept testing

Aims of the testing

A1.25 The tests aimed to establish, through application of the RDVA, to three case studies:

- 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
- where more guidance/explanation is required, and
- provide participants the opportunity to comment more generally on its structure and future application based on their experience.

A1.26 The tests also aimed to gather examples that could be used in guidance on how to apply the RDVA.

The three case studies

A1.27 The three case studies selected were:

- **Shellfish active management system:** This is a strategic evidence fund project to improve understanding of the processes affecting the sources, transport and impact of microbial pathogens in estuaries, and hence shellfish safety. Current regulations classify shellfish water quality based on periodic sampling, but the concept here is to eventually develop an active management system that would use real-time information on environmental conditions to assess the risk of shellfish contamination and hence to inform the closure and reopening of shellfish beds based on real-time risk levels. The project is co-funded by Seafish UK, building on an earlier case study in the Menai strait. It is anticipated that the datasets generated would help improve the understanding of the relationship between triggers (such as rainfall levels, agricultural activity, sewer discharges, tides) and the location and timing of increases in water contamination.
- **Extraction and detection of non-travel related Hepatitis E virus:** Between 2010-2016 there has been an increase in non-travel related Hepatitis E virus (HEV) infections, while there was a slight decrease in 2017 they appear to be increasing again. There is a need for surveillance of HEV in the UK. However, there is no robust standard method of extraction and detection of HEV, it is anticipated that this laboratory-based research will deliver a robust and reproducible method which will allow us in future to carry out a survey with the aim of quantifying the presence of HEV. Such data from the survey (and that generated from a separate study aiming to develop a HEV thermal death model) will help to inform risk assessments for HEV. It will also inform risk management (possible interventions steps) as well as our consumer and industry messages/advice in terms of the likely exposure to HEV from retail pork meat and pork products and possible step that can be taken to mitigate these risks (e.g. cooking and handling advice).

- **Efficacy of Recalls and Withdrawals Project**: In 2016 the FSA and FSS commenced a project to review the withdrawal and recall systems in the UK food retail sector to identify if improvements needed to be made to enhance the current system. The first phase of the project involved a review of the effectiveness of the current UK food recall system in the food retail sector. Following the review, recommendations were made to improve the system. The FSA and FSS Boards discussed the various recommendations at their September 2017 meetings and agreed 4 outcomes, each supported by a workstream, that the FSA/FSS should achieve in the delivery phase of the project. Workstream 2 concerned research to improve food recall communication to consumers so recall notifications are more consistent and accessible. It includes:
  - Research with industry to better understand current and possible future practices, and barriers to new approaches
  - Research with consumers to identify best practice (from the consumer's perspective) for recall notifications in terms of content and style; placement in-store and online and relevant channels for communication of alerts.
  - Development of best practice taking into account the above, which will form part of guidance developed under Workstream 1.

A1.28 Participants came from operational, science and social science backgrounds, and the projects were at different stages of development and involved different levels of inter-dependence on other projects and workstreams.

A1.29 It is important to note that none of the projects were at the early appraisal stage at which the RDVA would normally be applied, and so benefited from various levels of 'hind-sight'. In Phase 2 we tested the method using some projects at a much earlier stage of development.

Design of the tests

A1.30 The tests were carried out as facilitated conversations with the relevant project officers either face to face or by e-conference. In one case a policy client for the work also participated.

A1.31 As these were proof of concept tests, we didn't ask the project managers to complete anything in advance independently, but we did send a briefing note (see Table 1) with an appendix setting out the key elements of the RDVA and asked them to think about how they might answer the questions (note the RDVA is referred to as 'the methodology' in the briefing note).

Table 1: Briefing note sent to participants

Covering email from the FSA project manager:

Thanks again for agreeing to take part in the proof on concept testing for the Valuing FSA R&D project. I have booked in 1.5 hours but we may not need the full amount of time.

You will find attached a briefing note that lists the methodology and the questions/themes that we will be exploring. Please have a read through ahead and familiarise yourself with the concepts, but to be clear no prior work is required. However, you may wish to think about how you would answer certain parts. The structure of the meeting will be that the suppliers go through the methodology, in relation to the xxx project, to see if the methodology encapsulates and complements the projects aims/objectives etc but also to see where it requires adjusting, and if more guidance/explanation is required. Whilst this will be about the nnn project specifically, please feel free to comment more generally about its structure and future application (for example) using all your experience! Any issues, feel free to give me a call.

Briefing note: Valuing FSA Research and Development

The FSA have identified a need for a new methodology that will allow them to more effectively compare and prioritise research and development (R&D) projects and make sure the research budget is spent with greatest impact.

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

- A development and proof of concept testing phase, and
- A further testing and refining stage, during which the methodology will be applied to a larger sample of live R&D projects.

The draft methodology is designed to be compatible with the new Microsoft PowerApps implementation of the ‘five case’ business case model (referred to in this report as the Full BC Process). For projects that qualify as Research, the Benefits Management part of the Economic Case would not need to be completed because quantitative success measures would not generally be applicable. Instead, a more holistic assessment should be completed with the following elements:

- Determination that the business case should be considered as Research
- Research classification based on whether it is Must-do; the Strategic fit; and the Topic area

- A description of how outputs from the research could lead to immediate benefits and longer-term outcomes through one or more delivery pathways
- Qualitative valuation criteria for research quality; research utility; reach and significance of impacts; and risk and reward balance

Help requested with proof of concept testing

Your project has been suggested as a suitable case study for the proof of concept testing. We would like to spend 1 – 1.5 hours with you to explain the methodology, attempt to apply it to your project, and identify where the methodology needs to be adjusted and/or further guidance material developed to assist with future implementation. We will write up the notes of the interview as a mini case study for you to comment on and review.

Thank you in advance for your help

A1.32 We designed an interview template that set out the RDVA with additional notes for the interview team. These notes were designed to ensure that the points raised by reviewers of the Output 1 report and at the presentation were explored through the tests. These points are summarised in the table below.

Table 2: Summary of reviewer comments on the report and the RDVA

The comments we explored through the testing included:

- The deliberative approach – whether the RDVA helped participants think through, in a structured way, how their project would deliver outcomes and how the likelihood of success could be improved?
- Categorisation of the work as research – reviewers felt that the RDVA should not be confined to projects that could be shown to meet ONS criteria for research but should apply to any project where the benefits were expected to be difficult to quantify.
- Pathways to benefits – An additional pathway element was identified "improving the evidence base as a foundation for further research, including international collaboration" – we added this to the broader/other influence pathway
- Delivery of benefits – The need to use language that recognises benefits are highly uncertain at the stage of the assessment, but that it is the likelihood of delivery of potential benefits in practice that is important. We also strengthened references to planning, risk assessment and mitigation to focus on the need for robust plans.
- Assessing research quality – We explored the challenges of assessing research quality prior to writing a specification and receiving and assessing tenders.
- Evaluation criteria definitions – We recorded how people responded to the criteria, what they understood by them in their particular

context, with the aim of improving definitions, and providing examples of their application, in the RDVA.

- Linking scores to justification and gaming – This is linked to the aim of developing a deliberative approach noted above. Truly, deliberative approaches are less susceptible to gaming and the justification for scores should be clear in the narrative built up through the responses.
- Provision of guidance and support – we used the tests to identify areas where more clarity in questions or additional guidance is needed, and also where examples of the type of information required could be drawn from the projects tested.
- Burden on project officers - Reviewers generally supported the narrative, pathways approach proposed but there was a clear wish to avoid making the process more difficult.

A1.34 The interviews took an hour to an hour and a half. A facilitator led the interviewee through the process of applying the RDVA, prompting for additional information and providing guidance on the questions as necessary.

A1.35 One team member took notes of the responses and a second was allocated as observer, to note reactions to questions, and identify areas where interviewees needed additional prompts to understand the question and provide relevant and sufficiently detailed answers.

A1.36 After each interview a combined interview record was compiled with the note takers and observers comments amalgamated. Where these suggested minor adjustments could be made prior to the next interview, these were adopted.

A1.37 At the end of the three tests a note was prepared summarising the lessons learnt.

A1.38 There were a number of comments that we could not explore through the proof of concept testing, but which we considered when we reviewed the testing results and formulated recommendations. These concerned:

- How to ensure good practice in application of the RDVA is assured and maintained over time
- Governance arrangements including for example establishing a threshold (e.g. £100k) above which a fuller narrative should be required, and additional checks of responses mandated, and
- How the results will be used to compare projects.

A1.39 We made the decision not to ask participants to score the projects using the star rating system, preferring instead to focus on how the participants understood the criteria and described performance against them – this would provide information that would enable us to start to define ‘anchor’ points to help guide scoring.

Phase 2: Testing and development of the RDVA

A1.40 Phase 2 of the project involved the following activities:

- Submission of the proposed updated RDVA and guidance materials to FSA for review
- Implementing the Phase 2 testing programme using a secure web-based survey tool to most nearly mimic the Microsoft Power Apps business case application process and allow us to remotely monitor progress. We chose SurveyGizmo because it allowed us to embed help and examples in the tool itself, rather than require users to access a separate document – however, it had some limitations with respect to logic routing of questions.
- Testing a first wave of projects, selected by FSA, as follows:
  - Holding a webinar for the project officers of the selected projects to introduce this project and demonstrate the tool
  - Sending project officers a personalised link to the web-based survey tool with an introductory note.
  - below shows examples of the covering email and the introductory text provided in the tool
  - Monitoring rate of returns and encouraging timely returns
  - Providing telephone support if needed
  - Including in the web-based tool a final question asking for immediate suggestions for improving the clarity and usability of the tool.
- Analysing the returns and sharing the results of this with the Steering board – the analysis considered both the comments supplied by the projects, and the responses provided to the RDVA questions
- Preparing and sharing case study reports for each of the selected projects
- Agreeing and implementing improvements prior to launching the second wave of the survey, which would provide an opportunity for further learning and continue building a case study library.
- Analysing the second wave and making recommendations for further improvements to the RDVA.

A1.41 Examples of the introductory materials used in Wave 1 of the testing are shown in Figure 2 (note that the RDVA is referred to as ‘the methodology’ in these materials).

Figure 2: Introductory materials

Wave 1 covering email

Thank you for agreeing to participate in the testing phase for the Valuing FSA Research methodology. The unique survey link for your project is as follows:

[Unique link]

The survey questions contain “hover over” guidance and examples to help you answer each question. The attached document expands on this guidance, so we encourage you to refer to the guidance as well.

We would greatly appreciate it if you could complete the survey by 8 October. You can exit the survey and save your progress at any time, and we encourage you to do this if you are not sure how to answer a question and need to consult with colleagues etc.

The last page of the survey includes a feedback form on the process, but you can also send comments to the team by replying to this email.

If you have any difficulties accessing the survey, please contact [contact name and email]

Kind regards etc

Introduction provided in the RDVA tool

The FSA have identified a need for a new methodology that will allow projects where the benefit is difficult to quantify to be compared and prioritised.

As part of the process of developing and testing a new methodology, we are asking the project officers of a sample of projects to trial the new template. Your project has been selected to be part of this trial.

Completing the template should take no more than 15 minutes of your time, but may require you to consult with colleagues. You can save your responses by clicking the 'save and continue' button at the bottom of each page. Return to the template at any time by clicking on the link in your original invitation email. You can also review and revise your response to previous questions at any time.

Testing is still at an early stage, so your input will be valuable in ensuring we get it right. We would like you to complete the questions as best as you can and it would be useful if you could keep notes about any questions you find difficult to answer or unclear in anyway, as we will ask you to provide ideas for improving the form at the end.

A1.42 The projects selected for inclusion in each wave are presented in Table 3 overleaf.

Table 3: Phase 2 case study projects

Wave 1 (23rd – 2th October)

No	Project Title	Project summary/aims	Team	Status	Funding Route
1.1	Using NHS data to monitor the occurrence of severe adverse allergic reactions to food.	1. Describe the incidence of healthcare encounters in the UK related to food hypersensitivity from 2008-18, using NHS datasets 2. Establish an anaphylaxis registry 3. Define common patterns in the circumstances of severe (near-fatal) anaphyhlaxis reactions to food	Allergy Intolerance	To be commissioned	SEF
1.2	Developing Methods for potency estimation	Potency is a measure of chemical activity, expressed in terms of the amount required to produce an effect of given intensity. This would be a proof of principle project to estimate chemical potency when toxicological information is not available for a risk assessment.			
1.3	Food and Generation Z	This project will look at how people aged 16-25 interact with the food system, and what insights might we gleam from this to inform future policy? This will be done via three strands, a rapid evidence assessment of the literature on Gen Z and food.	Social Science	Active: project started July 2019 and will	SEF

No	Project Title	Project summary/aims	Team	Status	Funding Route
		Deliberative qualitative research and a quantitative survey.		report Jan 2020.	
1.4	Review of antibiotic use in crops, associated risk on antimicrobial resistance and research groups	Desk based study to establish baseline knowledge of the extent of antibiotic use on crops globally to indicate nature of risk that may be associated with these practises and trade.	Chief Scientific Advisory Team (CSAT)	Active/about to begin	SEF
1.5	Assessment of whether the UK's exposure to risks from high risk food products may change following EU Exit	A review of foodborne disease risks in production processes, focussing on making comparisons in relative risks between UK production, EU countries currently exporting to the UK ad potential non-EU trading partners.	Chief Scientific Advisory Team (CSAT)	To be commissioned/business case completed	SEF
1.6	Antimicrobial resistance in biofilms formed during secondary food processing of meat and meat products	Biofilms can be found on food-contact surfaces, particularly on machinery that is difficult to clean. Bacteria from biofilms on non-food contact surfaces can be transferred to food intermittently. This research project aims to identify the types of AMR bacteria and AMR genes (including plasmids) originating from biofilms in the food processing environment of meat and meat products.			

No	Project Title	Project summary/aims	Team	Status	Funding Route
1.7	Supplements Consumer Research	In 2018, working with the Regulatory Policy Unit, we commissioned research into consumer attitudes and behaviours in relation to food supplements. Our aim was to understand both mainstream and 'niche' food supplement consumption, to inform development of policy in this area, including identifying any emerging risks. The project included desk research, a quantitative survey and extensive qualitative research.	Social Science	Finished – report finalised April 2018	Regulatory Policy Unit

Wave 2 (October 16th – 25th October)

No	Project Title	Project summary/aims	Team	Status
2.1 Perishability project	Estimating the value of food spoilage and product value depreciation at ports	Economics	Active/completed	Internal R&D
2,2 Organisations, culture, & food safety: A rapid comparative overview of organisational culture	The Food Standards Agency (FSA) was interested in the potential of food safety culture frameworks – which aim to promote food safety by taking actions focused on the culture of food businesses. However, food safety culture is complex. So, devising	Independent Researcher	Active	Internal/academic secondment

No	Project Title	Project summary/aims	Team	Status
frameworks in the food sector	optimal implementation strategies is a challenge. The FSA was, therefore, interested in research on the matter. Accordingly, this report asked the following research question: how can the FSA approach the implementation of food safety culture frameworks?			
2.3 Levels and trends of AMR in campylobacter spp. From chicken reared in UK	Aim: to set up a baseline estimate of AMR prevalence in one key food/pathogen combo, using a consolidation and cleaning/harmonisation of existing (mainly FSA) data	Statistics	Set-up - funding approved	-
2.4 Cost-of-Illness model	Cost-of-illness (COI) analysis quantifies the monetary economic burden of a disease or condition, providing decision-makers perspectives of the magnitudes of the issue. This project is an in-house work collaborating with LSHTM, aiming to develop and update the existing COI model for foodborne diseases (FBD) and generate analogous estimates for food hypersensitivities (FH) for the first-time.	Economics	Ongoing	Internal

No	Project Title	Project summary/aims	Team	Status
2.5 Costs of Food Crime	Mapping out the drivers and impacts of food crime, and establishing an conceptual framework. Outputs could provide steer/direction for further research	Economics	Commissioned/just about to begin	IB??
2.6 What is the burden of antimicrobial resistance genes in ready-to-eat foods?	Sampling of ready-to-eat foods at retail to profile antimicrobial resistance genes	Microbiology	Active	IB

Appendix 2: The literature review

Introduction

A2.1 This appendix presents a report of a review of the literature relating to, or relevant to, prioritising research and development.

A2.2 It is structured around a number of key themes, highlighting some of the most relevant literature in each case.

Review findings

Decision making methods

A2.3 Most, perhaps all, prioritisation methods use criteria. These are organisation specific. being relevant to their circumstances depending on their sector, the timescales within which they operate, data availability, and their aims and objectives etc.

A2.4 The key defining difference between the methods used by different organisations is in how the criteria are used. The criteria fall into three main categories:

- Must-do criteria – research funded with very little discretion
- Economic criteria – valuation of outcomes in economic terms
- Multi-criteria approaches – including quantitative and qualitative criteria, generally taking a broader approach, recognising that some forms of 'value' can be difficult to monetise.

'Must do' or 'show-stopping' criteria

A2.5 In some cases, research is funded with very limited discretion, for example because it is part of a statutory duty or because it addresses an urgent strategic or operational need and there are no alternatives other than for the organisation to fund it itself.

A2.6 In discussions, senior FSA officials stated that FSA does fund some research projects because they are statutory in nature. The Science, Evidence and Information strategy (FSA, 2015) includes a pillar of statutory research to support its enforcement and investigation duties.

A2.7 Other gaps in research arise because the private sector is not funding some types of research. This could be caused by a market failure in the 'research market' (e.g. it is too far from market or there are spill overs, (Hewitt-Dunda and Roper, 2016)) or the Research Councils don't fund it because it does not fit their criteria. However, we have not come across a formal or transparent test for this.

Economic criteria-based approaches

A2.8 The economic approach uses one or more economic metrics such as Cost Effectiveness Analysis, Internal Rate of Return, Benefit Cost Ratio (used mainly in Government) or Net Present Value. 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.

A2.9 There are three main approaches to economic assessment. These were also discussed in the literature review conducted by the FSA (FSA 2017) in the context of assessing the impact of research after it has been conducted and has had time to have impact. Because of this, they are most relevant to the ex-post evaluation of research rather than ex-ante appraisal and prioritisation, which is the focus of this project.

1. **Using published data to value the economic outcomes**. This can include wages to approximate the productivity of a healthy worker, cost savings to the NHS due to reduction in disease etc.
   For example, Renkow et al (2010) use the monetised impact assessments produced by CGIAR institutes for their agriculture and food research to assess over time the changing impact of the organisation. However, the method for monetisation is not explained.

   Impact of the Institute of Food Research, Brookdale Consulting, 2013

   The 2013 study by Brookdale consulting provides an ex post economic assessment (cost effectiveness analysis) of the research commissioned by the IFR. It values research by its economic impact after it has been commissioned rather than an ex ante prioritisation. While the study allows the identification of areas where the IFR's research had most impact in economic terms, it is not able to support an ex ante prioritisation process in a world with changing disease patterns.

   In addition, the reader has to bear in mind that the IFR is a BBSRC funded research institution which conducts world class research in the very early stages of the research process, while the FSA needs to consider its public health and food safety role in a more immediate way.

2. **Using case studies to follow through particular research initiatives** (MRC, 2008 and Brookdale, 2013). The MRC, 2008, study 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. The authors develop a 12-stage approach for CVD which is then tested on mental health outcomes. The study includes the calculation of an Internal Rate of Return (IRR). FSA (2017) considers the advantages and disadvantages of case studies, highlighting the estimated IRRs and benefit to cost ratios of medical research as between 7% and 30% and 0.7 and 6.1 respectively. (FSA 2017). The main method is to calculate the avoided cost of ill health or to use Willingness to Pay

studies to value improvements in health or other benefits. (DFID 2015 in FSA 2017).

3. **The Macro-economic approach**. Links between public sector R&D spending and Total Factor Productivity using an econometric approach (Haskel et al, 2010 and 2013) and Hurley et al 2016, summarising a variety of studies using IRR. In this case the dependent variable (Total Factor Productivity, Haskel et al (2010 and 2013) or IRR, NPV or other in Hurley et al 2016) is explained by a number of independent variables based on economic theory and other empirical research on the links between productivity and R&D investment. As FSA (2017) correctly points out, macro-economic studies in this field have a number of weaknesses, including, that "the private sector may wrongly attribute the returns to its R&D investment which absorbs knowledge created through public funding as entirely private returns."
   However, it may also be the case that Government research crowds out private R&D (Veugelers (2016) in FSA (2017). In this case, an increase in Government R&D would lead to a reduction in private sector R&D.

Multi Criteria Approaches (MCA)

A2.10 (Note: Not all of the studies used here are about the allocation of research funds. Some cover other decisions regarding the allocation of scarce resources.)

> "This set of techniques provides clarity on which criteria are relevant, the importance attached to each, and how to use this information in a framework for assessing the available alternatives. By doing so, they can help increase the consistency, transparency, and legitimacy of decisions." *(Thokala et al, 2016)*

A2.11 Used in medical decision making (Thokala et al, 2016) – identifying the right criteria and weights is important to avoid misleading decision makers.

A2.12 Saarikoski et al (2016) demonstrate the use of multi criteria decision analysis in the context of ecosystem services decision making. They describe the integrative decision-making process and highlight the need for scoring and weighting of criteria. This is the case in all of the MCA approaches we have found in the literature (incl. MAVT (multi attribute value theory) and any Rank Based Methods. The main advantages of MCA are (i) its transparency, by clearly setting out the criteria and criteria weightings, and (ii) its ability to deal with incomplete and uncertain information.

A2.13 MCA can provide a useful framework for deliberative valuation[1]. Bunse et al (2015) provide a review of the literature on deliberative valuations. The authors highlight that in complex and unfamiliar contexts deliberative

[1] Deliberative valuation is an interactive valuation method, which brings different actors (policy makers, stakeholders and/or citizens) together in order to form value judgements

valuations provide additional information that is not apparent in a valuation that focuses on monetary values. This is helpful in the context of multiple stakeholders such as the FSA's Investment Board, with different knowledge and viewpoints taking decisions on valuations together.

Selecting criteria

A2.14 All prioritisation systems use criteria that are relevant to the aims and objectives of the organisation (or people) involved in the decision making. The criteria identify the most important areas of research (or other areas that prioritise resource allocation) to enable the organisation to achieve its objectives. The criteria may be used to prioritise and compare individual projects, and the same, or different criteria may also be used as the basis for categorising projects to enable monitoring of the make-up and balance of the overall research portfolio.

A2.15 In the pharmaceutical industry, financial returns, the innovativeness of a proposed project as well as the riskiness of projects are the most important prioritisation criteria. 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 (2008) 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.

A2.16 Research Councils put more weight on quality and the filling of gaps in the knowledge base (we talk more about the pharmaceutical industry's approach to research prioritisation below). In the case of the FSA the aims and objectives relate to healthy food which is affected by policy, made by industry and consumed by consumers.

A2.17 The box below lists the criteria identified in this review and the source in the literature.

Criteria used for prioritisation and the source in the literature

Criteria used to prioritise research	Source
Quality	SPICE 2018, BBSCR, various Bode-Greuel, 2008 Morris et al, 2016
Gap in the research base ○ **As part of a multicriteria approach**	Blau, 2004
Technology (accessibility)	Axling et al, 2014, Beise, 1999
Technology (innovative)	Axling et al 2014 Bode-Greuel, 2008
Financial	Jones, 2016 Bode-Greuel, 2008
Economic ○ **As Internal Rate of Return (IRR)** ○ **As Benefit Cost Ratio (BCR) / Net Present Value (NPV)** ○ **Macroeconomics**	Brookdale, 2013 Hurley et al, 2016 Brookdale, 2013 Jones, 2016 Haskel et al, 2010
Risks to be addressed *Note: In the FSA context, we interpret this as the public health risks that fall within FSAs remit and are identified as priority areas*	Bode-Greuel, 2008 Bouwknegt, 2016 Jones, 2016 Saarikoski, 2016
Riskiness of the project	Jones, 2016 Smith, 1999
Strategic match	Axling 2014 Blau, 2004 Bode-Greuel, 2008 Jones, 2016 Smith, 2103 Wudhikarn, 2016
Operational match	Wudhikarn, 2016 Blau, 2004
Timeliness	Renkow, 2010
The market can't deliver (Public sector specific)	Hewitt-Dundas and Roper, 2016

A2.18 There are differences between private and public sector organisations. These are most clearly expressed in the criteria of “Risk to be addressed” and “The market can’t deliver” criteria. The “Risk to be addressed” in the public sector context cover the responsibility for individuals and companies under the jurisdiction of the public sector organisation. Industry, which also has risks to address, mainly focuses on the risks particular to the company such as risk to shareholder value or legal risks.

The Research Excellence Framework

A2.19 The Research Excellence Framework (REF) is applied periodically by the four UK higher education funding bodies: Research England, the Scottish Funding Council (SFC), the Higher Education Funding Council for Wales (HEFCW), and the Department for the Economy, Northern Ireland (DfE). Its main purpose is to provide accountability for public investment in research and produce evidence of the benefits of this investment.

A2.20 The REF defines research as:

> “A process of investigation leading to new insights, effectively shared”

A2.21 The consultation document for REF 2021 lays out a set of criteria for evaluating research, focussing on three areas:

- **Research Outputs** – the quality of research outputs in terms of their originality, significance and rigour, with reference to international research quality standards
- **Research Impact** – the reach and significance of impacts on the economy, society, culture, public policy or services, health, the environment or quality of life
- **Research Environment** – the vitality and sustainability of the research environment, including the approach to enabling impact from its research, and its contribution to the vitality and sustainability of the wider discipline or research base

A2.22 Research submitted for review is graded using a star rating system for outputs and impacts, from 4* to 1*

Rating	Outputs	Impact
4*	World leading	Outstanding
3*	Internationally excellent	Very considerable
2*	Recognised internationally	Considerable
1*	Recognised nationally	Recognised but modest

The Balanced Scorecard

A2.23 The balanced scorecard is a management tool that is a form of MCA (see box overleaf). Constructing and applying the balanced scorecard provides a way of aligning decision making with strategic objectives. The scorecard usually contains four perspectives.

A2.24 Wudhikarn, 2016, describes the adaptation of the balanced scorecard method, applied in business into an academic institution. The focus is on the efficient management of all available resources within the academic institute assessed, not just research funds. The scorecard developed in the case study includes the finance, customer and internal perspectives and also a learning and growth perspective. It demonstrates that a scorecard method can be successfully applied in the non-business context. However, the four categories need to be selected using MCA and each individual perspective requires Key Performance Indicators (KPIs).

A2.25 O'Neil (1999) describes a similar attempt to adapt a scorecard to an academic institution, requiring academic personnel to prioritise and identify KPIs etc. The scorecard in this case also has four perspectives: academic management, stakeholder and internal business perspectives, and an innovation and learning perspective. As in the case of Wudhikarn, the scorecard was applied to the institution and all its decision making rather than just the research spending. This allows strategic alignment of all areas. The process of discussion to identify the four perspectives and the indicators is useful in and of itself because it makes the aims and objectives transparent and shows what success looks like. However, O'Neil highlights the resource intensity of the process.

A2.26 Axling et al, 2014, aim to provide support to research-based business to allow them to make most of their innovations. The key dimensions addressed in the paper are structure, governance and process. R&D leaders need to balance many conflicting priorities: short-term responsiveness versus long-term strategic focus; product or global business unit alignment versus regional support; customer pull versus technology push; outsourcing and partnering versus developing key internal capabilities; and radical versus incremental innovation focus. The authors recommend applying 8 'imperatives' to master the organisational change that is required to manage an R&D focused organisation. These are: focus on process and governance as well as structure, link R&D explicitly to the business strategy, clarify the role of R&D interfaces with other functions, establish a cross-functional steering team, use a transparent process to evaluate options, deconstruct the whole to manage complexity, pressure test using realistic situations, manage hearts and minds carefully.

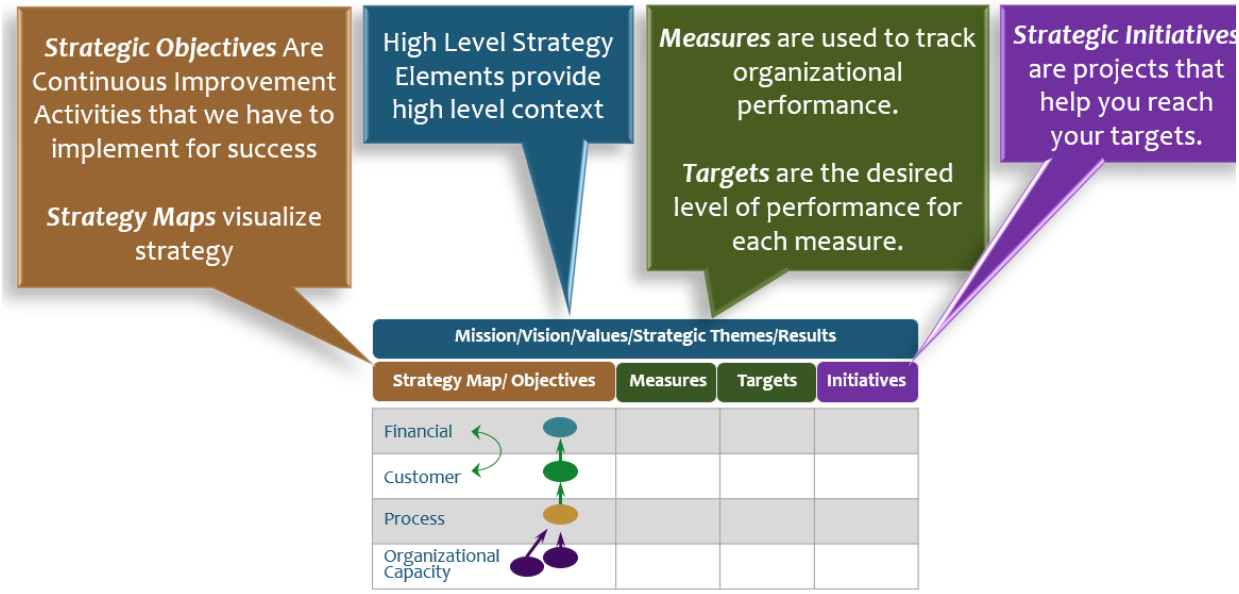
A2.27 One further interpretation of the balanced scorecard in the public sector is proposed in the report by Barber (2017). Barber uses a framework which has as the overarching focus the outcomes of public spending on citizens. These outcomes should be long term, building capability for the future. The overarching outcomes are supported by four pillars, which can be compared

with the four areas in a balanced scorecard. These are “Pursuing Goals”, “Managing Inputs”, focusing on data, benchmarking and cost, “Engaging Users and Citizens”, and “Developing Systems Capacity”. The latter includes the capacity to innovate and learn from innovation.

The balanced scorecard

The balanced scorecard (BSC) is a strategic planning and management system that organisations use to:

- Communicate what they are trying to accomplish
- Align the day-to-day work that everyone is doing with strategy
- Prioritize projects, products, and services
- Measure and monitor progress towards strategic targets.



The system connects the dots between big picture strategy elements such as mission (our purpose), vision (what we aspire for), core values (what we believe in), strategic focus areas (themes, results and/or goals) and the more operational elements such as objectives (continuous improvement activities), measures (or key performance indicators, or KPIs, which track strategic performance), targets (your desired level of performance), and initiatives (projects that help you reach your targets).

From: About the Balanced Scorecard Downloaded 18/02/2019

Impact of research

A2.28 The aim of the FSA's work including its research is healthy food for the UK population. As discussed above (para A2.14) there are three main pathways which FSA can use to reach this aim: policy makers determining the rules and standards of the food sector, the industry producing and selling food and consumers eating it.

A2.29 The final impact on consumer health is hence the core objective of the FSA (see also paragraph A2.14). We have considered the literature on the impact of research on the three main pathways described above.

ESRC: What is impact

Academic impact is the demonstrable contribution that excellent social and economic research makes in shifting understanding and advancing scientific, method, theory and application across and within disciplines

Economic and societal impact is the demonstrable contribution that excellent social and economic research makes to society and the economy, and its benefits to individuals, organizations and/or nations.

The impact of research, be it academic, economic and social can include:

- **Instrumental**: influencing the development of policy, practice or service provision, shaping legislation, altering behavior
- **Conceptual:** contributing to the understanding of policy issues, reframing debates
- **Capacity building:** through technical and personal skill development

Source: ESRC website: What is impact

Policy makers

A2.30 The work by Boa et al (2010) demonstrates how the DWP uses its research in policy decisions. Based on case studies it shows that the relationships between science staff and policy makers are good, enabling information flow and trust, the research management process is well run, which enhances the Department's reputation among external researchers and the commissioning of research is swift. All these factors allow for research results to be used in the policy design.

A2.31 The House of Parliament employs analysts who summarise evidence for MPs. Post note 547 on the Microbiome and Human Health (2018) provides a useful example of the type of information MPs are supported with in their policy decision making.

A2.32 The briefing document "Research Impact and Legislatures" September 2018 analyses the impact of REF 2014 research on Parliamentarians. It provides clear insights into what matters: The issue that was researched and results have to be clear, the research has to be relevant for the issue debated at the time, and it has to be independent and credible (from a well trusted source).

The paper further lists a number of ways in which research can feed into the legislative process, summarised in the box below

Research Impact and Legislatures

Substantive engagement with the UK Parliament was mentioned in 20% of REF2014 impact case studies (SPICE, 2018).

- Research can feed in through direct and indirect routes and can be actively sought out or sent in proactively by external organisations.
- Impacts arising from engaging with legislatures include influencing government policy, external organisations, and legislatures themselves (such as internal processes and skills development).
- Research that provides a persuasive and credible narrative on research impact is more likely to have impact.
- Evidence of impact can include citations, similarities in language, social media data, minutes of meetings and co-produced outputs that show a close working relationship.

A2.33 Other ways of impacting on policy makers are illustrated by REF 2014 examples: These include feeding evidence to Defra in time for negotiations with the EU on food labelling (Food Information Regulation) (REF 2014 Brunel University). Research on “Safeguarding human health and sustainable aquaculture through monitoring programmes developed from research into harmful algal bloom (HABs) dynamics” has provided advice to the Council of the Exploration of the Seas (REF 2014, Davidson). We note that the FSA has 28 case study examples of academic led research that were cited as part of the most recent REF assessment.

Industry

A2.34 There is a broad and deep literature on private sector R&D, implementation and use of innovation. The literature review has focused where possible on the use of government or academic research by the food industry. However, as was highlighted in the interviews, the food industry in the UK consists of a few large companies who do innovate and a lot of small companies who either don’t innovate or where there is little data and evidence of innovation. Margins have been described as “thin” by one interviewee, which limits scope to invest in R&D.

A2.35 The private sector generally uses monetisation approaches focussing on the impact of research on its bottom line. This can be a project- or portfolio-based approach.

A2.36 Beise and Stahl (1999) use a large survey of businesses in Germany to analyse the use of research, including Government funded research, in business innovation. They find that one-tenth of product- or process-innovating firms introduced innovations between 1993 and 1995 that would not have been developed without public research (ie 90% used publicly funded research to develop their products and processes).

A2.37 Hakason and Waluszewski (2007) use a theory-based approach in their study of the use of science by industry compared to academia. The location of knowledge creation matters. It is often seen as a simple transfer of knowledge from its production into a business setting. But if a company wants to commercialise knowledge it needs to bear in mind that there are different rewards for knowledge recreation in different settings, e.g. academics may feel rewarded by different schemes than business. To achieve use of technology or scientific insights an organisation like the FSA would have to ask itself:

- What does the new or proposed solution do to the established profit base of the businesses to be influenced?
- Can the new solution interact with the existing technologies?
- How does the new knowledge entering a company relate to existing and established knowledge?

A2.38 These considerations reflect potential hurdles and barriers for FSA research to feed through the industry pathway. Occasionally this plays out in the media when it comes to changing ingredients (e.g. salt content) but at other times this may not be visible to the public and decision makers.

A2.39 Caswell, Roberts, Golan and Solany contribute a chapter to the Handbook of Innovation in the Food and Drink Industry (2000) on the interaction of public and private incentives to promote food safety innovation in the US meat industry using innovation theory. They highlight three requirements for innovation to occur:

- Appropriability of profits
- Market demand (for the food product), and
- Technological capability.

A2.40 The study highlights the role of demand for improved, safer products. The emergence of large restaurant chains who depend on their reputation of being a safe place to eat worldwide has increased the market demand for safe meat inducing innovation at the meat production and processing stages of the supply chain. Similar incentives will apply with respect to the adoption of innovation by others, including Government organisations such as the FSA, that requires investment or an increase in running costs. The potential loss of reputation, while mainly affecting the downstream retailers and restaurants will be pushed up the supply chain and create incentives for the adoption of innovation.

Consumer

A2.41 One of FSA's main strategic outcomes is that Food is Safe – that consumers have the right to be protected from unacceptable levels of risk[2]. The interviews highlighted the importance of getting the message across to consumers about food safety, and the need to engage with science and research very early to

[2] FSA Strategic plan 2015-2020

ensure research findings were in a fit state to achieve this purpose. The box describes an example.

Consumer behaviour: the importance of getting the message right

Many consumers wash the raw chicken they have bought in a butcher or supermarket with the intention of making it safer. Research has shown that washing a raw chicken in fact increases the risk of infection. This message will only reach consumers if they hear of it and believe it.

A2.42 Stevens etc al (2018) demonstrates how social media can amplify research results. It makes clear that researchers or their organisations need to be proactive in using social media as a communication tool.

A2.43 Robertson (2018) analyses the US food survey to identify what influences consumer choice in food. Taste is the most important factor. The survey results also give health professionals as the most important source of information on food (in the US). It further demonstrates a disconnect between what people say and what they do.

A2.44 Cummings et al (2015) conduct an analysis of food shopping behaviour in the UK. Shoppers come with their own perceptions, knowledge and their current situation to the shop. When it comes to health food, the behavioural research they have conducted demonstrates that it is preferable if the consumer has a positive experience from the purchased good first, before informing them of the health food status of a product. This increases the probability of increasing consumption of this good. Many factors impact on taste, not just the actual ingredients: the packaging size and colour and even the price can impact on whether a consumer perceives a product as tasty. Another important influence on what consumers buy is which role they find themselves in when shopping. Cummings shows that the consumer buying as a parent will make a different decision to the consumer buying as a friend or just for themselves.

A2.45 Hallworth et al (2016) point out that a large share of ill health and health care costs are caused by unhealthy behaviour. Behavioural insight demonstrates that behaviour is often habitual and not a rational decision in each moment. Decisions further depend on the environment within which they are made. If policy does not consider this, it will be impossible to move behaviour into a healthier space. The authors propose a number of very small changes to increase the likelihood of behaviour change to a healthier mode:

- Make healthy behaviour more visible, so they seem prevalent
- Identify the right time when people are most open to change and trial interventions in different ways to test out (in an RCT set up) what matters most. This might mean that consumers are more open to research results on healthy shopping during specific periods of their life, eg as new parents, students etc. The way in which research messages are communicated will also have impact.

A2.46 FSA runs science projects, which for their impact rely on the consumer to change their behaviour. Projects that fall into this category need to consider how they can improve the likelihood that messages are taken up.

Measuring the impact of research

A2.47 Guthrie et al (2013) use a forward and backward tracing approach to assess the impact of health research on treatments. The method used was case study based interviews of practitioners in the field going back around 20 years to identify the impact of particular areas and pieces of research. The next step was a forward look starting from current areas of research. The theoretical framework used for this work is the Payback Framework (see box below), which is used to categorise the impacts of research. The analysis brought together factors influencing impact with outcomes for treatment in a narrative, which was validated in a workshop bringing together key stakeholders. Although we are principally concerned with appraisal rather than evaluation, this study is of interest because of the use of the payback framework, which FSA have trialled.

The Payback Framework

The Payback Framework consists of two elements: a classification system to capture and categorise the outputs and outcomes of research and a logic model which helps to understand and break down the research process. The framework has five categories of impact:

- knowledge production
- research targeting and capacity building
- informing policy and product development
- health and health sector benefit, and
- broader economic benefit

These are used for assessment of the level of impact of different case studies in the ranking exercise. Source: Guthrie et al 2013. FSA adapted the framework, (FSA 2017).

Portfolio approach - a multi-stage approach

A2.48 There is a rich body of literature on portfolio management of science and research budgets. We have selected those which appeared most relevant following interviews with senior officials in the FSA such as the CSA, head of CSA's office and the Investment Board members who are looking across all of the FSA's spending and how it matches its strategic needs.

A2.49 Smith and Sonnenblick (2013) consider the process of research management within the pharmaceutical industry. The paper is a case study for research management in a life-science company.

A2.50 They describe a multi staged approach. Firstly, the research portfolio of a company needs to be aligned with the company's strategy. Once the portfolio has been identified, the research projects can be selected using a scenario

technique. The second step was a project by project valuation. This used criteria which allowed grouping of projects into portfolios that can be aligned against the strategic objectives. The third step was to vet the project data to ensure consistency and relative accuracy. The fourth step was to create a set of alternative portfolios that achieve the strategic objectives in different ways or to different degrees. And the fifth and final step was to select the best alternative from the possible portfolios. The final step also used scenario techniques to identify the right portfolio. This approach can be very time consuming and requires the right governance structure in place that accommodates this type of decision making. The authors point out that the project valuation step requires different metrics to the portfolio comparison.

A2.51 Bode-Greuel and Nickisch, 2008, also differentiate between project and portfolio analysis. The project analysis needs to be sufficiently detailed to ensure that the resulting portfolio is aligned with the organisation's strategy. The first step in a companies' decision-making process has to be to identify the objectives for research, including the ROI and innovativeness, this should also include which diseases (in the context of the pharma industry) to focus on for long term growth, and align it with the company strategy. Secondly, projects have to be analysed with respect to their financial contribution, their riskiness and other criteria relevant for the organisation. This step requires sufficient resources. Bode-Greuel and Nickisch also recommend the use of decision trees at the project level. This includes a stop-go decision following every relevant milestone. These decisions need to involve the person responsible for the overall portfolio to assure the integrity of the portfolio. The final step is the analysis of the portfolio overall: What is its risk structure, what value will it deliver and what does it do for the long-term pipeline of new products.

Other methods for prioritisation: Demand driven prioritisation

A2.52 Morris et al, 2015 describe a method to measure the impact of finance journals. The authors assume that the quality of a journal will determine the quality of the authors it can attract. They use data from finance journals from 1970 – 2014.

A2.53 This is an example of a "demand driven" approach to prioritisation, where the importance of piece of research is determined by the number of stakeholders supporting it. Collaborative research undertaken by research clubs for member organisations who pay a subscription uses a similar mechanism, for example the research programmes operated by RSSB on behalf of the UK rail industry and UKWIR on behalf of the UK water industry.

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Appendix 3: Document review

A3.1 In addition to the literature review, we reviewed the following documentation:

- The ONS survey returns for FSA Annual Expenditure on Research and Development, and the associated supporting spreadsheets
- The SERD (science, evidence, research, development) tracker spreadsheet dated May 2018
- An analysis of R&D spend by category carried out by FSA's Analytics Unit
- A process diagram for Investment Board project approval
- Notes on the earlier attempt to modify the Payback Framework valuation methodology for FSA research prioritisation
- Ten example business cases and requests for funding for IB and SEF projects using a range of different templates
- A presentation and PowerPoint slide pack on the new Microsoft PowerApps 'five case' business case submission system for 2019/20 project submissions.
- FSA Strategic Plan, 2015-2020
- FSA board paper FSA 18/03/15, FSA PRIORITIES AND BUDGET FOR 2018/19
- Food Standards Agency Science, Evidence and Information Strategy 2015-20 - Delivery Plan
- FSA board paper FSA 18-09-17, SCIENCE UPDATE 2018
- FSA board paper FSA 18-09-09, RISK ANALYSIS: PROCESS, GOVERNANCE, COMMUNICATION

A3.2 Useful outputs from these are described below.

Notes on the Payback Framework

A3.3 The notes on the proposal to modify the Payback Framework refers both to the Payback Framework and to an earlier prioritisation scheme that was in use from 2007 to 2011.

A3.4 Both the Payback Framework and the earlier method would count as multi-criteria frameworks according to the definitions in the literature (see above). Issues raised with the schemes included:

- Too complex to apply, with insufficient information available to feed them (especially economic impacts and the problem of attribution of benefits)
- The vulnerability of the system to "gaming", consciously or sub-consciously, e.g. by overestimation of the likely economic impact of the research
- Insufficient resource to oversee and challenge proposals
- For some projects, difficulty articulating the need for the research and the anticipated benefits sufficiently clearly.

FSA Strategic Outcomes and Priorities

A3.5 FSA strategic outcomes were described in the FSA Strategic Plan 2015-2020:

- Food is safe
- Food is what it says it is
- Consumers can make informed choices about what to eat
- Consumers have access to an affordable healthy diet, now and in the future.

A3.6 FSA strategic priorities were also articulated in the Priorities and Budget board paper for 2018/19:

- Strategic Priority 1: European Union exit
- Strategic Priority 2: Regulating our future
- Strategic Priority 3: Doing the day job exceptionally well.

A3.7 There was also a set of FSA strategic priorities described in the Science, Evidence and Information Strategy 2015-2020, Delivery Plan:

Priority Themes - The science we need to develop and apply:

- Understanding risks and how to evaluate and compare them, so that we can target our work on effective consumer protection
- Intelligent and shared use of data, information and analytics, to understand existing risks, identify new and changing risks, and to develop targeted and effective surveillance and regulation
- Understanding consumers, food businesses enforcement partners and others in the food system and how we can work with them to support behaviour change and build and spread good practice
- Learning from what works and what doesn't, to maximise positive impacts and value for money, through our own work and our work with others.

A3.8 FSA science spending categories were also described in the Science Update 2018 board paper:

- Core spend – described as responsive or reactive, and includes funding the reference laboratories; statutory monitoring; the food and you survey (not R&D under the ONS definition)
- Investment spend – described as preparing/improving/evolving, includes well established science programmes; funding the science advisory committees, etc (some of which would count as R&D)
- Strategic spend – described as predicting/trialling/partnerships/breakthroughs, including horizon scanning (probably mostly counts as R&D, including the SEF projects)

A3.9 From the spend totals the strategic spend category appears to largely align with projects funded by the Strategic Evidence Fund.

Business case examples

A3.10 The example business cases show a range of different templates have been used, in the relatively recent past, with different ways for categorising research and articulating benefits. We assume that these have now been largely replaced by the Full BC Process.

Business Cases	Format of research categorisation and benefits description
1. Barriers to and Enablers of the Reporting of Intelligence Regarding Food Crime	**Draft specification for an Invitation to Tender.** Includes a narrative description of research aims, and an expected set of deliverables
2. Rapid method for pathogens detection 3. FSA/ LSHTM Research Fellow: Cost of Illness Modelling 4. FSA / UCL Behavioural Insights Research Fellow 5. Enhanced Molecular-based Surveillance and Source Attribution of Campylobacter Infections	**SEF funding application forms.** Includes three criteria; at least two must be met to be approved for SEF funding: • Emerging / disruptive technology • Horizon scanning & emerging risks • Strategic partnership co-funding Includes a qualitative statement of the anticipated opportunity / potential, but recognising that there is also risk
6. Scoping and Piloting consumer behavioural interventions 7. Co-funding contribution towards a PhD studentship in risk management	**IB funding requests from 2015 and 2016**, with reference to the previous online business case approval system. Qualitative statements of how the work supports the FSA strategy; the anticipated benefits and outcomes; and how the benefits will be measured
8. Estimating the Direct Cost of Microbiological and Allergenic Foodborne Illnesses 9. Examining the transmission of HEV in pig and into the pork food chain	**IB funding requests from 2017**, using an updated / modified template. As well as the above qualitative statements, the template includes a set of nine benefit categories that can be selected, although none of these have been maintained in the new Full BC Process system: • Empowering consumers to make informed choices • Maintaining relationships with external partners and stakeholders • Improving the quality of service that the FSA provides to consumers • Improving value for money or increasing our organisational efficiency • Complying with our legislative or contractual obligations • Improving FSA employees' working life • Improving public health • Reducing food crime • Mitigating organisational risks identified on corporate or directorate risk registers

Appendix 4: Outputs of the workshops

A4.1 The workshops provided an opportunity to seek input from a wider pool of people. (Note that the RDVA was referred to as 'the methodology' in the workshops.)

The methodology specification workshop

A4.2 This workshop was structured around three main questions:

1. What counts as an R&D project?
2. What is the best way to categorise R&D?
3. What must the methodology deliver?

A4.3 The session concluded with a wider discussion of some of the issues concerning how the FSA might achieve an overall balance in its research portfolio.

What counts as an R&D project?

A4.4 The 'Frascati' definition of R&D is used across government, but the workshop agreed that we should not try to force projects into this structure as almost all FSA R&D would count as applied research using this definition.

Figure 3: 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	Directed at developing new materials, products, devices, processes, systems or services or substantially improving existing instances

A4.5 The Office for National Statistics (ONS) also include some more detailed criteria for R&D on their annual survey forms, based on Organisation for Economic Co-operation and Development (OECD) definitions:[3]

Figure 4: ONS criteria

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

[3] 2018 Annual Government Expenditure on Research and Development, Office for National Statistics

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

A4.6 These definitions were shown in the opening presentation but not discussed in detail. However, the workshop discussions were largely consistent with these criteria, suggesting that they could be used as part of the RDVA. Most of the work that FSA calls science falls into this category, but there are some more borderline areas such as the work of the reference labs and the funding of expert advice (science committees etc). Relevant work done in-house by FSA staff would also be included in the definition of R&D.

A4.7 The workshop concluded that work that has not been done before and with an element of risk may need a new type of business case, as there is likely to be insufficient data to evidence a standard business case.

What is the best way to categorise R&D?

A4.8 The workshop discussed the pros and cons of various categorisation schemes (see below), but overall there was a strong preference for a scheme based on:

- The contribution made towards the FSA's strategic objective and the ultimate beneficial outcome of improved public health
- The main users of the research outputs (e.g. other scientists, consumers, the food industry, policy makers, regulators).

A4.9 This focus doesn't limit FSA to 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.

A4.10 The workshop noted that science business cases currently tend to focus on **how** the science would be done rather than **what benefits to the ultimate beneficiaries** could be expected to accrue. Telling the story of how the spend on R&D contributes to public health is often missing. This is potentially a cultural issue. The 'pathway' to the realisation of benefits was also an important consideration, which could be (for example) via industry action; via policy or regulatory change; or via a change in consumer behaviour.

A4.11 The benefits delivery pathways idea was therefore also an important part of the specification, which we developed further in the subsequent system mapping workshop (see below).

Figure 5: Different approaches to research categorisation presented at the workshop

Rationale

e.g. alignment with Strategic Outcomes, supporting the delivery of the Strategic Plan, addressing the objectives in the Science and Evidence Strategy:

- Ensuring that food is safe and what it says it is
- Ensuring consumers can make informed choices about what to eat
- Ensuring that consumers have access to an affordable healthy diet, now and in the future

Type of activity

- Policy research
- Social research
- Biological research
- Literature review
- Monitoring & data collection
- Development of new processes (testing, treatment)
- Knowledge transfer

Topic of R&D

- Informing new policy development need
- Improving regulation
- Monitoring foodborne disease
- Sampling analysis techniques
- Safety of food manufacturing techniques
- Consumer perception
- Reducing foodborne disease
- Allergens

Types of benefit

- Improved meat hygiene
- Improved consumer safety
- Improved consumer information
- Reduced industry costs
- Improved knowledge through monitoring
- Better understanding of public attitudes
- Improved processes
- Improved methods

Beneficiary of research

- FSA policy development
- FSA science
- FSA operations
- End consumer
- Food industry supply chain

- Other organisations (for joint funded research)

What must the RDVA deliver?

A4.12 In this discussion, the workshop participants were asked to rank in order of importance some potential elements of the RDVA and comment on how difficult they might be to apply in practice. The list of descriptors came from our interpretation of the requirements in the ITT and the project initiation discussions combined with some additional factors identified by the workshop participants. The participants were divided into two groups with a mix of disciplines in each group. The views of the two groups are summarised below:

Figure 6: Group rankings

Group 1

Ranking	Description	Difficulty
1	Identify what is / is not research, based on a clear definition	Medium
2	Categorise research in a way that is useful to FSA	Medium
3	Make it easier (not harder) to build a business case	Low
4	Treat innovative / risky projects fairly compared with lower risk projects that have easily realised benefits	Low
5	Measure the impact of research using quantitative / qualitative metrics	High
6	Encourage better collaboration	Medium
7	Don't duplicate research already being done elsewhere	Medium
8	Deal with a range of different types of output	Medium
9	Consider the value of a project on its own merits and as part of a portfolio	Medium
10	Deal with different funding routes – internal resource, external spend, investment board and strategic evidence fund, collaborative / part funded projects	Medium
11	Learn from the mistakes of previous valuation / scoring methodologies	Low
12	Identify who would be responsible for applying the method, and what additional support and information they would need	Low / Medium
13	Be an add-on to the existing business case process	Low
14	Must be transparent, not a "black box"	Medium

Group 2

Ranking	Description	Difficulty
1	Identify what is / is not research, based on a clear definition	Low
2	Consider the value of a project on its own merits and as part of a portfolio	High
3	Treat innovative / risky projects fairly compared with lower risk projects that have easily realised benefits	High
4	Measure the impact of research using quantitative / qualitative metrics	High
5	Deal with a range of different types of output	Medium
6	Categorise research in a way that is useful to FSA	Medium
7	Make it easier (not harder) to build a business case	Low
8	Identify who would be responsible for applying the method, and what additional support and information they would need	Medium
not ranked	Deal with different funding routes – internal resource, external spend, investment board and strategic evidence fund, collaborative / part funded projects	
not ranked	Learn from the mistakes of previous valuation / scoring methodologies	
not ranked	Be an add-on to the existing business case process	

A4.13 The following table compares how each element was ranked by the two groups. There is a reasonable degree of consistency, with both groups highlighting the following as important issues:

- The need to identify what counts as R&D
- Treating innovative / risky projects fairly compared with lower risk projects that have easily realised benefits, and
- Measuring the impact of research using quantitative / qualitative metrics

Figure 7: Group rankings – Groups 1 and 2

Description Ranking:	Group 1	Group 2
Identify what is / is not research, based on a clear definition	1	1
Categorise research in a way that is useful to FSA	2	6
Make it easier (not harder) to build a business case	3	7
Treat innovative / risky projects fairly compared with lower risk projects that have easily realised benefits	4	3
Measure the impact of research using quantitative / qualitative metrics	5	4
Encourage better collaboration	6	-
Don't duplicate research already being done elsewhere	7	-
Deal with a range of different types of output	8	5
Consider the value of a project on its own merits and as part of a portfolio	9	2
Deal with different funding routes – internal resource, external spend, investment board and strategic evidence fund, collaborative / part funded projects	10	-
Learn from the mistakes of previous valuation / scoring methodologies	11	-
Identify who would be responsible for applying the method, and what additional support & information they would need	12	8
Be an add-on to the existing business case process	13	-
Must be transparent, not a "black box"	14	-

- = not ranked or not identified

The System mapping workshop

A4.14 An important theme from the first workshop was the issue of how research leads to benefits. The consensus opinion was that this should be brought out more, and people need to think this through as part of their R&D business cases. Pathway mapping can help with this, so the focus of the second workshop was to see how feasible it would be in practice to identify the pathways to benefits for a sample of six example case studies. If this exercise showed promise, then it could form an important part of the specification for the DVA. The workshop was held on 28 November 2018 in central London.

A4.15 Based on our review of documentation and interviews, we proposed a generic pathway map as shown in Figure 8 overleaf. This considers the complete pathway from initial idea generation all the way through to long term outcomes, but the workshop participants were asked to focus particularly on the right-hand side of the diagram (starting from research outputs). The map also acknowledges that benefits and longer-term outcomes can be realised via policy maker changes; industry changes; or consumer behavioural changes.

A4.16 The workshop participants chose three projects in well-established policy areas to work on first, but then agreed that a better test of the approach would be to apply it to three more projects that were more uncertain and/or at an earlier stage of development. The projects selected were as follows:

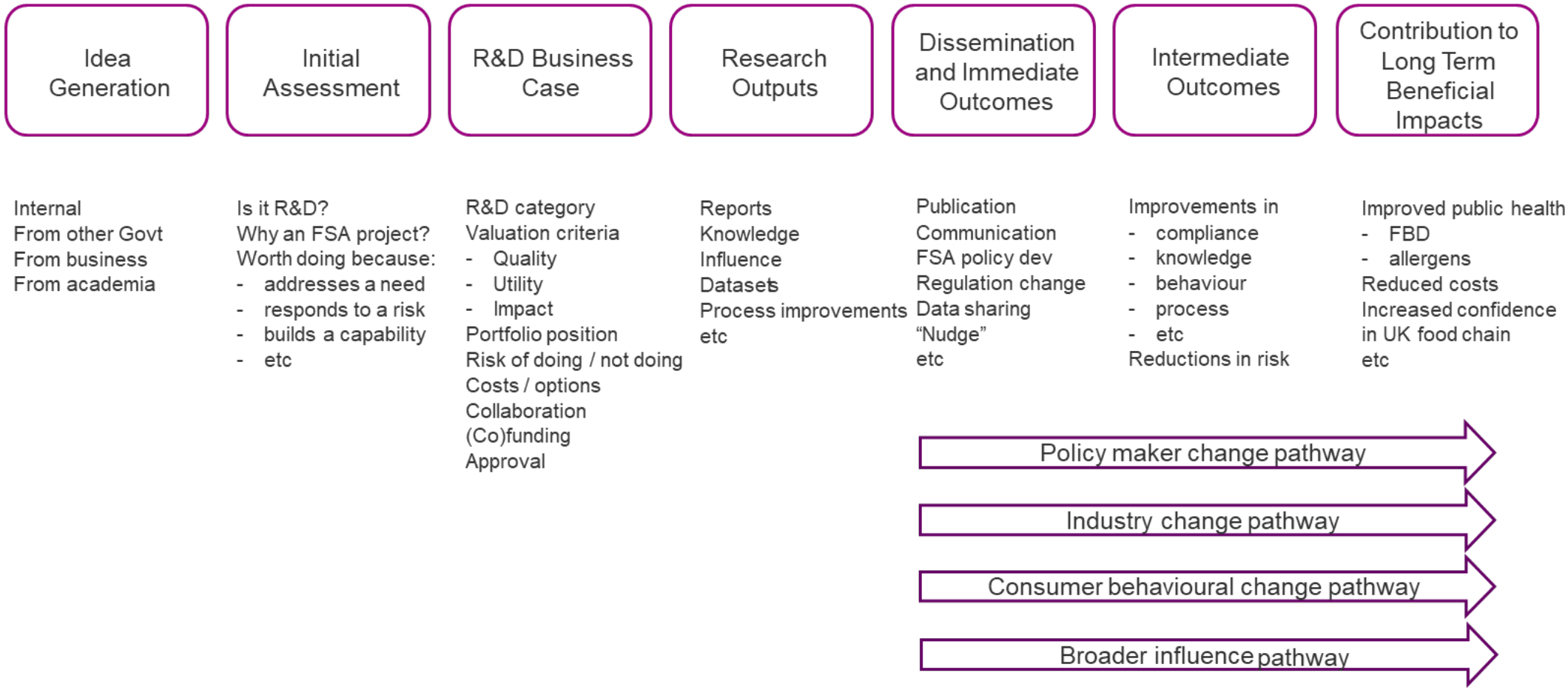
Well established	More uncertain / blue sky
The HEV infection model	The 21st century abattoir
The Food and You survey	Environmental chemical contamination
The provision of allergen information survey	The use of biomaterials

A4.17 Summaries of the benefit delivery pathways for the six projects focussing on the right-hand side of the generic pathway are provided at the end of this appendix.

A4.18 The overall conclusion from the workshop was that it was a useful process, and pathway mapping does have the potential to help improve the narrative for how a research project delivers benefits, so it could form a part of the proposed RDVA.

A4.19 However, all the project discussions concluded that it was very difficult to quantify the benefits in absolute terms. 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.

Figure 8: Generic delivery pathways



Project benefit pathway summaries

The HEV infection model

A4.20 This is research to understand the viral load in pork products of Hepatitis E virus, and hence to understand how HEV may be affecting UK consumers and making them ill. It is thought that up to 90% of confirmed HEV in human blood samples has come from eating pork products.

A4.21 The main research outputs are basic data on viral load in pork products in different parts and times of the food production cycle, together with technical reports and briefing reports for policy officials.

	Immediate research outputs and dissemination	Intermediate outcomes	Ultimate beneficial impacts
Policy change	International workshop to encourage EU collaboration	Options for regulatory change and policy on pork cooking advice	Reduction in human cases of HEV from consuming pork products
Industry change	Communication and engagement with key UK industry stakeholders, motivating change in industry practice	Improvements to the pork production cycle (slaughter and processing) to reduce HEV risk	Strengthening / protecting UK pork brand
Consumer change		Maintaining confidence in eating pork, improved cooking practices (re trend for cooking pork pink)	Reduction in hospitalisation for acute cases (e.g. in the immunosuppressed)
Broader influence	Publication of basic science data for wider use		

The Food and You survey

A4.22 The Food and You survey is a large consumer survey that provides evidence of public food safety attitudes, reported behaviour, food safety knowledge and food issues in England, Wales and Northern Ireland.

A4.23 The main outputs are the underlying data, a primary published report, and secondary analysis carried out by policy areas. The dataset is made available to academic researchers and outputs therefore also include papers published in peer reviewed journals. A technical report is published to show the methodology, which is used to support teaching in universities of robust methods of data collection and analysis.

	Immediate research outputs and dissemination	Intermediate outcomes	Ultimate beneficial impacts
Policy change	Can lead to immediate changes to policy e.g. labelling of raw drinking milk and campylobacter interventions. Outputs are used to measure the impact of policies, e.g. the impact of Caloriewise.	Horizon scanning – to identify policy areas for attention in the future and help focus further research Identifying communication needs Helping respond to emergencies – identifying groups likely to be at risk for example	Should ultimately support better food safety, reliability and confidence Changes in food safety behaviour, knowledge, attitudes Reductions in foodborne illness Can monitor trends in foodborne illness – reality versus perception
Industry change	e.g. Control of upstream contamination for campylobacter		
Consumer change	e.g. Food handling messaging – don't wash your raw chicken for campylobacter; communicating the 4Cs of food hygiene	Monitors cultural change in consumers- feeds into horizon scanning (see above)	
Broader influence	The French have modelled their survey on Food and You	ONS use it as one element of monitoring performance against sustainability goals	The robust method and use of survey outputs by academia etc adds to the credibility of the FSA

The provision of allergen information survey

A4.24 This was a survey to understand how to improve the provision of allergen information to consumers. The FSA wanted to know what information was currently being provided to the public, and who was following the current (voluntary) industry guidance.

A4.25 The main outputs included a technical report, academic journal papers, a blog and news articles. The work focussed on the top 10 allergens across the EU, so some key allergens for UK consumers were not included.

	Immediate research outputs and dissemination	Intermediate outcomes	Ultimate beneficial impacts
Policy change	Evidence to introduce regulation/ legislation, training, awareness raising		Reduced NHS costs and increased QUALY
Industry change	Guidance for best practice in communicating allergen ingredients with customers, training	Changes to menus, labelling and staff training	More sales to customers with allergies who are confident to consume products
Consumer change	Understanding what is safe to eat	Increased confidence to eat out at restaurants and take away food outlets	Increased QUALY
Broader influence		Wider understanding in society of food allergens	

The 21st century abattoir

A4.26 This is a concept to investigate bringing abattoirs into the modern world, using new technology along the supply chain to improve and speed up e.g. the detection of e.g. E. coli infection and focus physical inspections where they can be most useful.

A4.27 The main outputs will be pilot studies and an evaluation report, including case studies of the abattoir(s) participating in the project.

	Immediate research outputs and dissemination	Intermediate outcomes	Ultimate beneficial impacts
Policy change	Evidence to change the policy approach		Cost reductions from reduction of food born disease and having to deal with outbreaks
Industry change	Evidence to convince industry that this is a good thing Innovation for cost savings	Elevating standards set by retailers	Reductions in endemic animal disease Reduction in use of veterinary drugs (cost for industry and public health benefits)
Consumer change	Evidence to convince consumers that this is a good thing	Convincing consumers of the benefits	
Broader influence			Updating of international standards leading to all the above more widely

Environmental chemical contamination

A4.28 This is research to understand the risk of contamination in the human food chain from persistent organic chemicals and heavy metals that are present in materials such as recycled waste wood used for animal bedding.

A4.29 The main outputs are technical reports to identify the level of different contaminants found in different materials used in the farming industry.

	Immediate research outputs and dissemination	Intermediate outcomes	Ultimate beneficial impacts
Policy change	Evidence to change the policy approach	Change in regulation for permitted levels of contaminants	Improvement of public health
Industry change	Evidence to convince industry that there is a need to change practices. The water industry is now using the evidence also.	Potentially reduced options to use some beneficial chemicals such as flame retardants which are persistent contaminants	
Consumer change			Reduction of persistent pollutants in food products so safer food
Broader influence			

The use of biomaterials

A4.30 This is an initial desk-based review to determine if the FSA needs to develop a policy on the food safety risks from bio-materials as a replacement for plastic materials in the UK food industry (e.g. bio-material derived food packaging, drinking straws, cups, bottles etc).

A4.31 The output will be a review report to determine if there is a potential human health risk that the FSA needs to consider, and proposals for the next phase of research (e.g. migration modelling of contaminants and allergens for different product types).

	Immediate research outputs and dissemination	Intermediate outcomes	Ultimate beneficial impacts
Policy change	Identification of the potential risk and the need for FSA action Specification of future research needs	Appropriate policy on the food safety impacts of bio-materials, establishment of a baseline level of risk	
Industry change	Communication of the potential risk to manufacturers	Information to inform material choice decision making – food safety dimension as well as environmental argument of bio-material vs single use plastic	Most appropriate materials used for food products, considering both environmental impact and food safety impact
Consumer change			No adverse change in allergen reactions / food borne disease
Broader influence		Sharing of scientific data from future research projects	

Appendix 5: Interviews

A5.1 We interviewed four senior FSA officials, the Chief Scientist and his office, representatives of the Investment Board and the Strategic Evidence Fund, the communications team, policy teams, the commercial and finance teams, the operational delivery team (meat inspection) and three external stakeholders (representatives of the food industry, a consumer body, and another Government department - Defra).

A5.2 All the FSA officials stated that the main role of FSA's research was to support the organisation in its role of protecting the consumer and to answer policy related questions. In addition, research can fill evidence gaps where the FSA could not rely on the academic research community or food chain businesses to conduct the research it needs. Other important reasons cited included encouraging innovation in food chain businesses (directed towards improving food hygiene and reducing food borne disease and allergen risk primarily, although also reducing costs as long as this doesn't conflict with the primary objectives).

A5.3 Maintaining the reputation of the FSA was not seen as a primary reason to conduct research - only in so much as it allows the FSA to do its job (for example to enhance the credibility of its food safety messages with the public). Risk management is a key part of this, and risk management therefore has a role to play in research commissioning.

A5.4 There were mixed views on the effectiveness and governance of the current research prioritisation system. On the whole it was working, but some areas stood out where improvements could be made:

- All research proposals should have a business sponsor, but this is still work in progress. The proposals need to state more clearly what the benefits and beneficiaries are for the work, via a persuasive narrative that can be understood by the non-specialist, i.e. "tell a story". In addition, opportunities could be provided for the person who submitted the proposal to attend the investment board to answers questions, as they are putting their name and reputation forward with the proposal.
- The strategic evidence fund as a whole is approved by the Investment Board, but then the CSA has considerable discretion on how it is spent without further reference to the IB.
- FSA is less proficient at doing research to support longer term issues that are not connected to an immediate policy need, although the strategic evidence fund is now trying to address this. The officials involved in the SEF all agreed that this was still at an early stage of development, but there was considerable risk appetite here, to allow speculative projects to fail.
- The bidding process for research funding is not as efficient as it could be and is constrained by the fact that the FSA does not have enough experienced "project manager" scientists to propose and run research projects. A common perception of the process for submitting ideas for

funding is that it is more difficult than it really is, and some people may be unaware of the support available, particularly regarding the commercial aspects. This could result in sub-optimal outcomes. Introducing a more complex valuation methodology would potentially make this constraint worse.

- While currently most projects proposed are funded, there is also a risk in future that external research managers who have more experience submitting proposals to FSA will have their projects funded at the expense of other good ideas put forward by less experienced organisations, and the same contractors being used repeatedly. There is a need to look at how the pool of potential contractors can be opened up.
- Historical programmes of work such as campylobacter research, and areas viewed as a statutory duty, do not receive as much challenge as they perhaps should, compared with newer policy priorities such as allergens. However, the change from each policy area having its own research budget and science team, to a system where all science projects are delivered by a central science division drawing from a single budget, was seen as a step in the right direction here.
- Some concerns were expressed about whether there is a sufficiently open environment to allow new research needs to be identified by anyone (not just the science teams) and to encourage wider dissemination of research proposals outside of traditional silos.
- The new business case system is still in transition, and there is a list of issues noted in the first year of application that will need to be addressed in future years. Particular importance was attached to the need to be flexible, so that ad hoc requests that arise during the year (e.g. to meet an urgent policy need) can still be funded.
- Leverage of work conducted outside the FSA could be improved.
- There are cultural barriers between the science, policy, communications and field operations teams. This is normal in most organisations however. The CSA sees his role partly as bringing these four viewpoints together.

A5.5 The Microsoft PowerApps implementation of the Full BC Process for Investment Board funded projects was seen as a response to some of the previous process issues.

A5.6 The main criteria used in decision making for research funding were expressed in similar terms by all the officials. They referred to:

- Priority (with reference to policy needs, food safety risks and opportunities from new technology)
- The likelihood of the research method delivering the planned outputs
- Utility (how directly the outputs will lead to useful outcomes)
- Proportionality (is the proposal proportionate to the magnitude of the public health risk)
- Potential impact (a clear narrative about the health benefits to the public)
- Timeliness (with reference to when policy decisions must be made)

A5.7 The strategic evidence fund has its own set of criteria, which for the most recent round of proposals were agreed with the Investment Board to be:

- Emerging / Disruptive Technologies: New technology, or new ways of using existing technology in a way that has the potential to rapidly change the way we do things in the future
- Horizon Scanning & Emerging Risks: The issues / future risks that we need to be working on now to have a plan for the future
- Strategic Partnerships: Co-funding with others on either one of the above to maximise impact/potential.

A5.8 There were fewer clear opinions on the project vs portfolio balance 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 automated through a formal portfolio ranking methodology, and as we have noted above it is outside the scope of this project.

A5.9 From the interviews with external stakeholders, we got the impression that FSA research is trusted as high quality and impartial but is perhaps less accessible than it once was. FSA's website was mentioned; it has been designed to be more consumer facing, which is good, but this has made the technical and scientific content harder to find. The most important roles for FSA research are still seen as (i) providing the scientific evidence to underpin food safety risk assessments, and (ii) engaging with consumers to understand and represent their interests in decision making and to explain complex food safety risks in layman's terms.

Appendix 6: THE RDVA specification

A6.1 We developed an initial specification for the RDVA at an early stage in the project, which is set out here for completeness. During development and testing of the RDVA our understanding of the detailed needs from, and design of, the RDVA evolved somewhat, but the core requirements remained essentially the same.

Aim of the RDVA

A6.2 The RDVA shall:

- Provide a method of **categorising work as R&D** and therefore in scope of the RDVA
- Enable projects to be **compared and prioritised**
- Help ensure the budget is spent with **potential** to have the **greatest impact**

A6.3 It shall not:

- Discriminate against projects purely on the basis of the risks of achieving outputs, outcomes or impact
- Make it harder to prepare business cases.

A6.4 While portfolio optimisation is outside the scope of this project, the outputs of the RDVA should provide useful input to portfolio assessment carried out by the appropriate body e.g. by capturing information about each project that FSA can use to ensure the overall research portfolio is balanced in terms of risks to success, timing and delivery of benefits against FSA's strategic outcomes and priorities.

RDVA users

A6.5 The principal users of the RDVA and its outputs will be:

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

Definition of research

A6.6 The definition of research should build on the ONS detailed criteria for what constitutes research:

> "R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge. It meets all of the following five criteria – it is Novel; Creative; Uncertain; Systematic and Transferable/Reproducible"

A6.7 All FSA work that meets the definition should be subject to the RDVA, including internal research and R&D identified as must-do.

Categorisation of the research

A6.8 The RDVA should allow for research to be categorised according to:

- The benefits delivered, to enable the fit with FSA's strategic outcomes and priorities to be tested (see Figure 3 below)
- The main beneficiaries of the research outputs and the benefit delivery pathways (e.g. via consumers, industry or policy makers)
- The main topic areas (e.g. campylobacter, allergens etc), although this should also be clear from the Strategic Case.

Figure 9: FSA strategic outcomes and priorities, and research categorisation, as described in various source documents

FSA strategic outcomes described in the FSA Strategic Plan 2015-2020[4]
1. Food is safe
2. Food is what it says it is
3. Consumers can make informed choices about what to eat
4. Consumers have access to an affordable healthy diet, now and in the future.
FSA strategic priorities from the Priorities and Budget board paper for 2018/19[5]
a) Strategic Priority 1: European Union exit
b) Strategic Priority 2: Regulating our future
c) Strategic Priority 3: Doing the day job exceptionally well
FSA priority themes from the Science, Evidence and Information Strategy 2015-2020, Delivery Plan[6]
Priority Themes - The science we need to develop and apply:
a) Understanding risks and how to evaluate and compare them, so that we can target our work on effective consumer protection
b) Intelligent and shared use of data, information and analytics, to understand existing risks, identify new and changing risks, and to develop targeted and effective surveillance and regulation
c) Understanding consumers, food businesses enforcement partners and others in the food system and how we can work with them to support behaviour change and build and spread good practice
d) Learning from what works and what doesn't, to maximise positive impacts and value for money, through our own work and our work with others

4 FSA Strategic Plan, 2015-2020

5 FSA board paper FSA 18/03/15, FSA PRIORITIES AND BUDGET FOR 2018/19, Report by Chris Hitchen, Director of Finance & Performance

6 Food Standards Agency Science, Evidence and Information Strategy 2015-20 - Delivery Plan

FSA science spending categories described in the Science Update 2018 board paper[7]

a) Core spend - responsive/reactive, and includes reference laboratories; statutory monitoring; food and you survey (not R&D)

b) Investment spend - preparing/improving/evolving, includes well established science; science advisory committees, etc (some R&D)

c) Strategic spend - predicting/trialling/partnerships/breakthroughs, including horizon scanning (probably mostly R&D, including SEF projects)

Basis for comparison and prioritisation

A6.9 The RDVA should encourage and enable articulation of a **clear story** about:

- What **benefits** will be delivered by the research, focussed on FSA's strategic outcomes:
  - principally **improved public health**, but may also be
  - improving the **efficiency of the regulatory process**,
  - **maintaining food standards**, and
  - **empowering consumer choice**,
    - which will have an indirect impact on public health.
- The delivery **pathway** to the realisation of benefits including:
  - how this might be delivered via **industry action; policy or regulatory change; or a change in consumer behaviour** or a mix of these
  - the **timing** to realisation of benefits
- **Research quality and rigour**, and
- The **risks** to realising benefits, which may be technical or socio-political (this is to support e.g. risk management and portfolio assessment, projects should not be disadvantaged purely on the basis of risk)

It should enable FSA to assess:

- The fit with FSA's **strategic objectives**, and
- **value for money.**

Approach to valuing projects

A6.10 The valuation methodology should be more **holistic** than a rigid scoring scheme. A simple valuation tool is unlikely to be appropriate.

A6.11 Criteria-based valuation should be included, but equally important is the **narrative element** that describes the pathways that enable research outputs to deliver benefits that contribute to public health outcomes.

A6.12 The RDVA should promote a **deliberative** process that promotes a deeper understanding of the benefits and risks of a piece of work.

[7] FSA board paper FSA 18-09-17, SCIENCE UPDATE 2018, Report by Steve Wearne, Director of Policy and Science

A6.13 A new section of the business case submission template will be required for R&D projects, especially for projects with a high degree of risk.

Ensuring adoption

A6.14 The **consultation** used to date should continue throughout subsequent stages of the work to ensure the RDVA is straightforward to apply and helpful. This should be used to generate a core of 'expert' colleagues that people can refer to for help and advice.

A6.15 It will be important to ensure that there are **sufficient resources** to champion, implement and then maintain the RDVA so that it can be incorporated into the Full BC Process in due course.

Appendix 7: Proof of concept testing - Summary of lessons learnt

A7.1 In this appendix we set out the findings from the proof of concept testing programme taking each element of the RDVA in turn, and concluding with some cross-cutting observations.

1. The business case route applicable (does the RDVA apply?)

1.1 Briefly describe the project

Why ask the question?

A7.2 We asked this question to provide the interview team with context.

Observations and conclusions

A7.3 As the intention is that the RDVA will be implemented as part of the Full BC Process this question will not need to be included in the final RDVA (it will be covered by other steps in the full process). However, an aspect that emerged in the responses to this question was the importance of the relationship of the project under discussion to other projects. The test projects all formed part of a wider programme of work, some more clearly defined than others at this point in time, that would need to be carried out by FSA before the full benefits could be realised.

A7.4 We understand that the Full BC Process already prompts for information regarding related pieces of work and dependencies and may therefore already prompt consideration of the strength of the dependencies and whether one or more projects should be considered as a single package of work for the purposes of developing a business case.

A7.5 In the test project interviews, more information on related work, and in particular future actions needed to ensure benefits delivery, emerged throughout the process, suggesting that the user may have to return to this question later.

A7.6 The test projects provided good examples of both planned projects, and other work further down the line, not yet planned, that can be used to illustrate the type of situation the user needs to consider. This included a multi-workstream project that is a mix of research and more conventional activities that has recognised strong links to a communications plan.

1.2 Is the project research?

Why ask the question?

A7.7 Initially the intention was that work that qualified as research under ONS rules would be subject to the RDVA, so this was a screening question designed to establish if that was the case or not. However, reviewers of Output 1

questioned this assumption and suggested the RDVA should have wider application to any piece of work with difficult to value impacts.

A7.8 An important question was therefore whether the RDVA needs to elicit:

1. an accurate allocation of the work to research under ONS rules, OR
2. are we primarily interested here in understanding whether the new process should apply to this piece of work?

A7.9 At this stage, users would need to supply sufficient information to justify their response. We noted however, that thinking through the response also prompted thinking around the risks associated with novel, creative and uncertain elements of the work. These risks, and how they can be managed in the project, are explored in greater depth in the pathways' element of the process.

Observations and conclusions

A7.10 We began by asking interviewees to think through each of the ONS criteria for research, ALL of which must apply if the work is to be categorised as R&D. We found that respondents often found it difficult to distinguish between 'novel' and 'creative'. We also found that all the criteria often did not strictly speaking appear to apply to work where the RDVA was clearly appropriate and helpful.

A7.11 We agreed with FSA comments that the emphasis of this question should be changed to focus on the applicability of the RDVA (Point 2 above).

A7.12 We suggested simplifying this question to ask:

1. Are the **benefits uncertain** or otherwise **difficult to describe**? If yes then the RDVA can be used instead of the quantified Benefits Management part of the updated Economic Case (if no, the RDVA can still be applied as well as the Benefits Management part)
2. Is the work also **Novel,** and may lead to new findings, and **Creative**, original and not obvious? If yes, then the work is also likely to be classified as R&D under the ONS criteria.

A7.13 We noted that the user's background could be important in determining how people respond to these questions and that guidance needs to be drafted accordingly. The tests provided ample material from which to draw examples to illustrate the type of response required.

2.1 Is the project a 'must-do'

Why ask the question?

A7.14 This question seeks to understand if the project must go ahead to meet a legal or statutory requirement – i.e. there is no discretion about whether it is implemented, but there may be discretion about how. If this is the case, the project must still go through the RDVA so FSA have a good overview of the work they are doing, and because the RDVA is designed to prompt thinking about how the design can be optimised.

Observations

A7.15 We found it difficult to articulate this question clearly. We included both legal and statutory requirements and urgent operational requirements in this category, which may have led to confusion. We concluded that a clearer definition is required and that we also needed to include an example of an actual 'must do'. None of the test projects were 'must do' under this definition.

A7.16 FSA have provided the following improved definition of 'must-do':

> Work that is funded with very limited discretion, for example because it is part of a statutory duty or legal obligation

A7.17 An example of this would be official control lab work

2.2 Fit with strategic objectives

Why ask the question?

A7.18 To enable FSA to assess the profile of research being carried out under each of their strategic objectives and to enable decision makers to place projects within the context of the delivery of the strategic purpose of the FSA.

A7.19 At this stage, users need to supply enough information to justify their response. We found however that this question also helped prompt thinking about what steps would be needed to deliver benefits.

Observations

A7.20 We encountered different levels of familiarity with what we have called FSA's strategic objectives. As agreed in the initial draft RDVA, these are closely aligned with the strategic outcomes presented in the Strategic Plan, and also the Strategic Evidence and Information Plan (which are slightly different).

A7.21 We also encountered different responses to this question, with responders either keen to explore how their project ticked all the boxes, or requiring some degree of prompting to think about objectives outside the most direct and obvious answer.

A7.22 We concluded that users may need more guidance as to what each strategic objective encompasses, so they can answer this question consistently. In addition, respondents should be encouraged to discuss this with their policy lead, line manager or wider team.

A7.23 FSA have subsequently provided an updated set of descriptors for the strategic objectives. These are provided in the table below.

Table 4: Updated description of strategic objectives

Food is safe - Consumers have the right to be protected from unacceptable levels of risk in the food they eat.
Food is what it says it is - Consumers have the right to make informed decisions about their food, and have trust in the food system to do so. This is only made possible when it is correctly and accurately identified, and appropriately labelled.
Consumers can make informed choices about what to eat - Informing and empowering consumers as part of securing their rights. Understanding how growing challenges around safety, affordability, security, technology and sustainability will affect consumers interests and values over time.
Consumers have access to an affordable healthy diet, now and in the future (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.[8]
The regulatory process is efficient - to keep pace with rapid change, the regulatory regime requires modernising. By focussing on creating a risk-based, proportionate, robust and resilient system we can ensure consumers come first in everything we do.

[8] Wording updated following input from Northern Ireland colleagues

2.3 Research topic

Why ask the question?

A7.24 To enable FSA to understand how they are spending their research budget.

Observations and conclusions

A7.25 Respondents found it difficult to answer this question in all interviews, as there are several ways the question can be interpreted. In discussion with the FSA project manager it was agreed that categorisation by research topic or theme will be the most useful. FSA have provided an updated list of categories, for further testing in Phase 2. These are provided in Table 5 below.

Table 5: Updated list of research topics

Antimicrobial resistance (AMR)
Allergens
Foodborne diseases (FBD)
Consumer research
Market research
Regulatory research (including operations)
Nutritional (NI only)
Scientific governance and capability
EU Exit
Novel Foods
Chemicals: supplements/additives/natural
Chemicals: contaminants/pesticides/veterinary medicine
Radiological
Other microbiological (including TSE)
Other

3. Delivery pathways

Why ask the questions?

A7.26 This information serves a number of purposes:

- It prompts a deliberative process of thinking about how benefits might be delivered, following a theory of change type approach. This includes the risks and barriers to delivery and how these can be addressed – this should be aimed not at leaping hurdles, but at strengthening the project design, and understanding and capturing information about what needs to happen outside the project to ensure the potential benefits are actually realised.
- To this end, it provides a structure the user can use to frame conversations with policy leads, colleagues delivering related projects, and colleagues in e.g. communications.

- It provides the information users can subsequently use to help allocate meaningful scores in the qualitative ranking.
- It provides information that line managers, quality checkers and the decision boards can use to check scores are realistic, and
- It provides information decision makers can use to inform their decision about whether the work should be funded.

Observations and conclusions

A7.27 We were able to elicit very rich information here, however, the information was not always clearly structured and additional prompting was often needed. Examples of difficulties encountered included:

- Weak differentiation between immediate research outputs, intermediate outcomes, and longer-term impacts
- Confusion about timescales, e.g. whether impacts are viewed as long term or short term
- Additional prompting required to 'unpack' how to ensure benefits would be delivered and which other parties would need to be engaged
- Additional prompting required to help users think 'outside the box' around barriers, adverse outcomes, broader, tangential benefits, and how these will be assured and communicated, internally and externally.
- Additional information emerged when the scoring questions were asked – e.g. additional communications required and broader benefits; some prompting was required to help users think outside the box.

A7.28 We suggested the following actions to elicit a clearer narrative and deeper consideration of risk and delivery issues:

- Clarify the language used using theory of change language - outputs, outcomes and impact rather than outputs, intermediate outcomes and longer term outcomes
- Provide in the tool a picture or flow chart illustrating the different steps in the benefit delivery (theory of change) chain – with examples of the type of information that should be entered including requirements for successful delivery, risks and barriers to delivery and how these will be addressed
- Encourage consultation with colleagues including the benefits manager, policy colleagues and communications
- Include example responses to show the sorts of information that should be included
- Ensure that the questions, examples and supporting guidance are framed to elicit thinking in support of the scoring required at the next stage – responses at this stage should actively consider:
  - The *quality of the work* necessary to achieve **outputs** that are fit for purpose to generate the desired **outcomes** from the work, for example, to ensure evidence produced will be credible
  - The extent to which the **outputs** will be *timely*, *useful and useable* to support effective action and hence deliver **outcomes** (*the utility of the work*)

- How the *reach* of the work and hence delivery of **outcomes** will be optimised to maximise its **impact** in terms of the FSA's strategic objectives (*significance*) – recognising that additional work may be required to achieve this, and
- Consideration of what risks and barriers there are to achieving the **outputs**, **outcomes** and **impacts** and how these can be addressed – a separate question on risks, barriers and plans to address these, may be useful.

Table 6: Outputs, outcomes and impacts[9]

Item	Definition	Example
Outputs	The direct product of your activities and typically tangible and countable. In principle you should have full control over the outputs you produce.	Outputs of FSA research work includes reports, datasets, conference presentations, briefing notes etc.
Outcomes	Outcomes are the intended and unintended results and consequences of activities that may be realised (or only observable) over short-, medium- or longer-term.	Outcomes would include changes in food safety practice as a result of organisations applying new guidance or consumers modifying their behaviour.
Impacts	Contribution of the work towards meeting strategic goals. Impacts tend to lag outcomes and may be positive (**benefits**), negative, or neutral: intended or unintended.	Impacts would include improvements in food safety metrics, e.g. a reduction in incidents of food poisoning.

4. Scoring criteria

Why ask the question?

A7.29 The purpose of this section of the RDVA is to provide semi-quantitative measures that will:

- 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 to support funding decisions.

9 Derived from: Outcomes and Impacts Toolkit: Summary - Gov.uk, 2010; and Developing a Logic Model, University of Wisconsin, 2008

Observations and conclusions on the criteria

A7.30 **4.1 Research quality:** The Output 1 report reviewers had expressed concern that research quality could not be assessed in advance of the ITT research specification being developed and/or the receipt of tender documents from suppliers. Two of the test projects had already been put out to tender and the tenders assessed – which gave the respondents ample material to judge the research quality that should be achieved, so it was difficult to judge if users would be able to answer this question in practice. The intention, however, is that this criterion should help users think through what quality is appropriate (that is fit for purpose given the objectives of the research) and whether this is feasible within the constraints (timing, resources etc). It should also discourage over-design of projects. Discussions suggested to us, that the criterion did prompt useful thinking in this area, but this needs testing in the next phase through application to projects at early development stages.

A7.31 **4.2 Research utility:** Here we are concerned with the *potential* utility of the work, judged in terms of its *own objectives – the outcomes it is designed to achieve* – should the project be successful. We do not ask here about *likely* utility as this would double count with the risk versus benefit balance question that comes later. We had difficulty articulating this question clearly in the FSA context. Responses suggested the following definition of utility would be appropriate for the RDVA and this should be tested in the next phase:

> Will the work, if successful, deliver results that are timely, and are of a form that FSA, or its partners or stakeholders, will find easy to use and act upon without further manipulation or interpretation?

A7.32 **4.3 Significance and Reach:** Again, we are interested here in the *potential* significance and reach, this time in terms of its contribution to meeting *FSA's strategic objectives* should the project be successful. Responses were mixed here, with respondents sometimes needing more prompting to ensure that all the pathways and ultimate beneficiaries were considered, and that a clear chain from outputs, through outcomes to impact was articulated. Perhaps, not surprisingly, this appeared better for projects that were closer in terms of delivery of desired impacts, with one project able to articulate clearly how the significance and reach of the work would be assured (as far as possible), referring to specific workstreams and communications planning underpinning the work. For more exploratory projects, this level of planning is unlikely to be necessary, but some idea of how results will translate into benefits is needed – the test projects provided good examples of the sort of response we would expect at this stage.

A7.33 **4.4 Risk reward balance:** This criterion focuses on the risk of failing to deliver its desired outputs and outcomes (or delivering undesirable outcomes and impacts) versus the potential rewards (beneficial impacts). It seeks to focus users and decision makers attention on whether reasonable actions have been identified to reduce the risks and tackle barriers, and whether the level of rewards (should the project be successful) justifies accepting the residual risks.

A7.34 Throughout, the process, we are prompting thinking about different types of risk and prompting was sometimes required to help respondents focus on the risks to achieving outputs and outcomes. Some sort of 'hover over' guidance or similar setting out these different types may be useful.

Table 7: Different types of risk relevant to the RDVA

Beneficial impacts interms of the strategic objectives the project addresses – generally reductions in risk:

- e.g. food safety risks, food authenticity risks

Risks to project outputs and outcomes and hence to realisation of benefits:

- Risks to successful delivery of project outputs, i.e. to timeliness, cost or quality, due to limitations in the design of the project or external factors that could not be reasonably anticipated
- Risks associated with the uncertainty inherent in research - the project may be completed as planned but fail to deliver useful insights
- The project may deliver useful insights, but these are not taken up because the barriers are too difficult to overcome (e.g. industry resistance, reliance on consumer behavioural change, international dimensions)

Risks of undesirable outcomes and impacts arising as a consequence of the project:

- e.g. the findings have unanticipated consequences for example in terms of undesirable consumer or business behaviours leading to increases in food safety risks

Observations and conclusions relating to scoring

A7.35 Although we did not ask participants to score their projects, some useful observations did emerge in discussions.

- **Scoring potential:** Some participants, although not all, found the idea of scoring potential impact difficult – they felt that the fact that these are about potential impact and making best judgement must be made very clear.
- **Anchoring scores:** Example prototypical descriptors to help users to anchor their scores will be needed to help obtain consistent scoring.
- **Language:** All four criteria need to be expressed in plain English, using language that will be familiar to FSA users. The draft text suggested for utility above is an example.
- **Who should score:** While the scoring could be carried out by a third party (which would remove reviewers' concerns about bias and gaming) this would require a significant FSA resource commitment. A good compromise solution may be to require e.g. line-manager review and endorsement of the scores. We found that the information elicited during the pathways discussions would enable line manager to confirm

whether both the narrative and scores are reasonable, or to identify areas that require more thought. We discuss governance further below.

Cross cutting observations

Deliberative thinking

A7.36 Participants told us, and we observed, that the process did prompt deliberative thinking, building a narrative about how benefits would be delivered, the risks and barriers to these and how these could be overcome.

Promoting good practice

A7.37 Review comments suggested that previous experience was that initial good practice in applying processes 'dropped-off' with time, and as the resources that could be devoted to training and support decreased. In our experience, this is not uncommon. We propose that this risk can be managed in a number of ways:

- Clarity of language in the questions, and provision of guidance, examples and prototypical descriptors to provide scoring anchor points – the proof of concept testing and initial next testing and validation phase will provide material to develop and test the information provided
- Provision of this material via easily accessible links in the business case system – separate documents often will not be accessed, and
- Using the case study library building phase of this project to build a cohort of users (and other relevant staff) who can provide support to others.

A7.38 We suggest however, that maintaining good practice usually requires some ongoing support activity, and this could be provided through:

- Some light touch periodic ongoing training of line managers and support providers (such as the benefit manager) informed by review of a sample of returns and interviews
- Governance arrangements (see below)

Governance of the process

A7.39 We proposde above that line-managers should review scores, they should also encourage dialogue with other relevant groups within and without FSA as appropriate to the project. A sample could also be subject to independent review, especially in the early days. Review should consider whether:

- The narrative and scores show evidence that a deliberative process has been followed – including consultation with colleagues
- The scores appear realistic and justified by the narrative
- Any scores, individually or across the piece, appear too low (in comparison with previous scores) to justify submission to the board.

A7.40 The steering group also suggested that the level of scrutiny should be proportionate to the budget required. A level of £100k was suggested as a potential cut-off point, above which more detailed information would be

required, and more independent scrutiny of the case would be required. No consensus was reached on this.

Using the outputs of the process

A7.41 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 (which will have limits on the length allowed) and the scores, within the wider context of FSA needs.

A7.42 We suggest that on reviewing the scores the line manager produces a short commentary on each score – which would be included in the final project summary. We will develop options for presenting the information as part of Phase 2 of the project.

Recommendations from the proof of concept testing

A7.43 The recommendations from the proof of concept testing, relevant to the design of the RDVA, are described below. They were implemented at the start of Phase 2 of the project:

1. **Related work:** Confirm that the business case process prompts for information regarding related projects sufficiently, including the strength of the dependencies and whether one or more projects should be considered as a single package of work for the purposes of this process.
2. **What is research?:** Change the emphasis of this question to focus on whether the new process should apply to the project proposal being considered. We suggest simplifying this question to ask:

   *Are the **benefits uncertain** or otherwise **difficult to describe**?*

   Is the work also **Novel,** and may lead to new findings, and **Creative**, original and not obvious?
3. **Must-do:** Update the definition of must-do to reflect advice from FSA:

   Work that is funded with very limited discretion, for example because it is part of a statutory duty or legal obligation.
4. **Fit with strategic objectives:** Include guidance on FSA's strategic objectives to help participants answer this question consistently. Table 1 above provides an updated set of strategic objectives provided by FSA.
5. **Research topic:** Provide a list of research topics to select from. Table 2 above provides an updated list provided by FSA for testing in Phase 2.
6. **Delivery pathways:** Provide the following to elicit a clearer narrative and deeper consideration of risk and delivery issues:
   - Use theory of change language (see above)

- Provide in the tool a picture or flow chart illustrating the different steps in the benefit delivery (theory of change) chain including requirements for successful delivery, risks and barriers to delivery and how these will be addressed
- Ensure that the questions, examples and supporting guidance are framed to elicit thinking in support of the scoring required at the next stage
- Limit the length of submissions.

7. **Scoring criteria:** Test the scoring scheme in the next phase of work through application to projects at different stages of development, making the following changes:
   - **Research quality:** make it clear that this related to fitness for purpose of the research approach envisaged.
   - **Research utility:** make clear this relates to *potential* utility should the project be successful; use the following definition:

   Will the work, if successful, deliver results that are timely, and are of a form that FSA, or its partners or stakeholders, will find easy to use and act upon without further manipulation or interpretation?

   - **Significance and Reach:** Make clear this relates to *potential* significance and reach in terms of the project's contribution to meeting FSA's strategic objectives should the project be successful.
   - **Risk reward balance:** Provide guidance setting out the different types of risk considered through the process to help users answer this question consistently.
8. **Scoring process:** Provide the following to promote consistency:
   - **Anchoring scores:** Example prototypical descriptors to help users to anchor their scores and make it clear that very few projects would be expected to achieve a 4* score.
   - **Language:** Express criteria in plain English, using language that will be familiar to FSA users.

   Provision of guidance: To ensure guidance is useful and accessible, we should use the proof of concept tests and early tests in the next phase to develop examples and scoring anchor points that should be readily accessible directly in the tool (e.g. hover overs, click throughs, or grey text in entry screens) rather than in a separate document.

Appenxix 8: Results of the Phase 2 Testing and Development

A8.1 In this appendix, we set out:

- Findings from the testing carried out in Phase 2, and subsequent discussions with the steering group, under each of the RDVA steps in turn
- Our recommendations for refinements to the RDVA based on these.

Summary of test results and discussions

Step 1: Applicability of the RDVA

Wave 1 testing

A8.2 All seven projects provided clear responses to the questions in this step.

Are the benefits your project aims to deliver uncertain or otherwise difficult to describe? (Y/N with free text box)

A8.3 Five out of seven projects agreed that the benefits were uncertain or difficult to describe:

"No real baseline data for comparison"

"Non-tangible impact on clinical practice"

"Strategic insight"

"May not give a clear answer"

"Unclear if FSA will need to take action"

Is the work novel (may lead to new findings) or creative (original and not obvious)? (Y/N with free text box)

A8.4 Six projects out of seven respondents believe the work is Novel, with strong emphasis on filling knowledge gaps.

"Data we have not previously been able to obtain"

"Will know more about meat production in other countries than we knew before"

"Had little to no consumer insight before"

"Very little evidence / filling a gap in evidence base"

"Rare / not been done in UK before"

A8.5 Creativity was not mentioned explicitly.

Does your project depend on other projects to deliver benefits? (Y/N with free text box if the answer is yes)

A8.6 Only one project mentioned a dependency on an earlier project. This dependency was clearly described.

Wave 2 testing

A8.7 On the basis of the Wave 1 testing and feedback, no changes were considered necessary to this section.

A8.8 As in Wave 1, Wave 2 projects provided clear responses to this section of the RDVA.

A8.9 All five respondents stated that their project's benefits were uncertain or difficult to describe, three indicated that the work was novel or creative. Comments included:

- [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."

A8.10 Three projects indicated that they depend on other projects to deliver benefits with descriptions that 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."

A8.11 One project was aiming to deliver insights that may not have been dependent on other research projects, but the main benefit would have come from the application of the outputs of this research to help identify and prioritise other research.

Step 2: Project categorisation

Wave 1 testing

A8.12 Again, all seven projects provided clear responses to the questions in this step.

Is the work funded with very limited discretion, for example because it is part of a statutory duty or legal obligation? (Y/N with free text box if the answer is yes)

A8.13 No projects answered "yes" to this question, this is perhaps not surprising in a small sample.

Which of the FSA strategic objectives does the work contribute to? (Tick all that apply)

A8.14 There were no Northern Ireland projects in the Wave 1 sample, but all the other categories were ticked at least twice.

A8.15 One comment noted that SEF funded projects have a different set of strategic objective categories, so this raised the question of whether the SEF objectives should be merged with the list currently included in the tool. We discussed this with the Steering board who advised that we add a sixth objective to our list of strategic objectives "Strategic Evidence (SEF project)". This was implemented for Wave 2.

What topic area(s) does the research address? (Tick all that apply – includes 'other – please specify')

A8.16 Nine out of the 14 fixed categories (see Table 5 in Appendix 7) were ticked at least once. No projects made use of the "Other" category option.

Wave 2 testing

A8.17 Similar to Wave 1, there were no Northern Ireland projects in the Wave 1 sample, but all the other categories were ticked at least once with the exception of the new item "Strategic Evidence (SEF project)". None of the Wave 2 projects were SEF projects.

A8.18 Following advice from FSA, prior to roll out of the RDVA the Northern Ireland objective should be updated as follows: "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."[10]

A8.19 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 are potentially new categories of research. They are worth consideration for adding to the list. Alternatively, they may prompt thinking about a wider societal or cultural category or categories that should be added to the list.

Step 3: Benefit delivery pathways

Wave 1 testing

A8.20 Projects found this section of the RDVA the most difficult to complete. Three respondents said that they found the benefits pathway questions a little repetitive, and the difference between an output and an outcome not clear enough. This may in part be because there were no worked examples available for the first wave of testing; one of the main purposes of the case study library was to provide a good set of worked examples for project officers to refer to.

Describe the expected outputs and the plans for publishing, communicating and sharing the findings inside and outside FSA to ensure outcomes are delivered. (Free text – limited to 200 words)

[10] Communication from David Kane, FSA Project Officer.

A8.21 The expected research outputs were all clearly and comprehensively described:

> "Written up as a report and perhaps a peer reviewed journal paper"
>
> "Methods and models developed for future use"
>
> "Summary datasets published online"
>
> "Press releases and conference presentations"
>
> "Dissemination through policy team to joint Departmental meetings, industry bodies etc."
>
> "Recommendations for further work"

A8.22 One or two projects strayed into a description of outcomes and impacts, e.g.:

> "A reduced incidence of allergic reactions"
>
> "An increased understanding of which trade partners may present the greatest risk"

What are the risks and barriers to delivery of outputs, and how will these be managed? (Free text – limited to 200 words)

A8.23 Project delivery risks and risk management plans were clearly articulated:

> "Ethical approval delays"
>
> "Data availability, literature availability"
>
> "Survey participant recruitment"
>
> "Industry participation"
>
> "Lab work could be delayed, or data could be poor"

Through which of these pathways do you expect the work to deliver outcomes (change)? (Tick all that apply)

A8.24 Six out of the seven projects selected "policy development" and "broader influence", two projects selected "consumer 63ehavior" and/or "industry action" as well. The descriptions seemed to match the selected pathways.

For those pathways that apply: What potential outcomes are expected and how will these be delivered by the work? (Free text)

A8.25 The expected research outcomes were mostly well described, but some in more detail than others depending on the maturity of the project.

Policy development examples:

> "better FSA understanding of circumstances of severe allergic reactions leading to better targeted policy"
>
> "may help target surveillance better"
>
> "policy changes may be needed to address business operators who may not understand they are a food business"

Industry action examples:

"if the results are concerning, may change risk management advice and therefore industry actions"

Consumer 64ehavior examples:

"risk factors identified and communicated to consumers to ensure they mitigate these risks"

"empower consumers to make informed choices"

Broader influence examples:

"all outputs may require further work"

"may influence trade agreements and prompt further research"

For those pathways that apply: If successful, what potential impacts might the work contribute towards? How and why will outcomes contribute to impacts? (Free text)

A8.26 Impacts generally were not well described. Responses sometimes just repeated the FSA strategic objective (e.g. "food is safe") rather than being specific (e.g. "reduction in incidence of allergic reactions"). This could be due to the wording of the question and a lack of a worked example, which was provided for the second wave.

A8.27 Descriptions of how the outcomes might contribute to impacts was better, e.g.:

"by allowing better targeted advice and guidance to be developed"

"through increased/better surveillance"

"increased understanding for policy makers"

"inform future decision on what antibiotic use is acceptable"

What are the risks and barriers (technical or socio-political) to delivery of outcomes and impacts? Could there be negative outcomes or impacts? How does your plan help tackle the risks? What enablers can you use to improve likelihood of success? (Free text)

A8.28 Risks were described for six out of seven projects, but there was some confusion between risks to outputs and outcomes:

"no negative outcomes envisaged apart from potential industry sectors being implicated as higher risk"

"barriers will come from industry and their understanding of what they can do to help reduce the risk"

"lack of availability of appropriate data"

"change would require buy-in of local authorities"

"risk that staff may be moved onto other urgent projects"

"overemphasis on reduction of antibiotic use could increase crop losses"

Wave 2 testing

A8.29 To try to address the difficulties encountered by participants, we used the first wave of projects to create worked examples for the second wave (see Figure 10). As it was not clear to what extent the separate guidance document was used and useful, the decision was made to incorporate guidance directly within the tool.

Figure 10: The worked example included in the tool for outcomes and impacts

Outcomes

Outcomes are the intended results and consequences of activities that may be realized (or only observable) over short-, medium- or longer-term.

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 practice learning.
- Consumers and clinicians will become more aware of risk factors for severe allergic outcomes.

Impacts

Here, impacts are the contribution towards FSA's strategic objectives. Impacts tend to lag outcomes and may be positive (benefits), negative, or neutral and intended or unintended.

E.g.:

- Reduced incidence of allergic reactions.
- Reduction in hospitalisations and primary care visits.
- Reduced cost/burden on NHS.

How outcomes contribute to impacts

E.g.:

- Improved advice to clinicians, patients and consumers is hoped to reduce risk-taking behavior.
- 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.

A8.30 We also restructured the pathways questions to simplify the layout, for example:

- Combining the separate risk questions asked for outcomes and impacts

- Setting out the questions mapping project activities and outcomes through to impacts for each pathway as a matrix as shown below.

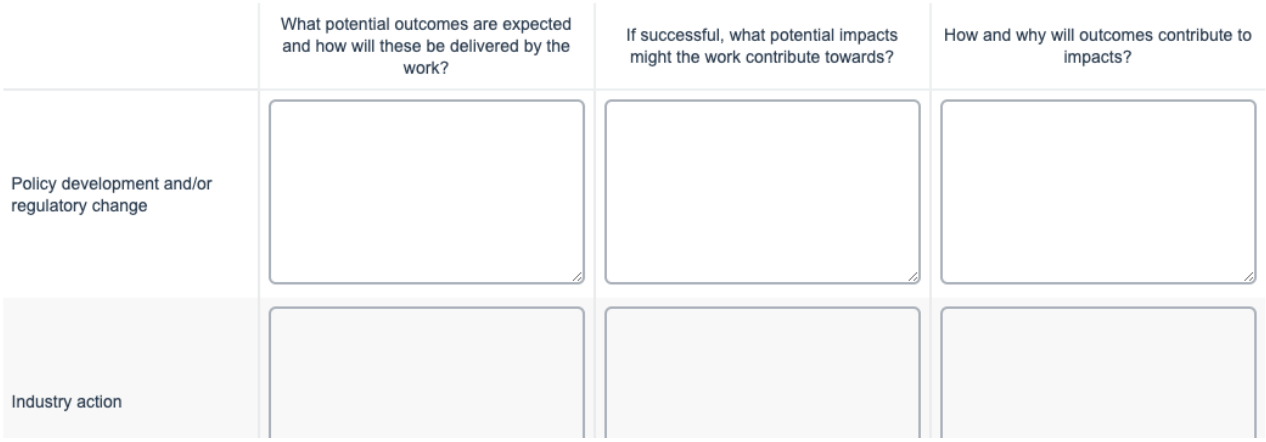


Figure 11: Benefit pathway question matrix

A8.31 These changes were designed to help projects distinguish between the different stages in benefits delivery and articulate these clearly. However, Wave 2 projects continued to find this more difficult with two participants failing to engage in depth with the Outcomes and Impacts questions. This may be, in part, because of the length of time since the introductory webinar, which not all participants were able to attend, and also because Wave 2 included some less experienced project officers. Again, the case study library is likely to be the most useful source of guidance to future project officers.

A8.32 Outputs and risks to outputs were well described. Projects appeared comfortable describing the immediate outputs of the research:

> "The outputs for this project will include a literature review assessing the strengths/weaknesses of existing methodologies and a report detailing the new methodology to be used for this project , with clear justifications for the decisions made. It will also include a PowerPoint presentation summarising the key findings, preferred methodology and any applicable recommendations, and electronic files of the underpinning data, including the modelling tool."

> "- excel interface - user-friendly calculator - working paper - several sets of slide packs - presentations - sharing it with other departments and internationally with other regulatory bodies"

A8.33 Some were less well developed:

> "Report and collated dataset. Probably presentations and an academic paper."

> "A full policy report with recommendations about the FSA's approach to ...."

A8.34 The risk descriptions also varied 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.”

A8.35 It should be noted that as the output questions are elicited elsewhere in the Business Case process, they do not need to be retained in the Pathways section of the RDVA when it is implemented in the Full BC Process – a cross reference should be included instead. However, for the case study library it is useful to keep a description of the project outputs together with the benefits pathways to provide context.

A8.36 The benefit delivery pathways selected by respondents were “Policy development and/or regulatory change” (selected by 4) and “Through broader / other influence” (selected by 4). No one selected “Industry action” or “Change in consumer behaviour”.

A8.37 Outcomes were mostly well described:

> “A better understanding on how much food crime exists in the UK, the types of food crime that exists, and the foods/drinks that food crime is most prominent in.”
>
> “The work will contribute to understanding the economic impacts of EU Exit and to develop cost-effective policy.”

A8.38 The ‘Impacts’ and ‘How and Why’ columns, generally provided between them a reasonable description of the pathways to impact, with some providing more information in the ‘Impacts’ column and some in the ‘How and why’.

A8.39 There was often some repetition between the two columns. This raised the question as to whether these columns could be combined.

A8.40 The risks descriptions were mixed – with some thinking through risks and barriers to delivery of ultimate impacts and some continuing 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.”
>
> “The success of this project in allowing the outcomes and impacts to be realised depends on the robustness/accuracy of the model that is made and how it is shared and used across the UK after it have been completed.”

"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)."

Steering group feedback and discussions

A8.41 The pathways to benefit narrative elicited in this step of the RDVA is a key source of decision information, and so the challenges identified here were discussed at some length with the steering group. A number of potential changes to this section were discussed as described below.

A8.42 **Duplication of output questions:** We noted that as the output questions are elicited elsewhere in the Business Case process, they do not need to be retained in the Pathways section of the RDVA when it is implemented in the Full BC Process – a cross reference should be included instead. When integrating the RDVA in the Full BC Process attention should be given to ensuring that the sequence of questions preserves the pathway structure (activities/outputs to outcomes to impacts (benefits)).

A8.43 **Merging impact questions:** It was agreed that the 'potential impacts' and 'How outcomes contribute to impacts' columns could be merged to reduce repetition.

A8.44 **Replacing narrative questions with tick boxes:** The narrative description of pathways to impacts could be replaced with a tick box approach with e.g. categories of different types of impact[11]. This was proposed both to reduce burden on project officers entering information, and decision bodies using the information. This would be in line with developments in UKRI who will no longer require applicants to provide a 'Pathways to Impact' plan in grant applications[12] from March 2020. However, this change reflects a culture change that has meant that impact is now a core consideration throughout the grant application process. The Pathways to Impact plan was important in driving this culture change.

A8.45 While we recognise that giving a narrative description can be challenging, this was attempted in the majority of the case studies and some were completed well. Tick box approaches depend on both the people filling in the form, and the people using the information, having a shared understanding of what the tick box categories mean, and this can take time and effort to develop. We therefore recommend retaining the narrative description, as it is a fundamental

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[11] See for example, ESRC impact examples (accessed: 10/02/2020) which identifies four types of impact recognised by the ESRC: Instrumental: influencing the development of policy, practice or service provision, shaping legislation, altering behaviour; Conceptual: contributing to understanding, reframing debates; Capacity building: technical and personal skill development; Culture change and enduring connectivity: actively building lasting connections between academic and non-academic

[12] Pathways to impact (accessed: 10/02/2020)

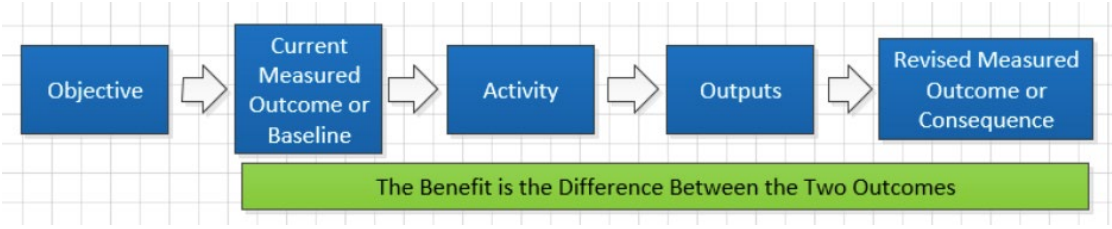
part of the approach, and should help drive more impact-oriented thinking. Limits on the length of the narrative should be reviewed and more restrictive limits applied is necessary.

A8.46 We recommend that the narrative approach is reviewed after the RDVA has been in use for a period and after UKRI has developed and tested the new approach it is planning, to enable learning from this to be considered by FSA.

A8.47 **Changing from TOC 'impact' language to FSA 'benefits' language:** The suggestion here is that the language used in the RDVA based on Theory of Change (TOC) language, is aligned with the process improvement language used in the FSA.

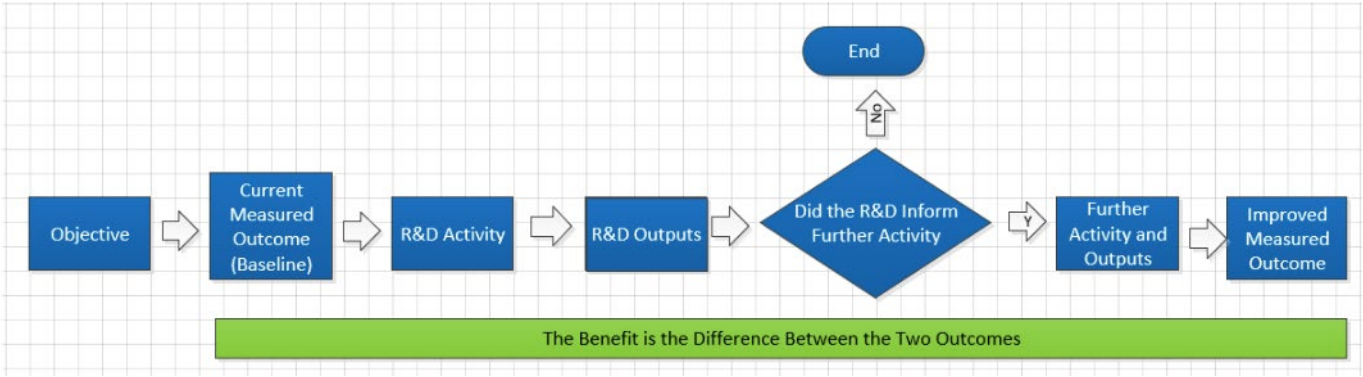
A8.48 In the language of FSA process improvement, impacts are not referred to. A process is described that leads from a current set of measured outcomes to beneficiaries (the baseline), via activities and outputs to a revised set of measured outcomes. The benefit is then the difference between the baseline and the revised outcomes. Benefits must have beneficiaries who obtain the benefit.

Figure 12: The FSA improvement process (excluding R&D)



A8.49 Research is recognised as being different to a classic change process in that additional activities are usually required before the outputs of the research can be realised as revised measured outcomes. The benefit is then the difference between the baseline and the revised outcomes, after these additional activities have occurred.

Figure 13: The FSA improvement process for R&D



A8.50 The RDVA currently uses theory of change language to prompt thinking about benefits delivery. Here we have defined the benefit delivery chain 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.
- Outcomes are the intended 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 towards an improvement in something that is related to one of FSA's strategic objectives the outcomes could potentially deliver or contribute to, 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 intermediate outcomes).

A8.51 As the outcomes and potential contribution to impacts are the result of the project activities and outcomes, it is implied, but not explicitly stated, that these are the results over and above the current situation – we do not ask users to describe the baseline.

A8.52 The Full BC Process uses slightly different language again. It asks users to provide: the benefit measures [i.e. the metrics that will be used to measure the success of an investment], the baseline [i.e. the current performance] and a target/impact [i.e. the anticipated revised performance after the investment has been implemented].

A8.53 These different ways of talking about impact and benefit are broadly consistent, but there are some differences – most notably:

- In FSA process improvement language is:
  - Benefit is more explicitly described as being the difference between the current situation and the expected situation after the investment or project has been completed (and for R&D projects after further activity has been completed).
  - Benefits can be expressed as improvements to e.g. systems and processes as well as improvements in the ultimate strategic objectives (e.g. food safety)
  - Benefits implies a positive improvement.
- The TOC language differs in:
  - Recognising the difference between the more immediate and intermediate outcomes delivered by a project or investment and the ultimate desired impact expressed in terms related to the FSA's strategic objectives
  - Impacts can be negative as well as positive
  - Impacts can be intended as well as unintended.

A8.54 While, aligning the RDVA language with language already widely used and understood in FSA is a good idea, the TOC language does have advantages. The split between intermediate outcomes and impacts recognised in TOC language provides more structure to help shape thinking about pathways to

the ultimate desired impact in terms of FSA's objectives and the ultimate beneficiaries (consumers and industry). It more clearly focuses attention on these ultimate objectives. It recognises that the application of research may lead to unintended negative impacts or the need to accept trade-offs as well as the intended positive impacts[13].

A8.55 We recommend that:

- The split between outcomes and impacts should be retained in the benefits pathway section - with some clarification (i.e. changing 'outcome' to 'intermediate outcome')
- The focus of the benefits delivery pathways section should be on positive impacts (benefits), but it should be clear that when benefits are referred to these are improvements to the ultimate impacts, not to intermediate outcomes.
- Users should be asked to think about potential negative impacts in the question on risks and issues.

A8.56 **Eliciting information about the baseline:** The inclusion of a specific question about the baseline is how the current benefits management section of the Full BC process is framed – and this section is considered inappropriate for R&D projects. We therefore would recommend retaining the current approach which captures information about the current situation 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."

A8.57 We note that the Full BC Process includes a question (Q14) '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

A8.58 **Risk questions**: Changes to how and where the risk questions are presented were also discussed. These are described under Step 4 below.

[13] An example for a trade-off could be increases in prices of a food-product due to a change in the production process.

Step 4: Semi quantitative valuation criteria

Wave 1 testing

Semi-quantitative assessment of 1. The quality of the anticipated project methodology; 2. The potential utility of the project outputs (if successful); 3. The potential reach and significance of the work (if successful); and 4. The risk-reward balance (Select score ★ Poor, ★★ Some weaknesses, ★★★ Wholly appropriate for FSA, ★★★★ Exceptional, and free text box to justify scores)

A8.59 Respondents mostly answered 3* - “wholly appropriate for FSA”, with a small number assessed as 2* - “some weaknesses”.

A8.60 Some participants expressed the view that it was ”too early to say at this stage” but gave a 3* rating anyway. Justification was provided for most scores:

> “project is novel and design is the best available within constraints of funding”
>
> “data availability is a risk, but can be mitigated”
>
> “efforts to access grey literature are included in scope, but this is challenging”
>
> “project intended as a rapid scoping piece, but may require further work”
>
> “has the potential to have significant reach”
>
> “has the potential to benefit all supplement consumers”
>
> “further insight will be required but an acceptable starting point”
>
> “project is not high risk, and the risks have been mitigated”
>
> “limited expense, shared responsibility with Defra”

A8.61 Responses seem consistent with the pathways descriptions.

Wave 2 testing

A8.62 On the basis of the testing and feedback in Wave 1 no changes were considered necessary to this section.

A8.63 In Wave 2, scores ranged from 2* to 4* - rather more projects used the 4* ratings. Justifications were not always supplied, but where they were, they did explain why the project thought the score was appropriate and revealed more about the strengths and weaknesses of the project. In one case, it was clear that the project tended to frame thinking about value around cost benefit:

> [On reach and significance] “Rewards are good in relation to the modest cost of this work”
>
> [On risk and reward] . “Cost - benefit ratio seems high …”

A8.64 One way of reducing repetition and cognitive load on projects would be to move questions on risks to this section as follows:

- Risks to delivery and quality of outputs and intermediate outcomes to Quality
- Risks to deliver of benefits (Impacts) to Risk Reward
- The justification should then be made compulsory and should include a brief overview of the risks, and critically mitigation planned.

A8.65 Overall, feedback on the RDVA suggests it was not difficult to use, but it took longer than anticipated to complete all the sections.

A8.66 In Wave 1, three respondents found the template “easy to use”; four found it “neither easy nor difficult to use”. Four respondents “agreed” that the template accurately reflected the benefits from their project; three were “neutral”.

A8.67 In Wave 2, four out of five respondents said that they found the template “easy to use”, and “agreed or strongly agreed” that the answers they had given accurately reflected the anticipated benefits from their project. However, one respondent found the template “very difficult to use” and indicated that they felt their answers did not accurately reflect the anticipated benefits from their project (“strongly disagree”) and three out of five indicated in the further comments section that they found the survey too long.

A8.68 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.

A8.69 As this is intended to be a deliberative process that prompts additional conversations with colleagues, these times do not appear unreasonable. However, examination of the responses throughout the tool suggest to us the following areas where improvements could be made:

- 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.

A8.70 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.

Steering group feedback and discussions

A8.71 Following presentation of the results to the steering group we discussed the following issues related to scoring.

A8.72 **Usefulness of the star ratings:** We concluded that these were useful providing concise information for decision-makers that complements the narrative description. We debated the issue of whether everyone would score 3* or 4* if it was self-assessment (at least initially). We concluded that the justification (which should be made compulsory) together with the narrative pathway description, would ensure that this did not present a risk to the

decision-making process. We also noted that the deliberative process the RDVA steps are designed to deliver, would mean that project officers should identify and address any weaknesses before submitting the final business case, meaning that in most cases low scores should be eliminated by the process.

A8.73 **Utility of the star rating for 'Quality':** We discussed whether this star rating was necessary, or whether it should be merged with 'Utility of Outputs'. We debated the difficulty of assessing quality before tenders that set out the approach had been received and noted that the tender exercise would eliminate low-quality bids. However, the budget for the work does need to be specified by this stage in the Full BC process and this implies that the project officer will have thought through to some degree the level and type of activity that will be required to deliver results and that some ITT's may be quite prescriptive, setting out the required approach.

A8.74 We would therefore recommend retaining this question, which also provides for re-assessment of the project approach if the RDVA is applied to review the project post implementation. The wording should however be revised to make clear the difference between Quality and Utility. 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 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 benefits?

The descriptions of the star ratings will also need reviewing and updating. Figure 14 below shows an example of what would be needed.

A8.75 **Elicitation of information on risks:** We discussed measures here to reduce repetition and cognitive burden and also to help improve the quality of responses and agreed:

- Project risks are already elicited in the Full BC Process – they do not need to be elicited twice. However, we note that this question falls at the end of the Full BC process and requires a detailed response. For R&D projects it may be better to move this question to this section, and reduce the detail requested. An example of how this might be done is shown in Figure 14 below.
- The questions on risks to outcomes and outputs could also be moved to this section and merged with the justification questions. An example of how this might be done is shown in Figure 15 below.
- The text of the question should emphasise that we want people to think about risks specific to the project rather than general/bland risk descriptions such as 'delay' or 'lack of data'. Links to the worked example should be used to illustrate good responses.

A8.76 Figure 14 and Figure 15 are provided 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 works.

Figure 14: Example reframing of the quality criterion and of the risk to outputs question (provided for illustrative purposes only)

Q: 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 findings of the research will be repeatable and conclusions robust?

★ **Poor**	★★ **Some weaknesses**	★★★ **Wholly appropriate for FSA**	★★★★ **Exceptional**
[Text to be revised]	[Text to be revised]	[Text to be revised]	[Text to be revised]

Justify your assessment, identifying any issues or risks to delivery or robustness of outputs – ensure risks are specific to the project rather than general risk descriptions such as “lack of data” (click to see example):

Justification	How will risks be mitigated?

Figure 15: Example of including risks to benefit delivery in the justification of the risk and reward question (provided for illustrative purposes only)

Q: The risk-reward balance

To what degree is the risk to realisation of benefits proportionate to the potential rewards (e.g. high risk but high potential reward)

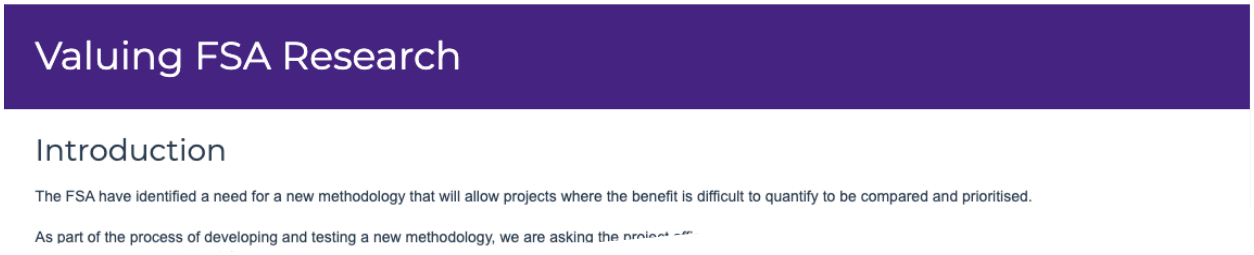
★ **Poor**	★★ **Some weaknesses**	★★★ **Wholly appropriate for FSA**	★★★★ **Exceptional**
[Text to be revised]	[Text to be revised]	[Text to be revised]	[Text to be revised]

Justify your assessment, identifying any risks (which may be technical or socio-political) to delivery of benefits and any potential negative impacts that might accrue from the project (click to see examples):

Justification	How will risks be mitigated

Summary of final recommended refinements to the RDVA

A8.77 The figures below show extracts from the latest draft of the RDVA (see also Annex 1 of the main report). The purple boxed text summarise our recommended changes.



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 text 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.
- 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

Step 1: Confirmation that the methodology applies

In the following questions we will ask you 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.

4. Are the benefits your project aims to deliver **uncertain** or otherwise **difficult to describe**? Help Example

- ◯ Yes
- ◯ No

Optional comments to justify your answer

Words used: **0** out of 100.

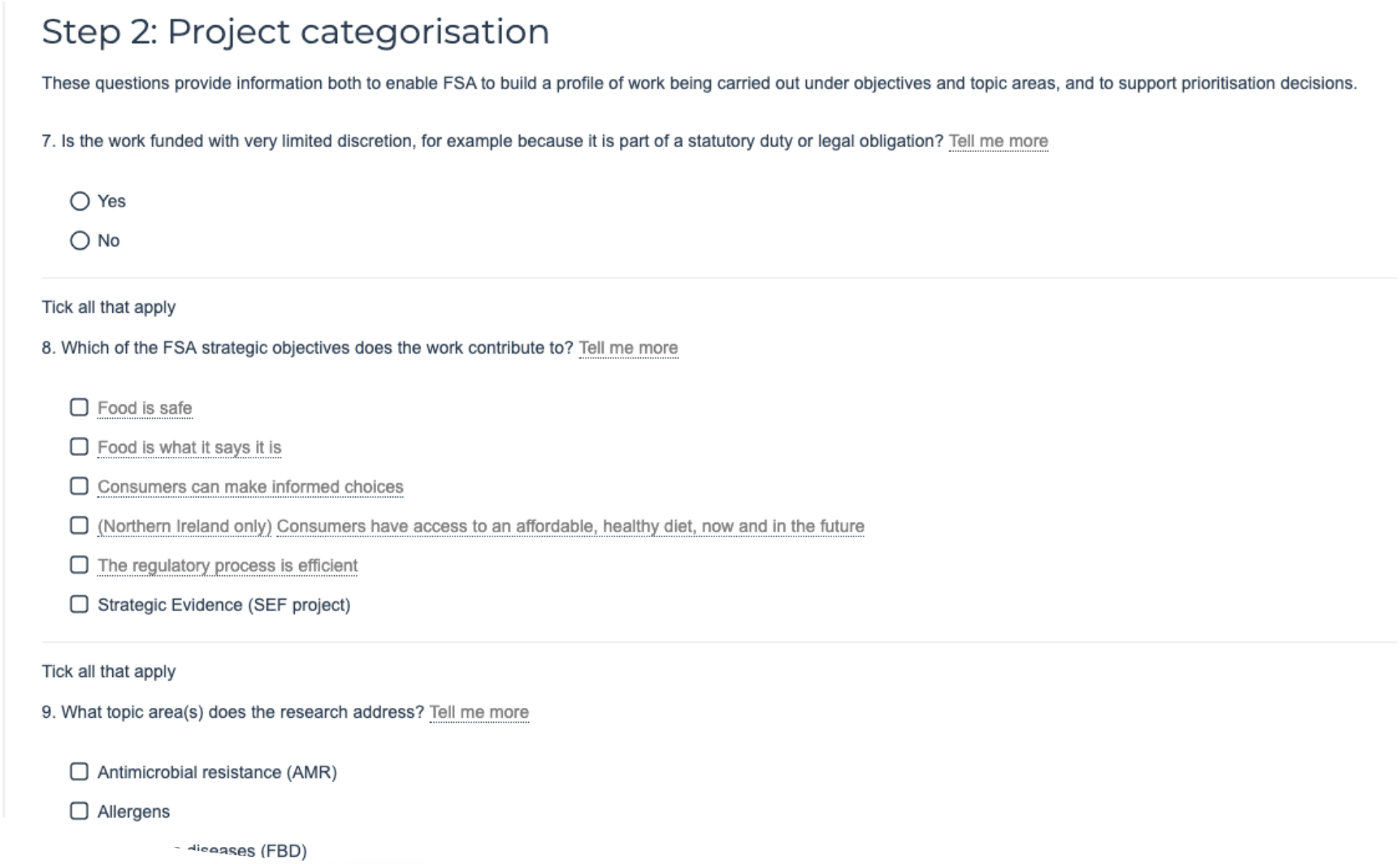
5. Is the work **novel** (may lead to new findings) or **creative** (original and not obvious)? Help Example 1 Example 2

- ◯ Yes
- ◯ No

Optional comments to justify your answer

- Include an introductory sentence explaining that the FSA will only 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: ‘Are the benefits your project aims to deliver uncertain or otherwise difficult to describe?’ compulsory.
- Include an example of a project which would NOT be classed as novel or creative (Q5) for example, the project relies on a well-established methodology.

Step 2: Project categorisation



Step 2: Project categorisation

These questions provide information both to enable FSA to build a profile of work being carried out under objectives and topic areas, and to support prioritisation decisions.

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

- ○ Yes
- ○ No

Tick all that apply

8. Which of the FSA strategic objectives does the work contribute to? Tell me more

- ☐ 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
- ☐ The regulatory process is efficient
- ☐ Strategic Evidence (SEF project)

Tick all that apply

9. What topic area(s) does the research address? Tell me more

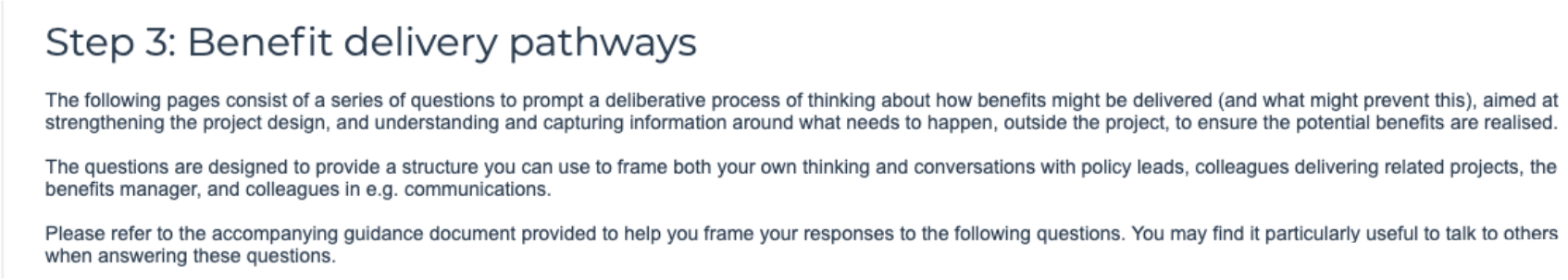
- ☐ Antimicrobial resistance (AMR)
- ☐ Allergens
- ☐ diseases (FBD)

- Add an example of a must do project to the definition of this type of project (Q7) – 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.

- Update the Northern Ireland strategic objective (Q8) 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 with the FSA ARI categories.

Step 3: Benefit delivery pathways



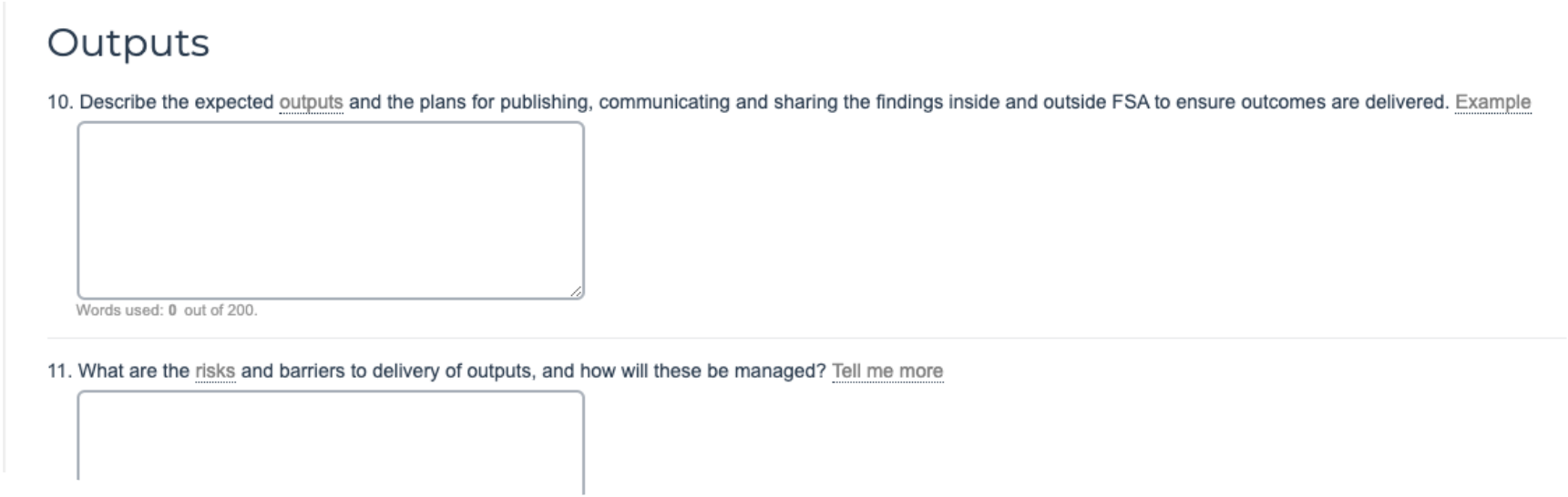
Step 3: Benefit delivery pathways

The following pages consist of a series of questions 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.

The questions are designed to provide a structure you can use to frame both your own thinking and conversations with policy leads, colleagues delivering related projects, the benefits manager, and colleagues in e.g. communications.

Please refer to the accompanying guidance document provided to help you frame your responses to the following questions. You may find it particularly useful to talk to others when answering these questions.

- Remind users in the introduction to this section that the purpose is to prompt a deliberative process of thinking.
- Retain the current approach based on narrative, rather than simplifying to a set of tick boxes, 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' here (and throughout the RDVA) to 'intermediate outcomes' to differentiate it from the way outcomes is used in FSA process improvement language.
- 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.



- If the outputs question (Q10) is retained in its current form add ‘utilising’ before ‘publishing’ in ‘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.
- Question 11 concerns project risks (risks to outputs), but we note that 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.

Pathways

Tick all that apply

12. Through which of these pathways do you expect the work to deliver outcomes (change)? *

- [ ] Policy development and/or regulatory change
- [ ] Industry action
- [ ] Change in consumer behaviour
- [ ] Through broader / other influence (e.g. international collaboration or improving th

Outcomes and impacts

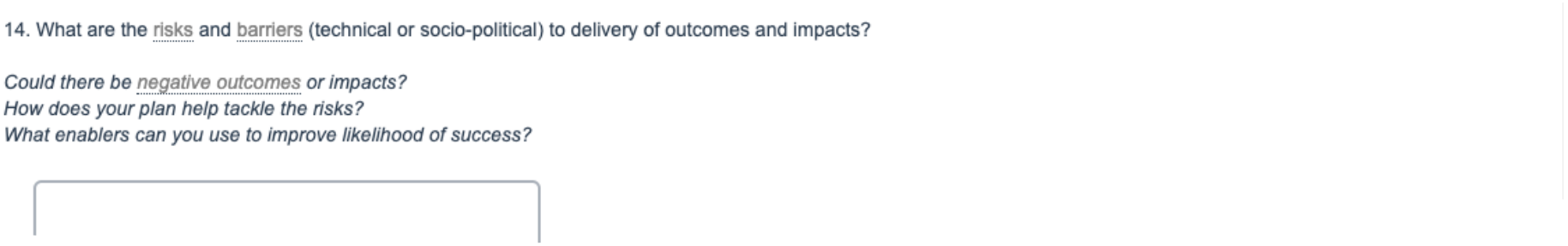
Outcomes	**Impacts**	**How outcomes contribute to impacts**
Outcomes are the intended results and consequences of activities that may be realised (or only observable) over short-, medium- or longer-term. E.g.: • Better quality data on trends in the occurrence of severe, food-induced allergic reactions 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 for severe allergic outcomes.	*Here, impacts are the contribution towards FSA's strategic objectives. Impacts tend to lag outcomes and may be positive (benefits), negative, or neutral and intended or unintended.* 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.

13. Fill in the rows which correspond to the pathways you selected in question 12 only. **You may leave the other rows blank.**

You selected **Policy development and/or regulatory change**

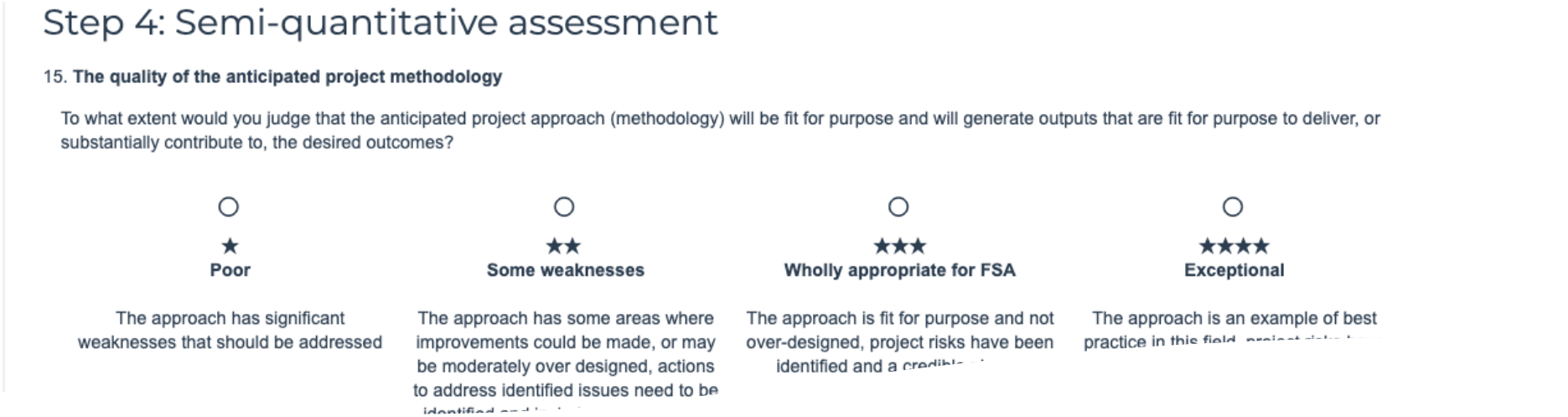
	What potential outcomes are expected and how will these be delivered by the work?	If successful, what potential impacts might the work contribute towards?	How and why will outcomes contribute to impacts?

- Implement logic routing to hide pathways the user did not select in Q12.
- Consider merging the ‘impacts’ and ’outcomes to impacts’ columns (Q13).



- Question 14 on risks to intermediate outcomes and impacts, could be moved to Step 4 and merged with the justification question for Risk and Reward Balance (Q18). An example of how this might be done is shown earlier in this appendix. 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.

Step 4: Semi quantitative valuation criteria



Step 4: Semi-quantitative assessment

15. **The quality of the anticipated project methodology**

To what extent would you judge that the anticipated project approach (methodology) will be fit for purpose and will generate outputs that are fit for purpose to deliver, or substantially contribute to, the desired outcomes?

★	★★	★★★	★★★★
Poor	**Some weaknesses**	**Wholly appropriate for FSA**	**Exceptional**
The approach has significant weaknesses that should be addressed	The approach has some areas where improvements could be made, or may be moderately over designed, actions to address identified issues need to be	The approach is fit for purpose and not over-designed, project risks have been identified and a	The approach is an example of best practice in this field,

16. **The potential utility of the project outputs (if successful)**

To what extent would you judge that the anticipated outputs will be timely, useful and useable to support effective action and hence deliver (or substantially contribute to) the intended outcomes of the project?

- Retain the star rating for 'Quality' (Q15) with some rewording to Questions 15 and 16 to make the difference between Quality and Utility clear and to reflect that the fact that detailed approach will not always be available until a tender document has been issued and a bidder 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 earlier in this appendix.