



Methodologies for qualification, assessment and prioritisation of potential harmonisation or alignment at European level

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1. Introduction

1.1. Purpose

This report describes the methodologies that will be applied in order to develop a list of recommended interventions – including alignment and harmonisation where appropriate – for improving the health and safety performance of the European wind industry and for facilitating more effective deployment of onshore and offshore wind.

The purpose of this report is to ensure the Wind Harmony project proceeds on the basis of clearly defined methodologies that have been scrutinised and agreed by other members of the project consortium, the project steering group and the European Commission.

1.2. Background

The Wind Harmony project is broad in its scope. The research phase will examine health and safety legislation, certification protocols and recognised ‘standard’ industry practices in 31 EU and EFTA countries (the ‘target countries’). The stakeholder engagement activities will seek the views of a broad cross-section of industry representatives, including developers, manufacturers, contractors, training providers, inspection and testing bodies, regulators, consultants, independent experts and workers. The project covers both onshore and offshore wind and considers health and safety risks and opportunities through the entire project lifecycle.

The outputs from the research tasks and engagement efforts (documented in separate project reports) will together inform an initial list of *potential candidate topics*.

A *candidate topic* can be broadly defined as any issue where the lack of a standardised or harmonised approach, either across the target countries or across all parts of the wind industry, introduces an unacceptable health and/or safety risk, or a barrier to efficiency, cost-reduction or innovation in the European wind industry. Candidate topics may also be opportunities for improving performance, for example the sharing of good practice or realising efficiencies across borders and sectors.

The potential candidate topics that emerge at the first stage are expected to be diverse in their scope and subject matter, ranging from strategic, industry-wide issues, to technical matters relating to specific safety hazards, equipment and work processes.

Potential candidate topics may relate specifically to:

- Onshore or offshore wind, or both
- All target countries or only a subset
- One major component or to the entire wind farm
- One or many phases of the wind farm life cycle

The volume of potential candidate topics is expected to be significant. The final required output from the project is a list of approximately 15-30 recommended interventions that will achieve maximum value in terms of improvements in health and safety performance, and the effective deployment of onshore and offshore wind. As such, robust methodologies for processing, analysing and distilling the potential candidate topics that emerge from the research and engagement phases, are critical to success.

1.3. Summary of Methodologies

The methodologies described in this report allow for the systematic filtering, prioritisation and assessment of the potential candidate topics to produce a shortlist of recommended interventions for presentation to the European Commission and to wind industry stakeholders, including via Task 6 events. Crucially, the methodologies depend on the input and engagement of the wider wind industry – the key to successfully identifying the issues and proposing solutions.

This report describes the three methodologies necessary to evaluate the potential candidate topics and develop a list of recommended interventions. These are summarised in **Error! Reference source not found.** and Figure 1. In broad terms:

- Methodology 1 seeks to create a consolidated list of candidate topics where harmonisation or alignment may be appropriate, using the outputs of the earlier project tasks. This is a desk-based exercise
- Methodology 2 consists of facilitated stakeholder workshops aimed at identifying and agreeing a shortlist of areas for potential alignment or harmonisation, and possible intervention options, based on the views and experiences of industry. The outputs of Methodology 1 are a key input to the workshops
- Methodology 3 seeks to assess the likely costs, benefits (and short-term risks) of the intervention option(s) identified for each shortlisted area for potential alignment or harmonisation in order to prioritise those interventions.

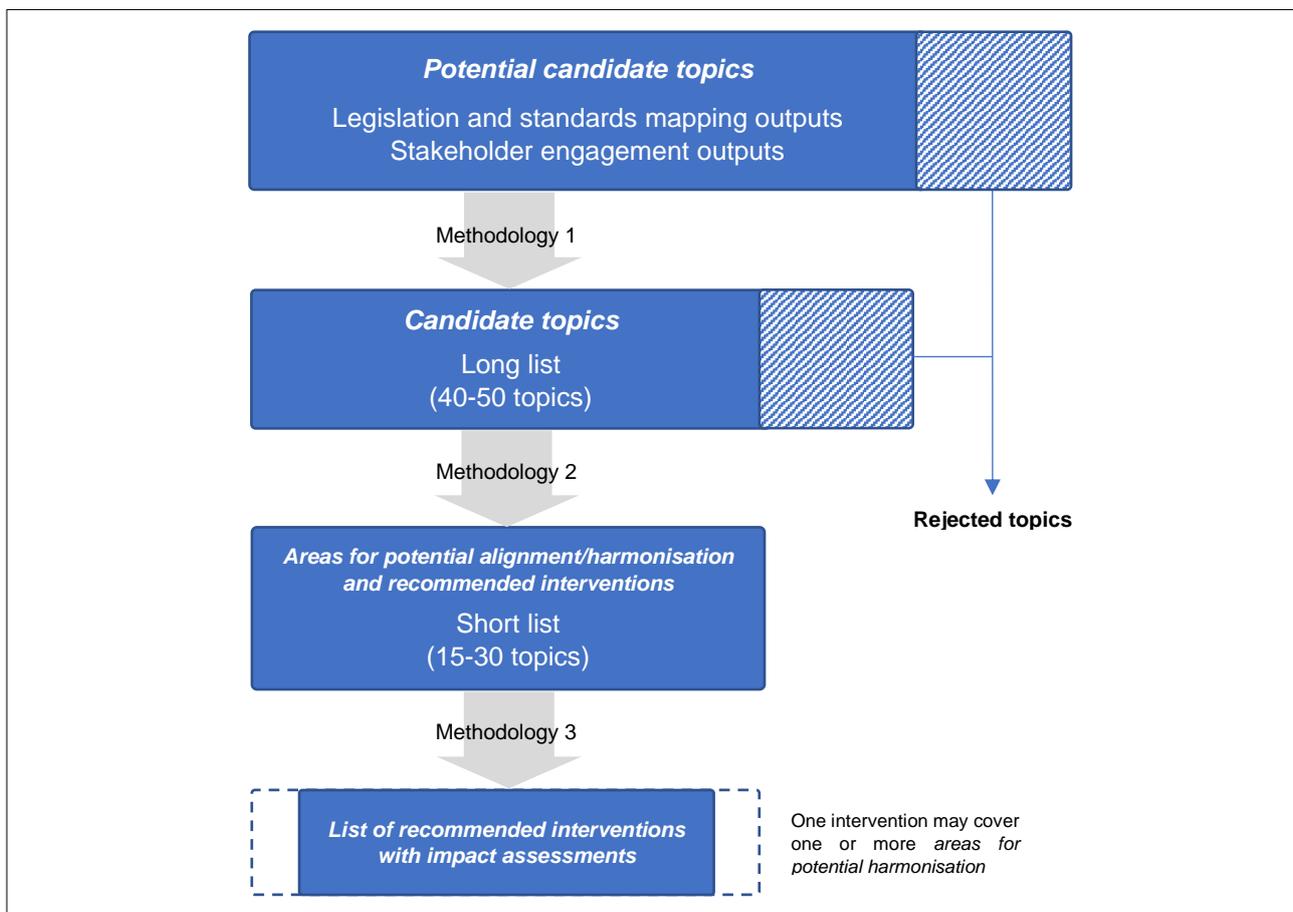


Figure 1: Flowchart depicting the application of the three methodologies to the 'potential candidate topics' in order to develop a list of recommended interventions for presentation to the European Commission and industry stakeholders

The project consortium has not sought to predict the outcome of the research and engagement phases of the project or the potential candidate topics that will emerge. The methodologies have therefore been designed to process any potential candidate topics regardless of their nature, scope or source.

1.4. Project Context

The development of methodologies as outlined in this report form Task 4 of the Wind Harmony project.

The application of the methodologies (assessment of potential candidate topics, workshops, development of shortlist and proposed intervention options and undertaking of impact assessments) and publication of the results forms Task 5.

In Task 6, the findings of the project – including the outputs from Task 5 – will be presented to the industry as part of a series of ‘best practice sharing events’ and will inform training ‘roadmaps’.

2. Development of Methodologies

2.1. Key Principles

The methodologies described in this report were developed in accordance with three key principles. Together, the principles ensured that the methodologies were appropriate to the Wind Harmony project, the scope and scale of the anticipated data inputs and the required outputs.

The three key principles were:

- Application of **evidence-based** (or led) decision-making, while considering industry perceptions and priorities as a key driver
- Application of a **risk-based** approach to assess inputs and define and refine recommendations
- **Consistency and alignment** with European treaties and applicable policy making at an EU and member-state level

These principles are also consistent with regulatory policy and common health and safety frameworks. The developed methodologies therefore draw on:

- Recognised theories and approaches for conducting risk-based evaluations
- Member-state and EU policy and legislation highlighting the principles of evidence-based policymaking

These concepts and principles are summarised in the following subsections.

In addition, the methodologies were designed to be clear and transparent, allow for objective and impartial analysis of the input data and require stakeholder participation and validation throughout.

2.1.1. Evidence-Based

Evidence based policy and decision making has been a tool that has been used in an increasing variety of governmental, regulatory and other institutions for many years.

Evidence-based policy (EBP) is a term often applied in multiple fields of public policy to refer to situations whereby policy decisions are informed by established objective (scientific) evidence. It reflects a common belief that social goals (e.g. a safety and health of workers) are best served when scientific evidence is used rigorously and comprehensively to inform decisions.

The selection and justification of an evidence-based approach for this project is reinforced EC initiatives and programmes including *Knowledge4Policy* (K4P)¹ a developing platform supporting evidence-based policymaking and the *EU4Facts Evidence for Policy*² community of practice. The paper '*Strengthening evidence-based policy making through scientific advice – Reviewing existing practice and setting up a European Science Advice Mechanism*' (EC, 2015)³ underlines the evidence-based approach.

The evidence to be processed using the methodologies described in this report is collected principally in the research and stakeholder engagement phases (Tasks 1-3).

¹ Knowledge4Policy at European Commission website: <https://ec.europa.eu/knowledge4policy/>

² EU4Facts at European Commission website: <https://ec.europa.eu/jrc/communities/en/community/76/about>

³ Available from: https://ec.europa.eu/research/sam/pdf/strengthening_evidence_based_policy_making.pdf

2.1.2. Risk-Based

A risk-based method will be used as it allows for a consistent and evidence-based approach to be adopted. Due to the volume, complexity and diversity of hazards, regulations and standards that are expected in the wind sector, alongside the development of many new and emerging technologies, the method will need to be able to filter and prioritize the ‘important’ (high risk) topics from other ‘less significant’ topics.

There are a variety of models, templates and frameworks that adopt this approach including:

- Eisenhower Matrix (Urgency-Importance model)⁴
- Cynefin Framework⁵
- Risk management standards (e.g. ISO 31000:2018 – Risk Management)
- Risk assessment approaches/models (e.g. the widely adopted likelihood-consequence or model)

The aggregation of these models and approaches is the **Impact-Concern** model, illustrated in Figure 2. The model has been newly developed for this project due to its simplicity and the commonly accepted use of similar matrices in the risk and health and safety communities.

This model forms the basis of the methodologies described in this report (specifically Methodology 2, section 3.2.3), to be applied in Task 5 of the project.

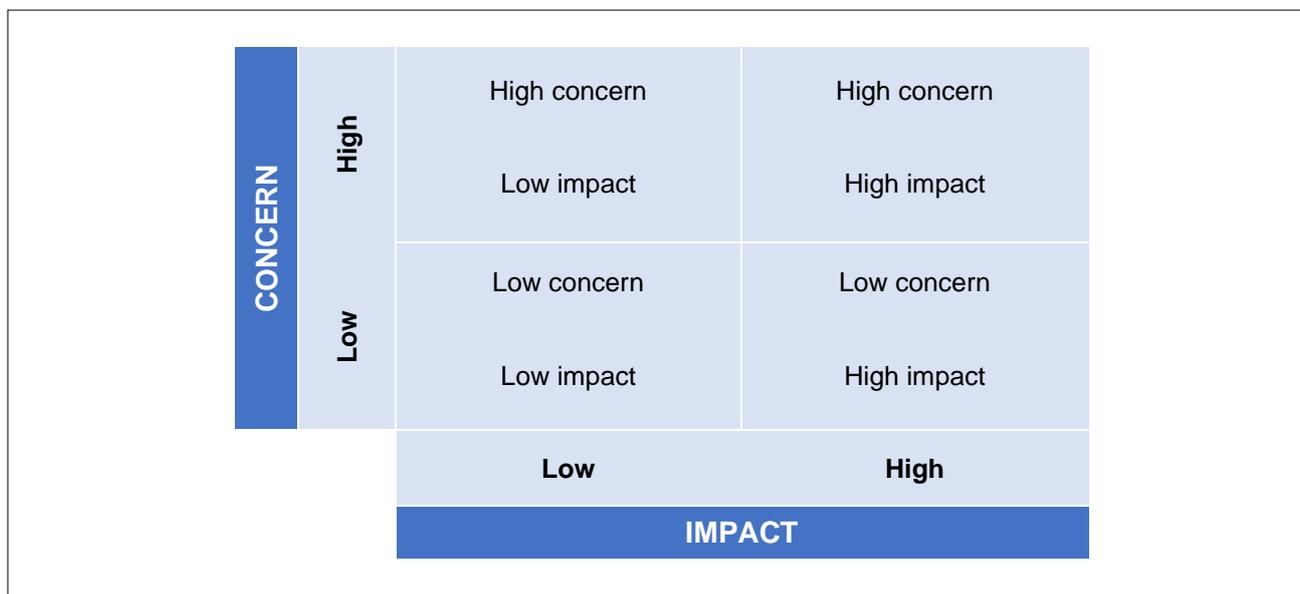


Figure 2: Basic Impact-Concern model used as the basis for the Wind Harmony methodologies

⁴ Various online sources

⁵ Summary of Cynefin Framework in Harvard Business Review: <https://hbr.org/2007/11/a-leaders-framework-for-decision-making>

2.1.3. Policy and Regulatory Alignment

It is important that any recommendations made by this project are consistent with relevant European policy and law. We do not provide detailed justification of the analysis of all relevant areas that could be applicable. However, account is taken of the principles set out in:

- *Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community*⁶ (2007) including the attached *Protocol on the Application of the Principles of Subsidiarity and Proportionality*
- *Communication from the Commission on the Precautionary Principle* (COM (2000) 1)⁷
- European Parliament factsheet: *The Principle of Subsidiarity*⁸

The European Parliament factsheet states that, “*The principle of subsidiarity and the principle of proportionality govern the exercise of the EU’s competences. In areas in which the European Union does not have exclusive competence, the principle of subsidiarity seeks to safeguard the ability of the Member States to take decisions and action and authorises intervention by the Union when the objectives of an action cannot be sufficiently achieved by the Member States, but can be better achieved at Union level, ‘by reason of the scale and effects of the proposed action’.*”

As the deployment of onshore and offshore wind at scale is relatively immature in most target geographies, certain risks including occupational health and wellbeing and the deploying of new technologies are not yet comprehensively understood. The wind industry has been operating ‘at scale’ for approximately 20 years for onshore wind and approximately half that for offshore wind. Health issues can have lengthy latency periods so the nature and severity of these risks may not become apparent or be fully understood for a number of years. It is therefore essential to apply the **precautionary principle** when seeking to identify the issues and formulate policies in response.

The project may find that solutions to the identified issues are best realised at a local (member state) level and that European level intervention is not appropriate, thus allowing alignment with local laws and customs. However, in certain cases there may be a clear benefit in taking action at the European level – for example, due to the cross-boundary nature of the supply chain and workforce. The **principle of subsidiarity** will therefore need to be considered when formulating and proposing recommendations for European-level intervention.

⁶ Text of Lisbon Treaty on EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2007:306:FULL&from=EN>

⁷ Text of Communication on EUR-Lex: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2000:0001:FIN:EN:PDF>

⁸ Factsheet on European Parliament website: <http://www.europarl.europa.eu/factsheets/en/sheet/7/the-principle-of-subsidiarity>

3. Description of Methodologies

3.1. Methodology 1: Identification of candidate topics

Desk-based analysis

3.1.1. Purpose

The purpose of Methodology 1 is to process the relevant outputs of the research and engagement phases of the project (the potential candidate topics) into a 'long list' of candidate topics through consolidation and initial filtering and prioritisation, as shown in Figure 3.

The volume of potential candidate topics is expected to be significant and the topics are likely to cover a broad and disparate range of risks, challenges, concerns and opportunities. Methodology 1 narrows the potential candidate topics down to a long list of approximately 40-50 candidate topics for further assessment in Methodology 2.

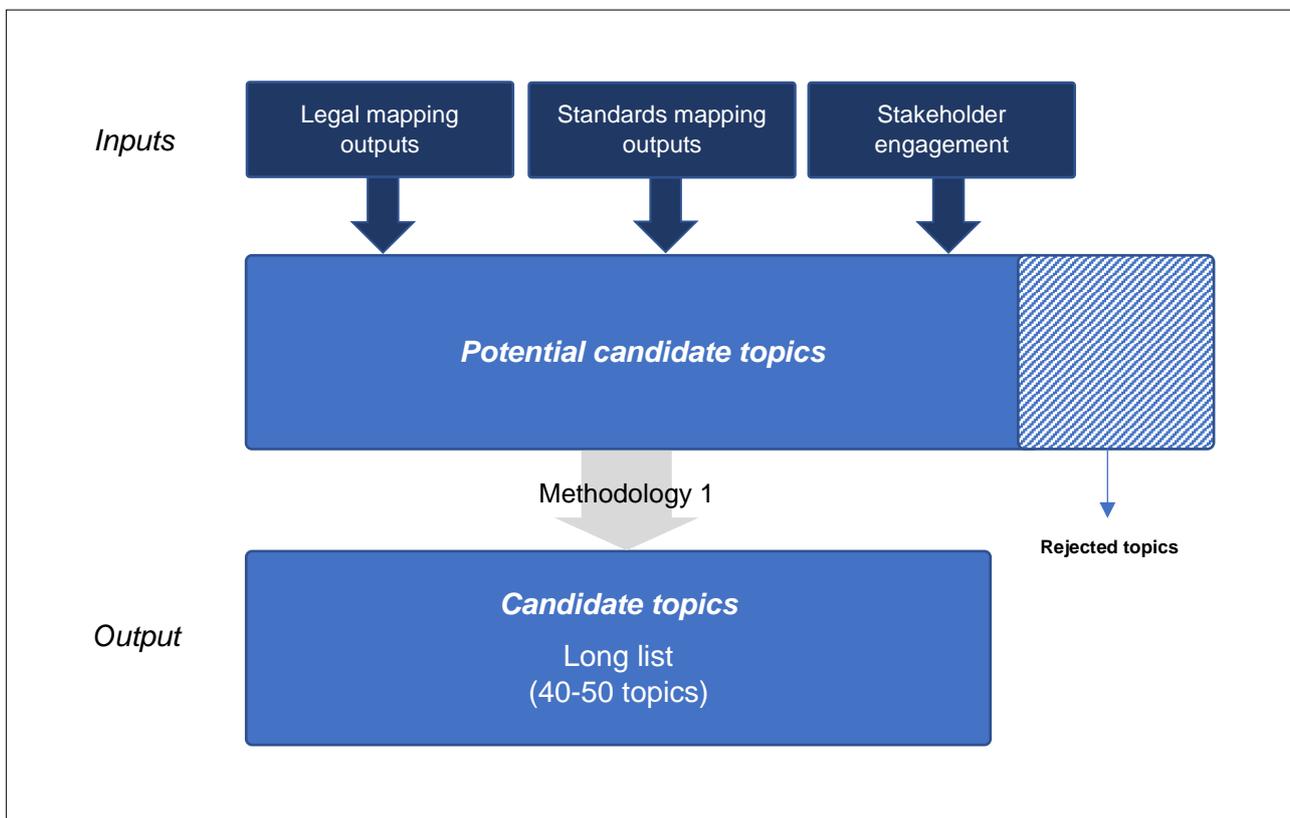


Figure 3: Summary flowchart for Methodology 1

The number of candidate topics in the long list is not fixed, but the list must be of a manageable length to allow for thorough assessment in later stages, within the project timescales.

3.1.2. Inputs

The inputs for Methodology 1 are the following specific outputs from the research and stakeholder engagement phases of the project:

- Identified differences and commonalities in health and safety legislation application to wind energy projects in the target countries
- Analysis of the application of national, European or industry standards and certification⁹ processes to the wind industry, including the extent of mutual recognition of such standards and processes
- Challenges and barriers to adopting to standardised procedures and interdependencies between these barriers
- Identified health and safety risk management practices operating in the European wind industry
- Identified relevant health and safety risk management practices operating in other, potentially more mature, industry sectors (for example, oil and gas and conventional power generation)
- Specific health and safety hazards, risks, challenges and concerns as identified by stakeholders via engagement events (particularly the workshops required for Task 3 of the Wind Harmony project)

These inputs are collectively termed the 'potential candidate topics'.

Should the research and stakeholder engagement phases fail to identify key health and safety issues that are known to the consortium, these issues shall be added to the list of potential candidate topics and be subject to initial assessment via Methodology 1. This is to ensure that all issues are subjected to the same degree of scrutiny and are only put forward as candidate topics if they pass the initial assessment described below.

3.1.3. Description of Method

Methodology 1 consists of two stages, as follows:

Stage 1: Assembly of a working list of potential candidate topics. Consolidation of potential candidate topics, merging duplicates and those that are broadly similar in subject matter and scope.

Stage 2: First stage filtering of the consolidated list of potential candidate topics, assessing the reach and scope of each topic, prioritising those that apply more broadly across a wind farm development (temporally and spatially) and eliminating specialised or niche topics where the value in harmonisation is likely to be limited.

Stage 1

At Stage 1, a list of potential candidate topics is collated from the outputs of the research and stakeholder engagement tasks. The list will be presented in tabular form (see Figure 4). Each potential candidate topic will be described to ensure the nature and scope of the topic is clearly defined and unambiguous. A 'subject area' will be assigned to each topic - these will match the topics (certification, competence schemes, safety inspection etc) and hazards (lifting operations, working at height, electrical safety etc) used in the legal and standards mapping tasks and will inform the consolidation task at Stage 2 ensuring that high-hazard topics are adequately reflected in the list.

The consolidation of topics is based primarily upon the judgement and expertise of the consortium and, where appropriate, key stakeholders drawn from the project steering group (in order to provide a degree of independent industry sense-checking). Potential candidate topics that should be merged

⁹ 'Standards' in this context is not limited to those published by national or international standards bodies and 'certification' is not limited to the verification of conformity with these standards. It may also refer to industry-led procedures, protocols or guidance that have achieved widespread acceptance and adoption within the wind industry. Examples include the GWO training standards and the accepted standard process for conducting offshore transfers of personnel

are likely to be self-evident. The intent of Stage 1 is to organise the list of potential candidate topics to streamline the Stage 2 filtering.

ID	Potential candidate topic	Description	Source	Subject area(s)
1	Confined space training	Significant hazard with no common approach to training, or minimum competence standards for entry to or supervision of works in confined spaces	Stakeholders	Training Competency schemes Confined spaces
2	Wind turbine safety design standard	No common design standard for wind turbine generators manufactured or installed in Europe	Research Stakeholders	Technical standards Certification schemes
3	Lighting and marking of WTGs	No common approach to lighting and marking WTGs for safety and navigational purposes	Stakeholders	Technical standards Aviation Marine operations
⋮				
n				

Figure 4: Initial potential candidate topic list structure and example entries

Stage 2

At Stage 2 the potential candidate topics are assessed for relevance or applicability to each of the following criteria:

- **Work activity** type
- **Work location** (or main asset type) within the windfarm site
- Wind farm **life cycle phase**

The life cycle phases will match those used in the legal research phase of the project¹⁰. The activity types, work location types and life cycle phases to be used are listed in Figure 5.

Work activities	Work locations / main asset types	Life cycle phases
Transportation (on site)	Foundations/transition piece	Design
Mechanical lifting	WTG tower	Installation
Height access/working	WTG nacelle/hub	Commissioning
Work over or under water	WTG blades	Operations
Use of tools/equipment	Site (onshore)	Maintenance
Work on electrical systems	Site (offshore)	Upgrade/repowering/life extension ¹¹
Marine/air operations/transfers	Ancillary structures (met mast etc)	Decommissioning
Work in restricted/confined spaces		

Figure 5: Work location types, work activity types, and life cycle phases for Stage 2 assessments

¹⁰ The 'vessel or haulier loading and unloading on site' phase has been considered as an 'activity' rather than a life cycle phase

¹¹ Life extension considered separately at the mapping stage but combined here as these phases share common hazards and risks

The Stage 2 assessment will be conducted using a simple scoring grid for each criteria group – three grids in total. The structure of these scoring grids is shown in Figure 6 using the life cycle phases as an example.

The scores for each potential candidate topic from the three scoring grids shall be aggregated to produce an overall score – see Figure 7. Topics with the highest aggregated scores have the broadest scope and reach and shall therefore be prioritised for taking forward to Methodology 2 over those with low scores.

ID	Potential candidate topic	Design	Install.	Comm.	Ops.	Maint.	Upgrade	Decom.	Total
1	Confined space training		✓	✓	✓	✓	✓	✓	6
2	Wind turbine safety design standard	✓	✓	✓	✓	✓	✓	✓	7
3	Lighting and marking of WTGs	✓			✓	✓			3
⋮									
n									

Figure 6: Scoring grid layout and example entries for assessing applicability of each potential candidate topic to project life cycle phases, to illustrate the Stage 2 assessment

However, all potential candidate topics – regardless of aggregated score – shall be individually assessed to ensure those topics with a narrow scope but which relate to a major hazard or significant risk, and those which have already been identified as high priority by the wind industry itself, are not eliminated.

This assessment will identify those potential candidate topics that can be clearly linked to recent accident data (particularly serious incidents resulting in fatalities and major injuries) and/or are subject to existing industry initiatives.

Consideration will also be given to those topics around which there was consensus at the stakeholder engagement stage. Topics raised by multiple participants will be flagged, particularly if those participants represent a broad range of sub-sectors and member states.

All topics will be objectively evaluated by the consortium experts, based on their experience and understanding of the wind industry. Topics that would not necessarily pass the Stage 2 tests – for example, due to their limited applicability - may be retained if they are considered to be a significant challenge facing the wind industry and therefore worthy of further consideration in Methodology 2.

In each case commentary on each topic, including a reasoned justification for selection or rejection will be provided in a final ranked list of potential candidate topics.

ID	Potential candidate topic	Score (activities)	Score (locations)	Score (life cycle)	Total score	Commentary and justification	Selected?
1	Confined space training	1	3	6	10	High-hazard activity Stakeholder consensus Limited existing regulation Discrepancies in terminology (i.e. restricted vs. confined) and approach increases risk	Yes
2	Wind turbine safety design standard	5	4	7	16	Eliminating/designing out risk is top of the hierarchy of controls Stakeholder consensus	Yes
3	Lighting and marking of WTGs	1	4	3	8	Limited applicability No consensus Limited evidence that non-harmonised approaches in member states increases risk	No
⋮							
n							

Figure 7: Score aggregation table and example entries. Potential candidate topics shall be ranked by score. This table shall enable readers to understand the rationale for selecting (or rejecting) topics

3.1.4. Validation of Method

Methodology 1 has been validated through peer review by members of the Wind Harmony consortium and selected steering group members.

The consortium and steering group will be invited to review the completed aggregation table (Figure 7) to check and validate the assigned scores, selection decision and justification for each potential candidate topic.

It is important to note that at Methodology 2, industry stakeholders have the opportunity to include any topic (on which they can collectively agree) on the shortlist of topics for intervention. The candidate topic list generated in Methodology 1 is intended to support the stakeholder workshops by presenting a pre-filtered and prioritised list for the consideration of the participants. Conversely, topics that are considered by the consortium to be 'high priority', but that are not identified as such by the workshop attendees, may be included on the shortlist.

3.1.5. Outputs and Presentation of Results

The outputs from Methodology 1 are:

- Completed aggregation table (Figure 7) showing the assigned scores, selection decision and justification for each potential candidate topic. This table will also identify where potential candidate topics have been merged
- Raw list of candidate topics for use in Methodology 2 workshops

3.2. Methodology 2: Shortlisting and identification of intervention options

Stakeholder workshop

3.2.1. Purpose

The purpose of Methodology 2 is, with industry engagement, to generate and agree a shortlist of 15-30 areas for potential alignment or harmonisation, along with appropriate intervention options for each, as shown in Figure 8. The final number of topics may be slightly longer than 30 items or shorter than 15 depending on the findings of the evaluation process.

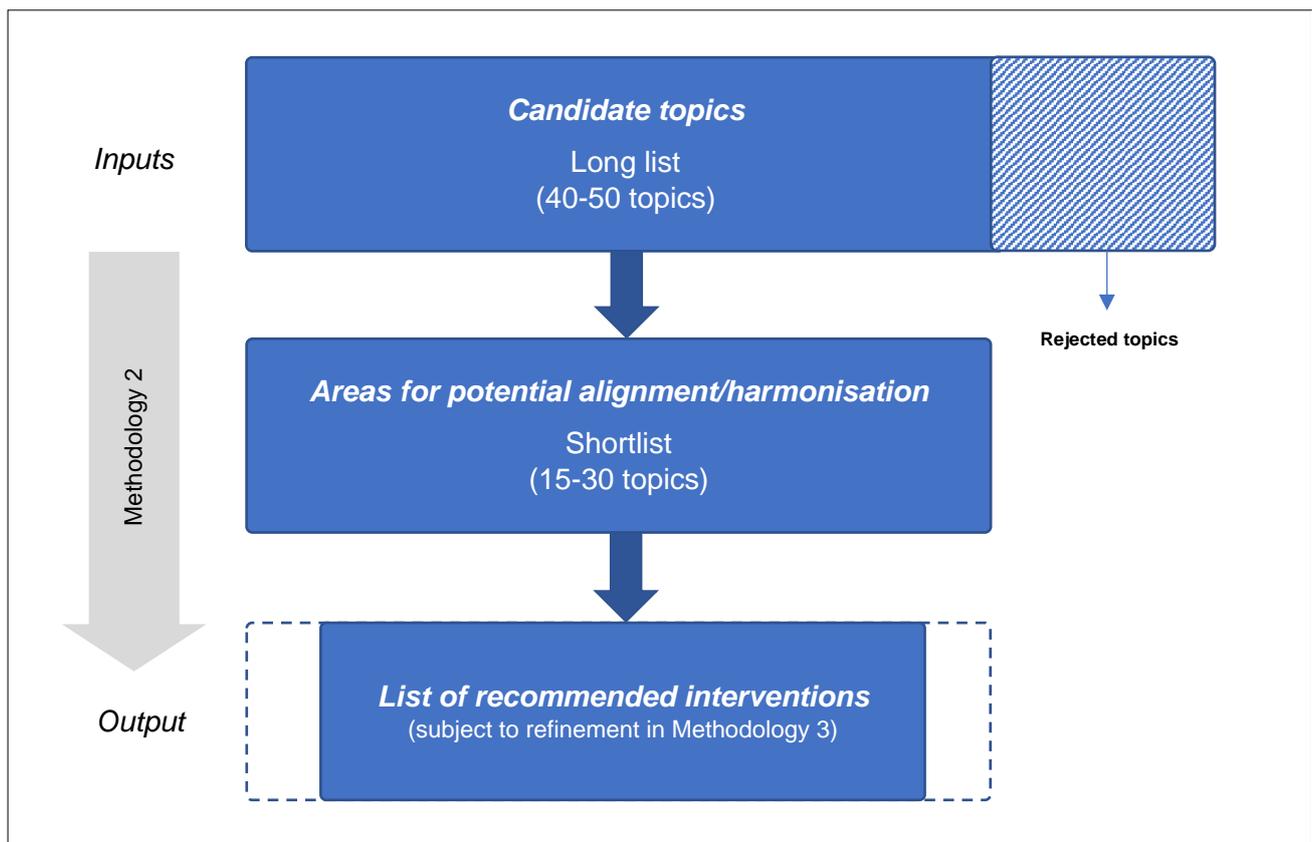


Figure 8: Summary flowchart for Methodology 2

3.2.2. Inputs

The inputs to Methodology 2 are primarily the contributions of the workshop attendees. The long list of candidate topics identified via Methodology 1 are presented during the workshops for consideration and validation. It is therefore critical that attendees represent a balanced range of interest and competencies to avoid bias in favour of any particular sector, target country or viewpoint.

3.2.3. Description of Method

Methodology 2 consists of facilitated stakeholder workshops that aim to:

- Generate a shortlist of areas for potential alignment or harmonisation
- Identify a suitable intervention option (or options) for each shortlisted area

Concept

Methodology 2 is based upon the impact-concern model described in section 2.

The workshops will be structured around the application of the following function:

$$f \text{ Impact } (Hz \times Va) * \text{ Concern } (Pe \times Co)$$

Where:

- Hz = hazard (score 1-5)
- Va = value (score 1-3)
- Pe = performance (score 1-5)
- Co = consensus (score 1-3)

The rating (scoring) of the impact and concern parameters allows a quantified value of 'importance' for each candidate topic to be calculated. The allocation of ratings is described as follows:

Impact

The **hazard** (Hz) rating considers the potential severity of the health and safety outcome (known or suspected). The selected rating will be based on the potential to cause harm - death, occupational disease or injury.

Examples: Work at height in or on a wind turbine would be rated 5 as there is a potential for fatal injury associated with this activity. Musculoskeletal problems caused by regular ladder climbing would likely be rated 3. Minor injuries requiring self-administered first aid would be rated 1.

The **value** (Va) rating considers the potential economic and operational benefit of standardisation. The selected rating will be based on:

- The size of the directly exposed 'at risk' population (e.g. number of wind turbine technicians)
- The size or number of assets or projects affected (e.g. number of wind turbines)
- How particular the issue is to the wind sector (e.g. offshore transfers to wind turbines)
- The potential economic benefit that could be realised through enhanced interoperability (e.g. common training standards)¹²

Examples: A common technical safety design standard that would apply to all wind turbines would be rated 3. A standard that has no explicit wind significance and/or is only relevant to a small percentage of businesses would be rated 1.

The basis of good health and safety risk management should always be to adopt a precautionary approach. In scoring the hazard out of 5, the model gives greater emphasis to the prevention of harm (which may not be fully understood), as opposed to any economic cost or benefit that might be realised, which is scored out of 3.

¹² Noting that more detailed cost-benefit assessment is undertaken in Methodology 3

Concern

The **performance** (Pe) rating takes account of accident/incident rates in the wind sector and an assessment of the sector's performance by stakeholders. The selected rating will be based on:

- Evidence of serious failure/harm (e.g. significant accident rates)
- Relative performance above comparable benchmarks (e.g. oil and gas sector)
- Evidence of interventions by health and safety regulatory agencies (e.g. prosecutions, other enforcement action)
- Perceptions from stakeholders – including the media – identifying concerns (e.g. fires in wind turbines)

Examples: Activities with high incident rates such as manual handling would be rated 5. Activities where there have been some concerns raised by regulators, such as use of lifts in turbines, would be rated 3.

The **consensus** (Co) rating takes account of the degree to which there is already an acceptance that standardisation is required and/or is already emerging within the industry. The selected rating will consider whether:

- The topic is already being recognised (formally or informally) as a common industry practice
- There are any competitive restrictions/opportunities to developing a standard
- There is a clear demand or agreement to seek standardisation
- There are defined 'risk owners' who would be responsible for any standards that may be recommended and developed

Examples: Activities where there is already an accepted informal standard – such as vessel transfer – would be rated 3. Activities where there is no clear demand for standardisation would be rated 1.

The concern rating also adopts a precautionary approach with greater weighting given to performance (where objective evidence of harm is or is likely to be available) over consensus which is a more subjective parameter.

It is important to note that the Hz, Va, Pe and Co values for each topic will be assigned by the workshop attendees through the facilitated process described in the following sections. This is to ensure that the industry itself has a central role in generating the shortlist of topics. This principle aims to minimise the possible disconnect between recommendations that may be produced by the consortium and the priorities and concerns of the industry. Industry agreement and buy-in, and a collaborative approach, will be essential if any of the recommendations are to be successfully taken forward.

Application of Model

Methodology 2 is structured around a series of facilitated workshops, as described in this section.

Structure and Format

It is anticipated that each workshop will last a full working day. There are no fixed numbers of attendees as the main aim will be to get sufficient representation of all key stakeholders. It is expected that the minimum number of attendees (assuming reasonable cross section of representation) will be 10. However, the target number will be 20-30 attendees ideally covering:

- OEMs
- Owners and developers

- EPCI and specialist contractors
- Workforce representatives
- Regulatory authorities
- Industry associations
- Research, academia and consulting

Every effort will be made to ensure the attendees provide broad geographic coverage and represent both the onshore and offshore wind sectors. It will be particularly important to ensure participation of stakeholders from:

- Target countries where there is a well-developed regulatory environment for the wind industry **and** high installed capacity (or projected capacity)
- Target countries where there is poorly developed or absent regulatory environment for the wind industry **and** high projected capacity

This is to ensure that the workshops bring together participants from the ‘mature’ markets (where there is accumulated experience of controlling risks and standardising for health and safety) with participants from less mature markets where concerns, priorities and barriers may differ significantly.

The workshop structure and process is illustrated in Figure 10 and described in detail below.

Step 1

Attendees will independently list their own ‘top 10’ health and safety topics (those they perceive are the most significant issues facing the industry):

- Participants will rank in order of priority/importance each topic
- There with no prompting of participants
- Limited time will be given (maximum 5-minute exercise)
- Facilitator to give no feedback on consistency or divergence of lists created

Indicative output from this exercise is shown in Figure 9.

Topic/issue	Rank
PPE – standard rules across sector	8
WTG access lifts	2
Helicopter winching	6
Dropped objects	2
[Repeated for up to 10 options]	-

Figure 9: Step 1 ranking sheet layout and example entries

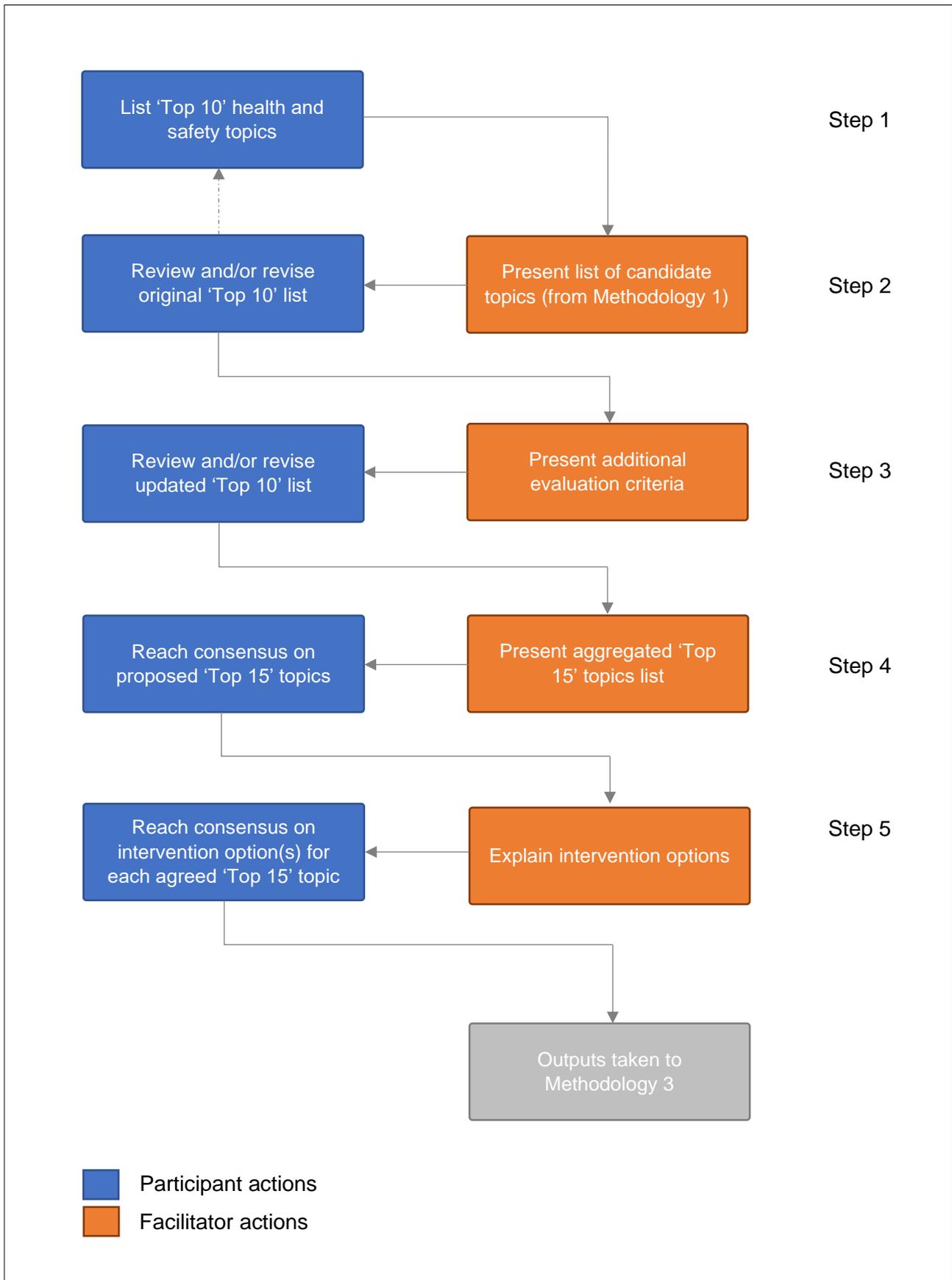


Figure 10: Structure and process for facilitated stakeholder workshops in support of Methodology 2.

Step 2

Facilitator will present the candidate topics list from Methodology 1 which may be supplemented by a limited number of additional topics raised by the group at Step 1. The facilitator may consolidate any additional topics into the existing candidate topics list if there are similarities.

Participants individually will be asked to update their initial 'top 10' based on the list of candidate topics, by amending the ranking sheet used in Step 1 (Figure 9). This step ensures the output from Methodology 1 is given due consideration in the shortlisting process.

Participants will be asked to plot their updated 'top 10' on a blank impact-concern matrix (Figure 11). At this stage, only basic verbal guidance will be provided to describe the impact-concern approach and the use of the matrix.

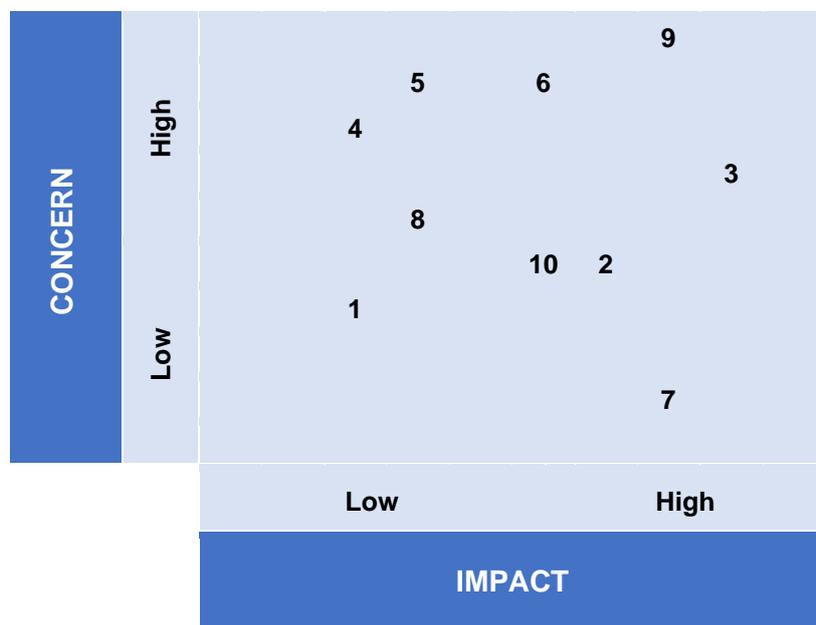


Figure 11: Step 2 plot matrix and example entries

Step 3

Facilitator will provide additional evaluation criteria to the group. Guidance will be given. The criteria are listed in Table 1: Step 3 evaluation criteriaTable 1.

Participants will replot their 'top 10' based on these criteria.

The original plots will be kept in order to identify where and why movements were made. An example of a completed (revised) plot is provided in Figure 12.

Assessment Criteria	Priority/Rating	Weighting	Evaluation Criteria
Hazard (Hz)	High	5	<ul style="list-style-type: none"> - Single/multiple fatality - Acute/chronic fatal or life-debilitating disease - Serious life-changing physical injury or health condition
	Medium	3	<ul style="list-style-type: none"> - Single/multiple injury - Acute/chronic health conditions - Significant life-affecting physical injury or health condition
	Low	1	<ul style="list-style-type: none"> - Trivial/minor harm potential - No significant acute/chronic health conditions - Limited life-affecting physical injury or health condition potential
Value (Va)	High	3	<ul style="list-style-type: none"> - Large directly exposed at-risk population - Significant number/scale of asset/project/operational application - Unique or highly particular relevance/application to wind sector - High economic benefit (direct and indirect) that could be realized
	Medium	2	<ul style="list-style-type: none"> - Medium scale of directly exposed population - Limited asset/project/operational exposure - Some relevance/application to wind sector - Some potential economic benefit (direct and indirect) that could be realized
	Low	1	<ul style="list-style-type: none"> - Low numbers of directly exposed population - Insignificant asset/project/operational exposure - No relevance/application to wind sector - No clear economic benefits (direct and indirect)
Performance (Pe)	Poor	5	<ul style="list-style-type: none"> - Direct evidence of serious failure/harm - Rates/performance above comparable benchmarks (industry/activity) - Direct intervention by enforcement agencies (on wind-specific issues) - Stakeholder performance perception – high concern
	Average	3	<ul style="list-style-type: none"> - Some evidence of failure/harm - Rates/performance comparable to benchmarks (industry/activity) - Limited intervention by enforcement agencies - Stakeholder performance perception – limited concern
	Good	1	<ul style="list-style-type: none"> - No/limited evidence of failure/harm - Rates/performance below comparable benchmarks (industry/activity) - No evidence of intervention by enforcement agencies - Stakeholder performance perception – no known concern
Consensus (Co)	High	3	<ul style="list-style-type: none"> - 'Standard' highly recognized or emerging as common industry practice - No competitive restrictions to develop a standard - Clear demand/agreement to seek standardization - Clearly defined 'risk owners' to be responsible for or 'own' standard
	Medium	2	<ul style="list-style-type: none"> - 'Standard' has some industry recognition - Some competitive restrictions to develop a standard - Some demand/agreement to seek standardization - Range of possible 'risk owners' to be responsible for or 'own' standard
	Low	1	<ul style="list-style-type: none"> - No recognition of 'standard' as a common industry practice - Significant competitive restrictions to develop a standard - No/limited demand/agreement to seek standardization - No defined 'risk owners' to be responsible for or 'own' standard

Table 1: Step 3 evaluation criteria

- Other stakeholders required to support the initiative
- The scope of the intervention (whether it applies to a specific product, or to the management of health and safety in general terms)
- Recommended solution (intervention option)

Groups/tables are not expected to fully scope or describe the proposed intervention in detail, only identify the most appropriate intervention type from the table.

Groups/tables will be asked to reach a consensus before submitted their completed list to the facilitator.

Where groups identify different intervention options for the same topics, the facilitator will initiate a brief discussion and individual voting will be used identify the preferred option. If there remains no clear preferred option, multiple intervention options may be carried forward to step 6 for further scrutiny.

Topic/issue	Actor with primary responsibility	Other stakeholders	Product or OHS standard	Recommended solution/intervention
WTG lifts	OEMs	Developers, regulators	Product	Harmonised standard
Induction training	Owners/developers	Contractors	OHS	Industry guidance
⋮				
[Repeat for all 10-15 topics]				

Figure 13: Step 4 intervention identification table

It is important to note that for some topics, the recommended intervention may not seek to achieve immediate harmonisation or alignment. As set out in Table 2, conducting further research, gathering additional data or maintaining the status quo (pending further review at a later date) may be the most appropriate action for some topics.

In addition to the formal list, and subject to time, the group will be given the opportunity to raise and share good practice examples that could benefit the industry at low or no cost and on shorter timescales. These will be captured by the consortium and reported on in the final report if deemed relevant.

Intervention	Subtype(s)	Purpose	H&S Example(s)
International law	<ul style="list-style-type: none"> - International conventions - EC Treaties 	Agreements on common objectives, principles and rules. Assist in facility transboundary movement of goods and services to enable interoperability. Enable development of common baseline product and performance standards	<ul style="list-style-type: none"> - UN - Global Harmonized System of Classification and Labelling of Chemicals (GHS)
Legislation	<ul style="list-style-type: none"> - EU Directives - EU Regulations - National/federal regulations 	Impose requirements, restrictions or conditions in relation to a specified activity. May be supported by mechanisms to secure compliance via enforcement actions	<ul style="list-style-type: none"> - Directive 2006/42/EC of the European Parliament and of The Council on machinery - Regulation (EC) No. 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
Standards (harmonized)	<ul style="list-style-type: none"> - Transposed harmonized standards (EN standards) 	Define state of the art for either a product or safety feature. Referenced when making a Declaration of Conformity. Can apply to common products (Type C), safety features (Type B) or general safety principles (Type A). Published in Official Journal	<ul style="list-style-type: none"> - EN ISO 19353:2016. Safety of machinery. Fire prevention and fire protection - EN 13852-1:2013. Cranes. Offshore cranes. General-purpose offshore cranes
Standards (other)	<ul style="list-style-type: none"> - Standards and technical specifications 	Rules, guidelines or characteristics for activities or for their results, aimed at achieving the optimum degree of order in a given context. Examples include product standards, test methods, codes of practice, guideline standards, management systems standards. Technical Specifications address work still under technical development	<ul style="list-style-type: none"> - EN 50308:2004. Wind turbines. Protective measures. Requirements for design, operation and maintenance - ISO 45001:2018. Occupational health and safety management systems
Codes of practice	<ul style="list-style-type: none"> - Codes of practice - Common rules 	Agreed common approaches defining standards or recommended 'rules' for controlling risks to meet health and safety obligations or to address specified risks. May be written/endorsed by range of actor such as regulators, standards bodies or industry associations. Typically apply only at a national/sector level	<ul style="list-style-type: none"> - Wind Turbine Safety Rules (WTSR) (UK)
Industry guidance	<ul style="list-style-type: none"> - Sector guidance 	Sector or activity specific good practice setting out recommended health and safety practices.	<ul style="list-style-type: none"> - G+ Good practice guideline - Working at height in the offshore wind industry - VDMA Safety Culture
Status quo	<ul style="list-style-type: none"> - 'Self-regulation' 	Businesses operate under applicable national H&S rules in addition to any self-imposed 'in-house' standards or safety programs. No direct oversight by regulators or industry associations. Duty holders determine which laws, standards or good practice apply to the risks they create	<ul style="list-style-type: none"> - Group or company H&S management systems
Research and development	<ul style="list-style-type: none"> - Collaborative research - Academic studies - Sector led initiatives 	R&D activities to generate evidence to assist in the recognition, evaluation and control of known and emerging health and safety risks. Often initiated as a result of data/statistics and horizon scanning activities	<ul style="list-style-type: none"> - <i>A detailed ergonomic assessment of ladder climbing: Key risks (short- and long-term) to technicians in the offshore wind industry (G+, 2018)</i>

Data and statistics	<ul style="list-style-type: none"> - Health & safety performance statistics 	Sector, activity or role specific health and safety performance statistics. Primarily record lagging (post incident/exposure) data (e.g. injuries). May also record leading indicators (e.g. training metrics). Aim to produced normalized data sets to identify key risks and monitor trends.	<ul style="list-style-type: none"> - G+ Health & Safety Statistics - AEE report on accidents in Spanish wind sector (2007-2017)
Horizon scanning	<ul style="list-style-type: none"> - Knowledge creation and sharing forums 	Networks, forums and knowledge exchanges to anticipate future health and risks and challenges	<ul style="list-style-type: none"> - European Risk Observatory - HSE Foresight Centre (www.hse.gov.uk/horizons)

Table 2: Summary of possible intervention options

Surveys

Methodology 2 is primarily delivered through workshops. It is however recognised that, for a number of reasons, attendance at workshops may not be representative of the European wind industry as a whole. There is a risk of over-representation of established companies from western and northern Europe and of large manufacturers and EPCI contractors over smaller, specialist contractors.

Where this is the case, web-based surveys will be used to target specific persons, market sectors or jurisdictions to ensure a more balanced view is obtained.

3.2.4. Validation of Method

Methodology 2 has been validated through peer review by members of the Wind Harmony consortium and selected steering group members. An internal trial run of the workshop shall be conducted to test the workability and credibility of the proposed approach. Minor adjustments to the workshop structure may be required as a result.

The consortium and steering group will be invited to review all outputs to ensure the methodology has been correctly applied and that the list of recommended interventions is balanced, proportionate and reflects the needs of the wind industry.

3.2.5. Outputs and Presentation of Results

The output from Methodology 2 are:

- Final list of 15-30 shortlisted topics for potential alignment or harmonisation, plotted on the impact-concern matrix (see Figure 14)
- Completed table (Figure 15) detailing the recommended intervention option(s) for each shortlisted topic

CONCERN Performance (Pe) / Consensus (Co)	High	PPE Extreme weather	Helicopter winching Marine co-ordination Dropped objects Inspection standards	
		ERPs		
	Low	Topics plotted here will not be taken forward as recommendations		Turbine design Mutual recognition Contractor selection Induction training
		Low	High	
IMPACT Hazard (Hz) / Value (Va)				

Figure 14: Example shortlisted topics plotted on the impact-concern matrix (Methodology 2 output)

Topic/issue	Hz	Va	Pe	Co	Rank	Recommended Intervention	Rationale/Justification

Figure 15: Shortlisted topics summary table (Methodology 2 output)

3.3. Methodology 3: Impact assessment of intervention options

Stakeholder workshop and desk-based analysis

3.3.1. Purpose

The purpose of Methodology 3 is to undertake an impact (cost-benefit) assessment of each of the intervention options identified in Methodology 2.

3.3.2. Inputs

The shortlisted areas for intervention/harmonisation and the recommended interventions identified via Methodology 2 are used as inputs to Methodology 3.

3.3.3. Description of Method

Methodology 3 is a two-stage process:

- Stage 1 is undertaken as part of the Methodology 2 stakeholder workshops as these present an opportunity to gather stakeholder views on the indicative costs and likely benefits of each recommended intervention
- Stage 2 is a desk-based analysis that will build upon the findings of Stage 1

Stage 1

Using the table in Figure 16, the workshop participants will be asked to consider, for each proposed intervention:

- The overall benefits that might be achieved in terms of risk reduction
- The potential costs, both direct/indirect, and one-off/ongoing (CAPEX and OPEX)
- The likely timelines and complexity of implementation
- Any other barriers to implementation

The benefits, costs and timelines/complexity shall be qualitatively assessed with participants asked to assign a high, medium or low rating for each. The workshop facilitator will provide indicative guidance on how ratings are to be assigned.

The participants will be asked to discuss and come to a broad consensus on this initial assessment.

Intervention	Benefits	Costs	Timeline/Complexity	Barriers
Common standard for WTG lifts	Medium	Medium	High	Other conflicting standards No clear risk owner
Standardised induction training	Medium	Low	Medium	Too many competing options/systems
⋮				
[Repeat for all 15 topics]				

Figure 16: Step 5 initial cost-benefit analysis table

Stage 2

At Stage 2, the data obtained in Stage 1 shall be reviewed and consolidated to understand the overall industry 'view' of each intervention option.

This assessment shall be built upon as a desk-based analysis. In particular, the Stage 1 workshop only requires participants to estimate the likely level of costs and benefits on a high-medium-low scale. At Stage 2, this requires further development to include evidence of where and how these costs may arise. This evidence may be sought from incident statistics, research papers (including those on the effectiveness of industry-led efforts on harmonisation), targeted stakeholder engagement and the experience and expertise of the consortium and steering group members.

3.3.4. Validation of Method

Methodology 3 has been validated through peer review by members of the Wind Harmony consortium and selected steering group members.

The consortium and steering group will be invited to review all outputs to ensure the methodology has been correctly applied and that the impact assessments are sound.

3.3.5. Outputs and Presentation of Results

The outputs of Methodology 3 are tabulated impact assessments for each proposed intervention, based on the template in Figure 17.

Intervention: [Insert Name/Title]			
Objective	[Summary of problem or opportunity being addressed]		
Proposed intervention	<i>Description</i>	[Insert summary]	
	<i>Type</i>	[See Table 2]	
	<i>Justification</i>	[Insert summary evidence]	
Rationale	<i>Criteria</i>	<i>Rating</i>	<i>Justification</i>
	Risk	[H/M/L]	[Insert summary evidence]
	Value	[H/M/L]	[Insert summary evidence]
	Consensus	[H/M/L]	[Insert summary evidence]
	Performance	[H/M/L]	[Insert summary evidence]
Socio-economic costs	Monetised	[Insert summary evidence]	
	Non-monetised	[Insert summary evidence]	
Benefits	Competitive	[Insert summary evidence]	
	Interoperability	[Insert summary evidence]	
	Other	[Insert summary evidence]	
Barriers	Political	[Insert summary evidence]	
	Legal	[Insert summary evidence]	
Timescales for Implementation	[Short/medium/long]	[Insert summary evidence]	

Figure 17: Impact assessment template

4. Deliverables

The methodologies described in this report feed directly into three project deliverables (at Task 5):

- D5.1: Report outlining the application of the methodologies and draft presentation of results
- D5.2: Report on potential socio-economic benefits, competitiveness improvements, the timescale to become effective and the potential barriers of the harmonisation of health and safety in the wind energy sector
- D5.3: Finalised list of initiatives (interventions) on health and safety including socio-economic benefits and potential barriers (completed impact assessments)

These outputs may be combined into a fewer than three deliverables for clarity. Any changes from the Technical Offer shall be agreed with the consortium and Commission.