BLUEMISSION AA
Building a coordination hub to support the mission implementation in the Atlantic and Arctic Basin

Demand Readiness Level

The demand for quick, effective, large-scale, and individualized coral reef restoration is anticipated to rise as a result of the increasing degradation of coral reefs driven by climate change. The Demand Readiness Level (DRL) is an additional scale to the Technology Readiness Level (TRL). It measures the maturity level of a need's expression by a potential innovator in a specific market, including leading markets focused on eco-innovation. Furthermore, it aims to understand and explain the gap between a technology push caused by TRL and a market pull that features a DRL.

	DRL: Demand Readiness Level	
Stage 5: Sustain		
Stage 4: Commercialize		
Stage 3: Develop & Test		
Stage 2: Prototype		
Stage 1: Conceptualize	9	Building the adapted answer to the expressed need in the market
	8	Identification of experts possessing the competences
	7	Definition of the necessary and sufficient competences and resources
	6	Translation of the expected functionalities into needed capabilities to build the response
	5	Identification of system capabilities
	4	Quantification of expected functionalities
	3	Identification of the expected functionalities for a new product/service
	2	Identification of a specific need
	1	Occurrence of feeling "something is missing"

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Demand Readiness Level

Stage 1: Conceptualize

Step 1: Occurrence of feeling "something is missing"

This is generally an informal, unstructured recognition of a potential need or problem, but without a clear understanding or definition of what exactly is needed or how it might be addressed.

HOW TO

By answering at least one of the following questions with YES, you can uncover informal and unstructured recognition of gaps and unmet needs in ocean restoration, laying the groundwork for deeper exploration and eventual innovation.

1. Are there noticeable changes in the ocean ecosystems that concern you?
2. Are there specific areas or species that seem to be deteriorating despite current efforts?
3. Do local communities and stakeholders say something about the current state of the ocean?
4. Have you heard any recurring complaints or concerns from those involved in or affected by ocean activities?
5. Are there restoration projects or initiatives currently underway, and do they seem effective?
6. Are there areas where current restoration methods seem to be failing or underperforming?
7. Is there anything that frustrates you about the current state of ocean restoration?
8. Do you wish that something could be done differently or better in ocean restoration?
9. Do people informally discuss potential issues or needs in ocean restoration?
10. Have there been any "aha" moments or sudden realizations about missing elements in current practices?
11. Are there any resources or tools you feel are lacking in your efforts to restore the ocean?
12. Are there any ideas or innovations you've come across that haven't been tried but seem promising?
13. Are there any broader environmental or societal impacts being neglected in current ocean restoration efforts?
14. Do you think the future of ocean restoration could be shaped differently by addressing missing elements?

Step 2: Identification of a specific need

At this step, the vague feeling that "something is missing", can be improved, streamlined or made more sustainable evolves into a more concrete understanding of what is required. This could be recognizing a gap in the market, a specific product feature that is lacking, or a particular problem that needs solving. The need is identified but not yet explored or defined in detail.

HOW TO

To delve deeper into identifying these needs, methodologies that offer structured approaches for fostering innovation are employed. This process is often referred to as Design Thinking or User-Centered Design (UCD). Both methodologies focus on understanding and addressing the needs and challenges of users to create innovative solutions. Both approaches involve multidisciplinary teams and stakeholders throughout the process to ensure diverse perspectives and ideas and therefore encourage creative thinking and exploring multiple solutions. Emphasizing an iterative development helps identify potential issues early, reducing the risk of failure.

Design Thinking

Design Thinking is a solution-focused, iterative approach to problem-solving that seeks to understand the user, challenge assumptions, and redefine problems in an attempt to identify alternative strategies and solutions. This approach can be applied to a wide range of challenges beyond just product design, including business strategy, organizational change, and process improvement.

	Objective	Techniques / Activities
1. **Empathize**	Understand the user's needs and experiences.	Observation, interviews, empathy maps.
2. **Define**	Clearly articulate the problem to be solved.	Problem statements, point of view statements.
3. **Ideate**	Generate a wide range of ideas and potential solutions.	Brainstorming, mind mapping, sketching.
4. **Prototype**	Create simple, low-cost prototypes to explore ideas and solutions.	Building models, developing mock-ups, creating digital prototypes.
5. **Test**	Evaluate the prototypes with users to gather feedback and insights.	User testing, feedback sessions, usability testing.
6. **Implement**	Develop and launch the final product based on the tested and refined prototype.	Detailed design, development, and deployment.

User-Centered Design (UCD)

User-Centered Design is an iterative design process that focuses on the users and their needs, preferences, and limitations at every phase of the design and development process. The aim is to create products that provide a great user experience. **Develop User Scenarios**

	Objective	Techniques / Activities
1. **Understand the User Context**	Gain a deep understanding of the users, their environment, and the tasks they need to perform.	Ethnographic studies, user interviews, contextual inquiries, personas.
2. **Specify User Requirements**	Define and document the user's needs and requirements.	User stories, use cases, task analyses.
3. **Design Solutions**	Develop design concepts and prototypes that address user needs.	Sketching, wireframing, creating low-fidelity and high-fidelity prototypes.
4. **Evaluate Design**	Test the prototypes with real users to gather feedback.	Usability testing, A/B testing, heuristic evaluation.
5. **Iterate**	Refine the design based on user feedback and repeat the cycle.	Continuous testing and refinement until the design meets user needs effectively.

EXAMPLE

An example could be the identification of a specific need for improving coral reef health. This might result from observing declining coral populations and recognizing the need for a solution to enhance coral growth and resilience against environmental stressors. At this level, the specific need (improving coral reef health) is identified, but detailed strategies or solutions to address the need are not yet developed.

Step 3: Identification of the expected functionalities for a new product or service

After recognizing a specific need, the focus shifts to outlining what features the new solution should have to effectively address the identified need. This involves specifying what the product or service should do, how it should perform, and what problems it should solve, thus providing a clearer direction for development and design.

HOW TO

HOW TO identify a new product or service & Example

	Objective	Example
1. **Define the Core Objectives**	Determine the main purposes of the product or service.	Enhance user convenience, improve efficiency, reduce costs, or increase safety.
2. **List Key Functionalities**	Outline the primary features that the product or service must have.	For a new app, key functionalities might include user authentication, data synchronization, and notification systems.
3. **Determine Performance Requirements**	Specify how the product or service should perform under different conditions.	Speed, accuracy, durability, and scalability.
4. **Identify Problem-Solving Capabilities**	Highlight the specific issues the product or service aims to solve.	Reducing environmental impact, minimizing user errors, or lowering maintenance costs.
5. **Incorporate User and Stakeholder Needs**	Consider the needs and expectations of users and other stakeholders.	Conduct surveys, focus groups, or interviews to understand their requirements.
6. **Explore Innovation and Unique Features**	Identify any unique features that could differentiate the product or service.	Integration with emerging technologies, user-friendly interfaces, or advanced analytics.

Action Plan for Identifying Functionalities

	Objective	Techniques / Activities
4. **Conduct Stakeholder Workshops**	Engage various stakeholders (users, customers, partners, and team members) to gather diverse perspectives.	Use brainstorming sessions to identify potential functionalities.
5. **Benchmarking and Research**	Study similar products or services in the market to understand best practices and gaps.	Analyze competitor offerings to identify opportunities for innovation.
6. **Develop User Scenarios**	Create detailed user scenarios and use cases to envision how the product or service will be used.	Map out user journeys to identify necessary features and potential pain points.

EXAMPLE

In the context of marine restoration, an example could be the development of a new artificial reef structure that is designed to support fish populations and promote coral growth. The expected functionalities for this new product might include:

- Ability to attract and provide habitat for various marine species
- Durability and stability in different marine environments
- Eco-friendly materials that do not harm the ocean's ecosystem
- Features that facilitate the growth of coral polyps

Step 4: Quantification of expected functionalities

This step involves setting specific, measurable targets for the functionalities identified in the previous step. Quantifying functionalities ensures clear performance standards and benchmarks, guiding further development and testing. By quantifying the expected functionalities, clear guidelines and standards are established for the development and assessment of the new product or service.

HOW TO

HOW TO quantify expected functionalities & Example

	Objective	Example
1. **Set Performance Metrics**	Define specific measurements for each functionality.	Durability (years), Speed (transactions per second), Efficiency (energy consumption).
2. **Establish Benchmarks**	Determine acceptable performance thresholds.	System uptime (99.9%), Response time (under 2 sec), Accuracy (95%).
3. **Specify Targets**	Set precise goals the product or service must achieve.	Support 1000 concurrent users, withstand waves up to 3 meters, increase biodiversity by 20%.
4. **Create Testing Criteria**	Develop criteria to test if the product meets the targets.	Load testing for capacity, stress testing for durability, field trials for ecological impact.

EXAMPLE

Returning to the example of artificial reefs, the expected functionalities of the prior step could be quantified as follows:

- Ability to attract and provide habitat for various marine species:
  - Attract at least 20 different species of marine life within the first year.
  - Document the presence of breeding activities within two years.
- Durability and stability in different marine environments:
  - Maintain structural integrity with less than 5% degradation over 5 years.
  - Withstand currents and storms up to certain specified weather conditions.
- Eco-friendly materials that do not harm the ocean's ecosystem:
  - Utilize materials with a 0% toxic release rate.
  - Ensure all materials are sourced sustainably and have a minimal carbon footprint.
- Features that facilitate the growth of coral polyps:
  - Achieve a 40% increase in coral polyp attachment and survival rate within the first 2 years.
  - Design structures to optimize water flow and nutrient availability conducive to coral growth.

Step 5: Identification of system capabilities

This step focuses on understanding and defining the complete set of capabilities the system needs to meet the quantified functionalities from the previous step. It involves analyzing technical, operational, and functional requirements for effective performance. By identifying these capabilities, the system's overall requirements are clarified, guiding detailed design and implementation.

HOW TO

HOW TO identify system capabilities & Example

	Objective	Example
1. **Technical Requirements**	Identify hardware, software, and technological needs.	Processing power, storage capacity, network infrastructure.
2. **Operational Requirements**	Define the operational conditions and constraints.	Operating environment, maintenance schedules, user support.
3. **Functional Requirements**	Outline the specific functions the system must perform.	Data processing, user interface, security features.
4. **Integration Need**	Determine how the system will integrate with existing systems.	Compatibility with current software, data migration processes, API requirements.

EXAMPLE

In the context of marine restoration, the system capabilities might be identified as:

- Technical Capabilities:
  - Ability to deploy structures that mimic natural reef formations.
  - Use of materials that are durable, non-toxic, and have properties suitable for marine life colonization.
- Operational Capabilities:
  - Capacity for remote monitoring and maintenance of the structures.
  - Resilience to withstand harsh marine conditions such as strong currents, saltwater corrosion, and biofouling.
- Functional Capabilities:
  - Suitability for supporting diverse marine species including endangered species.
  - Features that enhance the settlement and growth of coral polyps and other invertebrates.
  - Adaptability to different marine environments, from shallow waters to deeper zones.

Step 6: Translation of the expected functionalities into needed capabilities to build the response

This step focuses on turning the comprehensive list of system capabilities defined in Step 5 into a clear and actionable plan for implementation. These capabilities need to be translated into specific, practical requirements. This involves detailed planning of the exact resources, technologies, processes, and skills required to build and implement the system. This translation ensures that each capability identified is converted into actionable steps and resources, bridging the gap between what the system needs to do (functionalities) and how it will be achieved (capabilities).

HOW TO

HOW TO translate the expected functionalities into needed capabilities

1. **Review Expected Functionalities**	• Start by revisiting the quantified expected functionalities from Step 4. • Ensure you have a clear understanding of each functionality and its importance to the overall project.
2. **Break Down Functionalities into Sub-Tasks**	• Decompose each functionality into smaller, manageable sub-tasks. • Identify the core actions or processes required to achieve each functionality.
3. **Identify Required Capabilities**	• For each sub-task, determine the specific capabilities needed. • Capabilities can include technologies, processes, skills, and resources. • For example, if a functionality is continuous water quality monitoring, the required capabilities might include high-precision sensors, data analytics software, and reliable power sources.
4. **Map Functionalities to Capabilities**	• Create a matrix or mapping that links each expected functionality to the corresponding capabilities. • Ensure there is a clear connection between what needs to be achieved and how it can be done.
5. **Detail Technical Requirements**	• Specify the technical requirements for each capability. • This includes hardware specifications, software features, operational protocols, and environmental considerations.
6. **Assess Resource Needs**	• Identify the resources required to develop and implement each capability. • Resources might include financial budget, human resources, materials, and time.
7. **Plan for Integration**	• Ensure that the identified capabilities can be integrated into the existing system or environment. • Consider compatibility with current systems, ease of implementation, and potential risks or challenges.
8. **Develop an Implementation Plan**	• Create a detailed plan outlining the steps to develop and deploy each capability. • Assign responsibilities, set timelines, and establish milestones for progress tracking.

9.	**Validate Feasibility**	• Check the feasibility of the planned capabilities against project constraints like budget, timeline, and technical limitations. • Adjust the plan as necessary to ensure realistic and achievable outcomes.
10.	**Document and Communicate**	• Document the mapping of functionalities to capabilities and the implementation plan. • Communicate the plan to all stakeholders to ensure alignment and understanding.

EXAMPLE

Translation of expected functionalities into need capabilities

Expected Functionality	**Needed Capabilities**
Ability to attract and provide habitat for various marine species	• Design of modular structures that mimic natural coral reef complexity to facilitate diverse species habitation • Selection of materials that are safe for marine life and promote bio-colonization
Durability and stability in different marine environments	• Engineering designs that can withstand high wave energy and adverse weather conditions • Use of robust materials tested for long-term degradation in saltwater
Eco-friendly materials that do not harm the ocean's ecosystem	• Research and development of sustainable, biodegradable materials • Compliance with environmental regulations and standards for marine construction
Features that facilitate the growth of coral polyps	• Incorporation of texture and surface features suitable for coral larval attachment and growth • Development of nutrient distribution systems within the structures to support coral health

Step 7: Definition of the necessary and sufficient competences and resources

Here, the focus is on identifying and securing the skills, expertise, and resources required to develop and deploy the capabilities identified in the previous step. This step ensures that the project team is equipped with all necessary tools and knowledge to execute the project successfully. By matching financial, technological, and human resources to the project's requirements, the aim is to ensure that the project is not only theoretically sound but also practically achievable.

HOW TO

- Assessing the skills and knowledge needed among the project team
- Determining the material, technological, and financial resources required
- Planning for the acquisition or development of these competences and resources

Step 8: Identification of experts possessing the competences

Finding and putting together a group of people with the specialized knowledge and abilities required to meet the competencies listed in step 7 is the main goal of step 8. This stage assures that the appropriate human resources comply with the demands of the project. The goal is to create a capable and effective team that can drive the project towards successful completion. For example, competences can be secured by including experts in the team, such as marine biologists, environmental engineers, and project managers.

HOW TO

- Identifying key roles and the specific expertise required for each role.
- Searching for candidates through professional networks, academic institutions, industry associations, and other relevant platforms.
- Evaluating potential team members based on their qualifications, experience, and ability to contribute to the project's goals.

Step 9: Building the adapted answer to the expressed need in the market

The objective of this step is to develop and finalize the solution that directly addresses the needs and requirements identified earlier in the process. This involves integrating all the capabilities, competences, and resources to create a product, service, or system that meets or exceeds market expectations.

HOW TO

- Finalizing the design and specifications of the solution based on feedback and testing results from previous steps
- Ensuring that the solution is scalable, sustainable, and economically viable
- Preparing for implementation, which may include production, deployment, and market introduction.

NOTE: THE FINAL STEP OF THE DEMAND READINESS LEVEL ESSENTIALLY ALIGNS WITH THE ACTIVITIES FOUND IN THE TECHNICAL READINESS LEVEL AND BUSINESS READINESS LEVEL, FOCUSING ON THE DEVELOPMENT AND FINALIZING SOLUTIONS THAT MEET THE MARKET NEEDS.


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