DPS FRAMEWORK SCHEDULE 4: LETTER OF APPOINTMENT AND CONTRACT TERMS

Part 1: Letter of Appointment

Dear Sirs

Letter of Appointment

This letter of Appointment dated [TBC], is issued in accordance with the provisions of the DPS Agreement (RM6018) between CCS and the Supplier.

Capitalised terms and expressions used in this letter have the same meanings as in the Contract Terms unless the context otherwise requires.

Order Number:	CR19081
From:	Department for Business, Energy and Industrial Strategy, 1 Victoria Street, London, SW1H 0ET ("Customer")
To:	Steer Davies & Gleeve Ltd 28-32 Upper Ground, London, SE1 9PD ("Supplier")

Effective Date:	Friday 20th December 2019
Expiry Date:	Tuesday 31st March 2020

Services required:	Set out in Section 2, Part B (Specification) of the DPS Agreement and refined by: The Customer's Project Specification attached at Annex A and the Supplier's Proposal attached at Annex B.

Key Individuals:	BEIS Project Manager – [redacted]

Contract Charges (including any applicable discount(s), but excluding VAT):	£42,625.00
Insurance Requirements	Additional public liability insurance to cover all risks in the performance of the Contract, with a minimum limit of £5 million for each individual claim Additional employers' liability insurance with a minimum limit of £5 indemnity Additional professional indemnity insurance adequate to cover all risks in the performance of the Contract with a minimum limit of indemnity of £2 million for each individual claim.

	Product liability insurance cover all risks in the provision of Deliverables under the Contract, with a minimum limit of £5 million for each individual claim
Liability Requirements	**Suppliers limitation of Liability** (Clause **Error! Reference source not found.** of the Contract Terms);
Customer billing address for invoicing:	All invoices should be sent to should be sent to finance@services.uksbs.co.uk or Billingham (UKSBS, Queensway House, West Precinct, Billingham, TS23 2NF) A copy of the invoice should be sent to-

GDPR	Please see Contract Terms Schedule 7 (Processing, Personal Data and Data Subjects).

FORMATION OF CONTRACT

BY SIGNING AND RETURNING THIS LETTER OF APPOINTMENT (which may be done by electronic means) the Supplier agrees to enter a Contract with the Customer to provide the Services in accordance with the terms of this letter and the Contract Terms.

The Parties hereby acknowledge and agree that they have read this letter and the Contract Terms.

The Parties hereby acknowledge and agree that this Contract shall be formed when the Customer acknowledges (which may be done by electronic means) the receipt of the signed copy of this letter from the Supplier within two (2) Working Days from such receipt

For and on behalf of the Supplier:

[redacted]

28 January 2020

For and on behalf of the Customer:

[redacted]

Date:

14th Feb 2020

ANNEX A

Customer Project Specification

1. Background

The Industrial Strategy set out an ambition for the UK to become the world's most innovative economy. To achieve this, we need to ensure that the UK has a regulatory environment that supports innovation.

In June 2019, the Department for Business, Energy and Industrial Strategy published a White Paper which commits the government to establish a Regulatory Horizons Council to identify the implications of technological innovations and advise the government on regulatory reform needed to support its rapid and safe introduction. We define technological innovation as the application of technologies (e.g. AI-enabled smart home devices rather than just AI). The Council will:

- scan the horizon for technological innovation and trends, building on existing work and data across government;
- work with innovators, civil society, regulators and others to identify high-potential products, services and business models and the broad implications for people, business and the environment; and
- advise government on broad priorities for regulatory reform in order to facilitate the rapid and safe introduction of emerging products, services and business models.

As a first step, the Council will need to do a comprehensive horizon scan of technological innovations and then prioritise these so that its recommendations are focussed on technological innovations with the greatest potential economic and social benefit which face significant regulatory hurdles in order to realise this potential or require new regulations to be developed in order to ensure public safety.

To ensure that the prioritisation and recommendations are based on evidence and analysis, a prioritisation framework needs to be developed. This will consist of comparable data, quantitative and qualitative information and other metrics relating to economic / social potential and regulatory implications.

This will allow the Council to prioritise identified technological innovations in a robust, consistent and comparable manner.

The aim of the research project is to use the contractor's expertise and insights into various technologies and innovations and identify data, metrics and proxy measures that can used by the Council to filter down the comprehensive list of technologies to a smaller list of 'priority' technological innovations.

This work is essential for the Regulatory Horizons Council to deliver its function effectively and efficiently.

2. Aims and Objectives of the Project

The project will support the Regulatory Horizons Council to identify the implications of technological innovations and advise the government on regulatory reform needed to support its rapid and safe introduction.

The outputs of this project will enable the Council to make evidence-based recommendations on technological innovations with the greatest potential economic and social benefit which face significant regulatory hurdles in order to realise this potential or where there is a need for new regulations to be developed in order to ensure public safety.

The contractor will develop a framework which will provide data and metrics for each technological innovation. The metrics will then be weighted by the Secretariat (in collaboration with the contractor) to produce a shortlist of technological innovations.

3. Suggested Methodology

This process is expected to be iterative, where the contractor and BRE would work together and meet on a regular basis, for each of the below steps, in order to ensure that the analytical framework is developed in line with our needs.

The contractor is expected to do the following:

1. Clean the list of technological innovations provided by BEIS and provide a short description (few lines) for each of them.

- Through our horizon scanning process, we expect to identify hundreds of technological innovations. BEIS will scan for technological innovations based on existing external scans, databases (e.g. patent and investment data), google news alert, scientific and academic journals, and various other subscriptions. The identified technological innovations will be inputted into an excel database with basic information (see Annexe for an example of the contents of the spreadsheet). This long list is likely to include duplications, technological innovations that are very similar that can be grouped together, and non-comparable technologies/innovations.
- The first stage of this research work would therefore consist of cleaning the list by identifying and removing duplications, as well as clustering the various technological innovations into a smaller list so that the data collection and prioritisation thereafter can be done systematically and consistently across them all.
- The cleaned data, shortened revised list and proposed clusters should be reviewed by BEIS' project team before proceeding to the next stage.

2. Develop a list of metrics

- The contractor would then develop a list of metrics that can identify the potential economic benefit (e.g. GDP growth, gross value added, number of patents, productivity, size of the market, etc.), societal benefits (e.g. security, safety, wellbeing etc) and regulatory importance (i.e. are they any regulations? Does it cross regulatory boundaries? Are they regulatory barriers?).
- This list should be approved by BEIS' project team before proceeding to the next stage.

3. Collect data

- The contractor is expected to collect data on the identified metrics for each technological innovation, creating an evidence base on the innovations. On metrics or technological innovations where there is no data available, the contractor is expected to come up with proxy measures or innovative ways to provide information for that metric so that the technological innovations can be compared consistently.
- We expect the contractor to use databases or other information through desk research to provide either data to support metrics, or to help inform qualitative judgements. We do not require the contractors to conduct surveys or collect data through primary research.
- The evidence base created must be included in the final output and will support latter prioritisations by the BEIS project team. The framework is expected to include details of all data sources used.
- The contractor and BEIS' project team should meet in order to prepare the workshop.

4. Hold a workshop with the BEIS project team

- Based on the refined list developed by the contractor and the associated metrics and data, the contractor is expected to attend a workshop with the BEIS team. The primary aim of this workshop is to weight the metrics according to their importance for our policy outcomes whilst still taking into account the weaknesses and robustness of the data.
- We would like the contractor to provide a teach-in and facilitate discussion to help us understand the data as well as the characteristics and issues with the metrics.

5. Shortlist of technological innovations selection and documentation

    - The final stage would require the contractor to provide a final excel output consisting of the original list, the refined list and descriptions, the weighted metrics and data and a comprehensive description of the methodology and audit trail of the decisions made.

4. Deliverables

They will be expected to develop and present an analytical framework (metrics and data) that can be used to assess which technological innovations have (i) the highest potential economic and societal benefit and (ii) face significant regulatory hurdles in order to realise this potential or require new regulations to be developed in order to ensure public safety.

The contractors will be required to attend an inception meeting with the Client before the 23rd December 2019

The contractors will be expected to have identified and submitted the list of metrics to the BEIS project team for approval by the 13th January 2020.

The contractors will be expected to prepare and hold the workshop with the BEIS project team by the 12th of February 2020 and to deliver the final output by the 19th of February 2020.

The contractors will be expected to provide the analytical framework in the form of an excel spreadsheet that includes metrics and data for each technological innovation identified.

The contractors will be expected to provide a full audit trail of the methodology and steps taken. The framework is expected to include details of all data sources used and a full list of caveats and limitations to their work.

ANNEX B

Supplier Proposal

To be determined at Call for Competition stage

Approach/Methodology

Proposed Methodology, Stage by Stage

1.1 Our proposed methodology breaks the work into seven distinct stages. These are:

- **Inception**, where we will agree the finalised project requirements, project plan, consultation process, and project management approach;
- **Database Cleaning**, which will involve using data science software (we propose the package 'R') to characterise the spreadsheet, and then a combination of software-led and manual approaches to clean and restructure the data;
- **Metrics Development**, in which we will propose a scoring approach to capture the regulatory requirements and economic/social impact of the technologies identified;
- Gathering an **evidence-base for metrics**, using third-party information to complete the spreadsheet on the metrics identified in the prior stage;
- An interation with the client of outputs at this point in the work, through a stage of **client engagement on the evidence base for metrics;** and
- Finally, delivery of a **workshop**, including a teach-in and a prioritisation exercise; and the production of final **outputs** to document the work undertaken (in the form of a Final Report).

1.2 Further elaboration on these stages is included in Table 1 at the end of this document, which provides a detailed task list for the project.

Rationale for Chosen Approach

Data Cleaning: Blending the automated with the manual

1.3 Based on our experience on similar projects, we have proposed a blended approach combining manual inspection/data entry of individual data lines, and an automated approach which uses data science tools to sort, populate and revise the spreadsheet provided by BEIS.

1.4 Our understanding of the type of data being collected (sourced from, for example, news bulletins, journals and trend reports) suggests that involvement of an experienced researcher, able to read and understand the content of each line, and make judgements where necessary, is vital to successful delivery of this project. However, a line-by-line approach without any assistance from technology would be inefficient, time-intensive and may result in bigger-picture themes being missed. Therefore, we propose to combine the research task with outputs from data-science analysis, using best-in-class open-source statistical software (we propose to use the package 'R'). Free-text analysis will be conducted to identify key words, recurring themes, common word combinations, and highly similar entries (potential duplications). This 'pre-cleaning' stage will greatly reduce the quantity of manual work required.

Metrics Development: Attractiveness vs. Feasibility

1.5 We propose to develop a metrics methodology which scores innovations around two main themes: 'Attractiveness' and 'Feasibility'. This approach is derived from a combination of proven approaches used in science and innovation planning, in particular, the 'Priorities' method used at the Commonwealth Scientific and Industrial Research Organisation in Australia (CSIRO) which used an 'attractiveness' versus 'feasibility' score developed for

them by McKinsey and Co. Below, we discuss each of the elements of the proposed scoring methodology in detail, and set out the overall approach in Figure 2.

1.6 The market potential dimension ('**Attractiveness**') takes into account:

- The assumption that different innovations will be associated with different developmental 'S curve' progress to maturity profiles;
- A differential likelihood of UK firms capturing a proportion of this global market potential; and
- The degree of uncertainty over global market potential and of the ability of the UK to capture a proportion of that market potential.

1.7 The approach aligns with existing BEIS methods by explicitly using the Technology Readiness Level (TRL) classification to reflect the degree of uncertainty faced (progression along the TRL spectrum is associated with uncertainty reduction).

1.8 The regulatory dimension ('**Feasibility**') takes into account:

- The degree of uncertainty over potential regulatory restrictions/challenges based on current TRL status and the degree of technological novelty (is the innovation within an established 'paradigm' or more radical and potentially disruptive?)
- The severity of the potential regulatory restrictions/challenges, based on assessment of similar technologies in the UK and elsewhere.

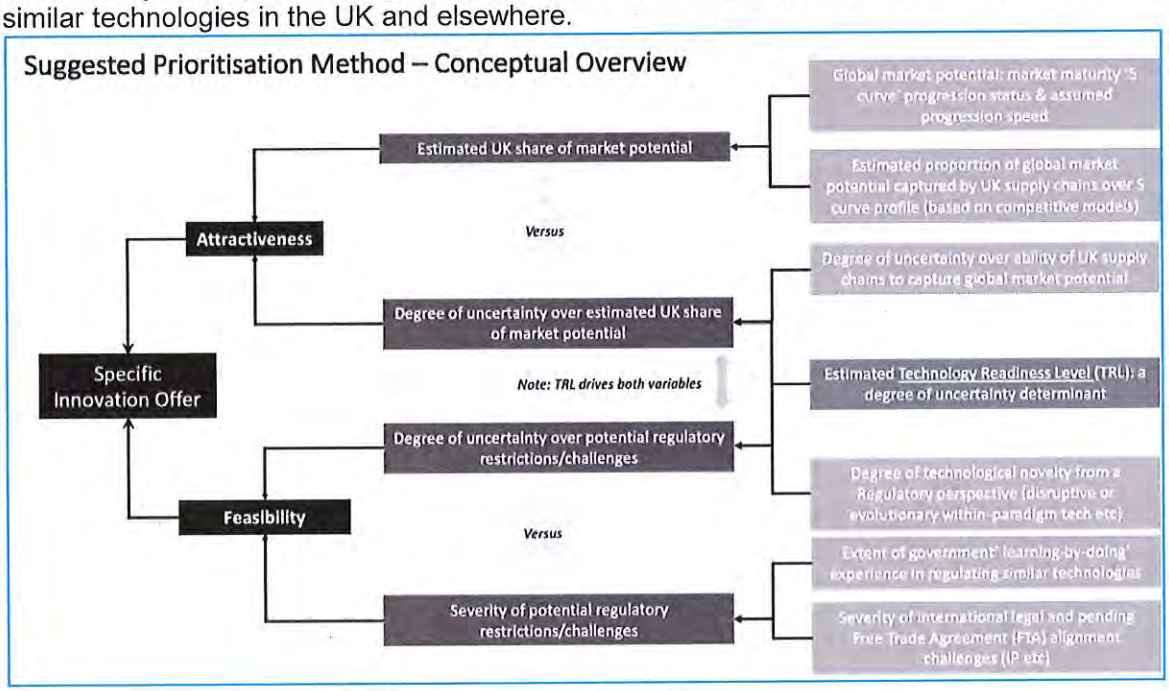


Figure 1: Prioritisation Method Overview. Source: Steer-ED, 2019

Accounting for Uncertainty

1.9 Alongside the Attractiveness/Feasibility assessment described above, we propose an additional assessment to capture the level of uncertainty around the underlying evidence. This will be captured using a familiar 'Risk Matrix' type approach, which is described in further detail below. The advantage of our proposed approach is that will allow us to make quick but modifiable assessments of a large number of innovations. For example, if there is great uncertainty around either the market potential of an innovation, the UK's ability to capture market-share, or the regulatory dimension, then the innovation can be scored as such in the database. As with a Risk Matrix, if new information becomes available the assessment can be easily updated and the implications easily communicated and grasped.

This is an important factor for creating an output which is transparent and has a usable life beyond the end of the project.

1.10 We recommend strongly against a scoring method that seeks 'spurious precision', for example by attempting to estimate potential economic impacts in terms of GVA or GDP. The uncertainty categorisation proposed in this Framework allows for a measured assessment of economic potential within the large margins of error that are inherent to this field.

1.11 Given the public policy context to this study, and so that the methodology could potentially contribute to the BEIS innovation appraisal toolkit, we propose adoption of a customised version of the NATO system for Intelligence Assessment. This is because intelligence assessments face similar challenges in handling ambiguous and uncertain information, with the necessity of making decisions (with important consequences) in a timely manner. Similarly, BEIS will need to react to the estimates produced by this study in a manner that factors-in the reliability and credibility of the information used to support decision-making.

1.12 The NATO system, described in Table 1, uses categories to assess the *Reliability* and *Credibility* of intelligence. When applied to innovation and regulation, it can be used as follows:

- An (often rare) peer-reviewed academic study of market potential would attract a reliability code of B and a credibility code of 2 (i.e. usually reliable and probably true).
- Meanwhile, a highly speculative commercial market appraisal commissioned by organisations associated with an innovation would be coded as D4 (not usually reliable and doubtful), or if the logic of the case and the evidence used are especially weak, a coding of E5 (unreliable and improbable).

1.13 A final coding and scoring method will be developed during the Metrics Development Phase of this project, in agreement with BEIS. The scores for uncertainty will be based on a version of the NATO system and will use a standard decision-support 'menu', which makes it easy to categorise quickly different information sources.

Table 1: NATO Intelligence Categories

Reliability	Credibility
A - Completely reliable: No doubt of authenticity, trustworthiness, or competency; has a history of complete reliability	1. *Confirmed by other sources*: Confirmed by other independent sources; logical in itself; Consistent with other information on the subject
B - Usually reliable: Minor doubt about authenticity, trustworthiness, or competency; has a history of valid information most of the time	2 - *Probably True*: Not confirmed; logical in itself; consistent with other information on the subject
C - Fairly reliable: Doubt of authenticity, trustworthiness, or competency but has provided valid information in the past	3 - *Possibly True*: Not confirmed; reasonably logical in itself; agrees with some other information on the subject
D - Not usually reliable: Significant doubt about authenticity, trustworthiness, or competency but has provided valid information in the past	4 - *Doubtful*: Not confirmed; possible but not logical; no other information on the subject
E - Unreliable: Lacking in authenticity, trustworthiness, and competency; history of invalid information	5 - *Improbable*: Not confirmed; not logical in itself; contradicted by other information on the subject

F - Reliability cannot be judged: No basis exists for evaluating the reliability of the source	6 - *Truth cannot be judged:* No basis exists for evaluating the validity of the information

Source:MoD Guidelines

1.26 In this structured approach, what matters most is the *combination* of estimates and the uncertainties over the precision of these estimates. Figure 2 and Figure 3 demonstrate how this Risk Matrix-informed approach can operate in practice. Figure 4 shows how these can then be combined to plot each innovation's overall assessment results. Our intention is to produce 'first cut' assessments using this methodology – with an emphasis on this process being fast and sufficiently resource-light to handle the large volume of information available.

Calculating in practice: Stage 1

Figure 2: Scoring for Attractiveness. Source: Steer-ED

Score each Innovation for the combination of Market Potential and degree of uncertainty over that Market Potential

Score calculated as per right hard side elements in previous diagram

STAGE 1: ASSESS MARKET ATTRACTIVENESS

Score for degree of uncertainty over market potential	*Score for market potential*	*1*	*2.5*	*5*	*7.5*	*10*
	Market Potential / Uncertainty over market potential	Very low (define range)	Low (define range)	Moderate (define range)	High (define range)	Very high (define range)
10	Very low (define range)	10	25	50	75	100
7.5	Low (define range)	7.5	18.75	37.5	56.25	75
5	Moderate (define range)	5	12.5	25	37.5	50
2.5	High (define range)	2.5	6.25	12.5	18.75	25
1	Very high (define range)	1	2.5	5	7.5	10

Emulates Risk Matrix principles by multiplying score for market potential by degree of uncertainty over market potential

Calculating in practice: Stage 2

Score each Innovation for the combination of Regulatory Implications uncertainty over of these Regulatory Implications

Score calculated as per right hard side elements in previous diagram

STAGE 2: ASSESS REGULATORY FEASIBILITY

		10	7.5	5	2.5	1
	Regulatory Impact / Uncertainty over Regulatory Impact	Very low (define range)	Low (define range)	Moderate (define range)	High (define range)	Very high (define range)
10	Very low (define range)	100	75	50	25	10
7.5	Low (define range)	75	56.25	37.5	18.75	7.5
5	Moderate (define range)	50	37.5	25	12.5	5
2.5	High (define range)	25	18.75	12.5	6.25	2.5
1	Very high (define range)	10	7.5	5	2.5	1

Emulates Risk Matrix principles by multiplying score for regulatory implications by degree of uncertainty over regulatory implications

Figure 3: Scoring for Feasibility. Source: Steer-ED

Calculating in practice: Stage 3

Score each Innovation on the basis of <u>both</u> previous assessments combined – identifies innovations with the greatest market potential (factoring-in uncertainty) and potential regulatory implications/impacts (factoring-in uncertainty)

	Attractiveness	Feasibility
	Score for Market Potential adjusted for Degree of Uncertainty	Score for Regulatory Impact adjusted for Degree of Uncertainty
Innovation 1	37.50	5.00
Innovation 2	18.75	25.00
Innovation 3	25.00	56.25

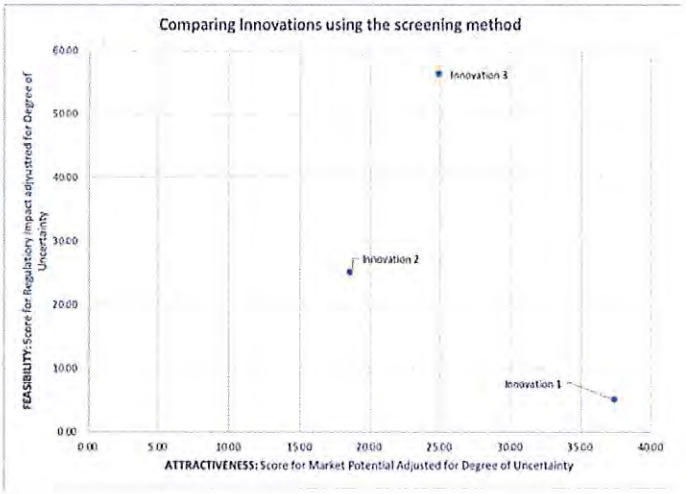


Figure 4: Combining attractiveness, feasibility, and uncertainty. Source: Steer-ED

Engaging Subject-Matter experts

1.27 To ensure buy-in across BEIS, and that the project outputs benefit from the expertise of Policy Executives, we propose a Delphi process[1] for revising the Risk Matrix outputs. BEIS Executives will be given the opportunity to revise the Risk Matrix outputs in several iterative rounds of consultation. This approach also allows for a longer-term online access updating process to be put in place by BEIS, if desired. The 'direction of travel' in these updates will be particularly useful for policymakers: see Figure 6, which shows how estimates would be adjusted by the Delphi Process. Our suggestion is that this Delphi process occurs in advance of the proposed weightings workshop, such that the workshop could then be used to understand the outputs of the work and discuss the implications of the findings. However, this can be discussed with the project team during the inception stage of the project.

[1] A Delphi method is a structured, iterative process for capturing the views of a group of experts. It is particularly used in business forecasting.

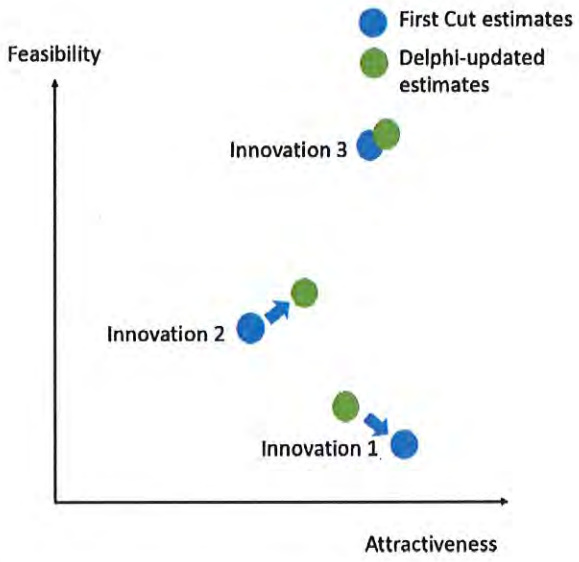


Figure 5: Adjustments to Risk Matrix outputs using Delphi method. Source: Steer-ED

Task List

1.28 Table 3 below sets out a detailed task-by-task account of our proposed methodology These are presented serially for ease, but in reality main would run in parallel (please see Gantt chart in project management section for details).

Table 2: Detailed Task List

Task/Output	Description	Output
Inception		
T1: Inception Meeting	Our Project Director and Project Manager will attend Inception, which will cover: • Issues arising from the proposal; • Methodological approach • Day-to-day management, milestones, timescale, risks; and Project initiation document (PID) requirements.	Meeting Note
T2: Preparation of PID	The project plan will form an up-to-date record of the project approach, methodology and management.	Project Initiation Document
Database Cleaning		
T3: Key-words analysis	Analysis of BEIS free-text spreadsheet using data science tools. Analysis will identify key-words, themes, possible duplications and combinations.	
T4: Taxonomy design	Using outputs from free-text analysis, researchers will propose a	

Task/Output	Description	Output
	taxonomy for sorting the data into themes and sub-themes.	
T5: Assignment to categories using key-word analysis	As a first-cut, the free-text analysis will be used to assign technologies to themes and groupings, and identify potential duplications.	Summary note detailing findings from key-word analysis
T6: Inspect entries manually and write descriptions	Line-by-line inspection of all entries – this process will confirm/modify the groupings, themes and duplications proposed by the free-text analysis process. This task also includes writing short descriptions of entries where data is missing or grouping/processing has occurred.	Revised spreadsheet (duplications removed, technologies grouped where relevant, short descriptions added)
T7: Client review of cleaned data and proposed clusters	Revised spreadsheet to be shared with client for iteration. This version will include: technologies sorted into themes and sub-themes; duplications removed; groupings where appropriate; text description of innovation included for every line.	
Metrics Development		
T8: Develop metrics framework	In consultation with our Technical Advisor, and given emerging findings, develop a scoring framework which captures the attractiveness and feasibility of technology, and trustworthiness of sources.	Summary note of Metrics `Framework
T9: Client review of proposed framework	Metrics framework to be shared with client and amended according to client's feedback.	
Evidence-Base for Metrics		
T10: Trawl for data sources to form evidence-base	Search of available news articles, literature and databases to be used as key sources for metrics evidence-base.	
T11: Summary of relevant information by theme	Summarise information identified in trawl (task 10) for themes and sub-themes. This evidence-base will be used as a major input for the row-by-row assessment	Summary note of key evidence by theme
T12: Line-by-line scoring exercise	Line-by-line scoring of innovations according to the metrics framework and evidence collected. Identification of areas where evidence-base is lacking or researchers are highly uncertain.	
T13: Calibration with technical advisor	Session with technical advisor to review all lines containing missing/uncertain entries. In addition, a random sample of	

Task/Output	Description	Output
	completed entries will also be discussed with our technical advisor for quality assurance purposes.	
Client engagement on Risk-Matrix scoring		
T14: Sharing of spreadsheet with BEIS subject-matter experts	Cleaned spreadsheet, completed with metrics evidence-base, to be shared with BEIS subject-matter experts. Brief guidance documents will be prepared to assist officials in providing inputs.	Spreadsheet with first-cut scoring included
T15: Input from BEIS Executives to calibrate metrics	BEIS officials will be invited to collaboratively adjust/amend inputs in the spreadsheet, based on their subject matter expertise.	
T16: Collation of results	Steer-ED will process the inputs from BEIS in order to create a single set of outputs which combines all the views/information collected.	
Workshop		
T17: Meet with client to prepare workshop	Meeting with BEIS project team to agree requirements for the project workshop.	
T18: Prepare workshop materials	Prepare Powerpoint presentation and any other workshop materials (e.g. handouts, exercises etc.).	
T19: Attendance and facilitation of workshop	The workshop will be facilitated by our Project Director Simon Pringle, who is a highly skilled facilitator. A teach-in on the study methods and findings will be presented by our Project Manager Emma Hanes.	Powerpoint presentation and workshop materials to be shared with client in advance of workshop
Outputs		
T20: Draft Final Report	A final report will be compiled which details the methodological approach, sources consulted, and audit trail of key decisions and inputs.	Final report
Project Management		
T21: Weekly 30-minute project management catch-ups	Budget has been allowed for a weekly 30-minute project management call between the Steer-ED project manager and BEIS project manager.	

Skills and Expertise required to deliver this project

1.92 Based on our understanding of the Brief, we judge that the following skills and expertise are necessary for the successful delivery of the project:

- An **expert knowledge of technology and innovation**, and the market and science factors which are driving this;

- A **thorough understanding of the UK regulatory environment**, in particular with regards to innovation on both the supply and demand sides;
- **Working with uncertainty,** with an ability to make well-informed judgements where data are unavailable or limited, and an innovative approach to filling evidence gaps;
- **Strong analytical capabilities**, this to ensure a fully documented audit trail, consistent treatment of inputs/technologies across the piece, and to use analytical tools wherever possible to lighten the burden of manual inspection, which would result in a time-consuming and less methodical process; and
- A **collaborative approach,** with the openness and maturity to draw-in ranges of opinions and judgement calls. Our recommended approach builds in several points where the study's outputs will be iterated with the client, including use of consensus building to gather views from a range of stakeholders at BEIS.

1.93 Table 1 shows how the Steer-ED team meets the above project requirements in terms of staff skills and expertise.

[redacted]

Client Inputs

1.94 Inputs from the client will be required at the following points in the project:

- Review of cleaned, grouped, and annotated spreadsheets;
- Review of proposed metrics;
- Input to the evidence-base for metrics – we have proposed to do this using NVivo, gathering views from a range of stakeholders and subject matter experts across BEIS
- Input to planning and delivering the Stakeholder Workshop; and
- Review of the final project outputs

Team Structure

1.95 Our proposed team structure is in Figure 1 below. The Project Director will [redacted] Founding Director of Steer-ED, [redacted] will be accountable for the overall accuracy and quality of the work, compliance with Company procedures, risk management, effective team-working, and ensuring staff welfare and safety.

1.96 The project will be led on a day-to-day basis by [redacted], our proposed Project Manager, who will be responsible for the technical and financial management, coordinating inputs from across the team and planning of work, and deploying resources and skills to deliver the project to time, cost, and quality standards.

1.97 [redacted] will provide consultancy support, in particular assisting with the task of reviewing manually the spreadsheet of innovations to ensure consistent and comprehensive data recording, cleaning and analysis.

1.98 Our Technical Advisor is [redacted] He is a subject-matter expert on Innovation Economics, and will provide overview and critical insight to ensure the quality of project outputs.

[redacted]

Staff Cameos

1.99 [redacted] is a biochemist by learning, a UK Civil Servant by training, and an economic adviser and analyst by career. With almost 30 years' consulting experience, he bring strengths in diagnosing and characterising the innovation of sectors, markets, and places at regional, national, and international levels. He is skilled in using this intelligence, overlaid with understanding of market and technology foresight, to shape policy, strategy, and action planning for economies. He has very well-developed co-development skills, and is adept in communicating complexity to experts and nonexperts alike, in both executive and political contexts.

1.100 [redacted] holds a degree and MSc in Economics. She worked as an economist in central government for eight years (both the Home Office and Department for Transport) and as an analytics professional for a multi-national mining company, where she was involved in freight market forecasting and freight optimisation. She worked in the Department for Transport's Strategy Unit where, among other things, she was responsible for a horizon scanning project on future transport technologies.

1.101 [redacted] has four years' experience in both the public and private sectors. Her professional background includes economic research and consultancy, focusing on the UK regional and European markets. She is experienced in collating, processing, and analysing large datasets. Her skills also include building and maintaining econometric models to capture trends and measure impacts.

1.102 [redacted] is Steer-ED's Special Advisor on Public Policy and Innovation Strategy. He has a doctorate in Industrial Economics (on innovation) and specialises in advising governments on innovation priorities and on uncertainty and risk management in the public sector. [redacted] is a member of the BEIS Expert Peer Review Group on Evaluation, and some of his consulting work has been re-published in peer reviewed academic channels.

Resource Management

Managing subcontractors

1.103 [redacted] will be a subcontractor to Steer-ED. Steer requires suppliers to provide details of their professional qualifications, experience and their quality, commercial and ethical standing. We maintain an 'approved supplier list'. Project Managers provide feedback on suppliers and this is stored in our Management Information System.

Project Plan and Timescales

1.104 Table 1 shows our proposed schedule of milestones and deliverables, which corresponds with our proposed project plan (Figure 1, overleaf). We note from the brief that the expected contract end date is 31st March, and final submission is requested by 19th February. We would like to propose an alternative final submission date of w/c 9th March, and an alternative date for the prioritisation workshop of w/c 2nd March. This is to allow sufficient time for calibration of outputs with both our technical advisor and with subject matter experts at BEIS. Calibration with BEIS experts is an extra step of the methodology which we have proposed, as laid out in our methodology section, to ensure outputs are robust and consistent with internal views from the department before attending the prioritisation workshop. This step is not essential and can be removed, with timelines adjusted accordingly, in consultation with you. However, this is our recommended approach in order to achieve highest quality outputs.

Table 4: Key Milestone and Deliverable Dates

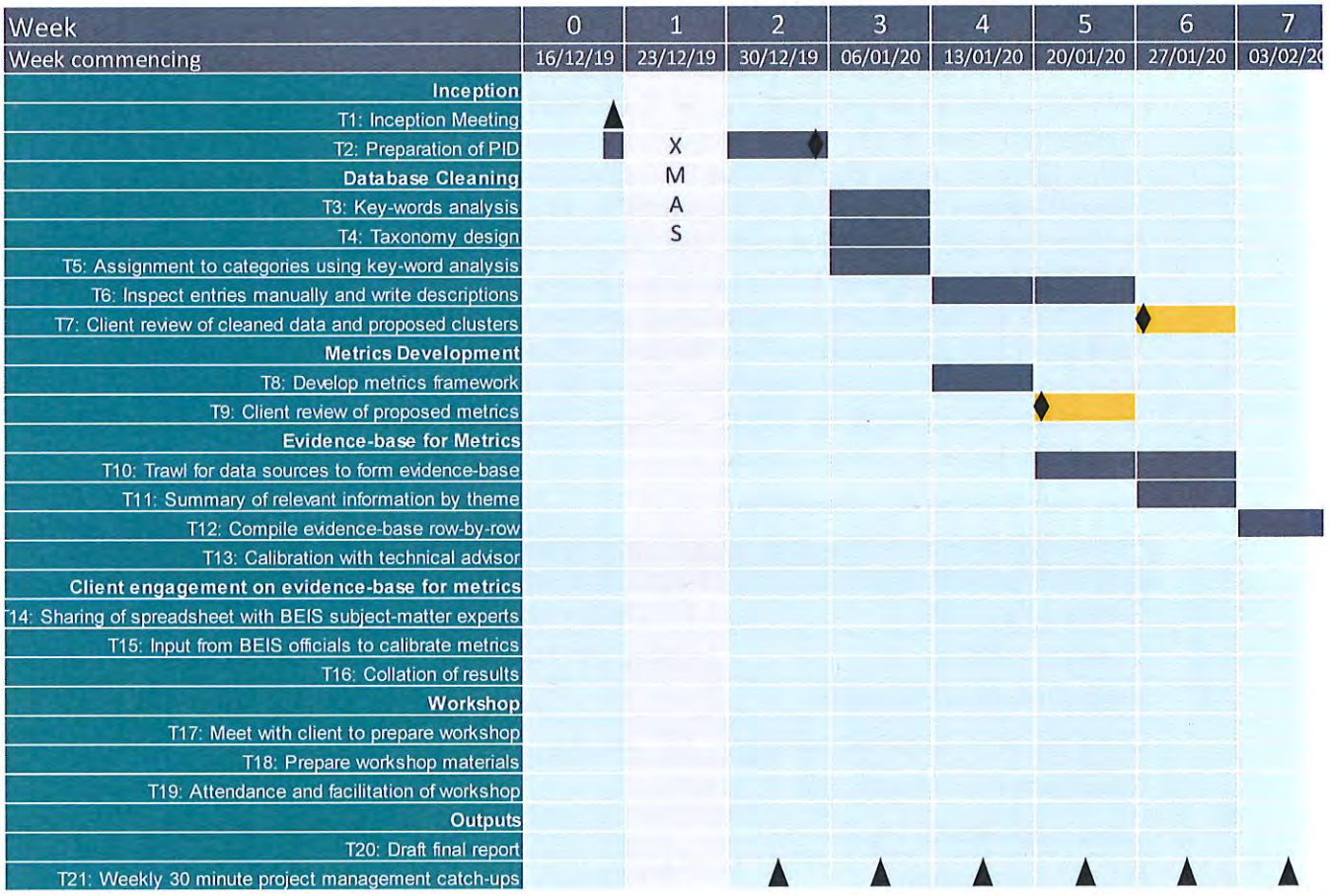
Milestone/Deliverable	Date indicated in brief	Our proposed date
Contract start date	20th December	
Inception meeting	Before 23rd December	20th December
Project Initiation Document		w/c 30th December
Client review of proposed metrics	13th January	3rd February
Client review of cleaned data		w/c 20th January
Client collaborative input		w/c 17th February
Prioritisation workshop	12th February	w/c 16th March
Final Submission	19th February	w/c 9th March
Contract End Date	31st March	

Project Risks

1.105 A full risk register has been prepared to accompany this proposal. Due to page limits, a short extract from the risk register is pasted below. The full risk register is available on request.

Table 5: Risk Register. *Score indicates a combined impact/likelihood scoring

Risk	Score*	Mitigation
EU exit leading to issues of staff availability	6	BEIS project manager to advise best approach given political environment.
Limited data available to evidence evaluation metrics	6	The study team are primed to use a range of alternative methods in the absence of data
Delay to sign-off of outputs	4	Project plan has built in review periods for client
Poor data quality of inputs leads to additional processing requirements	4	The budget has been designed to allow for line-by-line checking and validation, within our expectation of up to 1000 rows of data
Client does not accept findings	3	Weekly project management included in the project plan, to ensure no surprises
Consensus building exercise hindered by diverging views within BEIS	1	We will take the guidance of the BEIS project manager and our technical advisor to progress the project



Understanding the Project Environment

Figure 7: Project Timeline. Triangles indicate meetings, diamonds indicate deliverables. Yellow boxes show BEIS inputs

Policy Context

1.106 BEIS have set out a vision for the UK to be the world's leading innovation economy. As part of this, the Better Regulation Executive (BRE), responsible for leading UK regulatory reform, is undertaking an 'Horizon Scanning' exercise of future innovations, with the specific aim of assessing the regulatory requirements and enablers of these technologies, to help deliver the Government's agenda of a world-leading, innovation-friendly regulation system.

1.107 Innovation and regulation co-evolve. Innovation drives the evolution of regulatory stances and, in turn, the nature and extent of innovation are shaped by regulatory regimes. A key feature of this co-evolution process is that when regulation fails to adapt quickly, it can become obsolete/irrelevant or even harmful to national innovation capability. This highlights the importance of developing new and more agile approaches to regulation, which are able to quickly learn and adapt, rather than relying on anticipating inherently uncertain developments. Simply put, regulation must itself become more innovative.

Understanding of the Project Requirements

1.108 Against this background, this brief requires an assessment of technology and innovation in the context of setting the right regulatory environment to support, not inhibit, innovation. The purpose of the project, as we understand it, is to review a large quantity of 'messy' information collected from news reports and other open source documentation, and distil this into a useable, evidence-based collection of innovations of interest to policy makers. By capturing usable and comparable information on both the potential impact and the regulatory changes required to unleash these innovations, the project will help policymakers to prioritise and target regulatory reform in those sectors/markets most likely to bring greatest economic benefit.

1.109 We see several potential challenges for this project, described below. Our methodology and project plan have been designed specifically to address these concerns. These include:

- **Lack of information** – The availability of reliable information on the technological readiness, feasibility, impact and regulatory requirements of innovations is very limited in many cases. In the early stages of technological development in particular, these factors are often simply unknown;
- **Credibility of information** – Not infrequently, market projections for innovations display major Optimism Bias, not least because there are vested commercial interests in promoting the value of associated investment opportunities. However, there are also well-known cases of Pessimism Bias (especially in the early phases of digital developments) where experts radically under-estimated the eventual economic impact of innovations;
- **The subjective nature of this project's assessments** – Due to the lack of information and issues of credibility, the assessments developed under this project will require best-practice assessment/judgements rather than simply evidence collection. The subjective nature of these judgements means that there will likely be disagreement even between subject matter experts;
- **Inconsistent treatment leading to invalid outcomes** – A crucial requirement of this project is to assess innovations on a like-for-like basis to enable comparisons and prioritisation to take place. Without this, the final exercise could result in final recommendations being distorted or biased as a result of subjective judgements or variability in approach when handling the underlying data.
- **The database required to be developed by the project becomes a 'single shot' output**, which cannot be later modified or re-used to reflect changing circumstances or new information. This will particularly be the case if scoring is not transparent and reproducible.
- **The danger of 'spurious precision'** – It may be tempting to try and quantify the economic contribution of innovations to produce measurable and comparable metrics, especially when such studies exist for some of the technologies being considered. However, we would guard against striving for such a level of accuracy, which would more than likely be spurious and lead to incorrect conclusions overall (i.e. when comparing innovations).

1.110 The key features of our methodology, described in more detail in the Approach and Methodology Section, which have been designed specifically to address these issues are as follows:

- A simple, practical scoring method which will consider explicitly the reliability and credibility of information provided to the study;
- An opportunity for policy makers and subject-matter experts to input into the scoring decisions, particularly on the issue of regulatory requirement.
- A data-cleaning and sorting method using data-science tools, which will help to reduce, process, and distil the input information into a manageable and coherent dataset.
- A clearly constructed and easy-to-follow procedure for assessing technologies which can be applied in a consistent, transparent and documentable way.

Why Steer Economic Development

1.111 Formed in Autumn 2016 and based in offices in Manchester, London, and Leeds, we help clients improve the economic competitiveness and potential of their organisations, sectors, markets and places. The team provides a 'whole spectrum' offer, ranging from policy development and analysis, to strategy and bid development support, action planning, and on to evaluation and impact assessment. We bring significant experience in supporting clients to maximise the opportunity of their places, markets and sectors and bring considerable experience in innovation policy, skills policy, industrial strategy and economic competitiveness. Many economic development consultancies exist, but we are working genuinely to be independently-minded, evidence grounded, and crucially integrated in our thinking about economic development issues.

Relevant Project Experience

1.112 [redacted] works widely in the innovation arena, particularly around the role of innovation, from both supply and demand sides, as a driver of competitiveness. Last year, he drafted the Innovation Strategy for the Northern Powerhouse (on behalf of Northern Partners), and is currently completing the design of the Global Innovation Corridor in the Sheffield City Region (for the Sheffield Combined Authority). He is presently undertaking the economic appraisal of Sidewalk Lab's proposals for an Urban Innovation District at Toronto Waterside (for the Toronto Waterside Corporation, with this involving extensive exploration of how Sidewalk's proposals interface with Canadian regulatory environments), and has advised recently the University of Manchester on the development of an Applied Innovation District on the former UMIST campus. He is now supporting Bruntwood Properties, L&G, and Stanhope in their competitive bid to develop the site, in joint venture with the University.

1.113 [redacted] Technical Advisor to the project, has carried out extensive public policy work on innovation, uncertainty and economic development. This work spans the role of technical standards in innovation (a regulatory aspect) and also how best to manage uncertainty and investment risk in the innovation process. In 2003 [redacted] was contracted by the Australian Government to prepare a detailed technical case study of the development of Wi-Fi technology – a process in which technical standards played a key role. His detailed co-authored study contributed to the Australian Government's successful patent infringement litigation against a number of major Silicon Valley corporations (US$430 million in combined settlements).[2] This research highlighted the ways in which uncertainty over the potential

[2] See: https://marklmatthews.files.wordpress.com/2014/02/intellectual_property_research_institute_of_australia_occasionalpaper_0113.pdf

economic value of an innovation evolved (from beginnings in radio astronomy) and eventually led to profound but hard to forecast economic impacts [redacted] is currently working on the use of structured hypothesis testing methods to integrate *ex ante* appraisal and *ex post* evaluation in the public sector. This includes applications to regulatory frameworks via 'weak signals' analysis (spotting emerging 'false negative' regulatory failures in a timely manner).

1.114 [redacted] draws from ten years' experience working in analytics and economics across the private and public sectors. Of particular relevance to the data cleaning and processing element of this project, [redacted] has conducted similar tasks on large datasets, including for example a large database of international terrorism events being used by the Home Office. [redacted] used statistical software to conduct free-text analysis of the data, which consisted of news reports and press clippings describing historic terrorist attacks. The project required a disciplined and consistent approach to assessing and codifying the entries, such that robust econometric analysis could be performed. [redacted] also has direct experience of the Better Regulation Agenda, having participated in the previous government's 'Red Tape Challenge' and, as a government economist, having coached many policy colleagues through the process of designing fit-for-purpose impact assessments.

Ensuring successful delivery

1.115 Our approach will provide high-quality outputs and outcomes, both in terms of the processes followed and the spreadsheet/written outputs. For this project, a clearly documented audit trail to log sources and decisions is vital to ensuring a robust, usable output. Our project plan dedicates significant resource to line-by-line examination, input and logging of sources to ensure strict protocols are followed. We also believe that collaboration and co-production with BEIS' Project Manager and Subject-Matter experts in the Department is essential to ensure that the decisions and judgements required by the project are not made in a vacuum. This is why weekly project management catch-ups have been built into the project timeline, as well as a stakeholder consensus building session – this in addition to the Weightings Workshop proposed by BEIS in the study brief.

1.116 To ensure successful delivery of outcomes our approach requires: (a) confirmation of the underlying goals as well as the detailed requirements of the project; (b) thorough and ongoing, transparent management of risk to ensure we deliver what was agreed; (c) identification of the constraints, including resources, timescales and data; and (d) clarification and agreement of the intermediate milestones, outputs and processes that define successful delivery.

1.117 When planning projects, we use Inception Meetings to explain objectives, roles, approaches, communication protocols, confidentiality arrangements, milestones and deadlines. More generally, throughout the life of the project we ensure consistency in our approach and output across client and consultancy teams by using: (a) progress meetings to ensure common understanding and critical path requirements; (b) common templates and style guides for consistency; (c) spreadsheet and analysis tools best practice, which ensures accuracy, transferability and comprehensibility; (d) clearly defined and documented change management policies and tools; and (e) sign-off protocols which specify a unique requirement for sign-off for different outputs before they can be released (e.g. deliverables).

Quality Assurance

1.118 Across all aspects of our business, we operate ISO9001 certified Business Procedures (BPs). These are integral to our certified Quality Management System, and ensure assignment delivery to time, cost, quality, and performance objectives by applying consistent principles and methodologies across all our projects. Every project is led by a Project Director, accountable for the delivery of a high-quality project addressing our client's requirements. The Project Director is responsible for the overall success of the project, including assuring the accuracy and quality of work, commercial performance, compliance with company procedures, risk management, effective team working and ensuring staff welfare and safety. Each project is led on a day-to-day basis by a Project Manager. The Project Manager is responsible for the technical and financial management of projects, and planning of work, deploying resources and relevant skills to deliver the project on time, to cost, and to appropriate quality. The Project Manager is responsible for managing the joint inputs of the combined Project Team. The Project Manager is also responsible for managing the client relationship at a working level and ensuring our ISO9001 certified Business Procedures are followed.

Part 2: Contract Terms

Contract Terms v6.0