C2 Solving the problems of the sea in combination

Why does a company that started with barnacles put ocean data at its centre, and make surface treatment and the removal equipment its means?

Readers	Companies and local governments considering a partnership, investors and others. It can be read without specialist knowledge. For those who want to know what SeatecHIROSHIMA is doing and how far it has got.
Takeaways	1. Turning the sea into data is at the centre of the company. The company puts the state of the sea, which has been known through intuition and experience, into a form that can be measured and compared. To update all the industries connected with the sea by progressively turning the sea into data, with barnacles, a shared problem of the sea, as the starting point. This is the company's main purpose, which has not changed since its founding. 2. Treating surfaces and removing what has attached are the hands-on means of working on the sea in the field. There is one surface treatment technology, and it is used in different ways for both "Keep it off" and "Help it take hold". The results of that work are also checked with data. 3. There is also much that has not yet been achieved. Ocean data is at the prototype stage, and there are rafts that cannot be found by satellite. Only parts up to about the size of a football fit into the equipment that treats surfaces. The main results of the surface treatment come from the research of the technical supervisor. There is not yet any track record of the removal equipment being adopted in Japan.
After reading	Check which of the company's activities is closest to the problem at your own site. Talk to the company about raft position data as joint research or field trials, and about surface treatment starting with small parts or small sections.

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This is an English translation. The Japanese edition is the authoritative text.

1. Key points

- Turning the sea into data is at the centre of the company. The company puts the state of the sea, which has been known through intuition and experience, into a form that can be measured and compared. [S2] To update all the industries connected with the sea by progressively turning the sea into data, with barnacles, a shared problem of the sea, as the starting point. This is the company's main purpose, which has not changed since its founding. [S3]
- Treating surfaces and removing what has attached are the hands-on means of working on the sea in the field. There is one surface treatment technology, and it is used in different ways for both "Keep it off" and "Help it take hold". The results of that work are also checked with data. [S2]
- There is also much that has not yet been achieved. Ocean data is at the prototype stage, and there are rafts that cannot be found by satellite. Only parts up to about the size of a football fit into the equipment that

treats surfaces. The main results of the surface treatment come from the research of the technical supervisor. There is not yet any track record of the removal equipment being adopted in Japan. [S1, S2]

2. Why data is at the centre, and why there are two means

It began with oyster farms and barnacles

Before setting up the company, Michio Imai, one of the co-founders, saw oysters covered with barnacles at oyster aquaculture sites in Hiroshima. In interviews with producers, there is a voice saying that about 40% of oysters with barnacles attached die. It is not a counted value but what the producers feel from experience (R3-2 "Fouling organisms on oysters"). [S2]

In 2020, at "Shido Next Innovator" of the Ministry of Economy, Trade and Industry and JETRO, Imai met Hayato Chishaki and Masahiko Mori. The founding members did not know the field at sea, and found it hard to get the people in the field to listen to them. When the conversation turned to barnacles, the reaction of the people they were talking to changed. This was because everyone involved with the sea was troubled by them, and it was a subject everyone knew. This is why the company started with barnacles. [S2]

SeatecHIROSHIMA Ltd. was founded on 1 June 2021. The press release at the time of its founding says: "Our main purpose is to update all the industries connected with the sea by progressively turning the sea into data, with barnacles, a shared problem of the sea, as the starting point." [S3] This main purpose is still unchanged today. "All the industries" expresses the range that the company deals with. The same press release describes Hiroshima, which has the fisheries, manufacturing and shipbuilding industries all together, as a place suited to finding and solving the problems of the sea. [S3]

From a removal device, to surfaces, to position data

The first development was the idea of an underwater device to remove what had attached. [S2]

From fiscal 2022 to fiscal 2024, research (22K04725) funded by a national research grant (KAKEN) was carried out. It is research that treats the surface of a material so that the surface decides whether living things attach or not. With the same treatment, changing the agent fixed to the surface turns it either in the direction of making attachment harder or in the direction of making it easier. This research made it possible to try both directions in the sea and compare them. The principal investigator is Kensuke Kuroda (Representative, Nagoya Surface Technology; Specially Appointed Professor, Institute of Innovation for Future Society, Nagoya University). Kuroda supervises the company's technology as an individual. [S1, S2]

In fiscal 2023, the development of a transmitter to be fitted to oyster rafts (IKAK) moved forward. It started with what was said by the owner of a boat that had run up onto an oyster raft, breaking both the boat and the raft. From 2025, work with a laboratory at Hiroshima University to find rafts using satellite data was added. The aim is to reduce accidents in which small boats run into rafts (R5-1 "Collisions between boats and fishing gear"). [S2]

Data at the centre, and two means

Where rafts are; what has attached to things, and how much; how seaweed and seagrass beds have changed. Until now, people in the field have checked these by eye, so they were hard to keep on record. The company puts them into a form that can be measured and compared. [S2]

Treating surfaces and removing what has attached are the hands-on means of working on the sea in the field. Surface treatment controls attachment. Where attachment is not wanted, it makes attachment harder; where

attachment is wanted, it makes attachment easier. Even when attachment is made harder, things can still attach. What knocks them off then is the removal equipment. Preventing and removing are two parts of one set. [S2]

The intention is to observe the results of that work and progressively turn them into a form that can be used next. If it is known what has attached to which material and how much, it can be decided when to treat what. If the positions and number of rafts are known, judgements can be made to avoid collisions. [S2]

3. Current activities

The centre: knowing (ocean data)

This is work to locate the oyster rafts floating in the sea, using satellite data and a small transmitter fitted to the rafts (IKAK). The satellite analysis is done together with a laboratory at Hiroshima University, and IKAK is being developed by the company. A system that shows the positions of rafts found by satellite on the smartphone or tablet of the person operating the boat (OceanMap) was made as a prototype for research and development within joint research. This system is an aid to navigation, and it does not replace charts, radar, AIS or a visual lookout. How it works and its limits are described in R5-1. [S2]

What can be turned into data now is the positions of oyster rafts. There is not yet a system for collecting the amount attached or changes in seaweed and seagrass beds as data. Watching seaweed and seagrass beds by satellite is at the stage of an idea. [S2]

Means 1 – surface treatment: Keep it off

The surfaces of propellers, floats, nets and the like are treated so that it is harder for marine life to attach. The method fixes a fluorine-based antifouling active substance to the surface, and does not use substances such as copper or silver that keep living things away (biocides). Large surfaces such as a ship's bottom cannot be treated with the current equipment (chapter 6). [S2]

In the KAKEN-funded research, a treated float had no shellfish or algae attached to it 1 year after it was put in the sea. On a propeller, part of the agent came off after 5 months of use, and barnacles attached there. What the trials involved and their limits are described in R8-1 "Hull paint and the sea". [S1]

Means 1 – surface treatment: Help it take hold

The same surface treatment technology is used in the opposite direction.

One is the restoration of eelgrass beds. Rope with a treated surface is laid on the seabed so that eelgrass can put down roots. In December 2023, a trial began at the dock of Marine Craft Kazenoko on Kurahashi Island in Kure City. It is part of the KAKEN-funded research in chapter 2. In February 2024, it was confirmed that seeds had sprouted and roots had grown on the treated rope. In November 2024, as a continuation of the same trial, ropes under 4 conditions were laid on the seabed, and when they were compared in May 2025, the treated rope ranked higher in the area covered by eelgrass and in the number of shoots. A difference large enough to say that it is not due to chance has not yet appeared. [S1, S2]

The other is building soil with rice husks. The surface of rice husks is treated so that useful microbes settle on them, to make a soil improver that is spread on fields. The company observed in Hiroshima Prefecture that the germination and growth of komatsuna became faster. [S2]

The proposal to add nutrients to the sea with fishing gear made to hold nutrients also comes from this thinking in the "Help it take hold" direction. There is not yet any record of a trial in the sea (R8-2 "Arrangements for returning nutrients to the sea").

Means 2 – Take it off

The company is developing equipment that knocks off attached shellfish and algae under water. It is now at the stage of a minimal device that actually works. There is not yet any track record of its being adopted in Japan. [S2]

Beyond the sea

The company is also considering extending surface treatment beyond the sea, to things such as rust on metal, glass and water systems. It is still an idea, and the company has no track record in it. [S2]

4. How the company proceeds

How work is taken on, activity by activity

For ocean data, the company takes on work as joint research or field trials. At the sales stage, the company envisages a form in which those who own rafts install the transmitters fitted to the rafts, and the app is used for a flat usage fee. For surface treatment, the company takes on work as processing or joint research. For the removal equipment, the company is neither selling it nor seeking partners. [S2]

Testing on a small scale

The company does not build large facilities first. The intention is to start by testing small parts that fit into the current equipment, and to expand after seeing the results.

Tailoring the treatment conditions to each partner

The conditions for surface treatment change with the combination of 3 things: the sea where it is used, whether attachment is wanted or not, and what is being treated. The company's strength is its know-how in these treatment conditions. The company manages it as a trade secret.

Owning no factory, and handing over the right to treat

The company does not have large factories. The company sometimes takes on treatment itself, but what it wants to make its pillar is a form in which it hands over to manufacturers and contractors the right to treat under the company's conditions, field by field and region by region.

When the company hands over the right, it also hands over the treatment conditions and the equipment that treats surfaces, so that treatment can be done at the partner's own site. [S2] The form of handing over the right to treat is still an idea.

There are 4 forms of income that the company is considering for surface treatment. They are the sale of products, taking on processing, providing the right to treat, and a scheme for trading the carbon absorbed by seaweed and seagrass beds (credits). The company does not regard credits as a main source of income.

The company's partners

The company cannot have field sites at sea on its own.

- Marine Craft Kazenoko (Kure City) has been the company's partner in field trials since the company was founded. Since May 2025, the company has had its development site at Marine Craft Kazenoko's second factory.
- From October 2025 to August 2026, four parties, Hiroshima University, I-NET Corp., Marine Craft Kazenoko and the company, worked on joint research under the "Town & Gown initiative" promoted by Kure City and

Hiroshima University (R5-1).
- The company takes part in the "Hiroshima Sea Forest Project" of Shinhiroshima Telecasting CO., LTD.

5. History so far

These are the main events since the founding. They are based on the company's own record.

Date	Event
June 2021	Founded SeatecHIROSHIMA Ltd.
October 2022	Selected for the Hiroshima Global Unicorn Incubator Advanced Program
November 2022	Selected for Hiroshima Prefecture's HIROSHIMA UNICORN 10 STARTUP ACCELERATION (fiscal 2022, fiscal 2023)
April 2023	Certified under Shibuya City's "S-Startups"
November 2023	X-Tech Innovation 2023, Kyushu area: Special Jury Prize, StarFlyer Prize and EY ShinNihon Prize
December 2023	Sta★rt-up Pitch Japan (5th), Chugoku-Shikoku block: Resona Bank Prize and Audience Prize; reached the final
Fiscal 2023	Selected for the KOSEN Open Innovation Program (KOP) (establishment of eelgrass)
January 2024	RING HIROSHIMA Awards "The Good Partnership" (IKAK)
December 2024	MITANI Business Contest 2024: DEFTA Partners Prize and Business Engineering Prize
September 2025	Selected for the fiscal 2025 (Reiwa 7) Survey Project for Attracting Startups to Noto
October 2025	Selected for the Tokyo Metropolitan Government's "TOKYO SUTEAM" Nature Governance Startup Program
November 2025	SIH International Business Contest 2025: Grand Prix (Science Lab., 1st place)
November 2025	Mirai Works Booster 2025: Okumura Corporation Prize
March 2026	Signed the contract for joint research under the Town & Gown initiative of Kure City and Hiroshima University (the research period started in October 2025)
October 2026	Startup Business Plan Contest Ishikawa 2026: the top entrepreneur award

6. Weaknesses, and what is not yet done

- **Ocean data**: The only thing that can be turned into data now is the positions of oyster rafts. In the satellite analysis, there are rafts that are not found. It is at the prototype stage, and whether accidents have decreased has not been checked (R5-1).
- **Size**: Only parts up to about the size of a football fit into the equipment that treats surfaces. Large things such as ship hulls need other equipment to be developed.
- **Where the results come from**: The results for the float, the propeller and eelgrass in chapter 3 come from the KAKEN-funded research in which the technical supervisor served as principal investigator, and from the

trials that continued it. They are not results of the company's own trials. The report either does not state the number of test pieces, or shows only 1 per condition in its figures. They have not become papers that have undergone review by other researchers (peer review). The May 2025 comparison of eelgrass is a result from after the period of the report, and it is not in the report. [S1, S2]

- **Durability**: On the propeller, part of the agent came off in 5 months, and barnacles attached there. The research report names improving durability as an issue to be addressed. [S1]
- **Fluorine-based agent**: The agent the company uses is fluorine-based. What happens in the sea to the agent that has come off has not been measured (R8-1).
- **Cost and application**: Treatment requires specialist knowledge. The size of the initial cost is also a weakness.
- **Removal equipment**: It is at the stage of a minimal device that actually works, and there is no track record of its being adopted in Japan. [S2]
- **Eelgrass**: In the result that the treated rope ranked higher, a difference large enough to say that it is not due to chance has not appeared. [S2]
- **Things that are still ideas**: The form of handing over the right to treat, and fishing gear made to hold nutrients, are at the stage of ideas. The fishing gear has not been tried in the sea (R8-2).
- **Records from users**: Records of continued use by fishers or boat owners in their work do not yet exist in a form that can be presented.
- **Organisation**: The company has few people. It does not have enough people or funds to carry several developments forward at the same time.

The activities in chapter 3 are each at a different stage of progress. None of them is at a stage where it can be stated for certain that it works.

7. Reliability and sources

This paper is what the company has written about itself. Chapters 2, 4 and 5 are based on the company's own record and the memories of the people involved, and have not been checked by a third party. The trial results in chapter 3 are based on the published research results report and the company's website. This paper does not deal with the size of the problems or with comparison against other methods. See "Related materials" below.

Reliability: B = a report by the researchers themselves (not peer-reviewed); C = the company's pages.

ID	Source (publisher, year)	Type	Reliability	Chapters used
S1	KAKEN grant 22K04725 (principal investigator: Kensuke Kuroda): project page; research results report (in Japanese) (content as of 14 May 2025)	Report	B	Chapters 1–3, 6
S2	The company's pages: About us; Technology; Surface technology; Keep it off; Help it take hold; Take it off; Ocean data; Beyond the sea; Working with us (in Japanese) (SeatecHIROSHIMA Ltd., 2026)	Company	C	Chapters 1–4, 6
S3	Notice of the establishment of "SeatecHIROSHIMA Ltd." (in Japanese) (SeatecHIROSHIMA Ltd., June 2021)	Company	C	Chapters 1, 2

Related materials

- R1 "The burden of biofouling at sea": the fuel and labour that increase because of fouling
- R2 "Seaweed and seagrass beds and the living things of the sea": the role of seaweed and seagrass beds and how they are decreasing

- R3-2 "Fouling organisms on oysters": the living things that attach to oysters, and the voices of producers
- R5-1 "Collisions between boats and fishing gear": accidents involving small boats, and the work to locate rafts
- R8-1 "Hull paint and the sea": what paint releases into the sea, and the limits of surface treatment
- R8-2 "Arrangements for returning nutrients to the sea": the rules on nutrients in the Seto Inland Sea, and the company's proposal