

## **Solution: (Required)**

At this point in time, you have defined your core target audience and performed all the research to support your problem statement. It's time to process what you've learned from your audience; compile it into insights, connections, and patterns; define the challenge you're facing, and move toward solutions.

One of the main qualities of the Ideate stage is that it's collaborative and participatory. The underlying point here is that everyone is creative in their own way — the brainstorming process can only benefit from having as many minds and perspectives as possible united in tackling the same problem. If applicable, ask your target audience about your solutions to see if they are viable.

Describe all of your products or services, being sure to focus on the customer's point of view. For each product or service, answer the following questions in paragraphs/bullet points:

1. What is the name of your product/service? (Find a catchy name that people can remember.) What is your tagline?

### **HYGIEIA**

Be Part of the Solution, not the Pollution!

2. Describe the most important features of your solution. What is special about it? How is it solving the problem? Why does it work?

The Sea-bin and MOF are extremely cost-efficient, do not interfere with the religious practices and provide incentives to corporate industries and governments to invest in the project.

3. Describe the most important benefits for your solution. What does it do for the customer/target audience

Some of the many benefits of Hygieia are that it removes plastic and other solid waste from the rivers, enriching the river ecosystem. Also, since a large majority of the ocean plastic waste comes from these rivers, which carry it into the sea, we will also be taking the first, and major, step in reducing ocean waste. Another benefit of Hygieia is that it removes heavy metals using the MOF framework. This makes the river less toxic, and in turn, the marine life would be improved. In addition, since the toxin inside these fish and etc., also pass down to humans who eat them, causing illness, we would also be making the health of the population surrounding the area more robust.

Owing to the fact that a lot of the money has already been spent, Hygieia is relatively cheaper and more cost-effective than the alternatives. Aside from the upfront cost, maintaining it is relatively cheap, especially if you factor in the cheap labor available in India. Furthermore, the

Sea-bin and the MoF framework used for our project do not have to be replaced every month and the waste from it only have to be collected twice a day making it worthy of the upfront cost.

## **Go-To-Market Strategy (Implementation): (Required)**

Implementation pertains to the steps you will take to bring this project to life and to sustain it. Answer the following questions to understand that better:

### **1. How are you going to start building out the project/service?**

We are planning on starting our project, Hygieia, in the Yamuna waters located at the border of Delhi **near NTPC Water Treatment Plant**. We have chosen this location for two reasons: first, this is a difficult location to start the cleanliness project due to the religious and domestic waste being thrown here every day. We believe that if we can successfully implement our project here then we can use our formula almost anywhere else. Second, the water flows the fastest in this location so, fewer Sea-bins have to be allocated. The preliminary step is to focus on placing 6 Sea-bins in the river located near NTPC Water Treatment Plant, at the banks as most of the waste thrown from people such as the idols, burned ashes, domestic and industrial waste flows here. The second step is to deploy the MoF framework (Fe-BTC/PDA) in this part of the river to harvest heavy metals like Hg and Pb. Next, place a nano-mesh filter made out of graphene along the depth and the width of the river to capture the heavy metal compounds, bounded with the MOFs, and let the purified water pass. For instance, the MoF, Fe-BTC/PDA has the capacity to take out three times its weight for Hg and 40% of its weight for Pb, and it is also cheap making it cost effective.

### **2. How will your product/service sustain itself? Ex: Pricing model, donation-based, etc.**

There are many NGOs in India (both local and international) that would be willing and keen for a clean water initiative like this. Should we choose not to rely on donations, the government of India, which has sanctioned around ₹20,000 crore (~US\$3 billion) to clean the river. Till now, they've only spent around 10% of the money. Also, industries, dependent on heavy metals would also be very interested in funding the project as well due to the fact that we remove and collect precious heavy metals from the river, which is very useful for industrial purposes.

### **3. What are some initial costs for you to start building your project? (Material/structural costs, Server cost, Building costs, Advertising costs, etc. Estimate numerical figures based on values you find online)**

A Sea-bin costs €3,500 and for the specific area we are choosing to target, we will require about 6-7 Sea-bins. Taking the upper estimate, that puts the cost to €24,500 (~US\$28,000). The cost of purchasing a kilogram of MoF is US\$2.25. After estimating the dimensions of the river and the water flow, we would require a 10-5 kg of MoF per day. In order to extract the MoF bounded heavy metal compound, mesh filters need to place across the whole width and depth of the river.

The mesh has to be 100 by 3 meters. (The CBT-tech company which makes the graphene nanomesh filters has been contacted to know the price of the filter.)

4. Compare your prices with your competitors. Are they higher, lower or the same?  
(If applies)

Our main competitors are 'Omnipresent Robot Tech Pvt. Ltd' and 'Help Us Green' companies. Omnipresent Robot Tech Pvt. Ltd's idea of an autonomous sea drone, called Ro-boat, has a low initial cost, including research and development. However, the maintenance and upkeep would require hours of manual labor and track the Ro-boat with GPS, etc. which would significantly increase the cost of operations. Also, there's a higher likelihood of the Ro-boat malfunctioning/breaking down which may actually lead to more pollution of the river and would cost more to replace the Ro-boat. The other competitor, Help Us Green, targets only floral wastes that are dumped near temples. So, not only are they not a direct competitor, but Hygieia filters more than just floral waste.

5. How will you reach your target market? What marketing strategies are you planning on implementing etc. (Social media, Emails, etc)

We'll be reaching out to NGOs such as the World Wide Fund for Nature in India, which is already partnering with a local NGO for cleaning the river. Also, we'll try reaching out to government officials on social media, since the present government is very active online, and they are required to reply/acknowledge a certain number of tweets or concerns every day. Aside from social media, we'll also be banking on the NGOs having a connection with government officials that we can use.

6. What are the partnerships you will form to benefit the project? Ex: Partnering with 1871/MHub/Ideashop at IIT to build your products.

We can pair up with the Blue Planet Network which focuses on connecting organizations that funds clean water, sanitation, and hygiene projects. These water NGO partnerships range from community-driven projects in the San Joaquin Valley in California that is threatened by groundwater contamination to drought-plagued Mahandulwadi Village in India. In addition, the partnership with Yamuna Action Plan run by the government of India can be useful to establish our project faster.

## **Team: (Required)**

The executing team that will undertake the project is crucial when pitching your idea to potential investors or supporters. It is important that you add who is part of your team and why you are the best people out there to take your idea to the next level. **In your pitch video, there should be a slide dedicated to present your team members.**

When presenting your team, be sure to add the following for each person:

1. Educational background
2. Relevant experience
3. Each member's role or position in the team

\*Including a picture of each member with their credentials makes the overall presentation more friendly and easy to watch, so we strongly recommend the use of visual aids.

## Final Report Summary: (Required)

<b>Project/Idea Name</b>	Hygieia
<b>Problem Statement</b>	It is extremely difficult to prevent the combined effect of religious practices and improper industrial waste treatment that contribute to the pollution of a water body such as the Yamuna River.
<b>Research supporting the problem</b>	<ul style="list-style-type: none"> <li>- There are 21 major wastewater drains in NCT-Delhi, out of which 18 drains join Yamuna River.<sup>1</sup></li> <li>- Dissolved Oxygen (DO) in the river depletes significantly after Wazirabad barrage and remain critical in remaining part of the studied river stretch. The value of this parameter was observed in the range of 0.0 – 3.0 mg/l which reflects that DO is always violating the prescribed standard of 5.0 mg/l at Okhla D/s in Delhi.</li> <li>- 220, 000 people every year fall ill with waterborne diseases every year in Delhi</li> </ul>
<b>Target Audience</b>	<ul style="list-style-type: none"> <li>- Our target audience is the 50 million people of Delhi living near and relying on the waters of Yamuna. Since the Yamuna is a sacred river and also the water supply of Delhi people different kinds of people of all age, income groups, and educational background are dependent on it.</li> </ul>
<b>Solution</b>	<p>The solution has a two-stage process dealing with the purification of water:</p> <ol style="list-style-type: none"> <li>1. Sea-bin: a floating rubbish bin that can be located in <ul style="list-style-type: none"> <li>- Water is sucked in from the surface, passes through a catch bag made out of a fine mesh (polypropylene) and water is pumped back into the river leaving debris trapped to be disposed of properly.</li> <li>- Capable of displacing 25 liters per hour, catch up to 25kg of waste per day, plugged directly into a 110/220 V outlet, uses only 500W per 4AMPS of current.</li> <li>- The Sea bin can also collect a percentage of oils and pollutants floating on the water surface including microplastics up to 2 mm small.</li> </ul> </li> <li>2. Metal-Organic Framework (MOF): water stable metal-organic polymer, Fe-BTC/PDA, exhibits rapid, selective removal of large quantities of heavy metals, such as Pb<sup>2+</sup> and Hg<sup>2+</sup>, from real-world water samples.<sup>2</sup> <ul style="list-style-type: none"> <li>- A nano-mesh filter made out of graphene along the depth and the width of the river to capture the heavy metal compounds, bounded with the MOFs, and let the purified water pass.</li> </ul> </li> </ol>

<sup>1</sup> [http://www.sulabhenvi.nic.in/Database/WaterQualityStatus\\_6984.aspx](http://www.sulabhenvi.nic.in/Database/WaterQualityStatus_6984.aspx)

<sup>2</sup> <https://pubs.acs.org/doi/abs/10.1021/acscentsci.7b00605>

	<ul style="list-style-type: none"> <li>- For instance, the MoF, Fe-BTC/PDA has the capacity to take out three times its weight for Hg and 40% of its weight for Pb, and it is also cheap making it cost effective.</li> </ul>
<b>Unique Features</b> (What are special features that set your product apart/why it works)	<ol style="list-style-type: none"> <li>1. The use of Sea-bin and Metal Organic Framework (MOF) is sustainable.</li> <li>2. Specific heavy metals (lead, chromium, etc.) can be recovered for industrial use.</li> <li>3. Can be backed up with Govt, corporate and other non-profit organizations.</li> <li>4. The government has implemented a Sewage Treatment Plant (STP) to filter the water; however, STPs produce by-products, such as_, and it does not remove precious metals like lead and mercury, but in our project we are using a combination of Sea-bin and MOF which removes debris and also precious metals which can be used to in various ways.</li> <li>5. The religious practices are not affected by it and the industrial sectors are benefited by it as we are collecting precious metals as they can reuse them. In contrast, extracting heavy metals from the ores is expensive and time-consuming.</li> </ol>
<b>Special Benefits</b> (Why should people buy/use your product?)	<ol style="list-style-type: none"> <li>1. It collects plastic and other waste that reduces marine life decay.</li> <li>2. Collects plastics that can be used for recycling.</li> <li>3. Collects heavy metals for use in industry</li> <li>4. More cost-effective than the alternatives</li> <li>5. Increase in the quality of life of people that depend on the river</li> <li>6. Creates a source of employment for cleaning Sea-bin daily.</li> </ol>
<b>Limits and Liabilities</b> (What are some problems you will face?)	<ol style="list-style-type: none"> <li>1. Initial startup costs are high.</li> <li>2. The government has other burdens, so it may be difficult for the government to support this project.</li> <li>3. It is impossible to remove all the toxic pollutants in the water (heavy metals, inorganic and organic waste, and etc.)</li> <li>4. Even though we have a solution to tackle the pollution levels, a social change, and government rules to implement treatment of waste before disposal are difficult to establish.</li> <li>5. Need to replace MOFs periodically as they get used up</li> </ol>
<b>Competitors</b> (Who are your main competitors and how are you different?)	<p>Our Competitors are Omnipresent Robot Tech Pvt Ltd, and Help Us Green.</p> <ul style="list-style-type: none"> <li>- Omnipresent Robot Tech Pvt. Ltd's idea of an autonomous sea drone, called Ro-boat, has a low initial cost, including research and development.</li> <li>- However, the maintenance and upkeep would require hours of manual labor and track the Ro-boat with GPS, etc. which would significantly increase the cost of operations.</li> <li>- Also, there's a higher likelihood of the Ro-boat malfunctioning/breaking down which may actually lead to more pollution of the river and would cost more to replace the Ro-boat.</li> </ul>

	<ul style="list-style-type: none"> <li>- The other competitor, Help Us Green, targets only floral wastes that are dumped near temples. So, not only are they not a direct competitor, but Hygieia filters more than just floral waste.</li> </ul>
<b>Feasibility &amp; Sustainability</b> (How do you plan to implement your idea, and how will you make it last?)	<ol style="list-style-type: none"> <li>1. Contact NGOs to promote non-polluting religious practices for the betterment of people. (Jal Jagruti Yatra - Serve Happiness Foundation)</li> <li>2. Industries have an incentive to collaborate in this project as they are procuring precious metals.</li> <li>3. MOFs cost around 2.25 USD per kg. 1g of MOF removes 1.6 g of Hg, 0.3g of Pb and 99% of these ions in 1 ppm solution so we don't have to replace it frequently.</li> <li>4. The Sea-bins can work 24/7. Need to be checked once in two months and emptied twice a day.</li> <li>5. The Sea-bin can also work by solar, wind and wave power and consumes only 500W per 4 amps so it is environmentally friendly.</li> <li>6. The Sea-bin has an upfront cost of around 4100 USD after which there is a low maintenance cost so it is a cheap source of filtering polluted water in the long term.</li> </ol>
<b>Team</b> (Who's on the team, and why are they the best to execute this?)	Zawad Bin Zaki Sadaf: Research and data collection Deep Trapasia: Document preparation and Presentation of the video Mohit Jha: Document preparation and data management Laasya Annepureddy: Chemistry research and Presentation of video