NLA International–Seabed 2030

Phase 2 Objectives 4 & 5:

Benefits Analysis Workstream Report

Proposed model for Seabed 2030 – Seabed Mapping Benefits Analysis and Prioritisation

April 2022

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SECTION ONE: INTRODUCTION TO THE REPORT

1.1 CONTEXT

The Nippon Foundation-GEBCO Seabed 2030 Project's vision to map the world's oceans by 2030 is insightful and ambitious setting a challenging timeline to address the 80% of the oceans that have yet to be charted to the required gridded resolution. The "Wind in the Sails" (WITS) proposal supports the Seabed 2030 Project by providing empirical evidence to enable the development of a prioritised, targeted survey strategy. The aim of this three-phase project is to unite the global hydrographic community and operators within the marine and maritime domains around an agreed global seabed mapping priority list, underpinned by a robust evidence base that articulates the true need and value of mapping the seabed in its entirety to a defined gridded depth variable resolution.

WITS phases are: *(Bold text current phase highlights the current phase of activity, Phase 2)*

- Phase 1: Rapid evidence review and fast action priority list
- **Phase 2: Detailed modeling, benefit extrapolation and prioritisation of need**
- Phase 3: Release of interactive priority action map and revised strategy

1.2 'WIND IN THE SAILS' PHASE 2 TASK 'OBJECTIVES' – DETAILED MODELLING, BENEFIT EXPRAPOLATION AND PRIORITISATION OF NEED

WITS Phase 2 work builds on top of the Phase 1 outputs and is informed by the community engagement survey findings. Phase 2 has 3 objectives, as described below:

Objective 3: Catalogue the premium models for seabed mapping benefit analysis (Report 1 dated January 2022).

A collated catalogue of the various models used to calculate the environmental, social, and economic benefits to be derived from mapping currently uncharted areas of the seabed will be produced. Such benefit modelling has never been attempted on a global scale; it is anticipated that different models will have been used to quantify those differing benefits (environmental, social, and economic), and that varying types of seabed (coastal, deep water within EEZs or on the High Seas, etc.,) will also have been addressed in separate ways. A taxonomy of global seabed mapping categories will be developed, and the best models found to articulate the benefits of mapping each identified seabed characteristic category will be identified.

Objective 4: Model potential global benefit (Report 2 dated April 2022).

Using the blended suite of shortlisted premium benefit calculation models as a guide, a globally recognised and supported priority list will be transposed into a framework for a potential global model that reflects all categories and seabed survey priority needs. Extrapolating the priorities and needs across pan-maritime stakeholders/sectors will result in a global first a never-before-attempted quantification of the environmental,
social and economic benefits and bringing them together within one model.

Objective 5: Develop a final model to prioritise all areas of unmapped seabed (Report 2 dated April 2022).

With the global picture in place, further work will be required to develop an approach to prioritising areas for mapping interventions globally. This exercise will take the output from Objective 4 above as its starting point, but is listed as separate work which will need to be considered to develop a ranking model that draws in the disparate modelling functions into a coherent, quantifiable whole. For example, it may be necessary to develop separate rankings for the environmental, social, and economic benefits of each area (so that stakeholders with an individual interest in each of them can see those separately), and then develop a method to weight each of those scores in a headline 'score'.

1.3 Seabed 2030 Community Engagement – Two workshops & Phase 2 Report Review

WITS Phase 2 work included two Seabed 2030 community engagement workshops to inform the development of the benefit analysis and prioritisation approach, including:

1. Seabed 2030 - WITS Benefits analysis / model workshop 1 [February 2022], with a focus on Seabed mapping benefits analysis concepts and high-level approach.

2. Seabed 2030 - WITS Benefits analysis / model workshop 2 [March 2022], with a focus on Seabed mapping benefits analysis high level approach continuation, and seabed mapping prioritisation high level approach.

Provision is made for Seabed 2030 community workshop participants to have access to the Phase 2 reports *(see section 1.4 below)* and provide their optional review and provide additional feedback and guidance. NLAI will update the reports across during the period ending 31 May 2022 to take account of feedback and guidance received. *[NLAI proposes to use coloured font – italic to annotate community review guidance into final versions of the Phase 2 reports].*

1.4 Report Purpose, Target Readership, & Report Structure

WITS Phase 2 provides two reports:

- Report 1 focusses on Phase 2 Objective 3, is a guidance report, and provides a catalogue of the premium models for seabed mapping benefit analysis [Report 1, dated January 2022].
- Report 2 (this report), focusses on Objectives 4 and 5, is a guidance report, and provides a description of the proposed Seabed 2030 benefits analysis model and prioritisation approach. It also includes a set of recommendations (on benefits analysis / prioritisation matters) proposed by the WITS benefits analysis workstream team for Seabed 2030 consideration. [Report 2 dated April 2022].

Both **reports target readership** of the Seabed 2030 management, decision makers, and practitioners. Benefits analysis and prioritisation modeling approaches are developed with the same

readership in mind (Seabed 2030 management, decision-makers, and practitioners), and additionally, are produced with researchers and future donors / funding bodies in mind.

Report 2 (this document) layout / structure is as follows:

- Section 1: 'Introduction to the Report' – providing Seabed 2030, and WITS context; and provides the purpose and layout of the report.
- Section 2: 'Benefits Analysis Modelling', providing details on a proposed Seabed 2030 seabed mapping approach to benefits analysis, including proposed benefits analysis objectives, purpose, outline methodology, with and key assumptions and target outputs identified.
- Section 3: 'Articulating Seabed 2030 Value', which signposts for Seabed 2030 a good practice approach to the presentation of value is presented, including the use of document artefacts (examples provided) that can be used and tailored by Seabed 2030 seabed mapping to articulate both benefit and value.
- Section 4: 'Prioritisation Modelling'. This section proposes a seabed mapping approach to prioritisation for Seabed 2030 consideration, providing details on prioritisation objectives and purpose, with a set of key considerations identified towards developing a seabed mapping prioritisation framework (the methodology) for Seabed 2030 consideration. The section ends with a high-level review of two existing seabed mapping prioritisation tools (i) GEBCO seabed mapping prioritisation tool "GEBCO SCRUM Data Prioritisation Web App," and (ii) AusSeabed Seabed Mapping Prioritisation tool and suggests how Seabed 2030 may be able to leverage these going forward in support.
- Section 5: 'Collation of Recommendations' for Seabed 2030 consideration. This collation of recommendations for Seabed 2030 consideration is provided as a single table of recommendations with recommendations drawn from both WITS Phase 2 Reports (Report 1 and 2).
- Section 6: WITS Phase 2 proposed next steps, where high level next steps are identified and proposed.

Two Annexes complete Report 2:

  - Annex 1: Task Lexicon - Definition of Terms.
  - Annex 2: References.

SECTION TWO: SEABED 2030 SEABED MAPPING BENEFIT ANALYSIS MODEL

This section presents a proposed seabed mapping benefit analysis model for use by Seabed 2030.

The model is presented by dedicated sub-section covering the following seabed mapping benefit analysis topics:

- Benefit Analysis Objectives.
- Benefit Analysis Purpose, including target readership/user community.
- Benefit Analysis Model – Proposed Methodology and Approach, including a description of methodology / approach, key output, and any applicable key assumptions identified at this stage.

Preamble to the Model. The proposed benefit analysis model adopts a blended approach that brings together key methodology elements, exhibited by the range of premium benefit analysis models reviewed and presented in WITS Phase 2 Report 1 [WITS Phase 2 Report 1 - Catalogue of Premium Models for Seabed Mapping Benefits Analysis]. Noting, Seabed 2030 seabed mapping interests are global oceans, and the benefit model is generally aiming at understanding the benefit associated with High Seas seabed mapping, not withstanding, and accepting EEZ areas remain relevant to Seabed 2030, as discussed during Workshop 1. Further data and parameters are informed by the wider community engagement undertaken during WITS Phase 1 work.

The benefits analysis model documented below, was presented during Workshop 1, where Workshop 1 focused entirely on benefits analysis topics Seabed 2030 community engagement. Further engagement on the specific topics of use cases (see benefit analysis model step 4 below), and articulation of value (see section 3 of this report) took place during Workshop 2. Feedback and guidance received during and after the workshops has been introduced into the model logic by the WITS project team.

2.1 SEABED MAPPING BENEFIT ANALYSIS MODEL – OBJECTIVES

The **key objective for the Seabed 2030 benefit analysis model is to capture, analyse, and articulate the resulting benefits from a global coverage Seabed 2030 grid data product**.

The benefit analysis model casts a benefit lens from a range of perspectives, including seabed mapping grid data producers, users, and domain benefit perspectives, and resulting economic impact and economic value perspectives.

2.2 SEABED MAPPING BENEFIT ANALYSIS MODEL – PURPOSE OF THE BENEFIT ANALYSIS MODEL, TARGET READERSHIP AND USER COMMUNITY

The **purpose of the Seabed 2030 seabed mapping benefit analysis model** is to:

- Capture, analyse, and articulate the resulting benefits and economic value from Seabed 2030 seabed mapping data.

- Inform and evidence the Seabed 2030 business case.
- Build up a knowledge base, including:
    - Seabed 2030 value proposition.
    - Bank of reference case study ‘use cases’ for ongoing Seabed 2030 use.
- Be available for use in and inform ongoing Seabed 2030 seabed mapping prioritisation activities on benefit concerns.
- Contribute to the build-up Seabed 2030 stakeholder awareness in the value of seabed mapping generally.

The **target readership for the benefit analysis results / outcomes** includes:

- Seabed 2030 management
- Government Funding Decision-makers
- Future donors, including with philanthropy in mind
- Practitioners / researchers
- Public outreach / engagement where useful items can be potentially extracted from the benefits analysis work.

The **target user community for the benefit analysis model use** include:

- Seabed 2030 management
- Government Funding Decision-makers
- Future donors, including with philanthropy in mind
- Third party / other entity commissioned to implement, analyse, and evaluate the model / results. *(A Third Party would be anticipated to include a blend of technical domain and economic analysis expertise).*

2.3 SEABED MAPPING BENEFIT ANALYSIS MODEL – PROPOSED METHODOLOGY AND APPROACH

The Seabed 2030 seabed mapping benefits analysis model is based on an Eight-step (No. 8) process listed below.

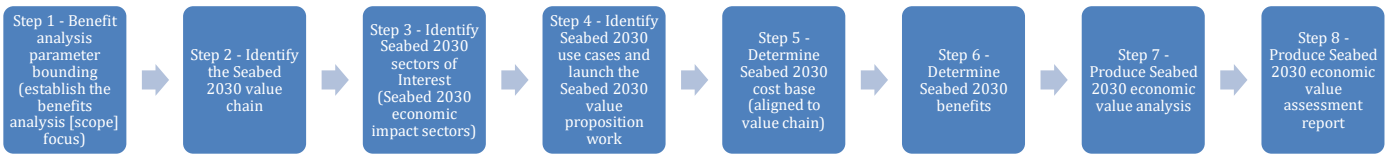


Figure 1: Proposed Seabed 2030 seabed mapping benefits analysis model

Step 1: Benefit analysis parameter bounding *(establish the benefit analysis [scope] focus)*
Step 2: Identify the Seabed 2030 value chain
Step 3: Identify Seabed 2030 sectors of Interest (Seabed 2030 economic impact sectors)
Step 4: Identify Seabed 2030 use cases and launch the Seabed 2030 value proposition work
Step 5: Determine Seabed 2030 cost base (aligned to value chain)
Step 6: Determine Seabed 2030 benefits
Step 7: Produce Seabed 2030 economic value analysis
Step 8: Produce Seabed 2030 economic value assessment report

The end-to-end model process runs in series, starting at step 1 and ending with step 8.

Each of the model steps is described further by dedicated sub-sections below. High level details are presented for each benefit analysis 'step' using the following common table structure.

Name / Number of Model Step [Steps 1 to 8]	
Name of step	Text: Name
Step Reference Number	Text: Step 1- 8
Method / Process description	Text: High Level Method (Activity Level) Description
Key Output	Text: Tangible Key Output from the Model Step / Resulting Documentation (if applicable)
Key Assumptions	Text: Identified if applicable, and may include TBD*

Explainer*:
TBD means 'To Be Determined' and infers to be determined during the actual production of the model/use of the model. N/A means 'Not Applicable.'
None means 'None.'

2.3.1 Benefits Analysis Model Step 1 Description - Benefit analysis parameter bounding (establish the benefits analysis [scope] focus)

Benefits analysis step 1 consists of the following process approach, target outputs and is based on the key assumptions presented in the table below.

Seabed Mapping Benefit Analysis Model Step 1: Benefit analysis parameter bounding (establish the benefits analysis [scope] focus)	
Name of step	Benefit analysis parameter bounding (establish the benefits analysis [scope] focus)
Step Reference Number	Step 1
Method / Process description	This step provides a scope that bounds and defines the parameters to be adopted for the benefit analysis use and / or focus. These items are discussed in Report 1, and include items, with the WITS project Team suggestions: **Item 1: Waters / Maritime Boundaries of Interest Waters of Interest to the Benefit Analysis** #1: Internal Waters - Inland water bodies / Navigable waterways, etc. #2: Ports #3: Coast #4: Territorial Seas 12 nm #5: Contiguous Zone 24 nm #6: EEZ #7: Archipelagic Waters #8: High Seas

	Where #1 through to #7 fall under national mandates, the focus for the benefit analysis model is proposed as #8: High Seas. To be supplemented with adhoc instances where there is a need to extend to include EEZ, e.g., Small Island Developing States, etc. where there may be current EEZ data seabed mapping data gaps that Seabed 2030 potentially can close. **Item 2: Other maritime / marine area boundary driven concerns or interests**, include, where available the following: [Relevant authorities are identified where known]. #1: Areas of Particular Environmental Interest [Source: Relevant Authority - International Seabed Authority] #2: Vulnerable marine ecosystem [Source: Regional Fisheries Management Organisations or associations, competent national authorities by cascade] #3: Particularly sensitive sea areas and areas to be avoided [Source: Relevant Authority - IMO] #4: Fisheries closures and fisheries restricted areas [Source: Food and Agriculture Organisation of the United Nations, Relevant Authority - IMO] #5 Whale sanctuaries [Source: Relevant Authority – International Whaling Commission] #6 Infrastructure closures: Pipeline (e.g., oil, gas, etc.,) and cable closures (e.g., telecommunications, grid, etc.) [Source: Relevant Authority – IMO cascade competent national authorities] #7World Heritage Sites, including those for their mixed cultural and natural outstanding value [Source: Relevant Authority – United Nations Educational, Scientific and Cultural Organization] #8 Marine Protected Areas [Source: Relevant Authority – Aichi Biodiversity Targets. Regional seas conventions, and by cascade competent national authorities] #9 Special Areas and Emissions Control Areas [Source: Relevant Authority - IMO] #10: Others TBD. *E.g., Offshore Mining delineated areas, other marine geological sites of interest, such as marine trenches, tectonic plates, and other sites of known geological interest / activity (that may drive benefits analysis and/or seabed mapping prioritisation e.g., support to tsunami forecasting)* **Item 3: Ocean Regions** – **Seabed 2030 may wish to segment the Global Oceans into regional areas for benefits analysis purposes**. This may be based on Seabed 2030 Regional Offices Ocean areas of responsibility, or other and is TBD. Segmenting would enable benefits to be analysed and compared between regions *(Any regional segmentation would feed into the Seabed 2030 Prioritisation Model addressed in section 4 of this report).* **Item 4: Seabed 2030 Product Portfolio & Underpinning Services to be considered in the Benefits Analysis.** **Seabed 2030 Product Portfolio of Interest, include the following:** **Sub-element 2.1: Seabed 2030 Actual / Concept Products**

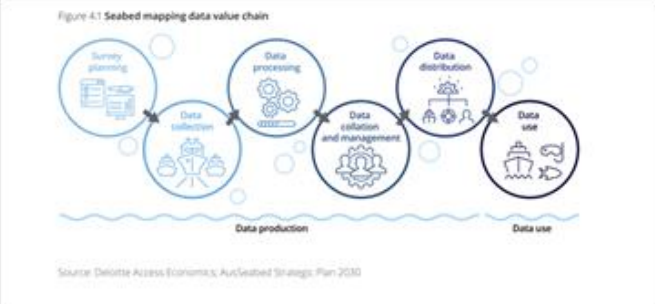
	#1: Seabed Grid **#2: Seabed 2030 Charts** Noting that the availability of acquired raw data, backscatter, and/or Seabed Features / Seabed Textures are excluded from this specific benefits analysis study (i.e., the focus is the post processed grid model). Sub-element 2.2 GEBCO Products To inform this study, the General Bathymetric Chart of the Oceans (GEBCO) consists of an international group of experts who work on the development of a range of bathymetric data sets and data products, including: • Gridded bathymetric data sets • GEBCO Digital Atlas, confirmed to consider Seabed 2030 as an input to the GEBCO Digital Atlas • GEBCO world map, confirmed consider Seabed 2030 as an input to the GEBCO world map • GEBCO Gazetteer of Undersea Feature Names **For the purpose of the benefits analysis, it is proposed to consider Seabed 2030 as:** **#1: An input to GEBCO gridded bathymetric data sets** **#2: An input to GEBCO Digital Atlas, and** **#3: An input to GEBCO World Map can be considered.** **Additional to the Seabed 2030 data products (grids and charts) and Seabed 2030 data holdings.** Sub-element 2.3: **Any other international data holdings in scope or to be considered – at this stage this is proposed as 'none' or 'not applicable.'** Assumed #1: None / Not Applicable Sub-element 2.4: Product Grids – depth and resolution parameters to be applied. As defined by Seabed 2030, the following depth and resolution parameters will be adopted for the benefits analysis work. The long-term target specification of 100m x 100m grid has been superseded. The initial efforts of Seabed 2030 are focusing on mapping the 93% of the ocean deeper than 200 meters, leaving national hydrographic agencies to cover waters closer to shore. Seabed 2030 progress tracking refers to the following parameters and it is these parameters that are adopted for the purpose of benefits analysis. **The specification of target resolutions by varying depth are:** **#1: Depth range 0-1500 metres, grid cell size 100m x 100m** **#2: Depth range 1500-3000 metres, grid cell size 200m x 200m** **#3: Depth range 3000-5750 metres, grid cell size 400m x 400m** **#4: Depth range 5750-11000 metres, grid cell size 800m x 800m**

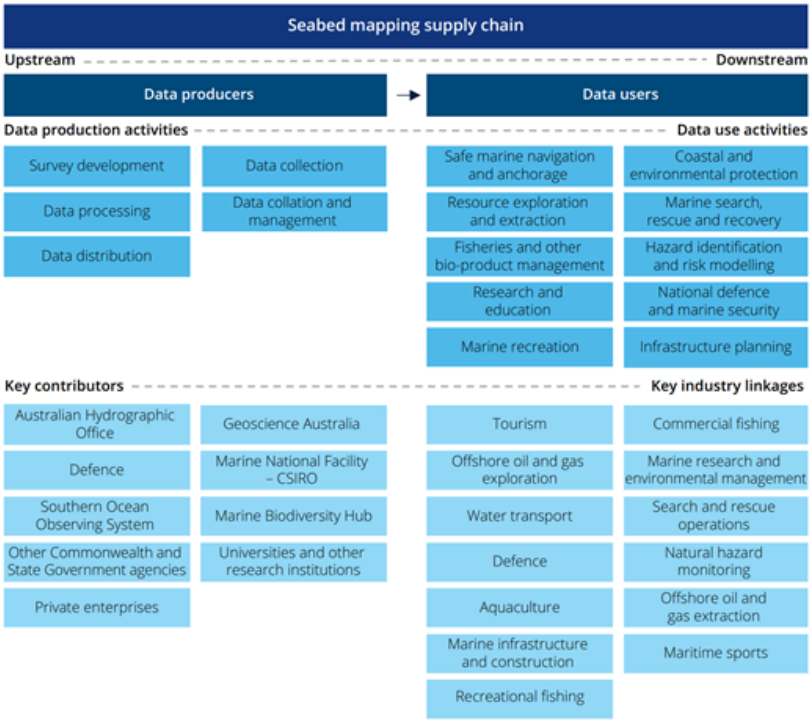
	Please note the Seabed 2030 ancillary reference to satellite altimetry providing a resolution in order of 5000m resolution / 5Km resolution, while of technical interest, is out of scope for the purposes of the benefits analysis. **Item 5: Currency / Maintenance Regime & Timeframe for Review** Whilst in the longer-term Seabed 2030 may seek to maintain the Seabed 2030 product portfolio and undertake resurvey / data maintenance work, at this time and **for the purposes of benefit analysis activities it is assumed that Seabed 2030 is a single event base-line survey without any associated update maintenance / resurvey specification applied**. Please see WITS Phase 2, Report 1 section 3 for full details.
Key Output	**[Document] Documented benefit analysis terms of reference** including the definition of key scope parameters to be addressed by the benefits analysis. 5 items above are proposed confirmed case by case.
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Benefits Analysis model.

2.3.2 Benefits Analysis Model Step 2 Description - Identify the Seabed 2030 value chain

Benefits analysis step 2 consists of the following process approach, target outputs and is based on the key assumptions presented in table below.

Seabed Mapping Benefits Analysis Model Step 2: Identify the Seabed 2030 Value Chain	
Name of step	Identify the Seabed 2030 Value Chain
Step Reference Number	Step 2
Method / Process description	A Value Chain is a key part of benefits analysis and economic value assessment, as it provides the base from where value is being generated from and to whom. The Value Chain captures all aspects of Seabed 2030 value chain, including: (i) Seabed 2030 Data Producers (ii)Seabed 2030 Data Users (iii) Aligned to Economic Sector Hierarchy (& see Step 3 further below). Sam Harper, Assistant Director IHO, articulated this through the project Workshop 1 follow up communication, stating: "*Value chains are a useful tool for mapping how an individual, group or community can go from a stated aim to a beneficial outcome. Commonly used to describe manufacturing processes or economic models, they can be applied to the geospatial data ecosystem."* There are many examples of data value chains, but most models describe or operate within four domains:

	1. Data - in our case the collection and storage of bathymetric data (and other types of marine geospatial data). 2. Information - where we manipulate the data into a something that is useful or something that can be more meaningfully interacted with (e.g., a gridded and/or attributed surface). 3. Knowledge - where we do the science based upon the derived or manipulated datasets created in the information domain (e.g., a habitat map, a hydrodynamic model or navigational chart). 4. Wisdom - where we take action based upon an interpretation of the evidence generated in the knowledge domain (e.g., using navigational aids to transit safely from A to B, or using ecosystem assessments to preserve fish stocks through the delimitation of marine protected areas). - In order for a value chain to function, you need suitable input data, communities, and governance, the later two forming key components of the ecosystem". In the workshop the WITS Project Team presented five (No. 5) examples, including AusSeabed prepared Value Chain, presented here:  The AusSeabed version works well, and distinguishes between **Data Production (Value)**, and **Data Use (Value).** Within these there are: • Data Production: Survey planning, data collection, data processing, data collation and management, data distribution • Data Use: Data users and data use activities Thereafter, AusSeabed segment value areas further, as presented below. This provides the link between Value chain data users and industries, *albeit for the seabed mapping supply chain*.



The WITS Project team suggest that the Seabed 2030 Value Chain may be modified as follows:

(i) Include a parallel 'value' to reflect 'Professional Services' the advisory services that accompany and stimulate the use of seabed mapping data.

(ii) Reduce the scope of data production to remove any items Seabed 2030 does not have responsibility for delivery. If this shows a gap in Seabed 2030 end to end capability, then this value gap should be considered further and closed.

(iii) A third suggestion is for Seabed 2030 to consider extending the right-hand side of the value chain to include and distinguish between 'Users', and also 'Users of Derived Data based on Seabed 2030', as in the example of GNSS Technology Value Chain in Maritime Domain, *(A reference from 'Report on Maritime and Inland Waterways User Needs and Requirements Outcomes of the European GNSS User Consultation Platform)*, presented below.

Value Chain

Output	[Document, with supporting Visio / Excel Worksheet as applicable]: Seabed 2030 Value Chain with summary description.
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Benefits Analysis model.

2.3.3 Benefits Analysis Model Step 3 Description - Identify Seabed 2030 sectors of interest (Seabed 2030 economic impact sectors)

Benefits analysis step 3 consists of the following process approach, target outputs and is based on the key assumptions presented in table below.

Seabed Mapping Benefits Analysis Model Step 3: Identify Seabed 2030 sectors of interest (Seabed 2030 economic impact sectors)	
Name of step	Identify Seabed 2030 sectors of interest (Seabed 2030 economic impact sectors)
Step Reference Number	Step 3
Method / Process description	This step captures a common view of Seabed 2030 Target Sectors / Industries for Economic Impact Assessment (e.g., to enable an economic analysis to focus the assessment on relevant searches). AusSeabed segmented sectors by two categories of data use (user type): 1) Sectors using seabed mapping data operationally, and then 2) Sectors unlocked by seabed mapping data they identified and used the following as their focus sectors: • Commercial fishing • Water transport • International Tourism • Domestic Tourism • Aquaculture • Oil and Gas Extraction • Marine research and environmental protection • Oil exploration • Search and rescue • Defence [It is helpful to understand some key economic definitions at this stage, including: A '**sector'** is an area of the economy in which businesses share the same or related business activity, product, or service. Sectors represent a large grouping of companies with similar business activities, such as the extraction of natural resources and agriculture. Dividing an economy into different sectors helps economists analyse the economic activity within those sectors. As a result, sector analysis provides an indication as to whether an economy is expanding or if areas of an economy are experiencing contraction. Further, Sectors are used by economists to classify economic activity by grouping companies that are engaged in similar business activities. An **'industry'** can be considered a collection of organisations within a specific sector where they are typically involved in a specific internal sector activity, e.g., an oil company may be extracting oil – oil can be considered a primary sector industry, as can forestry and also in this instance marine fishing, and extraction of crude petroleum and natural gas (offshore).

	An industry is a group of companies that are related based on their primary business activities. In modern economies, there are dozens of industry classifications. Industry classifications are typically grouped into larger categories called sectors. While a **sector represents a large segment of an economy that includes many companies, an industry represents a more narrow focus of the companies within a particular sector**. Thus, industries are the result of breaking down a sector into more defined and specific groupings. On the other hand, sectors can represent a large grouping of companies that have similar business activities, and hence why economic analysis for benefit / value analysis purposes is ideally addressed at sector level. **Economic Sectors definitions** proposed for awareness and terminology adoption include: **#1: Sector: Public or 'State Sector'**. **#2: Sector: Private or 'Privately run business'**. **#3: Sector: Voluntary or 'Not for Profit'**. Also: #**1: Primary sector [Raw Materials]** – Involves the retrieval and production of raw materials such as for our interest minerals, fishing, and oil and gas. #**2: Secondary sector [Manufacturing]** – Involves the transformation of raw or intermediate materials into goods, e.g., in this instance includes fisheries processing to food products. #**3: Tertiary sector [Services]** – Involves supplying services to customers, e.g., banking, and accounting, etc. and in this instance can include blue financing. Additional Sectors: #**4: Quaternary sector [Information Services]**– And is where knowledge-based services are accounted for (e.g., **Seabed 2030 can be considered a quaternary sector entity as a provider of data for….**). #**5: Quinary sector [Human services]** – activities centered on human-based services such as hospitality (e.g., and in this instance includes tourism). Also: #**1: Sector: Established sectors** - Sectors with long-term proven contribution to the economy. #**2: Sector: Emerging sectors** - New sectors showing high potential for future development.] Additionally, there are Marine / Maritime dedicated 'Sector': defined as **Blue / Ocean Economy Sectors.** These are cross cutting the economic norms presented above, and different configurations are used pending Entity interests, E.g., EU, OECD, UN, etc. **EU Blue / Ocean Economy identifies with:**

Sector	Sub-sector
Marine Living Resources	Primary production
	Processing of fish products
	Distribution of fish products
Marine non-living resources	Oil and gas
	Other minerals
Marine renewable energy	Offshore wind energy
Port Activities	Cargo and warehousing
	Port and water projects
Ship Building and Repair	Ship building
	Equipment and machinery
Maritime Transport	Passenger transport
	Freight transport
	Services for transport
Coastal Tourism	Accommodation
	Transport
	Other expenditure

OECD Blue / Ocean Economy identifies with:

Ref ID	Ocean Specific Description
1	**Marine fishing**
2	**Marine aquaculture**
3	Maritime passenger transport
4	Maritime freight transport
5	**Offshore extraction of crude petroleum and natural gas**
6	**Maritime and seabed mining**
7	**Offshore industry support activities**
8	Processing and preserving of marine fish, crustaceans, and molluscs
9	**Maritime ship, boat, and floating structure building**
10	Maritime manufacturing, repair, and installation
11	**Offshore wind & marine renewable energy**
12	**Maritime ports and support activities for maritime transport**
13	**Ocean scientific research & development**
14	**Marine & coastal tourism**

UN Blue / Ocean Economy identifies with:
1) Marine fisheries
2) Seafood processing
3) Sea minerals
4) Tourism
5) Sea transport
6) High technology and other manufactures
7) Ships, ports equipment and parts thereof

Wider **NLAI MARES Blue Economy Project work** identifies:

	Established Sectors, as: 1) Aquaculture 2) Fisheries 3) Coastal Tourism 4) Marine Transport 5) Ship Building and Repair 6) Marine Extraction of Oil and Gas 7) Ports Warehousing and Water Projects 8) Fish Processing Industry Emerging Sectors, as: 1) Blue Bioeconomy 2) Ocean Energy 3) Offshore Wind Energy 4) Coastal and Environmental Protection 5) Desalination] **The WITS Project Team recommend Seabed 2030 review the above sector listings, and either adopt one or a combination of the various lists, that can be adopted for Seabed 2030**. The assumption is that the economic value will be assessed across the sectors identified, supported by the economic analyst - see step 6 and 7 further below. Additionally, this selection supports Seabed 2030 identifying the useful set of value evidential use cases – see step 4 below, ensuring use case cover the range of Seabed 2030 benefits and economic value generation.
Outputs	[Document with supporting Visio / Excel Worksheet as applicable]: Seabed 2030 Economic Impact Breakdown / Listing. Sectors of interest for economic impact consideration are identified.
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Benefits Analysis model.

2.3.4 Benefits Analysis Model Step 4 Description - Identify Seabed 2030 use cases and launch the Seabed 2030 value proposition work

Benefits analysis step 4 consists of the following process approach, target outputs and is based on the key assumptions presented in table below.

Seabed Mapping Benefits Analysis Model Step 4: Identify Seabed 2030 use cases and launch the Seabed 2030 value proposition work	
Name of step	Identify Seabed 2030 use cases and launch the Seabed 2030 value proposition work
Step Reference Number	Step 4
Method / Process description	Use cases are useful standalone evidential artefacts of benefit and value on their own, and collectively showing the range of benefit and value Seabed 2030 can create. Use case are used and inform the benefit assessment and economic value assessment, providing tangible, real life / scenario value evidence. Further, use cases are also available for wider communications and

knowledge sharing, in addition to use in the value proposition and evidencing any Seabed 2030 business case logic.

The WITS Project Team recommends:

- **Seabed 2030 identify and documentation a set of use cases.**
- No less than 4 use cases are documented, with a target of 10 use cases would be ideal to build a useful bank of knowledge sharing collateral.
- Ideally there would be at least one-use case per sector identified in step 3 above.
- Each use case is proposed less than 3 pages in length for use in the Seabed 2030 value proposition document, and as long as required if they are additionally intended for publication in scientific journals. Ideally the use cases will include graphics and present / articulate the value of use of seabed mapping as the main focus.
- It would be interesting to consider identifying example use cases for emerging sectors as well as established sectors.

Of direct relevance to Seabed 2030, the NEEA study concludes that seabed mapping is critical for:

- Navigation
- Underwater recovery
- Forecasting weather, tsunami, and storm surge events.
- Climate change projections; and
- Identifying the outlines of where living marine resources exist.
- Seabed mapping provides the means to uncover the history of our fallen lost at sea and
- A framework for seabed mineral discovery.
- Accurate ocean depths are instrumental in connecting the world through safe navigation and transoceanic communication cables, and
- Critical to emergency response on the high seas.

And the benefits assessment report, include use case examples drawn from this list. For example, **one of seven coastal zone management use cases**, by NEEA study determined "**Topographic and bathymetric LiDAR data will improve USGS' ability to map, and model predicted and actual results of hurricane tidal surges, tsunamis, coastal erosion, and the effects of sea level rise and subsidence in coastal zones that cause billions of dollars annually in property damages." (Potentially US$ Billions Benefits and classified Major Benefit).**

Marine navigation and safety use cases directly evidences the use of seabed mapping and is a useful use case study reference for Seabed 2030. (**Use Case is Navigation and Underwater Recovery**).

An agenda item on use cases was tabled in Workshop 2, requesting guidance on use cases focused on high sea located seabed mapping benefits / value. This led to an interesting and informing community discussion with the following potential use cases being proposed for consideration:

	1) Martin Jakobsson shared link on a candidate use case technical paper [Polar Region Bathymetry: Critical Knowledge for the Prediction of Global Sea Level Rise], Jan 2022, see here https://www.frontiersin.org/articles/10.3389/fmars.2021.788724/full 2) Climate Change – e.g., see above 1 above. 3) Discovery or monitoring of marine biodiversity. 4) Improvement in Global Ocean Model, including location and identification of deep-water overflows. Pathway and changes, and climate models (noting climate modelers can be contacted via Helen Snaith. 5) Marine Biodiversity – areas around MPA and case study identification of suitable areas for MPAs, Deep Coral Areas, and a context of today we don't know the areas we should be protecting. 6) Deep Sea Mining Area Link – in the context of areas that may be identified for deep sea mining, and that we need to survey/understand what is there ahead of any mining proceeds. 7) Tsunami propagation – this connects shallow area and high seas. Inflow of shallow water and high seas. 8) Use case on the provision of EEZ seabed mapping in the absence of an existing national hydrographic entity office. 9) Economic impact, increasing customers for survey companies. 10) Banning bottom falls, Sea Mounts Latest Distribution in relation to bottom trawling. 11) Cable routes, in context of where to survey and where to encourage the placement of cables. 12) Signposted to EMODnet, where useful case studies have been documented, e.g., Dutch Storm Surge greatly improved modelling, UK Met Office / EMODnet data. 13) Evert Flier advised that Norwegian Government is committed to achieve 30% of Ocean Protected by 2030, and that Seabed 2030 could potentially link the Seabed 2030 activity to support reaching that goal. 14) Marine Biodiversity and Fisheries. 15) Present Seabed 2030 / GEBCO as more than seabed knowledge, in the context of enabling added value through combining Seabed 2030 data with other ocean data. 16) Cabling in Arctic instance – determining where cable across Arctic will go. Step 4 also includes the launch of the Seabed 2030 Value Proposition document drafting. A value proposition document is built up iteratively and updated hereafter across step 4 and through to step 8 to integrate findings and outcomes from the benefits analysis modeling. Essentially the value proposition document is aimed at senior management / budget holder decision-maker readership, is typically less than 20 pages in length (including use cases) and can be read in ~30 minutes. The Value Proposition is a document that describes the need for the Seabed 2030 mapping, provides use cases demonstrating how Seabed 2030 mapping will support mission needs, and describes the benefits of the Seabed 2030 mapping in next level detail compared to the

	Executive Fact Sheet above. It also provides the benefits evidence case for action. A proposed Value Proposition document structure and an example from geospatial sector is presented in section 3 for Seabed 2030 review and ongoing reference.
Outputs	[Document]: Seabed 2030 Value Proposition (Version 1), with Impact Statement Level Detail & [Document] Use Cases for ongoing reference) – *please refer to section 3 further below where a structure and early draft Value Proposition document is presented).*
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Benefits Analysis model.

2.3.5 Benefits Analysis Model Step 5 Description - Determine Seabed 2030 cost base (aligned to value chain)

Benefits analysis step 2 consists of the following process approach, target outputs and is based on the key assumptions presented in table below.

Seabed Mapping Benefits Analysis Model Step 5: Determine Seabed 2030 cost base (aligned to value chain) ***Note this is an optional ancillary activity alongside benefits analysis.***	
Name of step	Determine Seabed 2030 cost base (aligned to value chain)
Step Reference Number	Step 5
Method / Process description	This step captures a view of high-level costs that can be used either for ongoing Return on Investment or Cost Benefit Analysis work. This is an ancillary step to inform the business proposition for Seabed 2030 funding entity engagement and can be run outside of the economic assessment process. The cost estimation should reflect Seabed 2030 costs associated with realising the identified value chain and should include full costs, (direct and indirect costs). Feedback received in the community workshop indicated that the Seabed 2030 Regional Offices are well informed on cost estimation processes, and that across the community cost estimation processes are in place supporting the capture, processing and production of seabed mapping products and supporting cost benefit analysis internal to National tier hydrographic activities and options evaluation. Importantly, the community workshop confirmed that cost metrics by survey acquisition resolution / depth options and acquisition technologies and methods can be applied by area / linear nm survey route (metric bases). This is key as it enables relatively rapid cost assessment to be undertaken and lends itself to automatically comparing options in a system environment / supporting systematic prioritisation scenario options modeling.

	This was highlighted by Phase 2 Report 1 WITS Project Team, where the INFOMAR Marine Mapping Study - Options Appraisal Report: Final Report (2008), and the Atlantic Ocean Research Alliance (AORA) Related Seabed Mapping - Atlantic Mapping Framework AORA work were identified as informing best practice. [Please see Phase 2 Report 1 - Catalogue of Premium Models for Seabed Mapping Benefits Analysis].
Outputs	[Output Excel Workbook]: Seabed 2030 Cost Estimation Workbook, *an optional ancillary activity alongside benefits analysis.* This informs and is a potential data input to a system-based approach to seabed mapping prioritisation scenario options modeling.
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Benefits Analysis model and the Prioritisation model. TBD - A cost assumption is required to reflect if any cost estimation is to address any ongoing maintenance of the Seabed 2030 grid data (i.e., include cost for repeat survey work, etc.).

2.3.6 Benefits Analysis Model Step 6 Description - Determine Seabed 2030 benefits

Benefits analysis step 6 consists of the following process approach, target outputs and is based on the key assumptions presented in table below.

Seabed Mapping Benefits Analysis Model Step 6: Determine Seabed 2030 benefits	
Name of step	Determine Seabed 2030 benefits
Step Reference Number	Step 6
Method / Process description	This step presents a concise view on Seabed 2030 benefits. At this stage, the benefits assessment is primarily a qualitative assessment exercise. A survey questionnaire is used in support, and the evidence collation begins to inform quantitative assessment work that follows in step 7 – see further below). Seabed 2030 benefits captured in this step: 1: Reflect the Seabed 2030 Value Chain (Qualitative Benefits to #Data Producers and Benefits to #Data Users). 2: Identify benefits associated with the identified Seabed 2030 sectors of interest (see step 3 above). 3: Identify benefits associated with the identified Seabed 2030 use cases (see step 4 above). 4: Investigates and captures qualitative benefits across range of benefit, including: #Economic Benefits

	#Social / Socioeconomic Benefits #Cultural Benefits #Environmental Benefits #Political Benefits #Any anticipated Operational Benefits (resulting efficiency savings etc.) 5: Captures qualitative statements to inform/identify: #Direct use value, see below #Use Value, see below #Spillover Use Value, see below And which are assessed during step 7 below. Benefits Assessment Context, in the Phase 2 Report 1 the project team referenced Frontier Economics study on geospatial data market study, [UK HMG Cabinet Office an Initial Analysis of the Potential Geospatial Economic Opportunity (Boston Consulting Group) and follow-on study - Geospatial Data Market Study (Frontier Economics)]. The approach provided comprehensive benefit and economic contribution assessment for Geospatial Data, based on use cases, direct use value, use value and spillover use value. [#Direct use value: Where value accrues to users of [geospatial] data. This could include a sales and marketing firm using [geospatial] data to make better decisions and increasing profitability as a result. #Use Value: where value is also derived by indirect beneficiaries who interact with direct users. This could include other firms in the supply chain of the direct user or the firm's customers. #Spillover Use Value: Value that accrues to others who are not a direct data user or indirect beneficiary. This could, for example, include lower levels of emissions that generate health benefits to individuals which result from optimisation of the end-to-end supply chain of the direct user.] Frontier Economic noted that, ***"as the value from the geospatial data does not always accrue to the direct user of the data, there is a risk of underinvestment in geospatial technology and services."*** Accordingly, Seabed 2030 should consider assessing, Direct Use Value, Use Value and Spillover Value to ensure the true value of Seabed 2030 seabed mapping is not under-estimated or aspects of value are missed. These tracks are picked up again in step 7 below. The benefits assessment work may be informed by any or a combination of:

	• Domain expert / economic expert desk study. • One to one informing interviews. • Roundtable workshops. • Targeted survey questionnaire(s) (and may be community or sector focused or a two-step survey approach as identified above). The benefits details are captured as a standalone document and also are available for direct map across to the Benefits Annex part of the proposed Seabed 2030 Value Proposition Document (Version 2) *- please refer to section 3 further below where a structure and early draft Value Proposition document is presented).* **WITS project team emphasises the importance of investigating the full range benefits as itemised in items 1 to 5 above and emphasise the importance of considering Seabed 2030 data resulting benefits, considering resulting direct use, use value, and spillover use value to ensure a true and complete benefit and economic value position for Seabed 2030 can be gathered and published.**
Outputs	[Document]: Seabed 2030 Qualitative Benefits, *ready for insertion and use as the Seabed 2030 Value Proposition Document 'Benefits' Annex.* The Seabed 2030 Value Proposition 1st Draft Document is further informed and updated to Version 2.
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Benefits Analysis model.

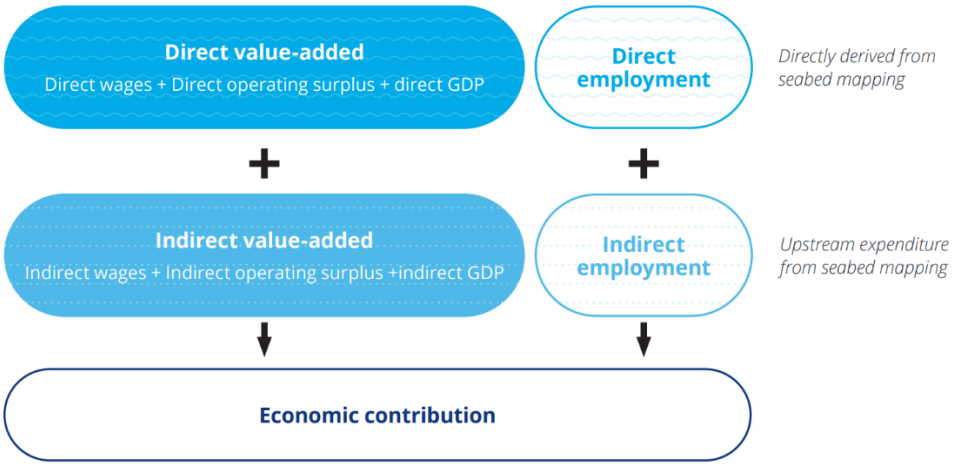
2.3.7 Benefits Analysis Model Step 7 Description - Produce Seabed 2030 economic value analysis

Benefits analysis step 7 consists of the following process approach, target outputs and is based on the key assumptions presented in table below.

Seabed Mapping Benefits Analysis Model Step 7: Produce Seabed 2030 economic value analysis	
Name of step	Produce Seabed 2030 economic value analysis
Step Reference Number	Step 7
Method / Process description	This step performs the economic analysis to identify the economic value of Seabed 2030. This is a quantitative assessment, informed by: • Economy Sector / Industry Statistics 'Code' searches / collation both to inform and benchmark findings. In the global context Seabed 2030 will be looking towards institution such as World Bank among others to identify useful searches and values that may be adopted/applied or used for future benchmarking.

	• Typically, a targeted informed user survey questionnaire (to inform strategic, tactical and/or operational scenarios efficiency savings / value etc.) is used. *See step 6 above, and/or as an extension or follow-on engagement of step 6 survey questionnaire targeting additional engagement with a subset of 1st round survey questionnaire respondees.* • Benefits can be categorised in engagement and assessment, e.g., as major, medium, minor, none, where any further quantification is over complex or not reliable. Benefits can be further requested to be 'value estimated' through case study scenarios costed and presented by survey questionnaire respondees. This approach was adopted by NEEA in U.S. as part of their benefits assessment / analysis approach, NEEA adopted a blended approach combining qualitative and quantitative analysis of benefit, asking survey respondees to present their own assessment and 'costed' efficiency scenarios, among others. Together this data was used by NEEA to inform economic contribution and value. Example benefits assessment case studies used by NEEA were presented and reported in the WITS phase 2 previous report, report 1. • Quantification may include relatively straightforward elements to assess e.g., the number of jobs created (FTEs) as a result of seabed mapping, and efficiency savings among others. • Quantification of value reflects the equation where Total Economic Value = Total User Value + Total Non-user Value. Total User Value includes both direct use and indirect use. • This analysis quantifies direct use, indirect use, and spillover use benefits as far as sensible / applicable and seeks to quantify any qualitative benefits in terms of associated economic contribution again as far as sensible. • Economic value is applied by sector and use case used to define and evidence logic applied. • Economic analysis rigor and norms are also used (e.g., Net Present Value (or NPV) factors, among others are applied. • Finally, ideally sensitivity analysis is undertaken on the model adopted for validation / benchmarking purposes. AusSeabed methodology followed a similar approach and applied two economic contribution method elements, (i) Economic contribution methodology and (ii) Economic Contribution Framework. The AusSeabed methods adopted are well documented in Appendix A and Appendix B of the project report respectively. [The value of Australian seabed mapping data to the blue economy Geoscience Australia, October 2021 [Deloitte Access Economics]. Essentially (i) economic contribution methodology applies economic value in terms of the contribution made to economy from seabed mapping. This is broken out into direct and indirect components. Deloittes present their adopted methodology for AusSeabed as follows. "The direct economic contribution of seabed mapping data measures the value added created directly as a result of economic activities within industries producing and using seabed mapping data. The indirect economic contribution calculates the value added created by the businesses that produce inputs for industries producing and using seabed mapping data. The indirect contribution acknowledges that production activities in the seabed mapping data industry stimulates demand in upstream industries. For example, a marine researcher may need to use a vessel as an input

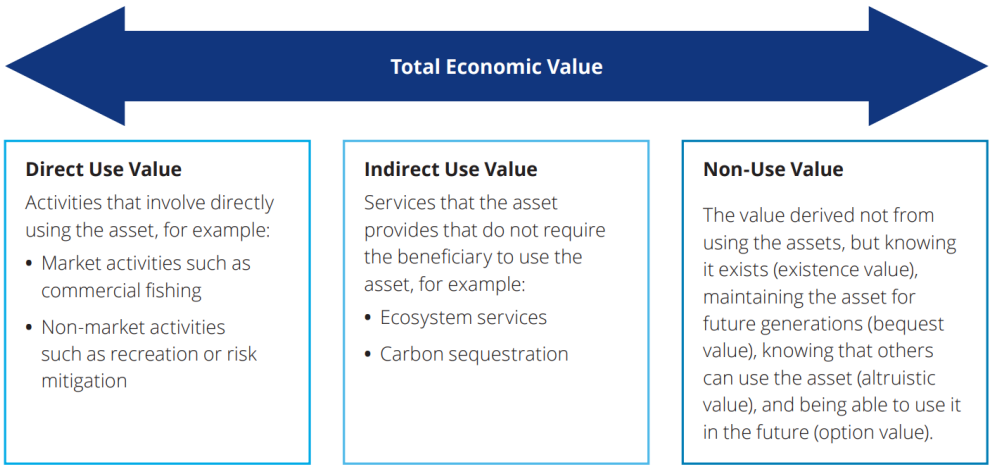
to their research activities. This expenditure stimulates demand and value added in the vessel charter industry. The total economic contribution to the economy is the sum of the direct and indirect economic contributions." This is presented in the figure below.



Source: Deloitte Access Economics

(ii) economic contribution framework applies wider economic benefits assessment such as additional environmental, cultural, social and sovereignty benefits delivered through mapping Australia seabed.

The economic contribution framework applies a Total Economic Value (TEV) framework, as presented in the figure below.



Source: Deloitte Access Economics

To highlight further, in the case of AusSeabed, the economic value by sub-sector was analysed and reported, with subsectors including: Based on sector *Partaking in seabed mapping data use:*

- Defence
- Tourism Protection
- Water Transport

	• Commercial Fishing • Oil Exploration • Search and Rescue • Marine research and environmental protection And, value-added by sub-sector whose activities are unlocked by seabed mapping data use: • Oil and gas exploration • Aquaculture
Output	[Excel Workbook with supporting explanatory / informing economic value methodology documentation]. This would include evidence based, e.g., feedback assessment from tailored survey questionnaire(s) and Seabed 2030 community domain representative workshops key findings, which may be tailored to focus on sectors (or collection of sectors) orientated. Seabed 2030 Quantitative Benefits Workbook with economic value analysis results summarised and presented.
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Benefits Analysis model.

2.3.8 Benefits Analysis Model Step 8 Description - Produce Seabed 2030 economic value assessment report

Benefits analysis step 8 consists of the following process approach, target outputs and is based on the key assumptions presented in table below.

Seabed Mapping Benefits Analysis Model Step 8: Produce Seabed 2030 economic value assessment report	
Name of step	Produce Seabed 2030 economic value assessment report
Step Reference Number	Step 8
Method / Process description	This step of the model provides the Seabed 2030 Economic Value Assessment Reporting with evidential supporting descriptions of the Economic Value Assessment including summary methodology description, and documentation of results, findings and economist / domain combined interpretation and guidance to Seabed 2030. Essentially this is where findings are presented to Seabed 2030 commissioning team and made available for use by Seabed 2030 with any wider benefits analysis study stakeholders. Three documents are typically and proposed produced as part of this step: 1. Detailed Document including detailed methodology, results, and interpretation of results with excel annexes, use cases, etc. 2. Summary management document including overview of method, results overview, and interpretation of results 3. Accompanying Economic Value Assessment Presentation Slide Deck

	All documents include reprographic quality infographics. The Seabed 2030 Value Proposition Documentation is also updated to a Version 3 to reflect key findings from the economic value assessment.
Outputs	[Document(s)]: Seabed 2030 Economic Value Assessment Report(s) (i) Detailed Version, with workbook annexes (ii) Management Overview Document (iii) Presentation Slide Deck And (iv) the Seabed 2030 Value Proposition Document (is updated from Version 2 to a Version 3) to reflect key findings from the economic value assessment – *please refer to section 3 further below where a structure and example Value Proposition document is presented).*
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Benefits Analysis model.

2.4 SEABED MAPPING BENEFIT ANALYSIS MODEL – GUIDANCE TO SEABED 2030

The Seabed Mapping Benefit Analysis Model is presented for Seabed 2030 consideration. As with any benefit analysis / economic value analysis, a number of 'parameters' require validation and adjustment during the production and use of the model, e.g., aligned to use of readily available / actual data. This is normal practice.

The WITS project team has included in Section 5 some benefits analysis related recommendations for Seabed 2030 consideration. The WITS project team are pleased to submit the proposed benefit analysis model for Seabed 2030 consideration and remain available to provide further explanation and guidance support as helpful.

SECTION THREE: ARTICULATING SEABED 2030 VALUE

In addition to the Seabed 2030 Economic Value Assessment Report, (main output from the proposed benefits analysis methodology), in this section the study team provides examples of three other document artefacts proposed for use by Seabed 2030 to articulate and present benefit and value. These three documents are presented in sections 3.1 to 3.3 below, and include:

- **Document Artefact 1: A Seabed 2030 Impact Statement.** The project team has developed a draft Seabed 2030 Impact Statement for consideration and editing, and please see section 3.1 below.
- **Document Artefact 2: An Executive Fact Sheet Document.** The project team has sourced a useful example Executive Fact Sheet for Seabed 2030 reference, a copy of which can be found in section 3.2 below. [Source: USA Government FGDC – Executive fact Sheet for the FGDC Geospatial Platform Programme]
- **Document Artefact 3: Value Proposition Document.** The project team has sourced a useful example Value Proposition Document for Seabed 2030 reference, a copy of which can be found in section 3.3 below. [Source: USA Government FGDC – Value Proposition Document for the FGDC Geospatial Platform Programme].

3.1 SEABED 2030 IMPACT STATEMENT

The following Seabed 2030 impact statement has been developed by the project team, and is proposed for reviewed, edited, and potentially used going forward by Seabed 2030.

Please note, the impact statement would be updated to reflect actual value assessment findings should Seabed 2030 decide to progress with any dedicated benefit assessment / economic value assessment study.

Seabed 2030 Impact Statement

Seabed 2030 is a collaborative project between the Nippon Foundation of Japan and the General Bathymetric Chart of the Oceans (GEBCO). It aims to bring together all available bathymetric data to produce the definitive map of the world ocean floor by 2030 and make it available to all.

Seabed 2030 collated data is fundamental to our understanding and sustainable use of our oceans. This data:

- Enhances our understanding of the World's Oceans and our subsea world,
- Underpins a wide range of Ocean and Marine Scientific Research,
- Supports our preparation for and mitigation of global and regional scale crisis, including climate change, sea level rise, and volcano, tsunami, and tide surge flood disaster events, and
- Enables socioeconomic development and growth of the Blue Economy.

In 2015, the WWF assessed the value of key Ocean assets at over US$24 trillion, with two-thirds of that based on assets that require healthy productive oceans.

The total global value of the Blue Economy is currently around US$2.5 Trillion and is predicted to rise to US$3 Trillion by 2030 and employ 40 million people. [Source OECD, 2016. The Ocean Economy in 2030].

3.2 Executive Fact Sheet Document

The use of executive fact sheet documentation is a useful way to articulate and present detail on a particular topic. This type of document is used by USA government and is well applied in the FGDC geospatial platform programme - the example document provided below.

Essentially the executive fact sheet is aimed at executive / senior management decision-maker readership, is typically no more than two sides in length and can be read in less than five 5 minutes. The fact sheet contains graphics, succinct, and is extremely easy to read and digest.

The document articulates the following details:

- The Challenge (being addressed/met)
- What is *Seabed 2030 Mapping?*
- What does *Seabed 2030 mapping offer?*
- Why is the *Seabed 2030 mapping needed?*
- What are the (headline) benefits of the *Seabed 2030 mapping product/programme?*
- How is the *Seabed 2030 mapping programme* being developed?
- Contains an Executive Statement of Strategic Fit/Alignment.

An example Executive Fact Sheet from the FGDC Geospatial programme is presented below for Seabed 2030 reference, and can also be accessed here: https://www.fgdc.gov/initiatives/resources/2011-7-06_Exec_Geospatial_Platform_Fact_Sheet.pdf

The WITS Project Team propose that Seabed 2030 produce an Executive fact sheet on the Seabed 2030 mapping programme.

GEOSPATIAL PLATFORM

The Challenge: Federal agencies and their partners collect and manage large amounts of place-based (geospatial) data – but it is often not easily found when needed, and sometimes data is collected or purchased multiple times. In short, the best government data is not always organized and managed efficiently to support decision making in a timely and cost effective manner. The Geospatial Platform is designed to provide that service and capability.

What is the Geospatial Platform?

The Geospatial Platform will be an **Internet-based capability providing shared and trusted geospatial data, services, and applications** for use **by the public and by government agencies and partners** to meet their mission needs.

Examples of National Geospatial Data

- Climate and Weather
- Cultural Resources
- Governmental Units
- Land Use-Land Cover
- Elevation
- Imagery
- Geology
- Real Property
- Transportation
- Utilities

What does the Geospatial Platform Offer?

- A "one-stop-shop" to deliver trusted, nationally consistent data and services
- Authoritative data to support informed decision making
- Problem solving applications (services) that are built once and used many times across multiple Federal agencies and other organizations
- A shared cloud-computing infrastructure to host data and applications
- A National and Federal focal point where governmental, non-governmental, private, and public data and applications can be visualized together to inform and address national and regional issues

Why is the Geospatial Platform Needed?

The ability to use visualization and mapping to help understand the impacts of events and how they affect citizens and government missions are very powerful. Whether it is a response to a natural disaster or viewing patterns of economic impact to our communities; visualizing where, when, and how these events occur lays a foundation for action and can help us:

Aerial photographs of Halstad, Minnesota in the Red River Valley along the Minnesota-North Dakota border, before and after flooding of the Red River in April 2011.

- **Put events in context of location, environment, and people affected**
- **Discover trends and relationships we might otherwise miss**
- **Communicate more effectively through maps**
- **Streamline geospatial data collection, delivery, visualization, and analysis**
- **Distill large amounts of complex tabular and spatial information into user-friendly formats**

Examples of Shared Services

- Mapping wildfires and evacuation routes
- Mapping natural disasters, e.g. floods, hurricanes, earthquakes
- Broadband mapping
- "Let's Get Moving" Initiative – childhood obesity mapping
- Mapping commuting routes and traffic patterns

What are the Benefits of the Geospatial Platform?

The Geospatial Platform will significantly expand access to high quality data**; enabling users to improve problem solving** and **streamline mission critical operations.** We expect that **increased sharing and reuse of resources** facilitated by the Geospatial Platform will **reduce costs, result in savings and wise investments, and improve decision making while stimulating innovation**. On balance, the integrated approach of the Geospatial Platform will mean that the federal portfolio of geospatial data will be better managed, service a broader audience, and be easier to use.

How is the Geospatial Platform Being Developed?

The Geospatial Platform is being developed by the member agencies of the Federal Geographic Data Committee (FGDC) through collaboration with partners and stakeholders. This multi-year effort represents the federal government's on-going commitment to:

- **Shared Leadership:** Actively engaging State, local, and Tribal governments, the private sector, non-governmental organizations, academia, and citizens;
- **A Business Orientation:** Defining the scope and scale of the Geospatial Platform via a customer-focused business model;
- **Transparency, Accessibility and Accountability:** Adhering to the principles of ease of use, maximizing access, increasing efficiency, and reducing redundancy;
- **Supporting Place-based Policies:** Implementing place-based policy-making, planning, and budgeting.

Who are the Geospatial Platform's Customers?

Everyone. The target **customers** for Platform offerings are Federal agencies, State, local, and Tribal governments, private sector, academia, non-governmental organizations, and the general public.

For more information about the FGDC visit: **www.fgdc.gov**

"In 2010 and 2011, Federal data managers for geospatial data will move to a portfolio management approach, creating a Geospatial Platform to support Geospatial One-Stop, place-based initiatives, and other potential future programs. This transformation will be facilitated by improving the governance framework to address the requirements of State, local and Tribal agencies, Administration policy, and agency mission objectives. Investments will be prioritized based on business needs. The Geospatial Platform will explore opportunities for increased collaboration with Data.gov, with an emphasis on reuse of architectural standards and technology, ultimately increasing access to geospatial data."

President's Budget, Fiscal Year 2011

For more information visit www.GeoPlatform.gov

July 2011

3.3 Value Proposition Document

The proposed benefits analysis model (presented in section 2 of this report), introduces the concept of undertaking a series of step activities to define Seabed 2030's value proposition, *please see step 4 of the benefits analysis proposed model*. A value proposition document is built up iteratively and updated thereafter across step 4 and through to step 8 of the benefits analysis model. This is as described in Section 2 above.

Essentially the value proposition document is aimed at senior management / budget holder decision-maker readership, is typically less than 20 pages in length (including use cases) and can be read in ~ 30 minutes. The Value Proposition is a document that describes the need for the *Seabed 2030 mapping*, provides use cases demonstrating how *Seabed 2030 mapping* will support mission needs, and describes the benefits of the Seabed 2030 mapping in next level detail compared to the Executive Fact Sheet above. It also provides the benefits evidence case for action.

A suggested structure for a Seabed 2030 seabed mapping value proposition is presented below for Seabed 2030 consideration.

Seabed 2030 Seabed Mapping Programme Value Proposition Document Structure *(Proposed)*:

- Introduction
- Seabed 2030 Seabed Mapping Product – The Challenge
- What is Seabed mapping?
- What is the purpose of Seabed Mapping?
- What does Seabed Mapping offer?
- Why is Seabed Mapping needed?
- Seabed 2030 Overview Timeline
- Appendix A: Use Cases – it is proposed a minimum of four use cases are documented, including for each use case, details on:
    - Seabed 2030 seabed mapping context – e.g., what aspect of seabed 2030 is this case study emphasizing?
    - Use Case background Addressing the issue
    - Value added by Seabed 2030
    - Graphics
    - Point of Contact
    - Use Case Reference
- Appendix B: Benefits of Seabed Mapping, a detailed level of benefit and essentially a benefit evidence set

An example Value Proposition from the FGDC Geospatial programme is embedded here:

2011-11-1-geospati
al-platform-value-pr

And can be accessed through here: https://www.fgdc.gov/initiatives/resources/2011-11-1-geospatial-platform-value-proposition.pdf. The WITS Project Team propose that Seabed 2030 produce a Value Proposition document for the Seabed 2030 mapping programme, aligned with delivery of benefits analysis and associated outcomes, and as described in Section 2 above.

SECTION FOUR: SEABED 2030 SEABED MAPPING PRIORITISATION MODEL

This section proposes a seabed mapping approach to prioritisation for Seabed 2030 consideration, providing details on prioritisation objectives and purpose, with a set of key considerations identified towards developing a seabed mapping prioritisation framework (the methodology) for Seabed 2030 consideration. The section ends with a high-level review of two existing seabed mapping prioritisation tools (i) GEBCO Seabed Mapping Prioritisation Tool *(The GEBCO SCRUM Data Prioritization Web App)*, and (ii) AusSeabed Seabed Mapping Prioritisation tool, and suggests how Seabed 2030 may be able to leverage these going forward in support.

Preamble to Prioritisation. The WITS project team guidance is based on founding assumptions:

- That **Seabed 2030, seabed mapping prioritisation, given its global coverage focus and need to take account of different global / regional / national and local interests and factors, requires a framework approach**. The framework includes elements of process/procedure, data and tools that come together to inform and enable evidence-based seabed mapping prioritisation decisions to be made.
- The prioritisation logic proposed by WITS project team was presented and discussed as a key topic of focus in the second Seabed 2030 workshop (March 2022). **Consensus was acknowledged that prioritisation is best assessed, and case made at the regional geographic tier (with oversight by Seabed 2030 global tier)**, recognising that if addressed nationally, the process would be too costly and cumbersome to implement, and if global only, the various regional to national needs and factors driving prioritisation decisions would not be accounted for.
- The **prioritisation process features the ability to optimise resulting benefit (e.g., economic, environmental, social resulting benefits) as part of informing/evidencing decisions, while being flexible to enable potentially overriding priorities to enter the decision logic at short notice**. For example, a new Seabed 2030 investor / funding body may have needs that potentially override and change/update the prioritisation landscape in the short or medium term.
- In terms of tools and digital data, **both tools and digital data have a strong contribution to make towards supporting prioritisation**. Tools can be considered as (i) identifying user community driven new mapping area requirements, (ii) providing an evidence base and supporting prioritisation decision-making process (the decision-making procedure sitting outside of but informed by the tool), and (iii) Once decisions are made and the prioritisation process authorises new data survey and production to proceed, the tool should be able to provide a seamless exchange of data to inform the implementation planning, production, and delivery; and finally (iv) The prioritisation process requires a continuous loop of reference data updating and is spatial in its logic and data type. The prioritisation tool will need ongoing updating for nominated **data**, and this is where data also supports the prioritisation process. Including, **reference data** (discussed in the data consideration topic further below), digital data boundaries enabling awareness and presentation on new data products that are already commissioned and in implementation, data products that are completed, and other new area needs ongoing all spatially defined, and presented. Additional **user provisioned data / information** will be required to support prioritisation assessment / review and these data will

be provided by different users. These may include **additional reference data and data input by user while using and interacting with any prioritisation tool.**

- Further in terms of tools, **Seabed 2030 preference is to reuse existing prioritisation tool capability where sensible, achieve prioritisation tool functionality through customising / configuring an existing available tool,** rather than designing, building, and implementing a new tool from scratch.

4.1 SEABED 2030 SEABED MAPPING PRIORITISATION MODEL – OBJECTIVES

There are five objectives for the Seabed 2030 seabed mapping prioritisation model:

1. Capture, present, and understand needs and **area of interest requirements** for new seabed mapping data and products from Seabed 2030.
2. provide an **evidence base for, to inform, and enable seabed mapping prioritisation decision-making** by Seabed 2030 (Global Ocean Geography).
3. Apply **Seabed 2030 benefits analysis regime, to inform seabed mapping prioritisation decision-making, and enable the benefit optimisation of new seabed mapping data acquisition and production commissioning by Seabed 2030**.
4. **Support the collation of evidence towards Seabed 2030 business plan** on seabed mapping prioritisation matters.
5. **Be available to inform and support Seabed 2030 stakeholder awareness building, Seabed 2030 mission generally and on seabed mapping prioritisation matters**.

4.2 SEABED 2030 SEABED MAPPING PRIORITISATION MODEL – PURPOSE OF THE SEABED MAPPING PRIORITISATION MODEL, TARGET READERSHIP AND USERS

The purpose of the Seabed 2030 seabed mapping prioritisation model is to:

- Provide a process and tool for interested parties to register their interest in and submit new seabed mapping data needs / requirements. This uses an on-line tool, with a spatial intelligent map window, through which a digital AOI can be digitised, and a user need described, from which evidence of need / and further justification will be considered.
- Access, and make use of appropriate reference data and information to inform and support Seabed 2030 prioritisation decision-making.
- Leverage benefits analysis (see Section 2) and apply benefit-driven prioritisation factors / weightings to inform and evidence prioritisation decision-making.
- Be an aid to provide an evidence base for, to inform, and enable Seabed 2030 seabed mapping prioritisation decision-making (Global Ocean Geography).
- Contribute to the Seabed 2030 stakeholder awareness building, Seabed 2030 mission generally and on seabed mapping prioritisation matters.
- Provide a capability for user contact details to be gathered to enable ongoing communication regarding their submitted seabed mapping needs *(thus ensuring no user needs are missed/or that users feel their engagement and effort has led to nothing).*

The **target readership for the prioritisation model and any resulting outputs** includes:

- Seabed 2030 management.
- Government Funding Decision-makers.
- Future donors, including with philanthropy in mind.
- Practitioners / researchers.
- Public outreach / engagement where useful items can be potentially extracted from the prioritisation assessment.

The **target user community for the prioritisation model** include:

- Seabed 2030 management (Mainly Global and Regional Tiers).
- Government Funding Decision-makers.
- Future donors, including with philanthropy in mind.
- Third party / other entity commissioned to implement, analyse, and evaluate the model / results. *(A Third Party may include survey commissioning and/or survey implementation entities).*

4.3 SEABED 2030 SEABED MAPPING PRIORITISATION MODEL – OVERVIEW AND KEY ELEMENTS

The WITS Project highlights five key elements that are proposed for Seabed 2030 consideration, and together represent the core of a potential prioritisation framework approach for Seabed 2030. These key elements are identified in the figure below, listed and then detailed by dedicated subsection below.

Proposed Prioritisation Framework Approach *(Overview & limited to Highlighted Elements to Inform Prioritisation)*

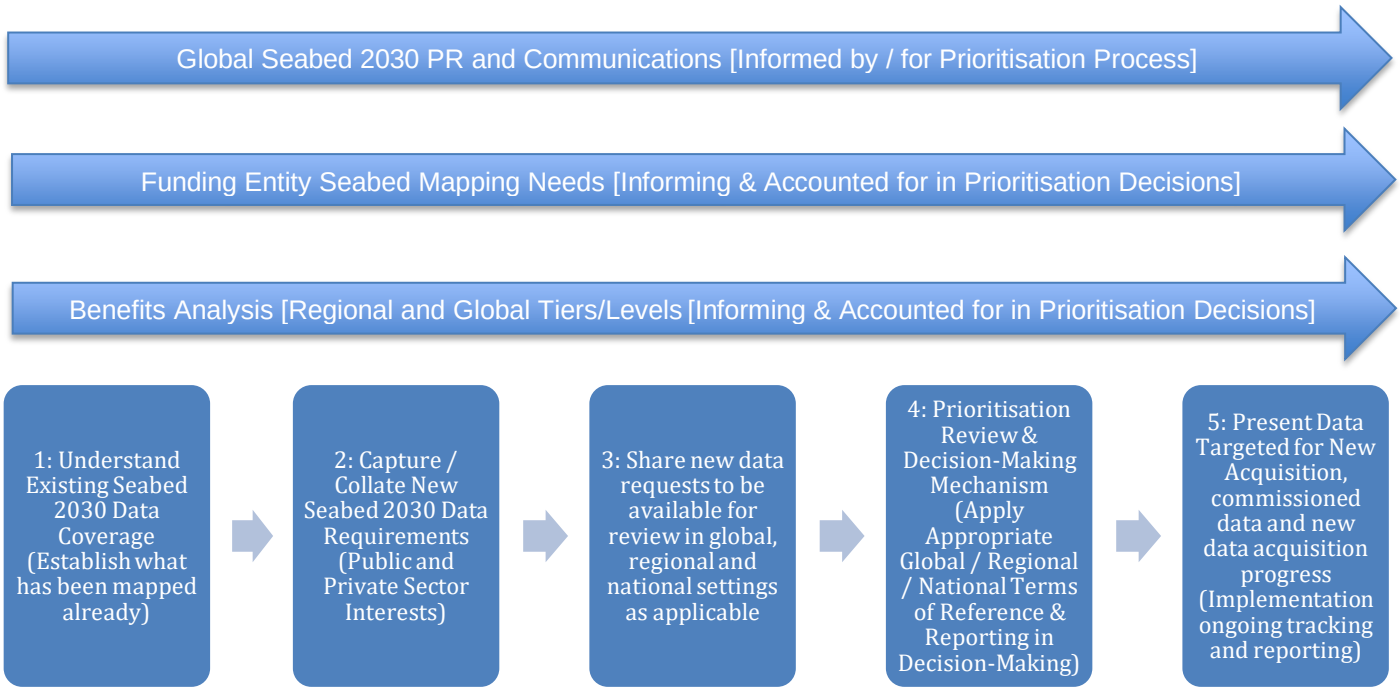


Figure 2: Proposed Seabed 2030 seabed mapping prioritisation framework elements

Element 1: Understand Existing Seabed 2030 Data Coverage - Establish what has been mapped already.
Element 2: Capture / Collate New Seabed 2030 Data Requirements (Public and Private Sector Interests).
Element 3: Share new data requests to be available for review in global, regional, and national settings as applicable.
Element 4: Prioritisation Review & Decision-Making Mechanism - Apply Appropriate Global / Regional / National Terms of Reference & Reporting in Decision-Making.
Element 5: Present Data Targeted for New Acquisition, commissioned data, and new data acquisition progress (Implementation tracking and reporting).

WITS Project Team propose that the above elements can be brought together and implemented as a seabed mapping prioritisation model (a framework) for Seabed 2030.

High level details are presented for each element using the following common table structure for Seabed 2030 consideration. Each prioritisation element is presented from a perspective of how each informs / supports Seabed 2030 seabed mapping prioritisation.

Name / Number of Prioritisation Model Element [Elements 1 to 5]	
Name of Element	Text: Name
Element Reference Number	Text: Elements 1- 5
Element description (Feature Highlights)	Text: High Level Description (Feature Highlights).
Framework Component	Text: Process, Data and/or Tools
Key Assumptions	Text: Identified if applicable, and may include TBD*

Explainer*:
TBD means 'To Be Determined' and infers to be determined during the actual production of the model/use of the model. N/A means 'Not Applicable.'
None means 'None.'

4.3.1 Prioritisation Model Element 1 Description - Understand Existing Seabed 2030 Data Coverage - Establish what has been mapped already.

Prioritisation model element 1 feature highlights are presented in the table below.

Prioritisation Model Element 1 - Understand Existing Seabed 2030 Data Coverage - Establish what has been mapped already	
Name of Element	Understand Existing Seabed 2030 Data Coverage - Establish what has been mapped already.
Element Reference Number	Element 1
Element description (Feature Highlights)	Seabed mapping prioritisation begins with parties / users being able to readily access, view and understand the extents or areas of existing seabed mapping. And when extents are understood, being

	able to understand the available data and their data product specification. It is assumed that a Seabed 2030 data store with an associated data catalogue exists for all acquired and processed Seabed 2030 mapping data and products, and that these are available to support prioritisation. To avoid duplication, ideally the prioritisation tool will be able to make use of a published API or published web data service / metadata driven catalogue from either Global or Regional Seabed 2030 data centres. A data catalogue for prioritisation can be implemented, and this should allow users as a minimum to search, view and understand the following: • Seabed mapping data area extents (Existing data / data products only*). • Seabed mapping data currency (Date of acquisition). • Seabed mapping data product specification (grid product, chart, depth, resolution, etc.). • Seabed mapping available data format (any options or constraints). Ideally users will be able to download an extract from or a full version data catalogue (area extents) file for instances where users wish to define new areas of interest in their own system ahead of uploading a new AOI to any prioritsation tool. (That is support offline definition of AOIs). *In the prioritisation decision making process further coverage details are proposed required and not addressed here, please see 4.3.5 further below *(Element 5 - Present Data Targeted for New Acquisition, commissioned data, and new data acquisition progress (Implementation tracking and reporting))*
Framework Component	Process: Understand Existing Seabed 2030 Data Coverage - Establish what has been mapped already. All users having the ability to view, search, query, and understand existing Seabed 2030 seabed mapping area extents / coverage, with associated data / data product specifications details. Data: Data Catalogue associated with existing Seabed 2030 seabed mapping data and data product coverages. [Data Catalogue / Metadata]. Tools: Prioritisation web application (spatially enabled) can integrate a published API / web data service published from Seabed 2030 Global and / or Regional data centres. Prioritisation tool users can view, search, and query the existing data coverage details. Users (ideally) will be able to download a copy of the Seabed 2030 data catalogue to enable offline production of AOI geometries in addition to being able to define online inside the prioritisation application.

Key Assumptions	A data catalogue of the existing global coverage Seabed 2030 data grids is assumed to be in place, and that this can be published for prioritisation purposes.

4.3.2 Prioritisation Model Element 2 Description - Capture / Collate New Seabed 2030 Data Requirements (Public and Private Sector Interests).

Prioritisation model element 2 feature highlights are presented in the table below.

Prioritisation Model Element 2 - Capture / Collate New Seabed 2030 Data Requirements (Public and Private Sector Interests)	
Name of Element	Capture / Collate New Seabed 2030 Data Requirements (Public and Private Sector Interests).
Element Reference Number	Element 2
Element description (Feature Highlights)	This element provides for all users to be able to use a web application / portal to be able to view the existing available Seabed 2030 seabed mapping data extents and submit or register a new area of interest (AOI) for new data acquisition request. New areas of interest will come from both public and private sector entities with varying reasons behind the request. Note this may be a user's first interaction with Seabed 2030 and accordingly the user experience and setting appropriate user expectations is important. Accordingly, a level of knowledge sharing is proposed provided at this stage of the prioritisation process, ensuring users have access to explainer details on topics such as data specifications (resolution, etc.), purpose of the prioritisation tool, if / how a user can expect to be communicated with by Seabed 2030. Further, at this stage as personal details are to be submitted by users with the new area of interest, etc., there are regulatory requirements that Seabed 2030 is required to comply with, (e.g., EU, UK GDPR regarding the use of personal information, etc.). WITS project team propose that Seabed 2030 seeks to capture the following (minimum) needs from users: • Area of interest – options: (i) digitised AOI online, including snap to existing vector, digitised offline and (ii) uploaded AOI file, and (iii) non-digitised AOI where a user submits a lay person description, anticipating a follow up call back from Seabed 2030 to support a joint definition of AOI / capture of need. • Why this area is of interest (support prioritisation evidence case), and that this includes a field to be populated including point of contact (email), name of entity, country (office location), sector, purpose/reason behind AOI request. [The

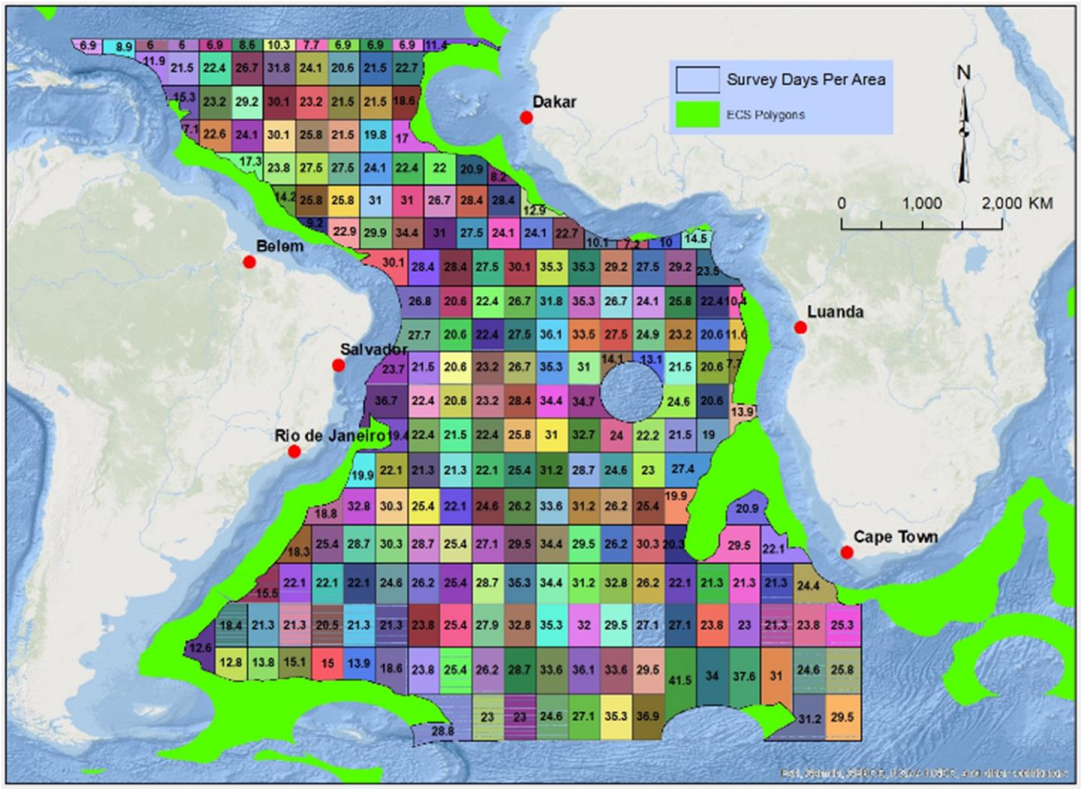
	purpose / reason fields to be populated can be tailored to reflect high level prioritisation criteria and are TBD at this time]. • Anticipated Users: Who are the anticipated users of data products? [Free Text] • Timescales: Are there are specific timescale / timeline requirements or constraints associated with the defined AOI, [Yes /No with explanation]? • Budget Availability: Is there any budget available to contribute towards or cover the cost of the acquisition of the identified AOI? [Yes /No with explanation]? To aid user AOI definition WITS Project team propose that users are presented with some key reference data including, among others to be TBD the following data layers: 1: Waters / Maritime Boundaries of Interest Waters of Interest to the Benefit Analysis #1: Ports #2: Coast #3: Territorial Seas 12 nm #4: Contiguous Zone 24 nm #5: EEZ #6: Archipelagic Waters #7: High Seas 2: Other maritime / marine area boundary potentially supporting the definition of AOI, including, where available the following: [Relevant authorities are identified where known]. #1: Areas of Particular Environmental Interest [Source: Relevant Authority - International Seabed Authority] #2: Vulnerable marine ecosystem [Source: Regional Fisheries Management Organisations or associations, competent national authorities by cascade] #3: Particularly sensitive sea areas and areas to be avoided [Source: Relevant Authority - IMO] #4: Fisheries closures and fisheries restricted areas [Source: Food and Agriculture Organisation of the United Nations, Relevant Authority - IMO] #5 Whale sanctuaries [Source: Relevant Authority – International Whaling Commission] #6 Infrastructure closures: Pipeline (e.g., oil, gas, etc.,) and cable closures (e.g., telecommunications, grid, etc.) [Source: Relevant Authority – IMO cascade competent national authorities] #7World Heritage Sites, including those for their mixed cultural and natural outstanding value [Source: Relevant Authority – United Nations Educational, Scientific and Cultural Organization] #8 Marine Protected Areas [Source: Relevant Authority – Aichi Biodiversity Targets. Regional seas conventions, and by cascade competent national authorities]

	#9 Special Areas and Emissions Control Areas [Source: Relevant Authority - IMO] #10: Others TBD. E.g., Offshore Mining delineated areas, other marine geological sites of interest, such as marine trenches, tectonic plates, and other sites of known geological interest / activity (that may drive benefits analysis and/or seabed mapping prioritisation e.g., support to tsunami forecasting) 3: Ocean Regions – Seabed 2030 may wish to segment the Global Oceans into regional areas for prioritisation purposes and aligned with the segmentation to be adopted for benefits analysis purposes (please see and as discussed in section 2 of this report). This may be based on Seabed 2030 Regional Offices Ocean areas of responsibility, or other and is TBD. 4: Grid (Tiles) – Seabed 2030 may wish to present a tile-based grid for users to identify / select tiles of interest. The grid / tile size for use is proposed to be aligned with any Maritime tile definition norms and is TBD. The ability to snap to vector / snap to grid will enable users to replicate/make use of single version boundaries presented by Seabed 2030 for use by users. This will aid Seabed 2030 ongoing production and service fulfilment of identified needs. It is relatively straightforward to apply limit threshold / area criteria in AOI digitising submission. Seabed 2030 may wish to consider this as a way to minimise unrealistic areas of interest being defined by users. Upon registration / submission of the AOI and supporting information an automated email could be issued explaining the next step process and linking the user to wider Seabed 2030 communications link / knowledge sharing activities.
Framework Component	Process: The capture / collation of new Seabed 2030 Data Needs / Requirements (Public and Private Sector Interests). Data: Publication of a set of reference data (see above and TBD) for user context and alignment of AOI definition. User defined AOIs are produced including digital AOI file and supporting contextual information (evidence for prioritisation information populated using table field layout). Tools: Web-Portal / Application, with easy to use layer selection, and editing tools. Ability for a user to upload an AOI digital file produced offline. User interaction to align on EU / UK among others use of personal information requirements.
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Prioritisation model.

4.3.3 Prioritisation Model Element 3 Description - Share new data requests to be available for review in global, regional, and national settings as applicable.

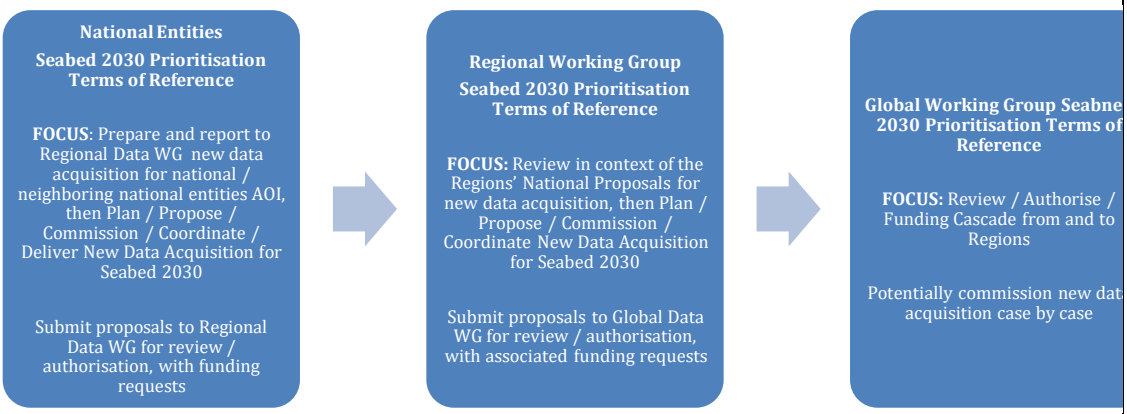
Prioritisation model element 3 feature highlights are presented in the table below.

Prioritisation Model Element 3 - Share new data requests to be available for review in global, regional, and national settings as applicable	
Name of Element	Share new data requests to be available for review in global, regional, and national settings as applicable.
Element Reference Number	Element 3
Element description (Features Highlights)	As described in element 4 below, it is anticipated that the prioritisation review will be generally actioned at the Seabed 2030 regional tier. This reflects the WITS discussion with the community in Workshop 2, where WITS concluded consensus was acknowledged that prioritisation is best assessed and a justification case made at the regional geographic tier (with oversight by Seabed 2030 global tier), *recognising that if addressed nationally, the process would be too costly and cumbersome to implement, and if global only, the various regional to national needs and factors driving prioritisation decisions would not be accounted for.* To ensure regional and national needs and thematic factors such as environmental features driving prioritisation decisions can be identified and considered this element includes the ability to use geospatial analysis to aid the development of user need justification and review. Accordingly, WITS anticipates a GIS-based Decision Support Tool will be available in each Seabed 2030 Regional Centre to support, and that a common approach to a range of geospatial analysis will be adopted (a common implementation across all regional offices). [A COTS / Open-Source desktop GIS is adequate for this, and it is not envisaged heavy customisation is required]. It will be necessary to estimate, collate and report the cost of new survey acquisitions (at regional level). This may require on an adhoc case by case basis the production of a more detailed cost benefit analysis, in instances where different options need to be filtered prior to a request being issued upwards to Seabed 2030. The community confirmed that predicting / estimating the cost base for mapping gaps can be standardised, and that a common approach can be implemented across Seabed 2030 regional offices (with adjustments adopted for different regional labour, etc. cost base). It will be necessary to report new user requirements between Seabed 2030 regions and global using a common reporting approach. This is proposed implemented through the adoption of a standardised reporting mechanism / process with digital extents uploaded into the proposed prioritisation tool (heat map tool). This reporting mechanism is described further in section 4.3.4 element 4 below, with the heat map tool further discussed in section 4.3.5 element 5 below.

	 **AORA project (above) presented survey days per area (resource effort) in an easy to visualise, understand and useful way. WITS Project Team envisages a similar approach to the visualisation of cost / effort could be applied by Seabed 2030.**
Framework Component	Process: Share new data requests to be available for review in global, regional, and national settings as applicable. Data: Access to GIS data TBD on a case by case basis will be needed to support regional office review of user requirements to inform prioritisation justification case. A common approach to cost estimation is proposed adopted across Seabed 2030 regions with regional adjustment made for regional cost base parameters accordingly. Tools: (i) Common template reports are adopted for the collation and reporting of new user requirements to inform Seabed 2030 prioritisation review. These are proposed to be adopted across all Seabed 2030 regions for the purpose of Seabed 2030 prioritisation collation and reporting of new data acquisition requirements. (ii) Desktop GIS to be available in Seabed 2030 regional offices. (iii) Seabed 2030 Prioritisation Heat Map tool to be available in support.
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Prioritsation model.

4.3.4 Prioritisation Model Element 4 Description - Prioritisation Review & Decision-Making Mechanism - Apply Appropriate Global / Regional / National Terms of Reference & Reporting in Decision-Making.

Prioritisation model element 4 feature highlights are presented in the table below.

Prioritisation Model Element 4 - Prioritisation Review & Decision-Making Mechanism - Apply Appropriate Global / Regional / National Terms of Reference & Reporting in Decision-Making	
Name of Element	Prioritisation Review & Decision-Making Mechanism - Apply Appropriate Global / Regional / National Terms of Reference & Reporting in Decision-Making.
Element Reference Number	Element 4
Element description (Feature Highlights)	Element 4 provides for appropriate levels of prioritisation assessment and review to ensure efficient, and evidence based governing processes are adopted / followed. This provides for the application of appropriate Global / Regional / National Terms of Reference & Reporting in Decision-Making. There are 3 levels of geographic prioritisation input / output - review / reporting proposed. These correspond to 3 Seabed 2030 tiers (National, Regional and Global). As discussed, and resulting from Workshop 2, a consensus was acknowledged that prioritisation is best assessed and case made at the regional geographic tier (with oversight by Seabed 2030 global tier), recognising that if addressed nationally, the process would be too costly and cumbersome to implement, and if global only, the various regional to national needs and factors driving prioritisation decisions would not be accounted for. The level of effort and involvement in decision-making adopts this alignment and is described using tables below by tier (national, regional, and global). The implementation of streamlined and efficient governance is proposed around National entities generally making requests and standing up Regional and Global Data Working Groups (WGs) to review, validate and make decisions on new area of interest and prioritisation. (These same WGs may be involved in subsequent commissioning and implementation planning). The following terms of reference and reporting mechanisms are proposed and highlighted in the process figure below. 

Terms of reference and reporting can be potentially implemented using the following framework and interactions as presented in 4 tables below. (The 1st table is common to all tiers, 2nd table is for National Tier, 3rd Table regional tier and 4th table global tier):

All tiers key areas of focus

Seabed 2030 [All Tiers] Data Working Group TOR (Prioritisation)	
Purpose	TBD pending tier
Mission/Objective	TBD pending tier
Attendees	TBD pending tier
Scope of Business	**(i) New Data Review and Prioritisation through to Authority to Proceed** -Data request review -Review priorities - Push for authorisation to proceed - Authorise request to be acted on - Funding case and approvals **(ii) Implementation Planning and Reporting** -Commissioning data -Review and report on new data acquisition progress (active task orders) **(iii) Seabed 2030 strategic communications relating to new data acquisition programme / progress** **(iv) Seabed 2030 Data risk / issues management**
Frequency	Quarterly
Location	Virtual Meeting / On-line
Meeting Products	(i) New Data Acquisition Review / Planning Report (ii) New Data Implementation Planning Report (iii) Strategic Communications Plan

National (Entities) Tier *(Focus summary is informing prioritisation to regional tier and implementation case by case as applicable).*

National Entities Seabed 2030 New Data Acquisition Prioritisation TOR	
Purpose	Submit national requests / make recommendations for new data acquisition as applicable. Commission and deliver new data acquisition task order as applicable.
Mission/Objective	Prepare and submit new data acquisition plans (to Regions). Prepare and submit new data acquisition task order progress reports (to Regions).
Attendees	TBD

Scope of Business	-Prepare and submit Seabed 2030 National Data Recommendations for Acquisition to Regional Data WG. -Commission and manage / deliver new data acquisition plans/task orders as applicable. -Input to Strategic Communications relating to new data acquisition programme / progress. -Make and submit funding case requests to Regional Data WG.
Frequency	Ad hoc case by case as applicable
Location	Virtual Meeting / On-line / Report Submission
Meeting Products	-National New Data Acquisition Review / Planning Report (Input from National tier). -Authorisation to Proceed on National Data Acquisition Plans as applicable. -Coordinate funding line for new data acquisition task orders (national tier as applicable).

Regional Tier *(Focus Summary: Review in context of the Regions' National Proposals for new data acquisition, then Plan / Propose / Commission / Coordinate New Data Acquisition for Seabed 2030. Submit proposals to Global Data WG for review / authorisation, with associated funding requests).*

Seabed 2030 Regional Data Working Group TOR	
Purpose	Commission and coordinate new data acquisition Review national data acquisition plans Report to Global Data WG
Mission/Objective	Review / Authorise New data Acquisition Plans (from National/Region) Report to Global Data WG
Attendees	TBD
Scope of Business	-Review Seabed 2030 National / Regional recommendations for new data acquisition - Review heat map tool submitted data requests in context of national / regional data acquisition plans -Provide Authority to Proceed to National (for new data acquisition plans/task orders), and action any Regional task order commissioning -Review and report on new data acquisition progress (Regional active task orders)

	-Input to strategic communications -Funding Request Preparation / Budget holder Regional -Data acquisition risk / issues management (Regional)
Frequency	Monthly
Location	Virtual Meeting / On-line / In Person / Report Submission
Meeting Products	-Regional New Data Acquisition Review / Planning Report (Input from Nations and Regional Priorities) -Authorisation to Proceed on Regional Data Acquisition Plans -Task order commissioning activated -Coordinate funding requests to Global Data WG for Regional new data acquisition task orders / programme commissioning (quarterly)

Global Tier *(Focus summary: Review / Authorise / Funding Cascade from and to Regions. Potentially commission new data acquisition case by case).*

Seabed 2030 Global Data Working Group TOR	
Purpose	Review / Authorise Regional new data acquisition plans (from Regions)
Mission/Objective	Review / Authorise Regional new data acquisition plans (from Regions)
Attendees	TBD
Scope of Business	-Review Seabed 2030 Regional / Global recommendations for new data acquisition -Provide Authority to Proceed to Regions (for new data acquisition plans/task orders), and any centralised global task order commissioning -Review and report on new data acquisition progress (active task orders) -Seabed 2030 strategic communications relating to new data acquisition programme / progress -Funding Case Coordination / Budget holder Global -Data acquisition risk / issues (Global)
Frequency	Quarterly
Location	Virtual Meeting / On-line
Meeting Products	-Global New Data Acquisition Review / Planning Report (Input from Regions and any global identified priorities) -Authorisation to Proceed on Regional Data Acquisition Plans

		-Coordinate funding line for new data acquisition task orders
Framework Component	Process: Prioritisation Review & Decision-Making Mechanism - Apply Appropriate Global / Regional / National Terms of Reference & Reporting in Decision-Making Data: Prioritisation data AOIs via heat map tool, ad hoc geospatial analysis outputs as described in previous prioritisation elements, and reporting as described by 3 tier tables. Tools: (i) Common templates for reporting and information sharing are adopted. (ii) Desktop GIS to be available in Seabed 2030 Regional Offices to support geospatial analysis to inform prioritisation evidence cases. (iii) Seabed 2030 Prioritisation Heat Map tool to be available in support.	
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Prioritsation model.	

4.3.5 Prioritisation Model Element 5 Description - Present Data Targeted for New Acquisition, commissioned data, and new data acquisition progress (Implementation tracking and reporting).

Prioritisation model element 5 feature highlights are presented in the table below.

Prioritisation Model Element 5 - Present Data Targeted for New Acquisition, commissioned data, and new data acquisition progress (Implementation tracking and reporting)	
Name of Element	Present Data Targeted for New Acquisition, commissioned data, and new data acquisition progress (Implementation tracking and reporting).
Element Reference Number	Element 5
Element description (Feature Highlights)	The use of heat map tool capability was introduced in element 3 and 4 above and is further used for this element. Element 5 provides for additional progress tracking data to be available to Seabed 2030 decision-makers to inform and aid prioritisation decision-making. Fundamentally this allows prioritisation decisions to take account of any existing data production progress and/or issues, to mitigate forward planning for any stove pipes in delivery and adjust new area of interest decision-making to reflect production progress reporting / requirement backlog review at any given point of time (proposed 3-monthly reporting). Proposed supporting information / data to be available in support of prioritisation includes the following range of detail (addition to new data AOI and justification reports). *These details would be aligned with any existing SeaBed 2030 production reporting process and procedure in place and are TBC during the prioritisation tool implementation phase of work*:

	#1: New data acquisition request is in planning, #2: New data acquisition request proposal submitted and pending authority to proceed, #3: New data acquisition request proposal submitted, authority to proceed issued, and pending commissioning with supplier, #4: New data acquisition activated task orders with supplier in production, including: [By data product specification (based on depth and resolution]: #4.1: progress reporting (commissioned, in survey permissions phase, #4.2: in data capture / acquisition phase, #4.3: data acquired, #4.4 data in processing/production phase, #4.5 data produced in post-processing & QC, #4.6 data produced / available (in production house data store) #4.6 data uploaded / published to GEBCO / Seabed 2030 data store This additional information would only be accessible by Seabed 2030 management at Global and Regional tiers and would be presented in the heat mapping tool and as part of the standard 3 monthly reporting to aid and inform prioritisation decisions.
Framework Component	Process: Present Data Targeted for New Acquisition, commissioned data, and new data acquisition progress (Implementation tracking and reporting). Data: Access to information and data on Seabed 2030 new requirements AOI with supporting justification reporting, with implementation progress and tracking details to inform and adjust prioritisation decision-making. Tools: (i) Common template reports are adopted for the collation and reporting of new user requirements to inform prioritisation review. These are proposed to be adopted across all Seabed 2030 Regions for the purpose of Seabed 2030 prioritisation collation and reporting of new data acquisition requirements. (ii) Seabed 2030 Prioritisation Heat Map tool to be available in support.
Key Assumptions	None applied at this time. Assumptions will apply and are TBD during production of the Prioritsation model.

4.4 REVIEW OF TWO EXISTING SEABED MAPPING PRIORITISATION TOOLS – IHO GEBCO AND AUSSEABED

As described in section 4.3 onwards above prioritisation tools have a strong contribution to make towards supporting prioritisation decision-making.

Seabed 2030 preference is to reuse existing prioritisation tool capability where sensible, achieve prioritisation tool functionality through the customisation of or configuring an existing available tool, rather than designing, building, and implementing a new tool from scratch.

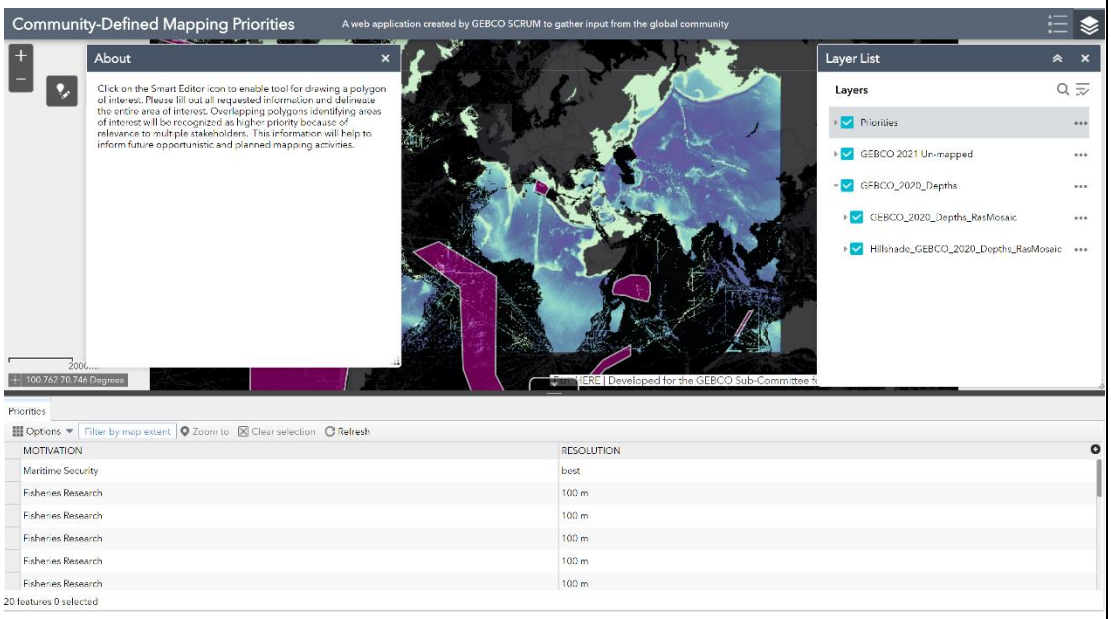
In this section the WITS Project Team has provided a high-level review of two existing seabed mapping prioritisation tools to inform Seabed 2030, (i) GEBCO Seabed Mapping Prioritisation Tool (The GEBCO SCRUM Data Prioritization Web App), and (ii) AusSeabed Seabed Mapping Prioritisation tool, and suggests how Seabed 2030 may be able to leverage these going forward in support.

4.4.1 GEBCO Seabed Mapping Prioritisation Tool – 'GEBCO SCRUM Data Prioritization Web App'

Prioritisation tool key features / highlights are provided for the **GEBCO Seabed Mapping Prioritisation Tool** in the table below.

Prioritisation Tool	**GEBCO Seabed Mapping Prioritisation Tool – 'GEBCO SCRUM Data Prioritisation Web App'**
Website URL	https://columbia.maps.arcgis.com/apps/webappviewer/index.html?id=17be370fd5ff4b2ebc773c11c0c97fa0

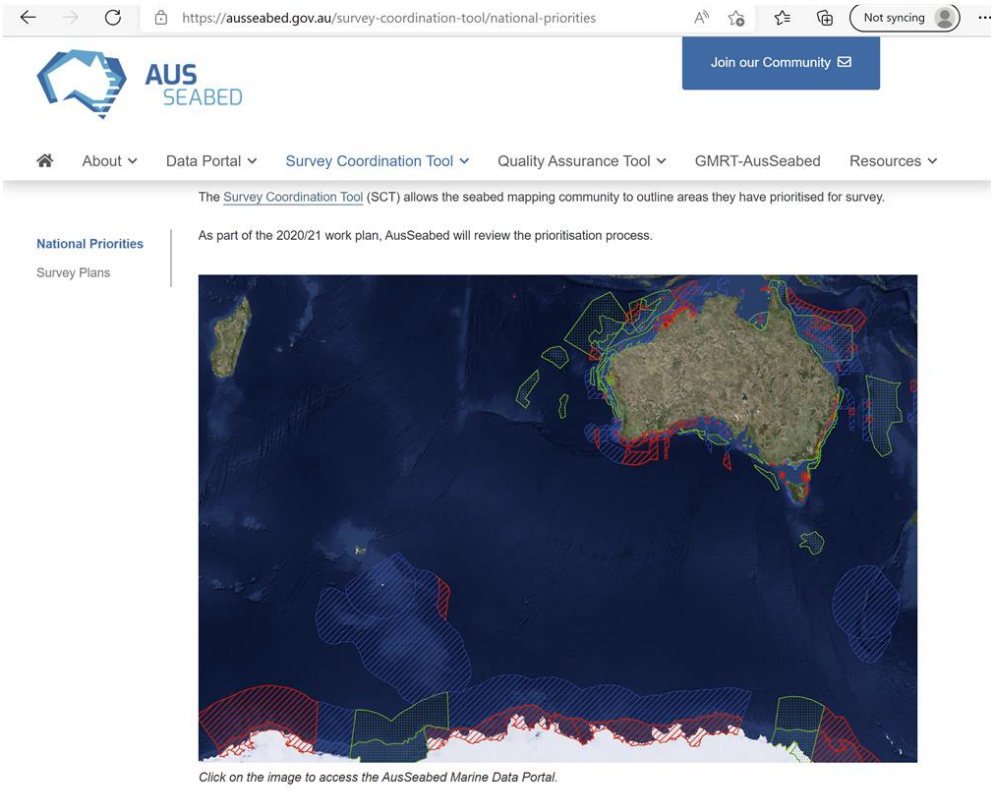
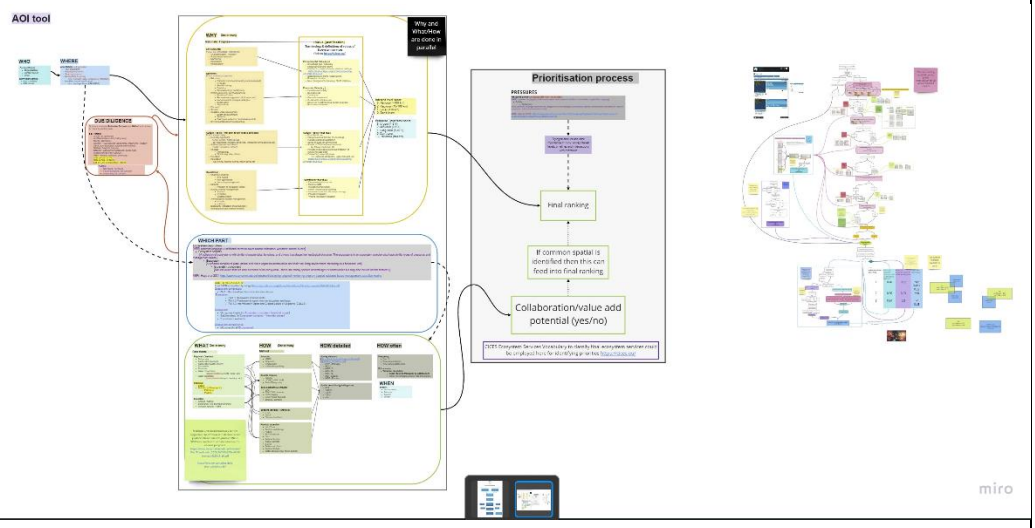
Tool Key Feature Review	The application was designed by GEBCO's Sub-Committee for Regional Undersea Mapping
	(SCRUM) to help gather input from the broad community about areas that are of high priority for new data acquisition.
	
	Reference Data includes:
	• Topographic Map Base (Esri, HERE, NRCan, Garmin, and maybe others pending location)
	Active Layers include:
	• Priorities
	• GEBCO 2021 Unmapped Area [GEBCO2021_TID_WMAS.tif] – see here: https://maps.ccom.unh.edu/server/rest/services/GEBCO2021/GEBCO_2021_TID/MapServer
	• GEBCO 2020 Depths, including:
	  ○ GEBCO_2020_Depths_RasMosaic - see here: https://maps.ccom.unh.edu/server/rest/services/GEBCO2020/GEBCO_2020_Depths/MapServer/0
	  ○ GEBCO 2020_Depths_RasMosaic (Hill shade) – see here: https://maps.ccom.unh.edu/server/rest/services/GEBCO2020/GEBCO_2020_Depths/MapServer/4
	
	Priorities can be viewed as polygons in the map window and as a list in the attribute table.
	
	New priority areas are defined by users, through the use of a Smart Editor Tool. This invites users to: "Click on the Smart Editor icon to enable tool for drawing a polygon of interest. Please fill out all requested information and delineate the entire area of interest."

	Priority logic to be applied is presented to users as “Overlapping polygons identifying areas of interest will be recognised as higher priority because of relevance to multiple stakeholders. This information will help to inform future opportunistic and planned mapping activities.”  The application is readily accessible on the web, easy to navigate and use.
Tool Highlights (for Seabed 2030)	WITS Project team review highlights the following to inform Seabed 2030: 1: This tool provides a web application for the capture of ‘Community-Defined Mapping Priorities’. 2: The application is easy to access, easy and quick to use. 3: The application is spatially intelligent (based on Esri technology). 4: Users can view all priorities and filter priorities for view. 5: Users are invited to define a polygon area of interest, provide an email for communications purposes, populate / submit justification - Why map this area? and populated and submit a ‘Desired Resolution’ details. 6: The tool assume users will know about ‘resolution’, no explanation for users is provided. 7: The why map this area justification does not capture sufficient descriptive detail from which to make a truly informed decision. 8: There is no guidance on how the submitted details are used and/or follow-on communication expectations once an area of interest is identified and submitted. 9: It is not clear if the tool provides adequate response to satisfy EU / UK requirements associated with the use of personal information, e.g., GDPR. 10: As the tool is based on Esri technology, it will be relatively straightforward to replicate the site and/or undertake further customisation / configuration work, to expand the application functionality to support further interaction with users and/or the capture of further descriptive detail to collect further evidence for prioritisation justification. 11: The tool stops at user submission of requirement and does not take the prioritisation assessment further. 12: As a user experience, you are probably left wondering - ok, what is next?

Seabed 2030 Recommendation	Seabed 2030 to review and consider if / how to enhance GEBCO SCRUM Data Prioritisation Web App', either as a replicated tool for Seabed 2030 with enhanced user functionality and user experience, and if the functionality of the application can be enhanced to cater for further prioritisation process support, actual decision-making, analysis of benefits etc.

Prioritisation tool key features / highlights are provided for the **AusSeabed Seabed Mapping Prioritisation Tool** in the table below.

Prioritisation Tool	**AusSeabed Seabed Mapping Prioritisation tool**
Website URL	**AusSeabed National Seabed Mapping Priorities**, see here: https://ausseabed.gov.au/survey-coordination-tool/national-priorities **Survey Coordination Tool** – see here: https://coordination.ausseabed.gov.au/login (User login required) MIRO board of prioritisation workflow process is presented below.
Tool Key Feature Review	The AusSeabed website states, AusSeabed applies the following National Priorities towards Seabed Mapping, where "priority is given to areas where: • More bathymetric data are required for safe navigation. • There is a known pressure and baseline data are required to provide information to support an environmental assessment and monitoring. • There is resource competition, and baseline environmental data are required to support better understanding of surrounding issues. • Data are urgently required to support policy and government decisions. Agencies then rank their priority areas 1, 2 and 3 based on urgency of the need for the data and the impact of the data. These priority sets are compiled by Geoscience Australia and submitted to the Australian Hydrographic Office (AHO) for consideration as supplementary material for their "Hydroscheme" acquisition plan." A **Survey Coordination Tool (SCT)** allows the seabed mapping community to outline areas they have prioritised for survey. Users require a login to access and interact with the SCT tool. Australia is looking to prioritise areas of its EEZ to map (75% uncharted) and in doing so they have developed a "heat map tool" which users/organisations can access through their website and input areas of interest and user needs, etc. WITS received a copy of MIRA Prioritisation Process from AusSeabed contacts (see further below). AusSeabed have kindly offered for Seabed 2030 the opportunity to reuse, customise or configure the process and heatmap tool for Seabed 2030 purposes and use. AusSeabed shared a MIRO board of the

	prioritisation process they have developed on mapping needs and prioritisation to inform the WITS project work.  *Click on the image to access the AusSeabed Marine Data Portal.* The highlights below reflect the WITS review of the **prioritisation MIRO board** shared (figure below). 
Tool Highlights (for Seabed 2030)	**WITS Project Team highlights the following aspects of the AusSeabed Prioritisation Tool and approach for Seabed 2030 consideration:** 1: Context - Australia is looking to prioritise areas of its EEZ to map (75% uncharted) and in doing so they have developed a “heat map tool” which

	people/organisations can access through their website and input areas of interest and user needs, etc. WITS received a copy of MIRO documented Prioritisation Process (Workflow) from AusSeabed contacts. **AusSeabed have kindly offered Seabed 2030 the opportunity to reuse, customise or configure the process and heatmap tool for Seabed 2030 purposes and use – This is an excellent opportunity for Seabed 2030 to leverage and tailor some existing robust work on seabed mapping prioritisation. WITS Project Team recommend Seabed 2030 to investigate this opportunity feasibility further through a proposed detailed review identified below.** 2: **AusSeabed Prioritisation approach is robust (potentially over-prescriptive – please see 3 and 4 below) and an excellent starting point for Seabed 2030 prioritisation tool.** WITS Project Team recommend Seabed 2030 undertake a detailed review of the AusSeabed prioritisation tool in the context of a Seabed 2030 prioritisation approach / framework to capture and understand how the AusSeabed tool can be most effectively tailored and customised for Seabed 2030 prioritisation needs. 3: The **AusSeabed Prioritisation approach and the tool is tailored to the Australia National Sovereignty use which also inherently targets EEZ seabed mapping context**. The workflow for the tool feels over-prescriptive; and **runs the risk of potentially over-engineering or over-positioning the use of a tool for prioritisation.** There is a case that some of the decisions the tool is seeking to inform simply should be human judgements / human decision and probably should not be attempted to be determined using factored weightings. The **decision workflow adopts reference standards which while they may be applicable to the Australia sovereign setting, should be reviewed and considered in terms of their international global / and other regions applicability / suitability**. 4: **WITS Project Team propose that Seabed 2030 actions a more detailed review of the AusSeabed tool, position an appropriate balance between where a tool can / should be applied for Seabed 2030 'global and set of regions' scenario. Such a review should confirm the prioritisation 'purpose and approach', and then review the level of customisation / configuration (workflow and functionality) required to tailor the AusSeabed tool for Seabed 2030 purpose.** 5: **WITS Project Team emphasises some golden points relating to the use of a Heat Map Tool to support Seabed 2030 prioritisation**. Such a tool would enable the visualisation and apply the use of: • Existing Data Coverages. • Planned new data acquisition coverages. • Reference Data can be efficiently presented and used in support, with rapid visualisation to inform users understanding and geographic / thematic context e.g., MPA boundaries presented. • Cost Data Factors can be applied. • Benefits Assessment factors be applied, as applicable. • A tool should be able to be readily configured for use at a regional level, to support and evidence regional scenarios / settings, and provide regional tailored new data recommendations to evidence and inform prioritisation decision making review at regional and global level.

	WITS Project Team recommend Seabed 2030 to consider how a heat mapping tool can be best applied to both benefits analysis and prioritisation processes.
Seabed 2030 Recommendation	WITS Project received a copy of MIRA Prioritisation Process from AusSeabed contacts. AusSeabed have offered the opportunity for Seabed 2030 to reuse, customise or configure the process and heatmap tool for Seabed 2030 purposes and use. Seabed 2030 is recommended to engage Aero Leplaistrier of Geoscience Australia, and Kim Picard (Director of the National Seabed Mapping Section – National Earth & Marine Observation Branch – Environmental Geoscience Division – Geoscience Australia) to investigate the AusSeabed heatmap tool and prioritisation process reuse and customisation opportunity.

SECTION FIVE: COLLATION OF RECOMMENDATIONS

This section of the report presents a 'Collation of Recommendations' drawn together by the WITS Phase 2 study team, for Seabed 2030 consideration. We present this as a single table of recommendations collated from both WITS Phase 2 Reports, (Report 1 and 2).

Ref.ID	Recommendation
Concerning Ref.ID 1 - 13	**WITS Phase 2 Project Report 1 Recommendations**
1.	Seabed 2030 Recommendation: **3DEP: USA NEEA offers a comprehensive engagement approach to both identify benefit use cases, and a comprehensive approach to cost benefit analysis, including comparing cost benefits analysis for different technical approaches, and follows a use case based assessment approach.** **Of direct relevance to seabed 2030, the NEEA study concludes that seabed mapping is critical for:** • **Navigation** • **Underwater recovery** • **Forecasting weather, tsunami, and storm surge events.** • **Climate change projections; and** • **Identifying the outlines of where living marine resources exist.** • **Seabed mapping provides the means to uncover the history of our fallen lost at sea and** • **A framework for seabed mineral discovery.** • **Accurate ocean depths are instrumental in connecting the world through safe navigation and transoceanic communication cables, and** • **Critical to emergency response on the high seas.** **And concludes that "even if these benefits are difficult to quantify, they certainly should be considered as "Major"."** As with NEEA the **3D Nation Study approach / methodology is robust and comprehensive** and is anticipated to document and evidence details that will be transferrable for use by Seabed 2030 benefits analysis approach. In particular, the engagement questionnaire questions on benefits are especially useful applying benefits scale category (major, moderate, minor, none, do not know) and requesting participants to complete scenario-based evidence for benefits, based on numbers of hours saved, numbers of dollars saved, etc. **The questionnaire addresses instances inland bathymetry, near shore, and offshore use cases. Questionnaire Part 3.4 (Page 111 of 144) provides detailed engagement questions on offshore scenarios and use cases. These are directly relevant to Seabed 2030.**
2.	Seabed 2030 Recommendation: **The AusSeabed economic value methodology is comprehensive but is focused on internal EEZ related use cases, benefits, costs, and economic value assessment**. The report Annex A

	presents the economic contribution methodology and Annex B presents the Economic Contribution Framework adopted. **This represents a candidate economic value assessment methodology that Seabed 2030 can apply and tailor for 'High Seas' context.** Note there is a need for Seabed to consider **global** as opposed to national economic value. The AusSeabed prioritisation tool offers 3 priority ranking categories that could be used by Seabed 2030, including: • Urgent (1-2 years) • Mid-term (2-5 years) • Long-term (5-10 years) The AusSeabed team has provided Seabed 2030 has been provided with a draft storyboard of the AusSeabed prioritisation workflow for ongoing reference / use. The centre page graphic is compelling and a visually useful way to present sub-sector economic values and could be repurposed for Seabed 2030.
3.	Seabed 2030 Recommendation: This specific PWC Infomar report has been included in the review **should Seabed 2030 wish to investigate and compare costs / benefits for different implementation options**. The PWC report provides a **comprehensive cost benefit analysis approach, methodology and working example that Seabed 2030 could adopt and tailor for their purposes**. It could also potentially **inform the Seabed 2030 prioritisation approach.**
4.	Seabed 2030 Recommendation: Both Seabed 2030 benefits analysis and mapping prioritisation can be informed by the **AORA systematic approach adopted towards the realisation of seabed mapping**. It is recommended that Seabed 2030 engages and aligns with AORA Atlantic Bathymetry & Benthic Habitat Mapping next steps activities. **Seabed 2030 could adopt the AORA map tile approach for cost assessment (spatially orientated) and use this to build up and present a benefit assessment visualisation**. **AORA is imminently producing a report titled and addressing the 'Atlantic Bathymetry and Benthic Mapping Framework' which is directly relevant to Seabed 2030 and will potentially be able to inform and guide Seabed 2030 work on benefits analysis and prioritisation**.
5.	Seabed 2030 Recommendation: Any benefits analysis methodology can be informed by this report and its approach **(UK HMG Cabinet Office an Initial Analysis of the Potential Geospatial Economic Opportunity (Boston Consulting Group) and follow on study - Geospatial Data Market Study (Frontier Economics). The approach is comprehensive based on use cases, direct use value, use value and spill over use value.** A **similar approach based on use cases and estimating economic, environmental, and social value could be adopted by Seabed 2030**.
6.	Seabed 2030 Recommendation: Any benefits analysis methodology can be informed by this report and its approach **(Economic Value of the Geospatial Information Industry in Ireland, Indecon Study), with an optional**

	methodology for the assessment of direct and indirect economic value assessment.
7.	Seabed 2030 Recommendation: Any benefits analysis methodology can be informed by this report and its approach. **The Oxera (for Google) approach assesses economic value** through consideration of (i) direct effects, (ii) indirect effects and (iii) wider economic effects. Seabed 2030 could adopt a similar approach.
8.	Seabed 2030 Recommendation: Any benefits analysis methodology can be informed by this report and the approach taken by Google – Alphabeta study. Seabed 2030 could follow a similar global methodology - **consider consumer, business, and societal resulting benefits** from Seabed 2030.
9.	Seabed 2030 Recommendation: **Seabed 2030 engage WorldDem™ product team at Airbus Intelligence** to be informed on (i) the approach adopted (Public/Private Partnership finance model), to realising the WorldDEM™ product, and (ii) how Airbus has gone about presenting and supporting a global elevation product user community to identify synergy and insight from Airbus experience.
10.	Seabed 2030 Recommendation: **Seabed 2030 engage NextMap™ product team at InterMap** to be informed on (i) the investment model adopted by InterMap to realise the NextMap® product, and (ii) how InterMap has gone about presenting and supporting a global elevation product user community to identify synergy and insight from InterMap experience.
11.	Seabed 2030 Recommendation: **Seabed 2030 engage MAXAR 3d data suite at MAXAR** to be informed on (i) the investment model adopted by MAXAR to realise the 3d data suite product portfolio, and (ii) the context of combining data with user tools (e.g., Vricon explorer), to support target user community, and to identify any synergies and draw insight from MAXAR experience.
12.	Seabed 2030 Recommendation: **Seabed 2030 engage RESTEC / NTT DATA Corporation** to be informed on (i) the investment model adopted to realise the **AW3D products and services,** and (ii) how they see AW3D will evolve to contribute to customers' development of new businesses. Seabed 2030 may also see interesting automation of workflow through engagement with AW3D companies.
13.	Seabed 2030 Recommendation: **Seabed 2030 engage with OpenStreetMap Foundation** to be informed on (i) the investment model adopted to realise OSM, (ii) how they successfully leveraged citizen science approach, (iii) the challenges and opportunities and how to realise an open data offer at a global level of scale, and to identify any synergies and draw insight from the OSM experience.
Concerning Ref.ID 14 - 29	**WITS Phase 2 Project Report 2 Recommendations**
14.	Seabed 2030 Recommendation: 'Regional Segmentation' **Seabed 2030 to consider and determine how best to segment the Global Oceans into Regional Areas of Interest** for the purposes of benefits analysis and seabed mapping prioritisation processes. Regional approach would enable benefits and prioritisation to be executed, analysed, and then compared at regional tier. A Regional approach to both benefits analysis and seabed mapping prioritisation is recommended as pragmatic approach from the WITS Project Team to take account of regional geo-location specifics / differences and regional benefits and priorities awareness.
15.	Seabed 2030 Recommendation: '**Define and Document a Seabed 2030 Value Chain'** – Seabed 2030 to consider, workshop, produce and document a Value

	Chain for Seabed 2030, both to inform benefit analysis / value analysis, and to inform Seabed 2030 organisation operating model future evolution.
16.	Seabed 2030 Recommendation: '**Define and document a list of sectors (economic impact sectors) for ongoing use in the Seabed 2030 benefits analysis and economic value assessment work.**
17.	Seabed 2030 Recommendation: **Prepare a set of Seabed 2030 use cases** to inform the Seabed 2030 benefits analysis model, evidence the evolving Seabed 2030 business case, and be available to support ongoing Seabed 2030 knowledge sharing activities and strategic communications.
18.	Seabed 2030 Recommendation: **Investigate and define the underlying model to costs estimation that can be used to support a system approach to cost assessment for seabed prioritisation options modelling**. Review AORA and InfoMar cost estimation processes to inform this aspect of the Prioritisation model.
19.	Seabed 2030 Recommendation: **The WITS Project Team has investigated and proposed a Seabed Mapping Benefit Analysis Model for Seabed 2030 consideration**. As with any benefit analysis / economic value analysis, a number of 'parameters' require validation and adjustment during the production and use of the model, e.g., aligned to use of readily available / actual data. This is normal practice. The WITS project team has included across section 5 and listed in this table above further benefits analysis related recommendations for Seabed 2030 consideration. The WITS project team are pleased to submit the proposed benefit analysis model and wider benefits analysis recommendations for Seabed 2030 consideration and remain available to provide further explanation and guidance support as helpful.
20.	Seabed 2030 Recommendation: **The WITS Project Team propose that Seabed 2030 produce an Executive fact sheet on the Seabed 2030 mapping programme**.
21.	Seabed 2030 Recommendation: **The WITS Project Team propose that Seabed 2030 produce a Value Proposition document for the Seabed 2030 mapping programme, aligned with delivery of benefits analysis and associated outcomes**.
22.	Seabed 2030 Recommendation: **WITS project team propose that Seabed 2030 seeks to capture the following (minimum) needs from users**: • Area of interest – options: (i) digitised AOI online, including snap to existing vector, digitised offline and (ii) uploaded AOI file, and (iii) non-digitised AOI where a user submits a layperson description, anticipating a follow up call back from Seabed 2030 to support a joint definition of AOI / capture of need. • Why this area is of interest (support prioritisation evidence case), and that this includes fields to be populated including point of contact (email), name of entity, country (office location), sector, purpose/reason behind AOI request. [The purpose / reason fields to be populated can be tailored to reflect high level prioritisation criteria and are TBD at this time]. • Anticipated Users: Who are the anticipated users of data products? [Free Text] • Timescales: Are there are specific timescale / timeline requirements or constraints associated with the defined AOI, [Yes /No with explanation]? • Budget Availability: Is there any budget available to contribute towards or cover the cost of the acquisition of the identified AOI? [Yes /No with explanation]?

23.	Seabed 2030 Recommendation: **WITS Project Team have proposed and provided a high level description for a prioritisation framework approach for Seabed 2030 consideration**. This process combines elements of process, tools, and data to support Seabed 2030 seabed mapping prioritisation, with a strong focus on regional tier review and evidence building to inform and support prioritisation decision-making.
24.	Seabed 2030 Recommendation: **Seabed 2030 to review and consider if / how to enhance GEBCO SCRUM Data Prioritisation Web App'**, either as a replicated tool for Seabed 2030 with enhanced user functionality and user experience, and if the functionality of the application can be enhanced to cater for further prioritisation process support, actual decision-making, analysis of benefits etc.
25.	Seabed 2030 Recommendation: AusSeabed have kindly offered Seabed 2030 the opportunity to reuse, customise or configure the prioritisation process and heatmap tool for Seabed 2030 purposes and use – This is an excellent opportunity for Seabed 2030 to leverage and tailor some existing robust work on seabed mapping prioritisation. **WITS Project Team recommend Seabed 2030 to investigate this opportunity feasibility further through a proposed detailed review identified below.**
26.	Seabed 2030 Recommendation: **WITS Project Team recommend Seabed 2030 undertake a detailed review of the AusSeabed prioritisation tool in the context of a Seabed 2030 prioritisation approach / framework to capture and understand how the AusSeabed tool can be most effectively tailored and customised for Seabed 2030 prioritisation needs.**
27.	Seabed 2030 Recommendation: **WITS Project Team propose that Seabed 2030 actions a more detailed review of the AusSeabed tool, position an appropriate balance between where a tool can / should be applied for Seabed 2030 'global and set of regions' scenarios**. Such a review should confirm the prioritisation 'purpose and approach', and then review the level of customisation / configuration (workflow and functionality) required to tailor the AusSeabed tool for Seabed 2030 purpose.
28.	Seabed 2030 Recommendation: WITS Project Team emphasises some golden points relating to the use of a Heat Map Tool to support Seabed 2030 prioritisation. Such a tool would enable the visualisation and apply the use of: • Existing Data Coverages. • Planned new data acquisition coverages. • Reference Data can be efficiently presented and used in support, with rapid visualisation to inform users understanding and geographic / thematic context e.g., MPA boundaries presented. • Cost Data Factors can be applied. • Benefits Assessment factors be applied, as applicable. A tool should be able to be readily configured for use at a regional level, to support and evidence regional scenarios / settings, and provide regional tailored new data recommendations to evidence and inform prioritisation decision making review at regional and global level. **WITS Project Team recommend Seabed 2030 to consider how a heat mapping tool can be best applied to both benefits analysis and prioritisation processes**.
29.	Seabed 2030 Recommendation: WITS Project received a copy of MIRO Prioritisation Process from AusSeabed contacts. **AusSeabed have offered the**

	opportunity for Seabed 2030 to reuse, customise or configure the process and heatmap tool for Seabed 2030 purposes and use. Seabed 2030 is recommended to engage Aero Leplaistrier of Geoscience Australia, and Kim Picard (Director of the National Seabed Mapping Section – National Earth & Marine Observation Branch – Environmental Geoscience Division – Geoscience Australia) to investigate the AusSeabed heatmap tool and prioritisation process reuse and customisation opportunity.

SECTION SIX: WITS PHASE 2 PROPOSED NEXT STEPS

This report is the WITS Phase 2 Objectives 4 and 5 report, and provides for consideration by Seabed 2030:

- A proposed benefits analysis model approach.
- The proposed use of an Impact Statement, Executive Fact Sheet, and Value Proposition Documentation to support the articulation and presentation of Seabed 2030 benefit and value.
- A proposed Seabed 2030 seabed mapping prioritisation approach.

The WITS project team propose the following next steps:

Phase 3 Proposed WITS Activities (Focus: Benefits Analysis and Prioritisation)

Preamble / Context WITS Phase 3 activities focus on the Phase 2 recommendations from WITS that could be potentially delivered / accelerated for Seabed 2030, through third party support (by the NLAI WITS team).

These activities focus on:

Objective 6 - Seabed 2030 Benefits analysis / review key areas. Production of Seabed 2030 benefits documentation – Value Chain, Executive Fact Sheet, Value Proposition and a set of Use Case Evidence.

Objective 7- Seabed 2030 Prioritisation – Develop the proposed approach into a documented methodology *(Level 4 business process / procedure documentation produced).* And provide a tool review and design, with a prototyping of a tailored prioritisation tool for Seabed 2030.

Objective 8 - Targeted community engagement, to inform both benefits analysis and prioritisation, (inc. by survey, workshop, and one to one informed user engagement).

While contributing towards:

- **Seabed 2030 evolving business case supporting justification, benefit evidence and the articulation of benefit.**
- An **expansion of Seabed 2030 best practice knowledge base**.

Please note Seabed 2030 will receive full benefits qualitative assessment with a 'publication document pack' that will be ready for use for (i) Seabed 2030 business case evidencing, Seabed 2030 funder business case evidencing, and/or for use by economic analyst for a deeper economic value assessment project (quantitative study) should Seabed 2030 decide to go ahead with such a study.

Proposed sub-activities are identified by objective area 6,7 and 8 overleaf.

Objective 6: Seabed 2030 Benefits analysis / review key areas. *Production of Seabed 2030 parameters, and benefits documentation – Value Chain, Executive Fact Sheet, Value Proposition and a set of Use Case Evidence.*

Sub-Activities / Tasks include:

6.1: Support Seabed 2030 to adopt a **'Regional Segmentation'** of the Global Oceans into Regional Areas of Interest for the purposes of benefits analysis and seabed mapping prioritisation.

6.2: **'Define and Document a Seabed 2030 Value Chain'** – Workshop with Seabed 2030 to workshop, produce and document a Value Chain for Seabed 2030, to inform benefit analysis / value analysis, and to be available to inform Seabed 2030 organisation operating model future evolution.

6.3: **'Define and document a list of sectors (economic impact sectors) for** ongoing use in the Seabed 2030 benefits analysis and economic value assessment work.

6.4: **Collate and produce a set of Seabed 2030 use cases** to inform the Seabed 2030 benefits analysis model, evidence the evolving Seabed 2030 business case, and be available to support ongoing Seabed 2030 knowledge sharing activities and strategic communications.

Production of up to 12 use cases *(proposed not to exceed 6 pages each including graphics)*. These are proposed based on at least one use case drawn from each per segmented region, at least one use case for each identified (Seabed 2030 priority) economic impact sector, with 10 use cases orientated towards 'existing' economic sectors and 2 use cases for 'emerging' economic sectors. *Emerging economic sectors may be tailored to an anticipated (future orientated) contribution by Seabed 2030 data.*

6.5: Production of a **Seabed 2030 Executive fact sheet** on the Seabed 2030 mapping programme.

6.6: Production of a **Seabed 2030 Value Proposition Document** for the Seabed 2030 mapping programme. *(Excludes detailed economic quantitative analysis aspect, which would require specialist economic analyst engagement).*

Outputs include:

- Seabed 2030 Regional Segmentation Document [Target ~10 page explainer document]
- Seabed 2030 Value Chain Document [Target ~10 page explainer document]
- Seabed 2030 Economic Impact Sectors Document [Document with 1-page overview of each identified sector (up to 20 sectors)]
- Seabed 2030 Executive Fact Sheet (Focus: Seabed 2030 seabed mapping) [Target ~2-3 page document]
- Seabed 2030 Value Proposition Document (Focus: Seabed 2030 seabed mapping)
- Up to Twelve (~No. 12) Use Cases [Document Set of ~6 pages per Use Case]

Objective 7 - Seabed 2030 Prioritisation *– Develop the proposed approach into a documented methodology with process documentation (Target work process level 3). Further, provide a detailed review of GEBCO and AusSeabed Prioritisation Tools, and present an architecture/design for a tailored prioritisation tool for Seabed 2030.*

Sub-Activities / Tasks include:

7.1: Define and document work process for Seabed 2030 Seabed Mapping Prioritisation, (These are 'go to' processes defined to work process level 3 detail)

7.2: Propose a set of Seabed 2030 Seabed Mapping Prioritisation Tool User Needs/Requirements, and validate with Seabed 2030 representatives.

7.3: Review the GEBCO SCRUM Data Prioritization Web App., and provide a Gap Analysis target to meet Seabed 2030 user needs – as defined in activity 7.2 above

7.4: Review the AusSeabed Prioritisation Tool, and provide a Gap Analysis target to meet Seabed 2030 user needs – as defined in activity 7.2 above

7.5: Present a tailored Seabed Mapping prioritisation tool architecture and design for Seabed 2030 consideration, with implementation plan. Options from which the design will be based are (and to be defined on project) GEBCO enhanced, AusSeabed enhanced, or bespoke (tailor-made) prioritisation tool.

7.6: Agree with Seabed 2030 representative a workflow to be used to prototype Seabed 2030 workflow as scenario to base any future tool configuration / customisation / dev build

Outputs include:

- Seabed 2030 Seabed Mapping Prioritisation Process Document
- Seabed 2030 Seabed Mapping Prioritisation Tool User Needs/Requirements Document
- GEBCO SCRUM Data Prioritization Web App. and AusSeabed Gap Analysis Report
- Seabed 2030 Seabed Mapping prioritisation tool architecture and design, with implementation plan.
- Seabed 2030 scenario workflow to be used to implement the Seabed 2030 prioritisation tool. [Excludes implementation of workflow tool production]

Objective 8 - Targeted community engagement*, to inform both benefits analysis and prioritisation work, (inc. by survey, workshop, and one to one informed user engagement).*

Sub-Activities / Tasks include:

8.1: Seabed 2030 Management Engagement Ongoing – *fortnightly meetings, plus nominated peer to peer call on for to inform / review documentation iterative development (to validate scope and focus as documents develop).*

8.2a: NEEA community engagement survey questionnaire – focus on benefits analysis regional perspective (qualitative assessment), targeted benefits analysis re priority sectors (qualitative assessment), inform use cases, inform an evidence base to be available for future economic value assessment (should Seabed 2030 decide to progress with such an activity in future).

8.2b: Workshops – workshops are proposed at this time in support of the following activities (i) Value Chain definition, (ii) Validation of economic impact sectors and associated use cases, (iii) Prioritisation Tool User Needs/Requirements Capture.

8.3: One to One Informed User Engagement – used across all activities delivery as required.

Outputs include:

- Project progress reporting to Seabed 2030
- All sub-activities output informs Objectives 6 and 7 works with findings built into activity 6.x and 7.x outputs accordingly.
- The survey analysis will include the production of a survey returns analysis/evaluation report (for Seabed 2030 management review).

The WITS project team is very grateful and would like to express our thanks to the Seabed 2030 community for their guidance, input and support provided to the WITS project. In particular, the team is very grateful to all Seabed 2030 community survey questionnaire respondents, community workshop participants, and Seabed 2030 community members that have provided peer to peer support throughout the project delivery.

The project team wishes Seabed 2030 and community ongoing success in their seabed mapping mission.

ANNEX 1: TASK LEXICON / DEFINITION OF TERMS

For domain orientated technical definitions please search the International Hydrographic Organization (IHO) Hydrographic Dictionary; please see here: https://iho.int/en/hdwg

Supplemented with additional terms defined for the purposes of this project in the table below.

Abbreviation	Term	Definition
AOI	Area of Interest	Also referred to as study area or area of interest (AOI)—that contains a geographic subset of the features in another, larger dataset. This is particularly useful for creating a new dataset, where the new dataset comprises the area within a geographic delineation.
AORA	Atlantic Ocean Research Alliance	Atlantic Ocean Research Alliance - The All-Atlantic Ocean Research Alliance is the result of science diplomacy efforts involving countries from both sides of the Atlantic Ocean which aims at enhancing marine research and innovation cooperation along and across the Atlantic Ocean, from the Arctic to Antarctica. See here: https://allatlanticocean.org/whoweare
AusSeabed	AusSeabed is a national seabed mapping coordination program (Australian Waters)	AusSeabed is a national seabed mapping coordination program. The program aims to serve the Australian community that relies on seabed data by coordinating collection efforts in Australian waters and improving data access. The AusSeabed program is a national collaborative initiative led by Geoscience Australia, but operated by Commonwealth, State and Territory entities, universities, and industry. It is open to all interested parties. See here: https://www.ausseabed.gov.au/home
CBA	Cost-Benefit Analysis	Cost–benefit analysis (CBA), sometimes also called benefit–cost analysis, is a systematic approach to estimating the strengths and weaknesses of alternatives. It is used to determine options which provide the best approach to achieving benefits while preserving savings in, for example, transactions, activities, and functional business requirements. A CBA may be used to compare completed or potential courses of action, and to estimate or evaluate the value against the cost of a decision, project, or policy. CBA has two main applications: (i) To determine if an investment (or decision) is sound, ascertaining if – and by how much – its benefits outweigh its costs. (ii) To provide a basis for comparing investments (or decisions), comparing the total expected cost of each option with its total expected benefits. CBA is related to cost-effectiveness analysis. Benefits and costs in CBA are expressed in monetary terms and are adjusted for the time value of money; all flows of benefits and costs over time are expressed on a common basis in terms of their net present value, regardless of whether they are incurred at various times. UK Government Green Book methodology for cost benefit analysis, involves the following steps: 1. Scope and Baseline

		2. Identify costs and benefits 3. Quantify, monetise, and measure costs and benefits 4. Compare costs and benefits 5. Sensitivity analysis 6. Reporting and interpretation See here: https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent?msclkid=5026cc8dc09c11eca01c9eca2bf239f6
COTS	Commercial Off-The-Shelf	Commercial off-the-shelf, e.g., software products commercially available
EEZ	Exclusive Economic Zone	An exclusive economic zone (EEZ), as prescribed by the 1982 United Nations Convention on the Law of the Sea, is an area of the sea in which a sovereign state has special rights regarding the exploration and use of marine resources, including energy production from water and wind. It stretches from the baseline out to 200 nautical miles (nm) from the coast of the state in question.
Economic Sectors	Economic Sectors	Economic Sectors include: #1: Sector: Public or 'State Sector'. #2: Sector: Private or 'Privately run businesses. #3: Sector: Voluntary or 'Not for Profit'. Also: #1: Primary sector [Raw Materials] – Involves the retrieval and production of raw materials such as for our interest minerals, fishing, and oil and gas. #2: Secondary sector [Manufacturing] – Involves the transformation of raw or intermediate materials into goods, e.g., in this instance includes fisheries processing to food products. #3: Tertiary sector [Services] – Involves supplying services to customers, e.g., banking, and accounting, etc. and in this instance can include blue financing. Additional Sectors: #4: Quaternary sector [Information Services]– And is where knowledge-based services are accounted for. #5: Quinary sector [Human services] – activities centered on human-based services such as hospitality (e.g., and in this instance includes tourism). Also: #1: Sector: Established sectors - Sectors with long-term proven contribution to the economy. #2: Sector: Emerging sectors - New sectors showing high potential for future development.
Esri	Esri (Company) - Environmental Systems Research Institute	Esri is an international supplier of geographic information system software, web GIS and geodatabase management applications. The company is headquartered in Redlands, California. See here: https://www.esri.com/en-us/home
Economic Value Assessment	Economic Value Assessment	The assessment of economic value associated with [Seabed mapping]. One example methodology through which economic value can be assessed involves: (i) Assessment of Direct Economic Contribution,

		(ii) Assessment of Indirect Economic Contribution, and (iii) Economy-wide (resulting) Impacts. At a sectoral level: Economy-wide output contribution; Economy-wide employment contribution; and Economy-wide value added/GDP contribution, with two types of multipliers can potentially be applied: - Type I multipliers enable the estimation of the economy-wide impacts arising from the direct plus indirect impacts associated with changes in activity that occur in backward-linked industries due to an increase in demand from the seabed mapping industry. - Type II multipliers are an expansion of the Type I construct but include direct, indirect, and induced impacts. Induced impacts arise through the additional consumption that takes place as a result of the additional employment incomes created through the indirect impacts. In other words, Type II multipliers include the household as an additional sector in the economic relationships that make up the input-output framework.
EU	European Union	European Union - The European Union is a political and economic union of member states that are located primarily in Europe.
FGDC	Federal Geographic Data Committee (FGDC) [U.S. Government]	The Federal Geographic Data Committee (FGDC) is an organized structure of [U.S. Government] Federal geospatial professionals and constituents that provide executive, managerial, and advisory direction and oversight for geospatial decisions and initiatives across the Federal government. See here: https://www.fgdc.gov/
FTE(s)	Full Time Equivalent(s)	FTE is a unit of measurement equivalent to in business that indicates the amount of time that an employee or student is working. Full Time Equivalent(s) is used to represent headcount, e.g., 10 FTE are 10 Full Time Equivalent job positions/job posts. FTE is a unit of measurement equivalent to in business that indicates the amount of time that an employee or student is working.
GDPR	General Data Protection Regulation	The General Data Protection Regulation (EU) 2016/679 (GDPR) is a regulation in EU law on data protection and privacy in the European Union (EU) and the European Economic Area (EEA). The GDPR is a key component of EU privacy law and of human rights law, in particular Article 8(1) of the Charter of Fundamental Rights of the European Union. It also addresses the transfer of personal data outside the EU and EEA areas. The GDPR's primary aim is to enhance individuals' control and rights over their personal data and to simplify the regulatory environment for international business. Superseding the Data Protection Directive 95/46/EC, the regulation contains provisions and requirements related to the processing of personal data of individuals (formally called data subjects in the GDPR) who are located in the EEA and applies to any enterprise—regardless of its location and the data subjects' citizenship or residence—that is processing the personal information of individuals inside the EEA. For UK requirements see here: https://www.gov.uk/government/publications/guide-to-the-general-data-protection-regulation?msclkid=43017329c09511ec8e7885796010f289

GEBCO	General Bathymetric Chart of the Oceans (GEBCO)	The General Bathymetric Chart of the Oceans (GEBCO) is a publicly available bathymetric chart of the world's oceans. See here: https://www.gebco.net/
GIS	Geographic Information System	Esri definition for GIS state: "A spatial system that creates, manages, analyses, and maps all types of data." "A geographic information system (GIS) is a system that creates, manages, analyses, and maps all types of data. GIS connects data to a map, integrating location data (where things are) with all types of descriptive information (what things are like there). This provides a foundation for mapping and analysis that is used in science and almost every industry. GIS helps users understand patterns, relationships, and geographic context. The benefits include improved communication and efficiency as well as better management and decision making." See here: https://www.esri.com/en-us/what-is-gis/overview
Industry	Industry	An 'industry' can be considered a collection of organisations within a specific sector where they are typically involved in a specific internal sector activity, e.g., an oil company may be extracting oil – oil can be considered a primary sector industry, as can forestry and in this instance marine fishing, and extraction of crude petroleum and natural gas (offshore). An industry is a group of companies that are related based on their primary business activities. In modern economies, there are dozens of industry classifications. Industry classifications are typically grouped into larger categories called sectors. While a sector (see below) represents a large segment of an economy that includes many companies, an industry represents a narrower focus of the companies within a particular sector. Thus, industries are the result of breaking down a sector into more defined and specific groupings. On the other hand, sectors can represent a large grouping of companies that have similar business activities, and hence why economic analysis for benefit / value analysis purposes is ideally addressed at sector level.
INFOMAR	Integrated Mapping for the sustainable development of Ireland's marine resource	INFOMAR is a DECC funded joint programme between the Geological Survey Ireland and the Marine Institute, surveying Irelands unmapped marine territory and creating a range of integrated mapping products of the physical, chemical, and biological features of the seabed. See here: https://www.infomar.ie/
IHO	International Hydrographic Organization (IHO)	The International Hydrographic Organization (IHO) is an intergovernmental organisation representing hydrography. See here: https://iho.int/en/

IMO	International Maritime Organization	The International Maritime Organization is a specialised agency of the United Nations responsible for regulating shipping. See here: https://www.imo.org/en
LIDAR	Light Detection And Ranging	Light Detection And Ranging - a method for determining ranges (variable distance) by targeting an object or a surface with a laser and measuring the time for the reflected light to return to the receiver. It can also be used to make digital 3-D representations of areas on the earth's surface and ocean bottom by varying the wavelength of light. It has terrestrial, airborne, and mobile applications.
MIRO	MIRO (Brand)	MIRO – an online whiteboard and collaboration solution
MPA	Marine Protected Area	A marine protected area is a defined region designated and managed for the long-term conservation of marine resources, ecosystems services, or cultural heritage. For Guidelines for applying the IUCN protected area management categories to marine protected areas, see here: https://portals.iucn.org/library/node/48887 [2nd Edition]
NEEA	National Enhanced Elevation Assessment	National Enhanced Elevation Assessment. 'National Enhanced Elevation Assessment (NEEA)' was conducted to document national level requirements for enhanced elevation data, estimate the benefits and costs of meeting those requirements, and evaluate multiple national enhanced elevation program scenarios. For the NEEA final report See here: https://www.dewberry.com/services/geospatial-mapping-and-survey/national-enhanced-elevation-assessment-final-report
NLAI	NLA International (Company)	NLA Internal (Company). See here: https://nlai.blue/
NPV	Net Present Value	Net Present Value is the value in the present of a sum of money, in contrast to some future value it will have when it has been invested at compound interest.
N/A	Not Applicable	Not Applicable
OECD	The Organisation for Economic Co-operation and Development	The Organisation for Economic Co-operation and Development is an intergovernmental economic organisation with 38 member countries, founded in 1961 to stimulate economic progress and world trade.
OSM	OpenStreet Map	OpenStreetMap is a collaborative project to create a free editable geographic database of the world. The geodata underlying the maps is considered the primary output of the project. See here: https://www.openstreetmap.org/about?msclkid=f1f7bfc1c09311ecab872fb810f3e417
QC	Quality Control	Quality management review process/procedure.
Sector	Sector	A 'sector' is an area of the economy in which businesses share the same or related business activity, product, or service. Sectors represent a large grouping of companies with similar business activities, such as the extraction of natural resources and agriculture. Dividing an economy into different sectors helps economists analyse the economic activity within those sectors. As a result, sector analysis

		provides an indication as to whether an economy is expanding or if areas of an economy are experiencing contraction. Further, Sectors are used by economists to classify economic activity by grouping companies that are engaged in similar business activities. While a sector represents a large segment of an economy that includes many companies, an industry (see above) represents a narrower focus of the companies within a particular sector. Thus, industries are the result of breaking down a sector into more defined and specific groupings. On the other hand, sectors can represent a large grouping of companies that have similar business activities, and hence why economic analysis for benefit / value analysis purposes is ideally addressed at sector level.
SCT	Survey Coordination Tool	Survey Coordination Tool (SCT) an AusSeabed Tool. The Survey Coordination Tool (SCT) is designed for the seabed mapping community to communicate their plans to survey as well as outline areas they have prioritised for survey. It also hosts the online form for submitting survey requests to the Australian Hydrographic Office (AHO) for consideration by the HydroScheme Industry Partnership Programme. See here: https://www.ausseabed.gov.au/survey-coordination-tool
TBC/TBD	To Be Confirmed / To Be Determined	To Be Confirmed / To Be Determined
TEV	Total Economic Value	Total Economic Value (TEV). Used in the quantification of economic value, where Total Economic Value = Total User Value + Total Non-user Value. Total User Value includes both direct use and indirect use.
TOR	Terms of Reference	Terms of Reference (TOR) define the purpose and structures of a project, committee, meeting, negotiation, or any similar collection of people who have agreed to work together to accomplish a shared goal.
UK HMG	United Kingdom Her Majesty's Government	United Kingdom Government
USA	United States of America	United States of America
Use Value	(Economic) Use Value	Where (economic) value accrues or is derived through Direct, Indirect or Spill Over, including: #Direct use value: Where value accrues to users of [geospatial data. This could include a sales and marketing firm using [geospatial] data to make better decisions and increasing profitability as a result. #Use Value: where value is also derived by indirect beneficiaries who interact with direct users. This could include other firms in the supply chain of the direct user or the firm's customers. #Spillover Use Value: Value that accrues to others who are not a direct data user or indirect beneficiary. This could, for example, include lower levels of emissions that generate health benefits to

		individuals which result from optimisation of the end-to-end supply chain of the direct user.
USGS	United States Geological Survey	The United States Geological Survey, abbreviated USGS and formerly simply known as the Geological Survey, is a scientific agency of the United States government.
WITS	Wind In The Sails	Project Name ‘Wind In The Sails.’
WG/WGs	Working Group (s)	A committee or group appointed to study and report on a particular question and make recommendations based on its findings.

ANNEX 2: REFERENCES

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