

Unit 1: theCity&TheCity - The 9th Island

by Peng yuqing Chan wencheng Zhou jiaxuan Wang wenzhe

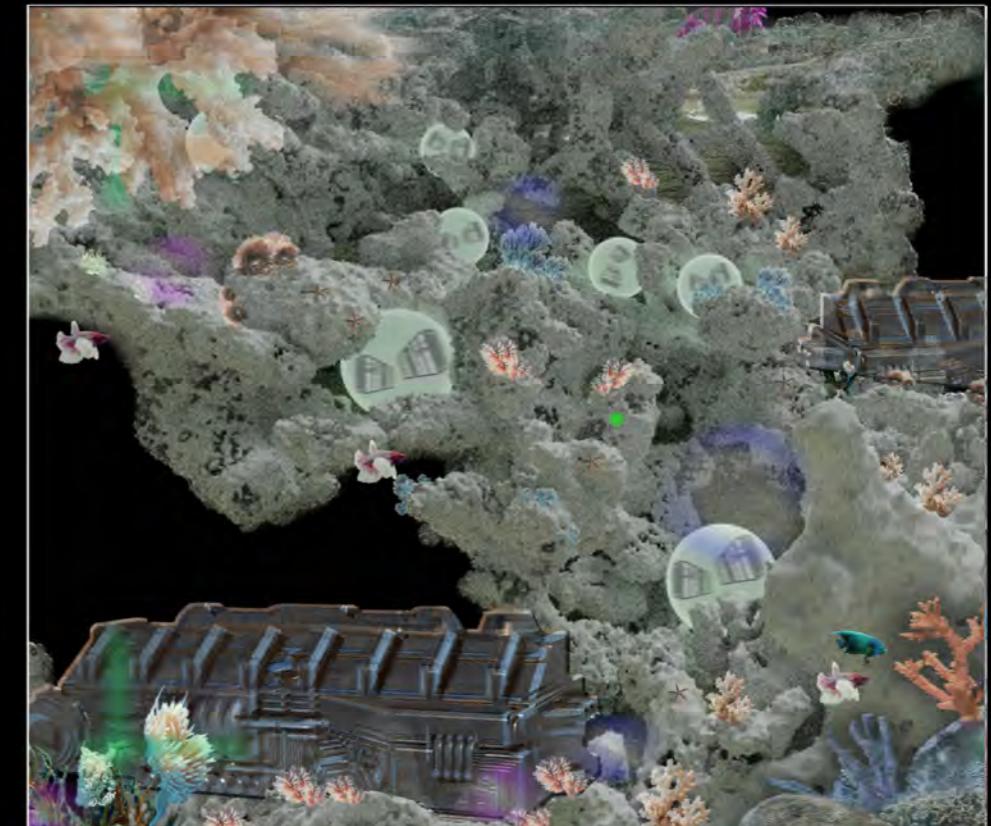
Instructor: Hadin Charbel & Joris Putteneers

Co-tutor: Qianxin Deng

Advanced Research Projects 2023

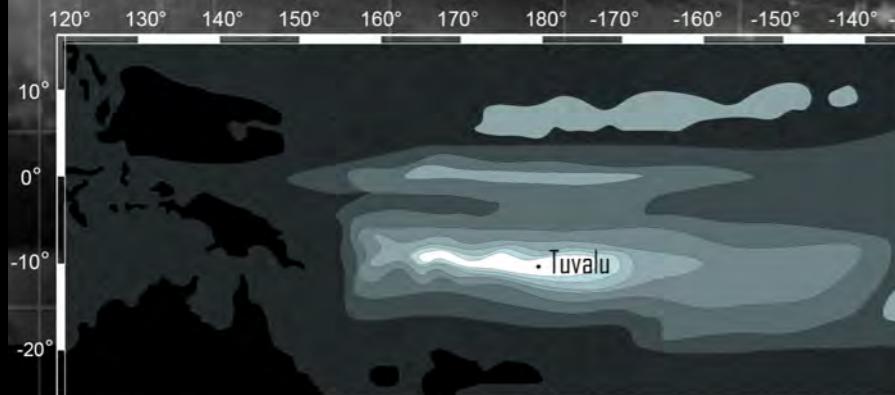
Keywords:

Data centers, underwater, virtual worlds, tuvalubiorock, protecting coastlines



site analysis

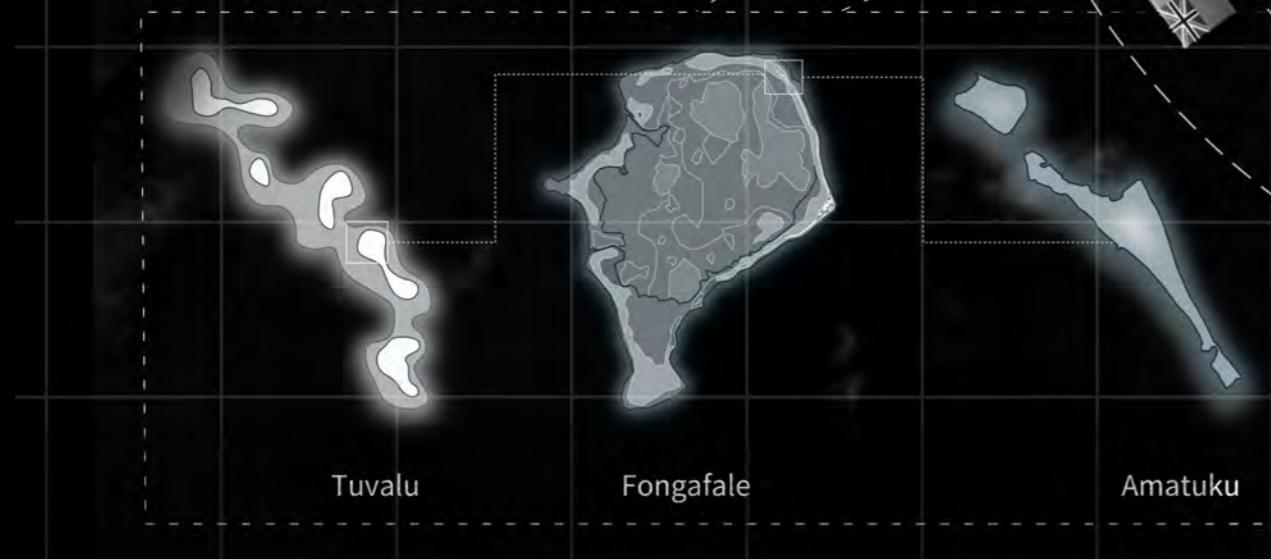
Map of reconstructed sea level trends
in the tropical western Pacific (1900-2023)



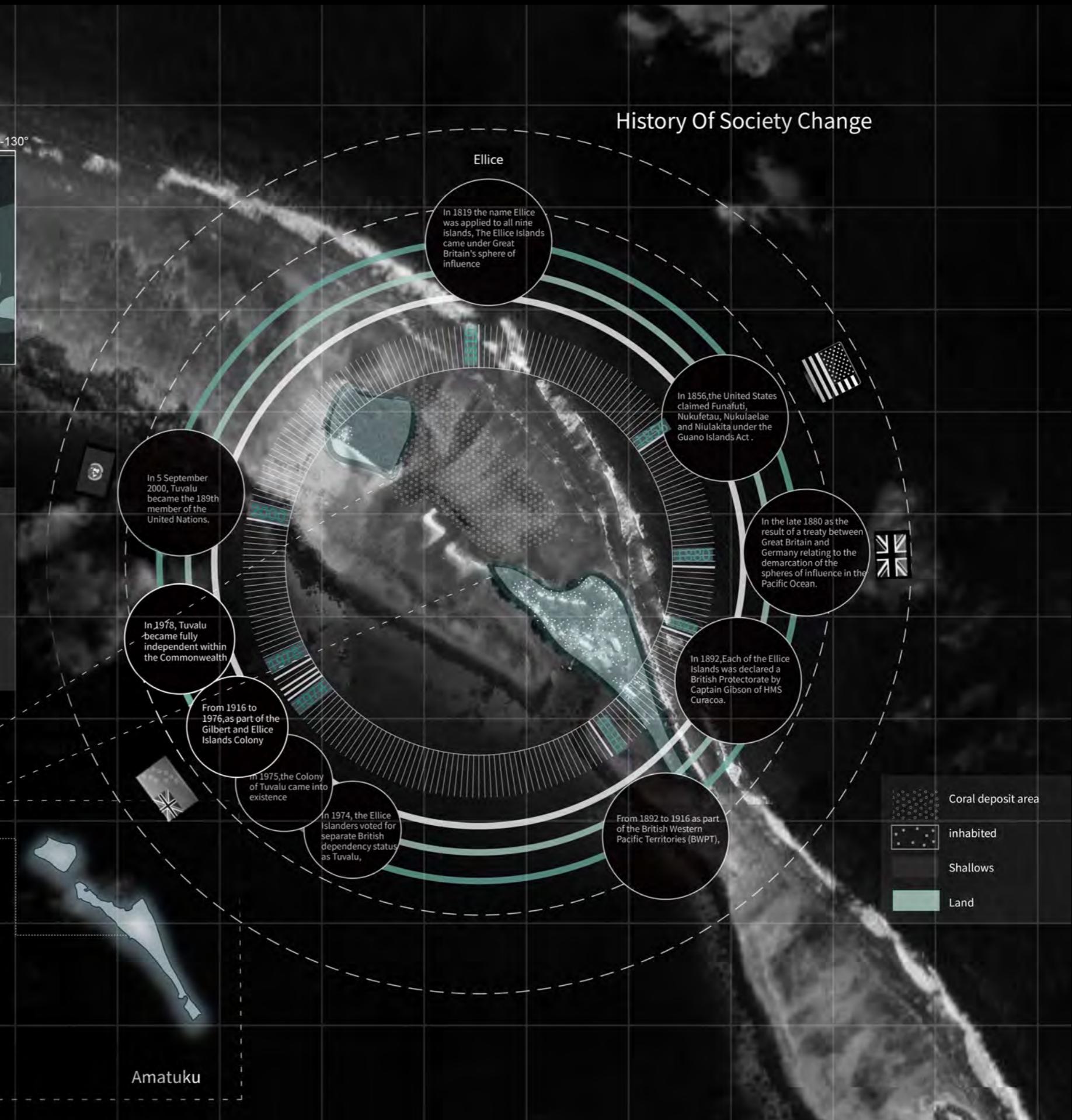
The 9th island

Eight of Tuvalu's existing islands are about to be submerged by rising sea levels, and we created a ninth island to protect the last of Tuvalu's civilizations

Site location



History Of Society Change

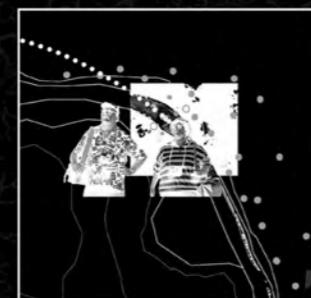


site analysis

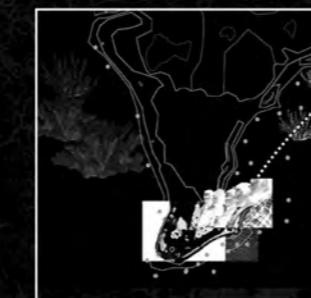
Site selection



- Long narrow seabed
- Easy to connect the island with the seabed
- Few corals living

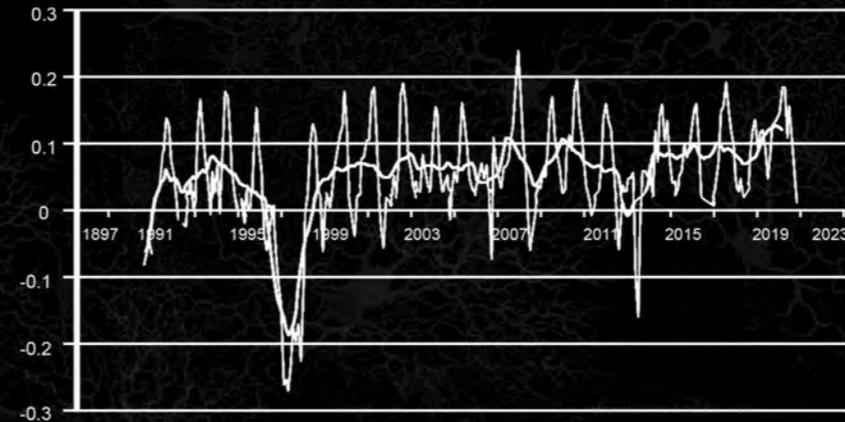


- Surrounded by several islands
- Biodiversity
- Relatively shallow seabed
- Hard to connect each islands



- Biodiversity
- Close to the seabed
- Sufficient land areas
- Easy to connect these two islands

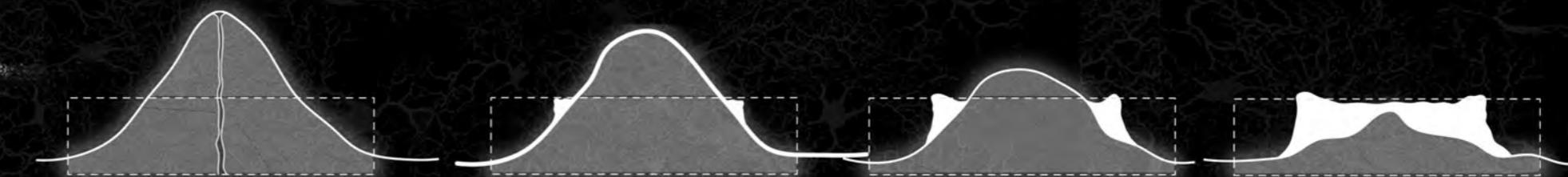
Sea level growth trend



Sediment distribution



Formation of atoll



Soil horizon

Fine foraminiferal rich sand

Coarse coralline algae rich sand with foraminiferal sand

Soil & root horizon

Coralline algae and shell gravel

Medium foraminiferal rich sand with fine coralline algae gravel



Sargassum polycystum
Beginning in 2011, the non-native brown seaweed (*Sargassum polycystum*) has rapidly spread in Funafuti lagoon especially adjacent to Fongutale. It has responded to nutrient enrichment in the lagoon in the vicinity of Fongutale. Its dense coverage has reduced sunlight penetration to the reef and outcompetes corals and makes fishing difficult.

PLATE CORALS



Leave

Stay

Tuvalu present

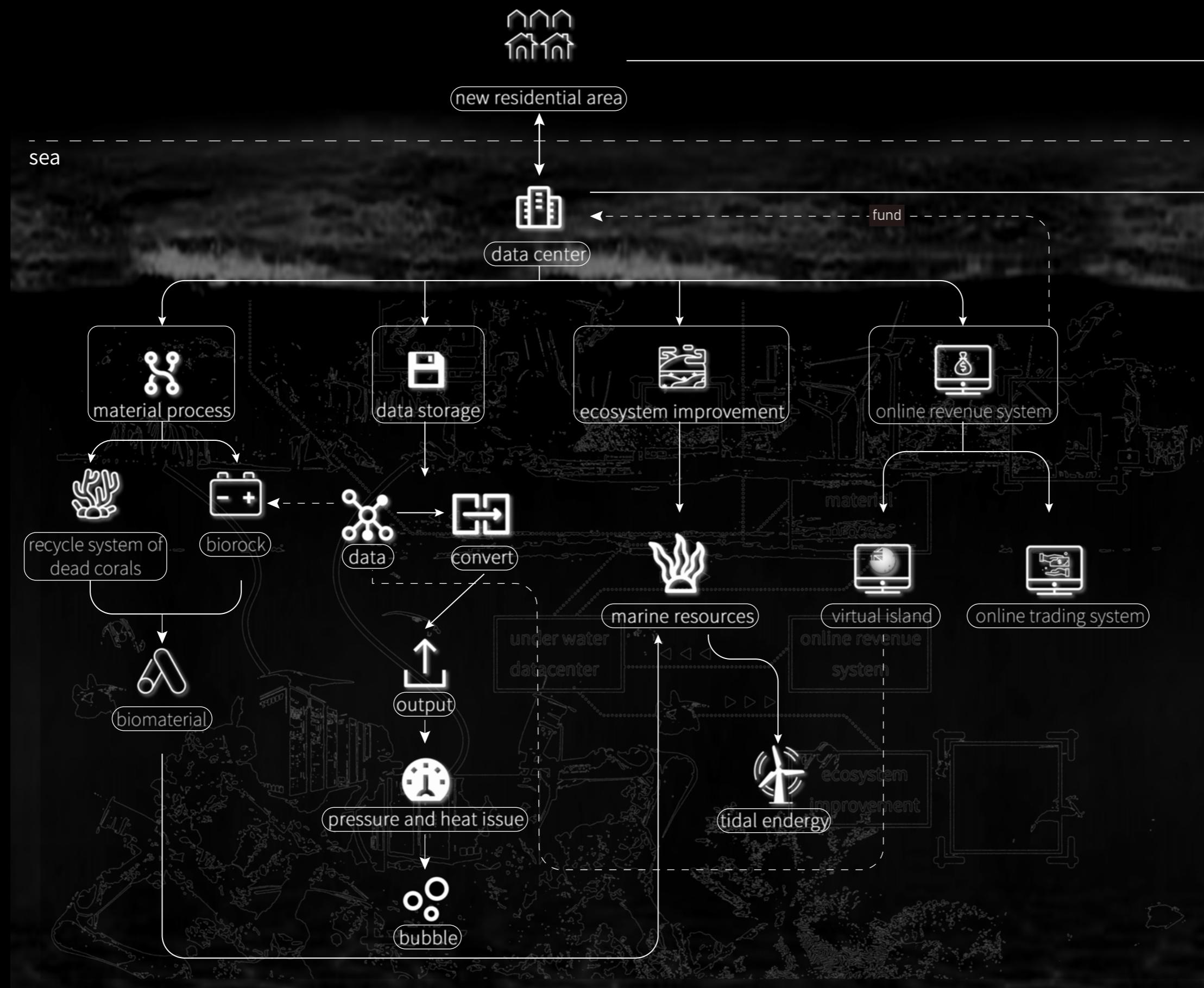


self-identify
next generation

damage caused by
sea level rise

deteriorating
living condition

design system



.TV: Tuvalu has been making money from



Tuvalu Makes \$5 MILLION A YEAR By selling domain names

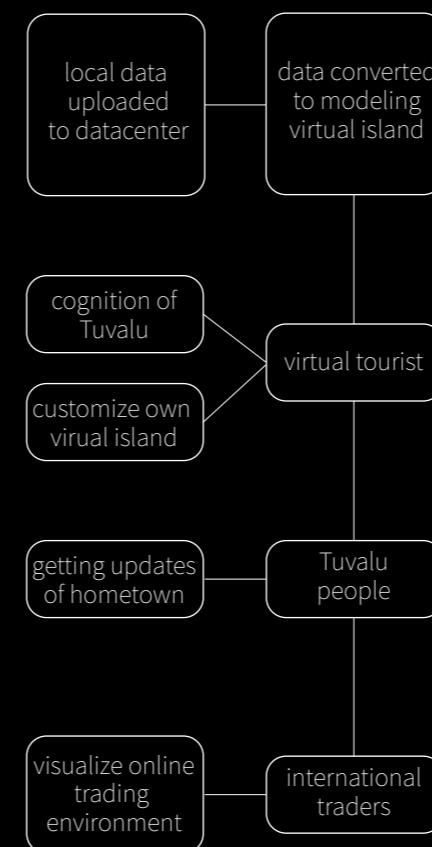
A tax haven is simply a country that offers individuals or businesses little or no tax liability. According to our research, the Caribbean offers some of the most popular tax havens in the world, providing benefits such as very low tax liability and financial privacy.



Tuvalu government: Digital nation project

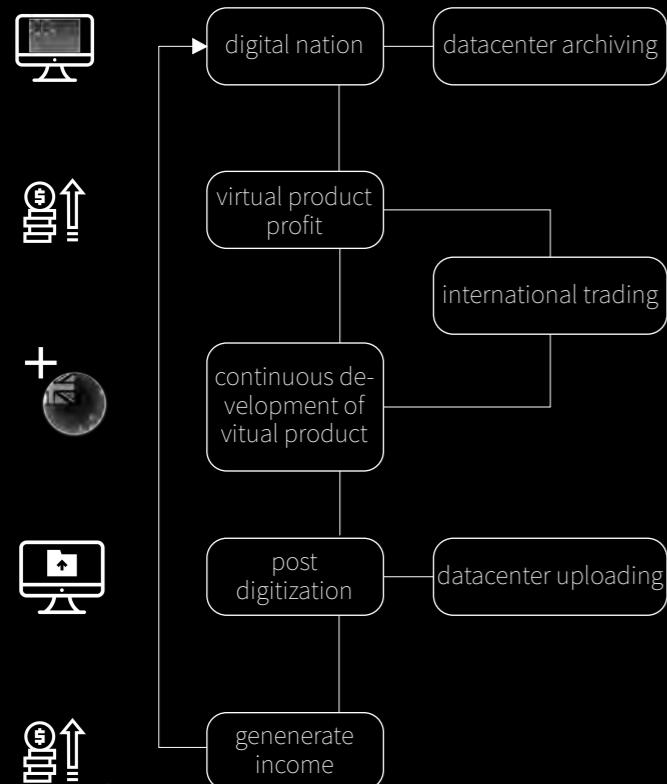
The agreement with Verisign expires in 2021, opening the door for a renegotiation between Tuvalu and Verisign. With the perceived value of .tv buoyed by the success of Twitch.tv and other platforms — thanks to a sustained and substantial increase in esports and video game streaming — an updated agreement could be a bonanza for Tuvalu. The .tv domain has been a useful asset for Verisign as well. As a registry, Verisign is essentially a wholesaler of domain names. It creates domain name extensions, sets the rules for those domain names and accredits retailers.

custom virtual island:



revenue system: international online trading

mechanism between virtual and real world functioning:



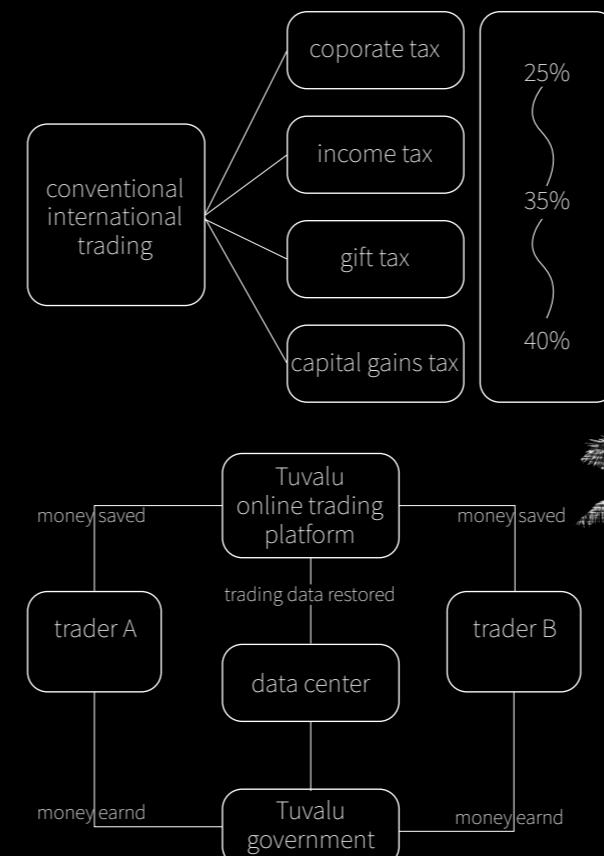
case:



tax heaven Caribbean:

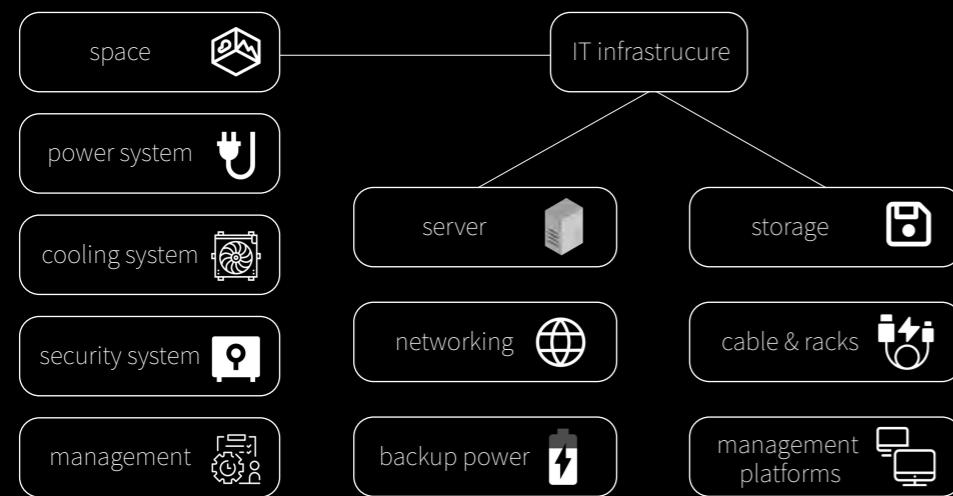
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international trading:

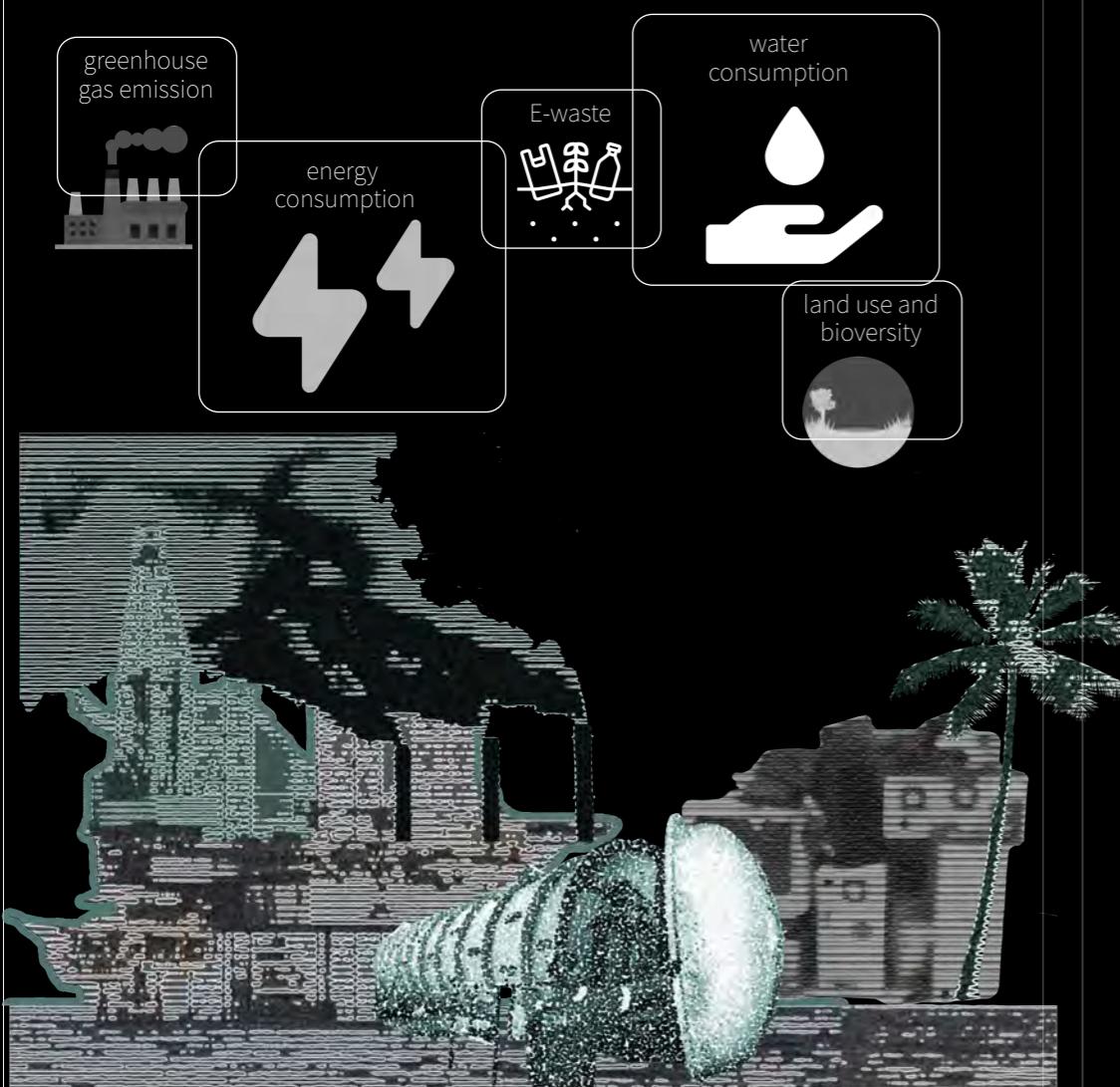


about data center

basic composition of datacenter

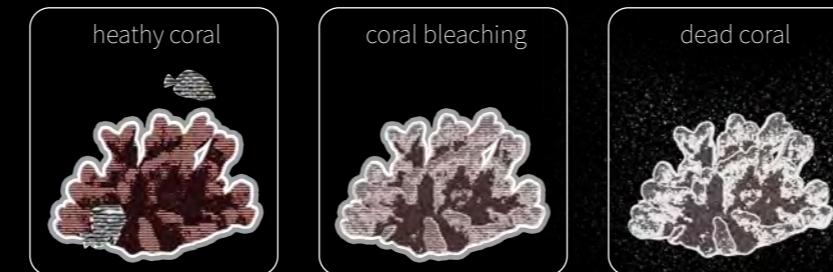


potential environment compact of building datacenter

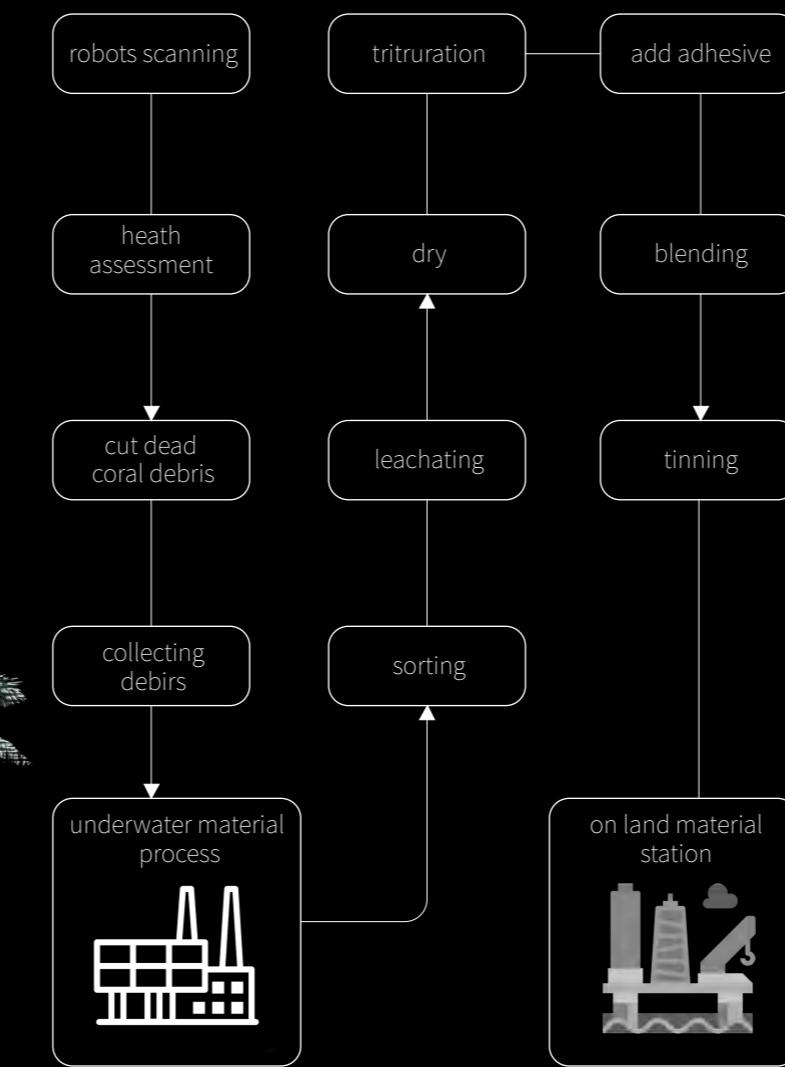


coral health monitoring and assessment

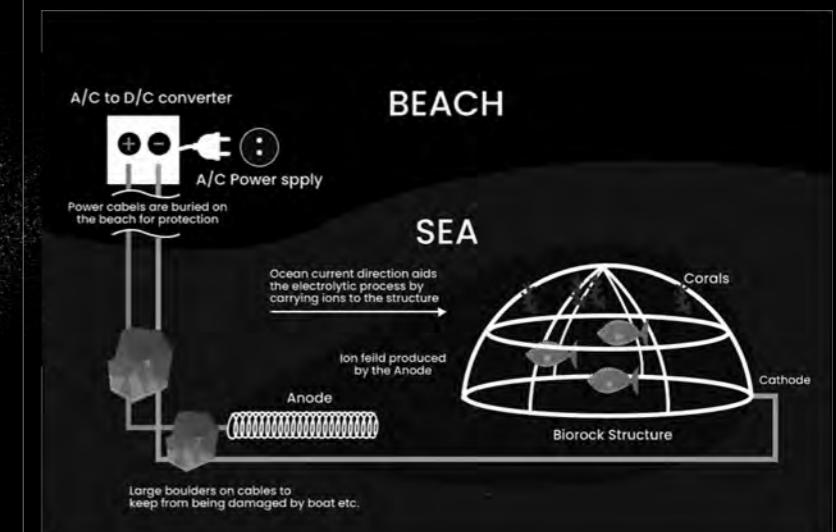
coral health monitoring and assessment



coral debris recycling and material system

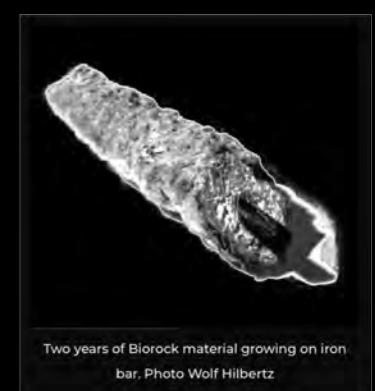


biorock formation mechanism

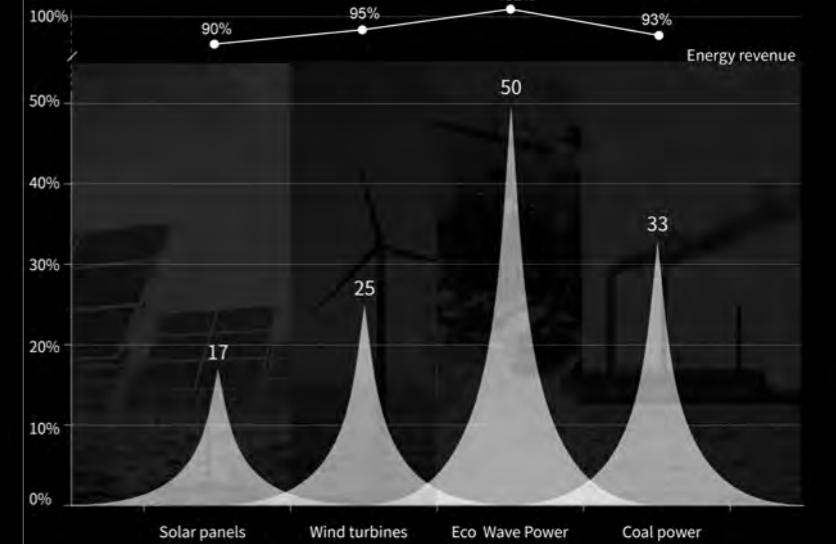


what is biorock:

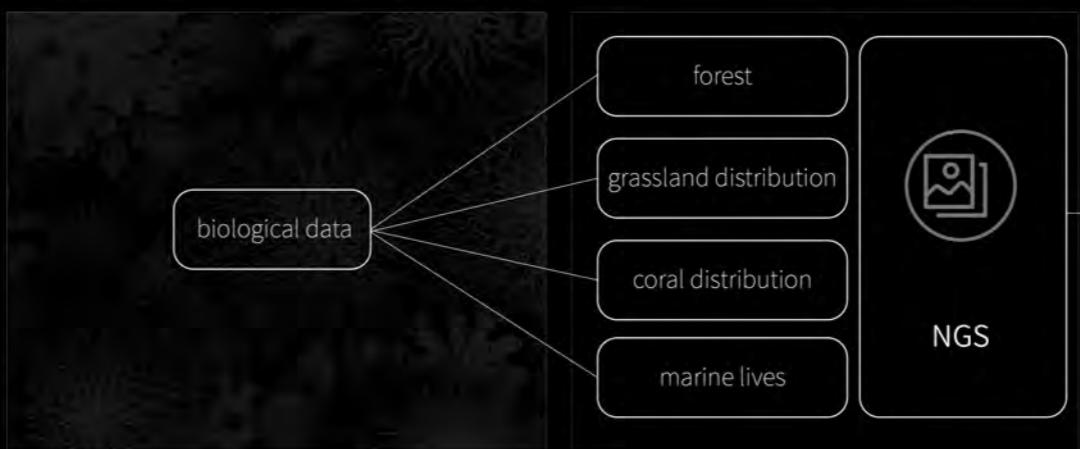
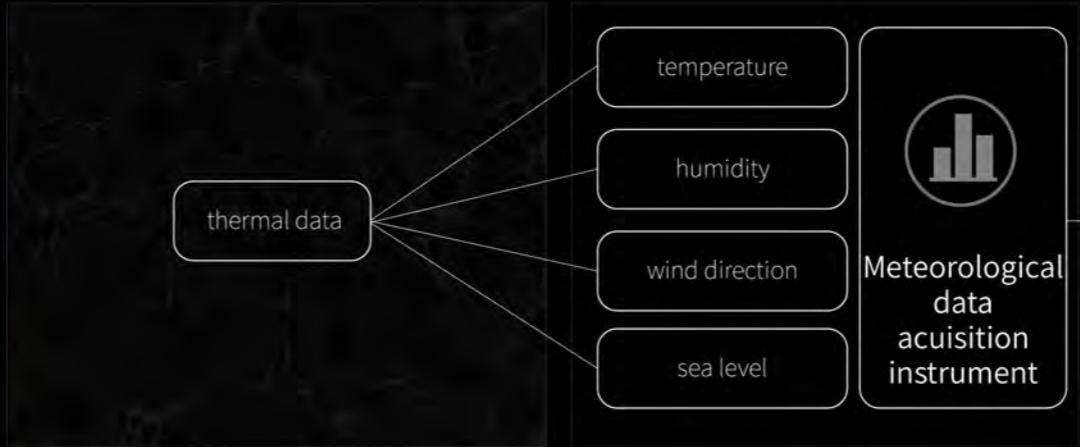
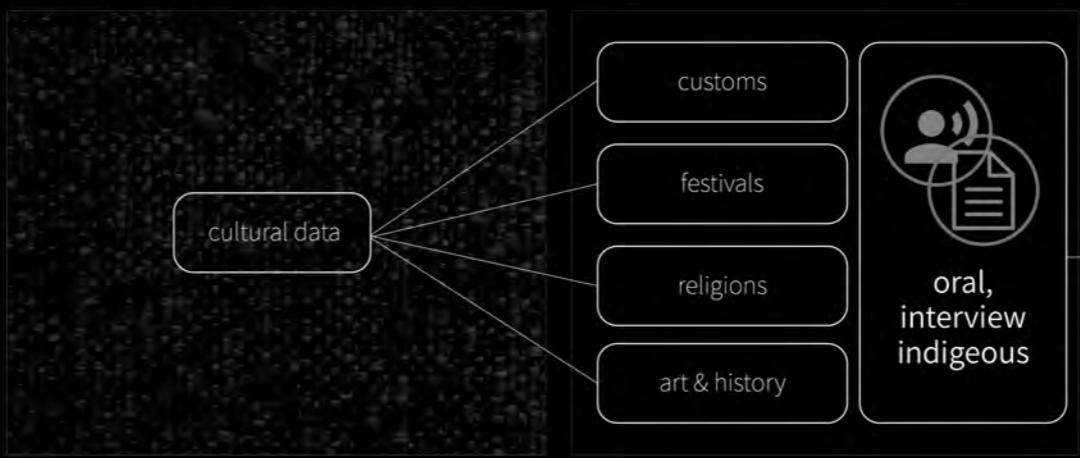
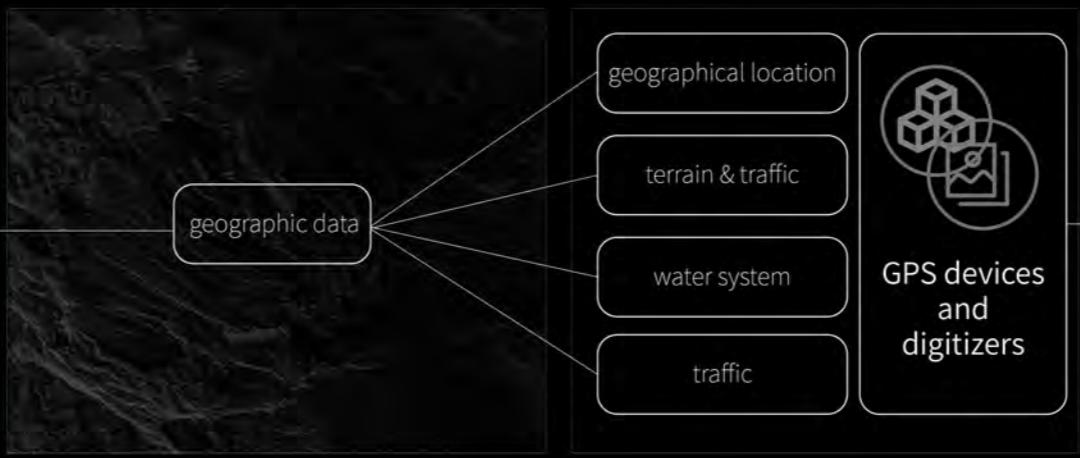
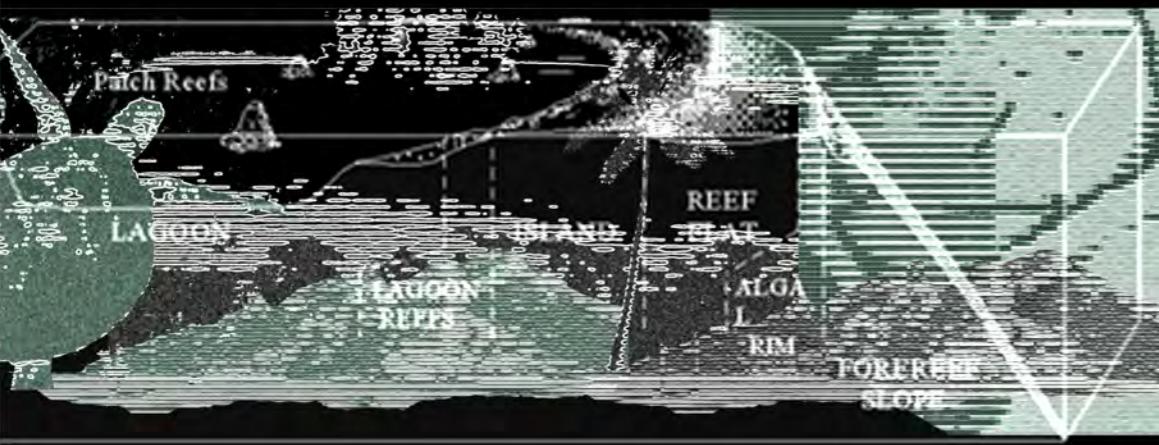
Biorock technology is an innovative process originally invented in 1976 by the late architect Prof. Wolf H. Hilbertz to produce natural building materials in the sea. Biorock materials are the only marine construction material that grow, get stronger with age, and are self-repairing.



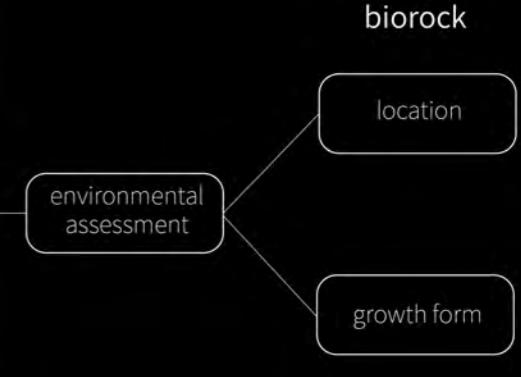
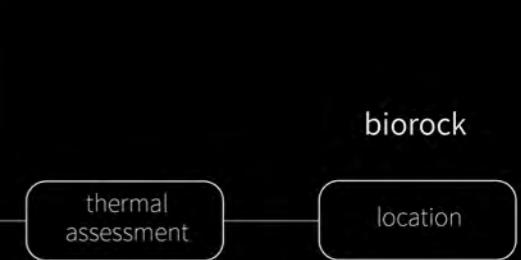
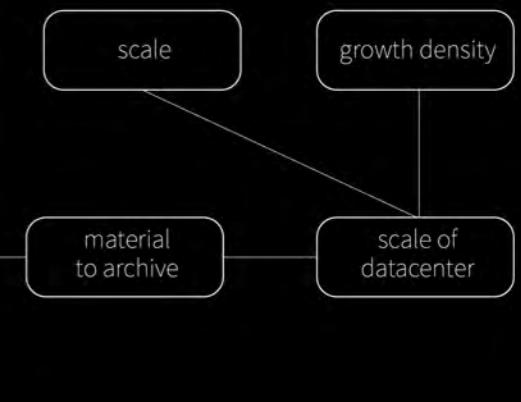
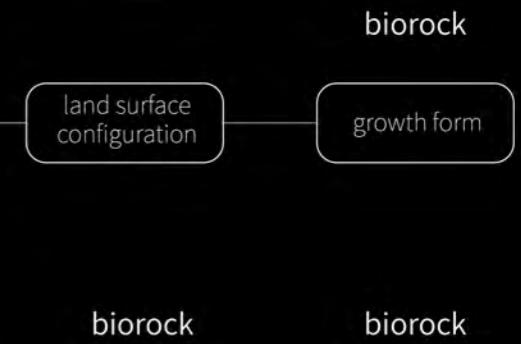
other environmental response: efficiency comparison of power generation methods



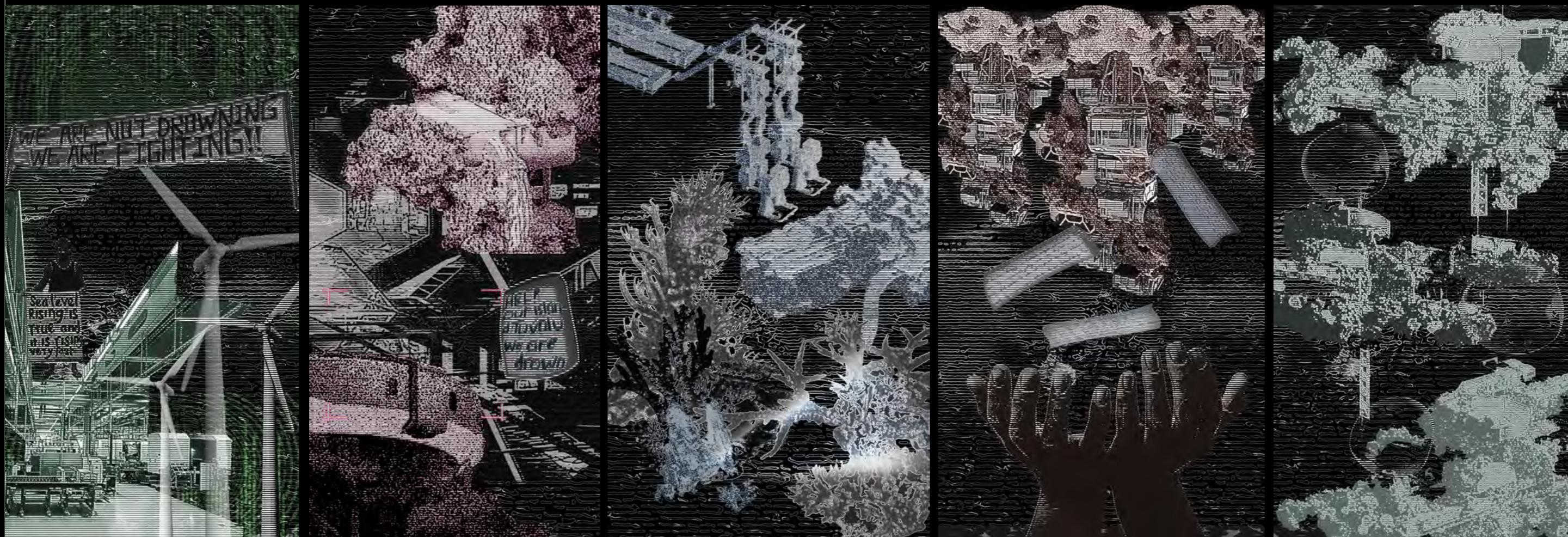
data collecting: how to collect data



data to construction: data controls the growth of biorock



timeline: different operations in different stage



2023

2033

2038

2048

2078

data collecting

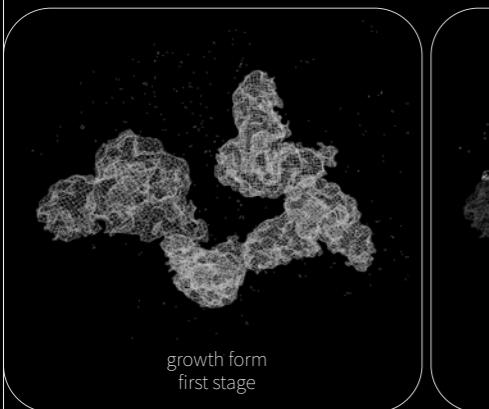
data center construction

material factory construction

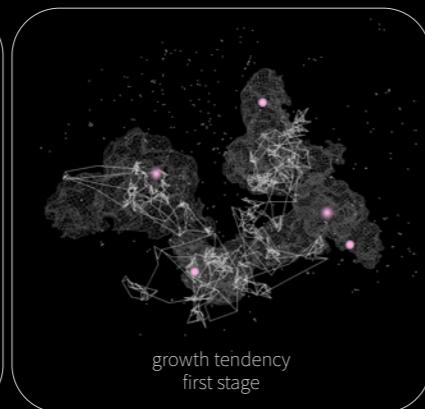
residence construction

growing datacenters..

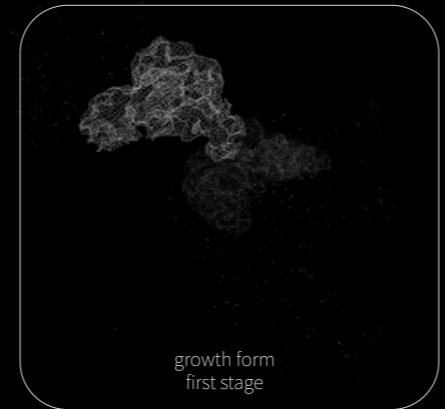
biorock: morphological research



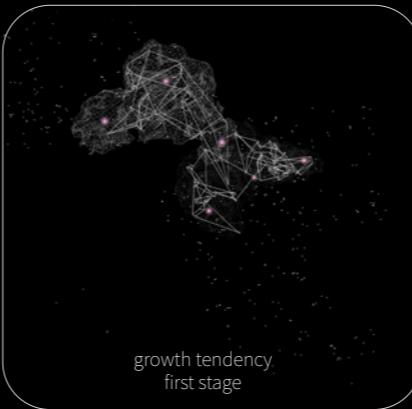
growth form
first stage



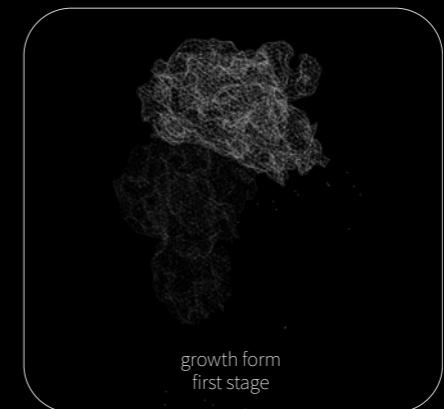
growth tendency
first stage



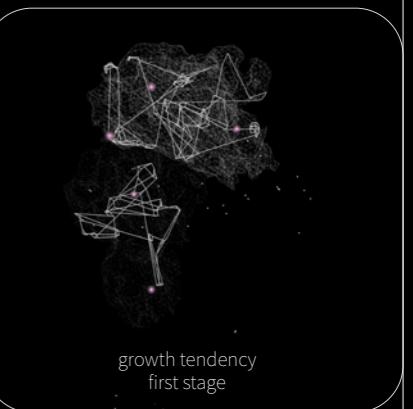
growth form
first stage



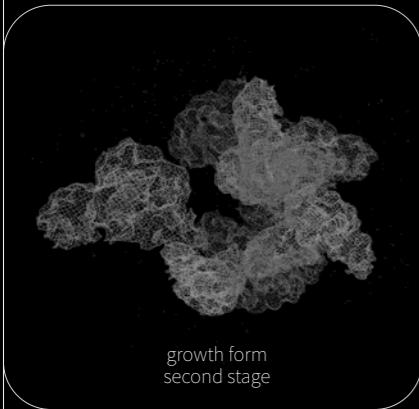
growth tendency
first stage



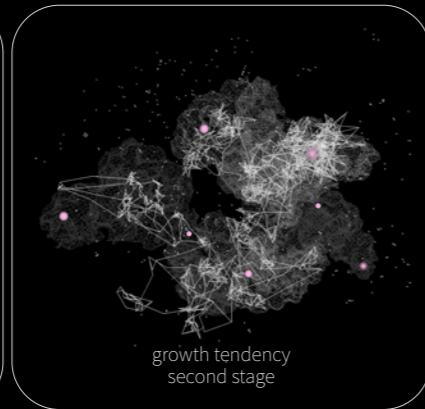
growth form
first stage



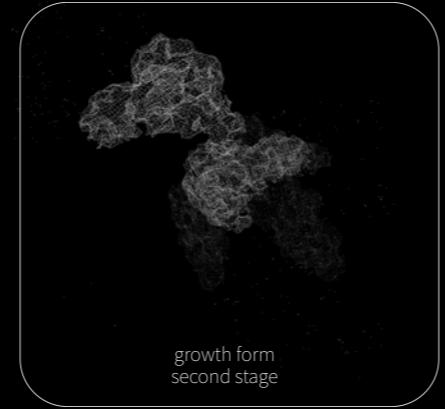
growth tendency
first stage



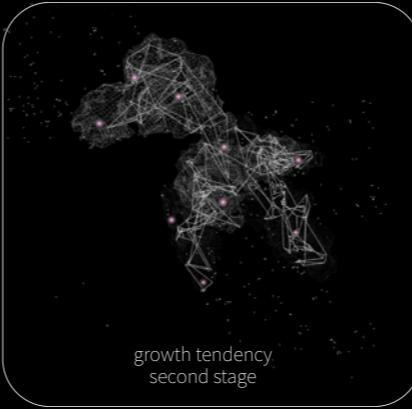
growth form
second stage



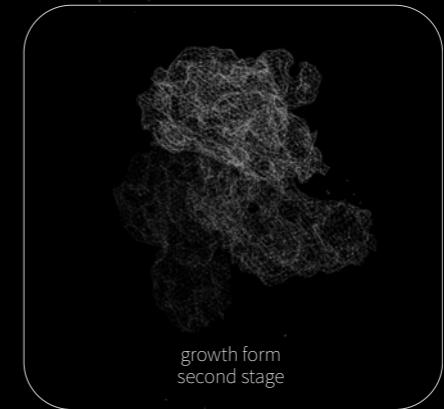
growth tendency
second stage



growth form
second stage



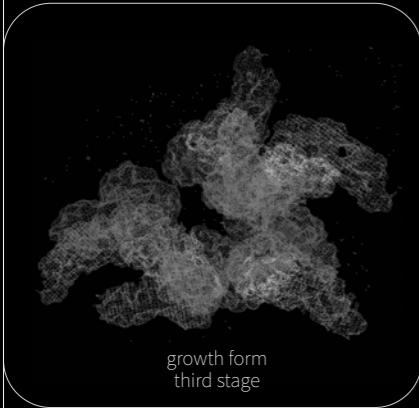
growth tendency
second stage



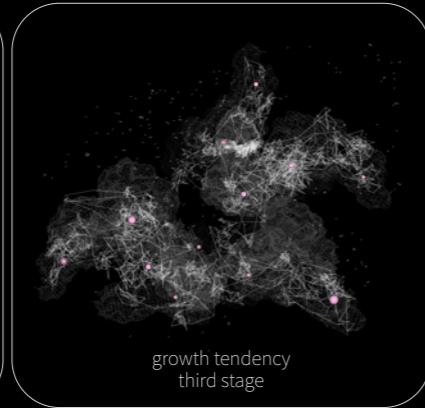
growth form
second stage



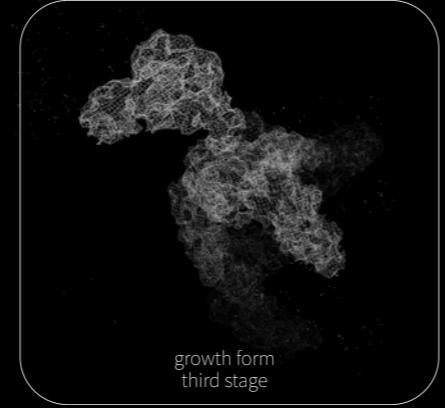
growth tendency
second stage



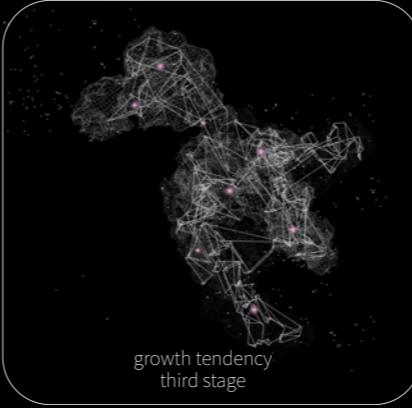
growth form
third stage



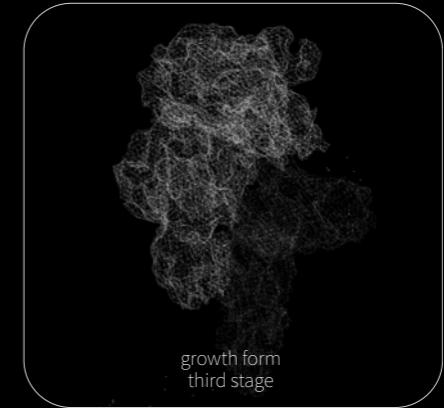
growth tendency
third stage



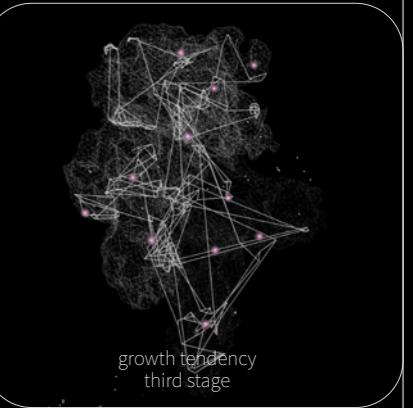
growth form
third stage



growth tendency
third stage

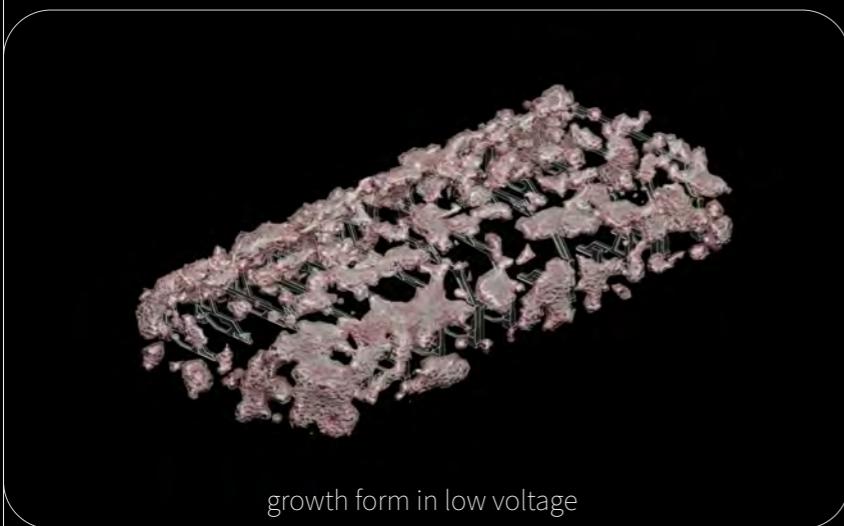


growth form
third stage



growth tendency
third stage

growth form in different voltage level



growth form in low voltage

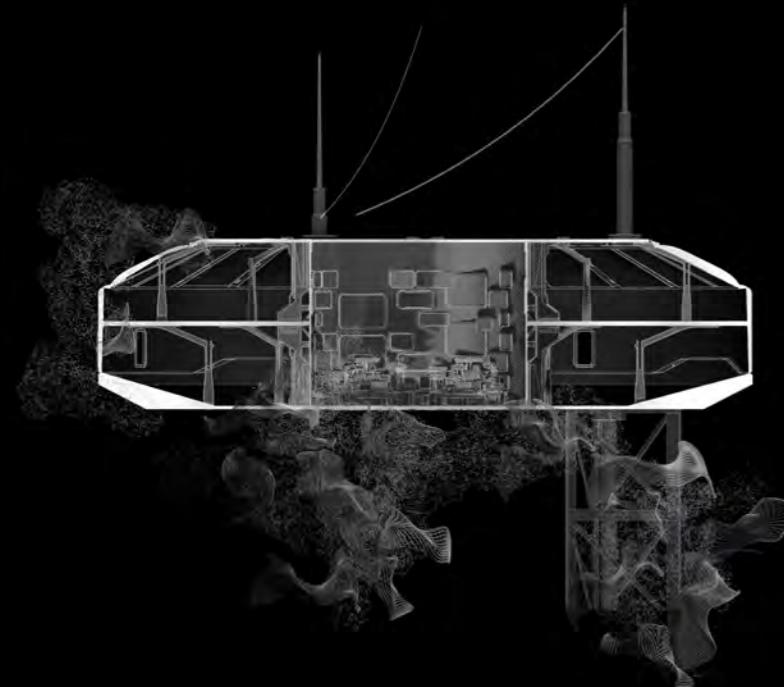


growth form in medium voltage

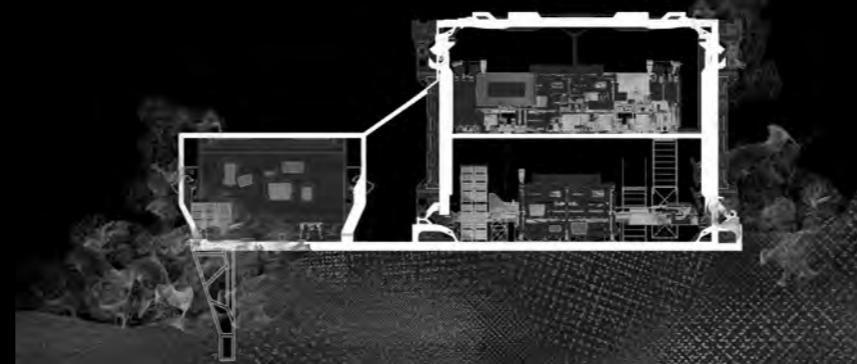


growth form in high voltage

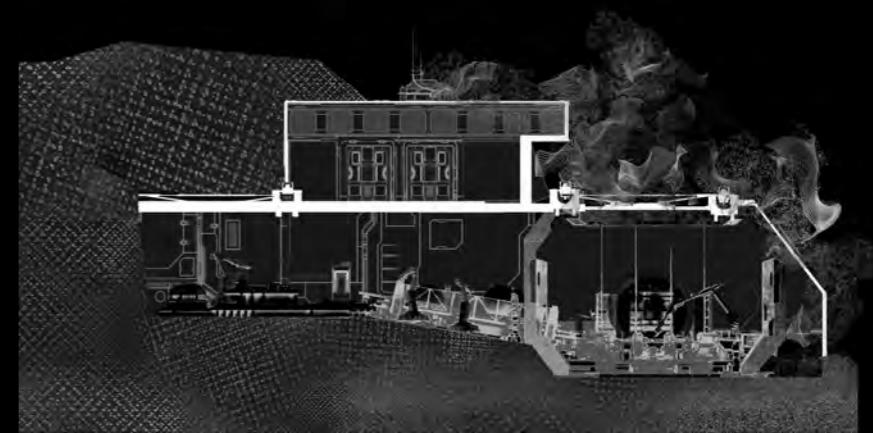
section research: interactions with sea bed in 3 different types



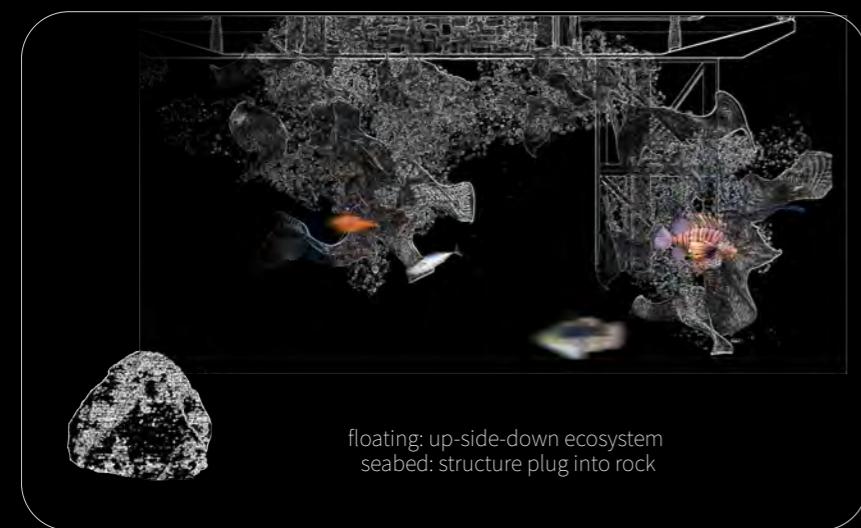
floating



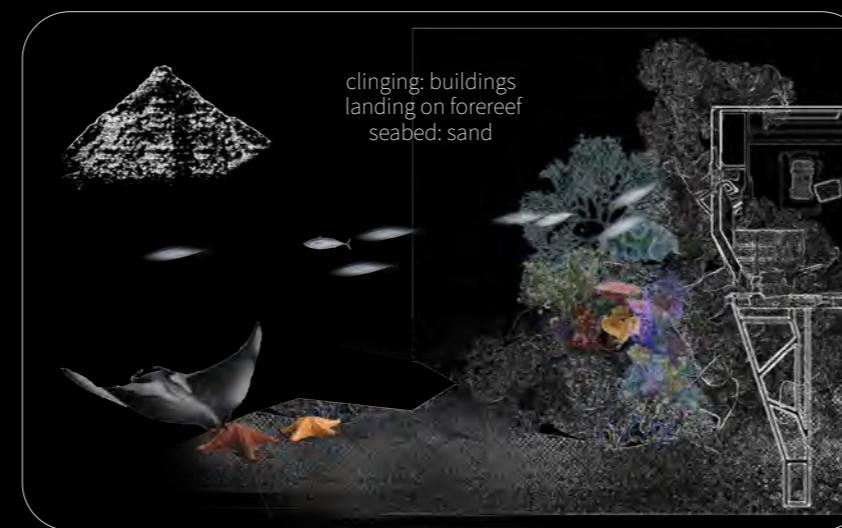
clinging



burried



floating: up-side-down ecosystem
seabed: structure plug into rock

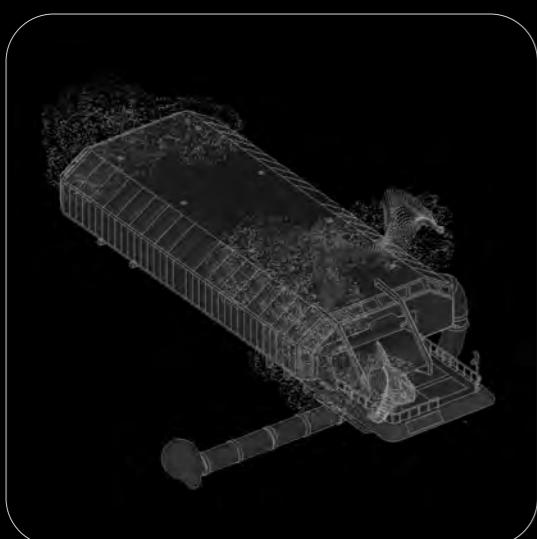


clinging: buildings
landing on forereef
seabed: sand

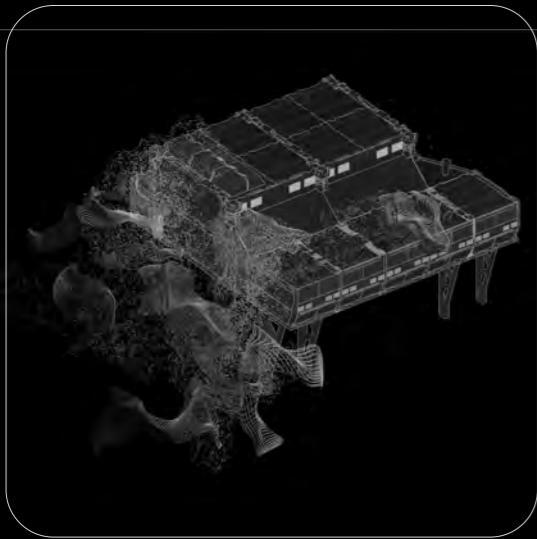


burried: buildings half-burried in sea bed
sea bed: coral reef

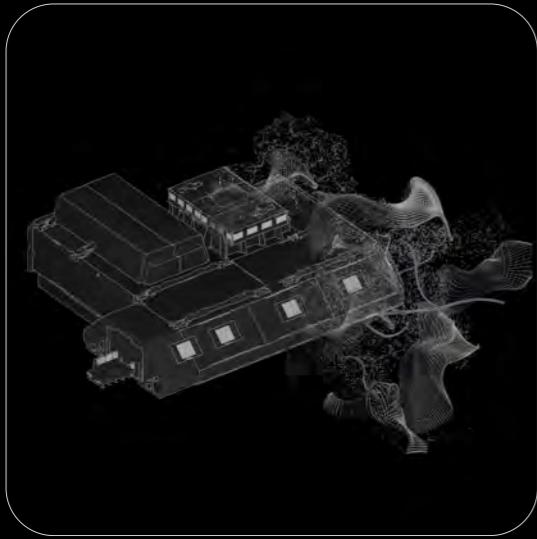
typology



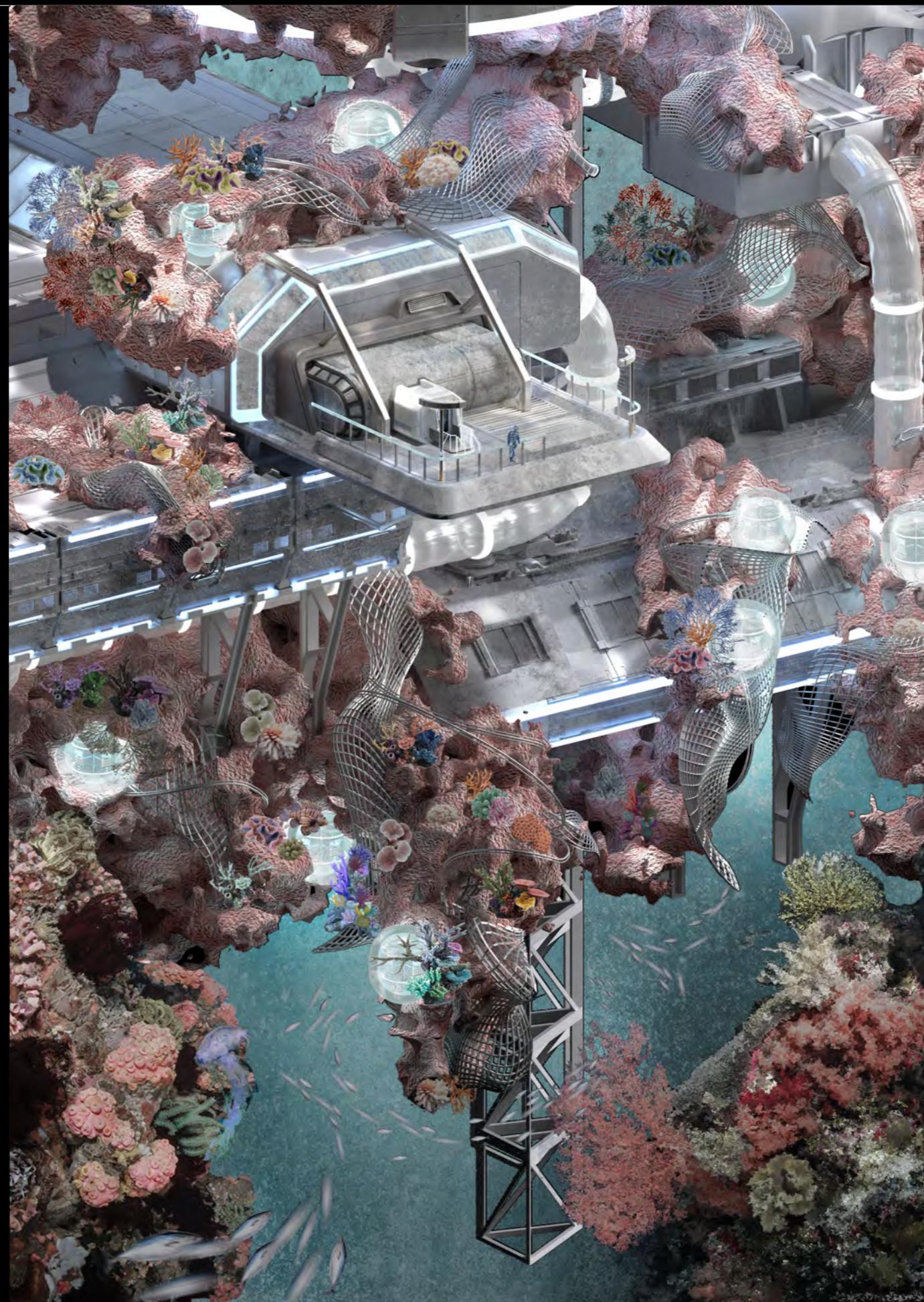
data-output space



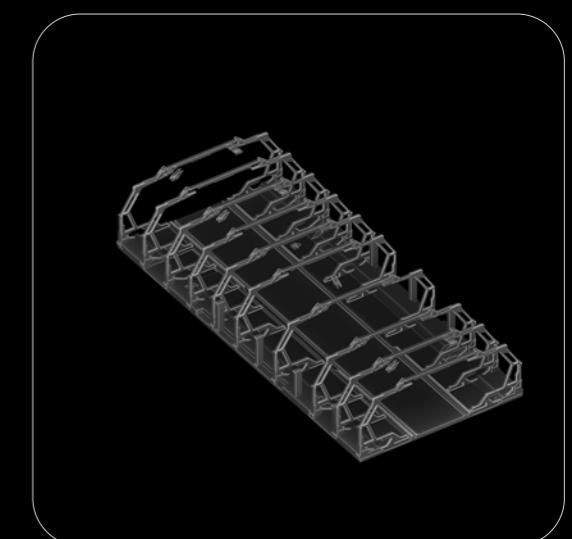
data-convert space



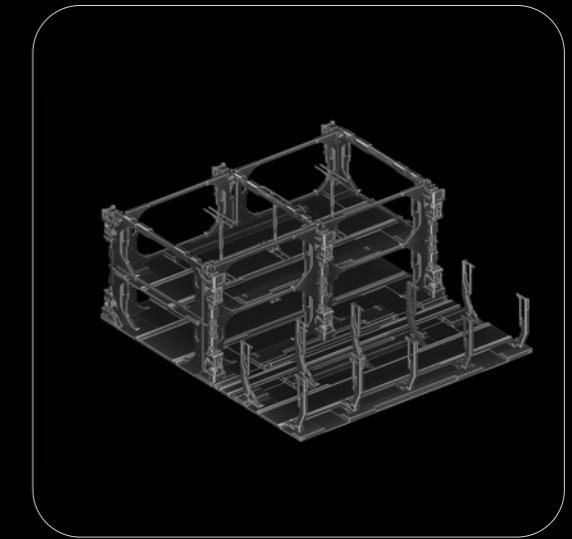
bubble-assemble factory



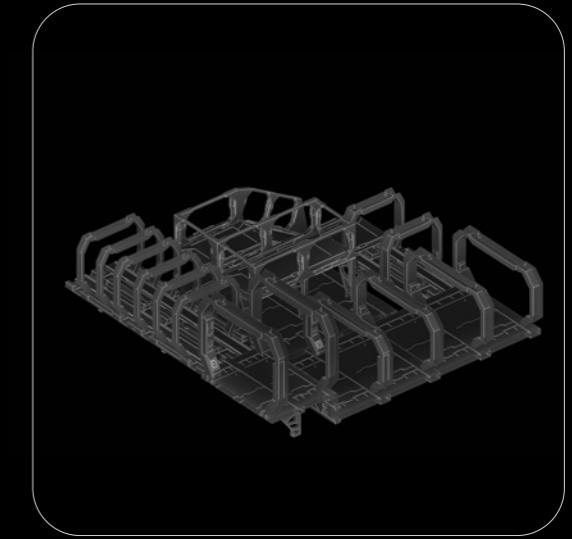
structure



data-output space

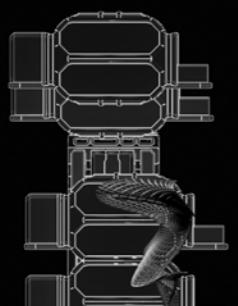


data-convert space

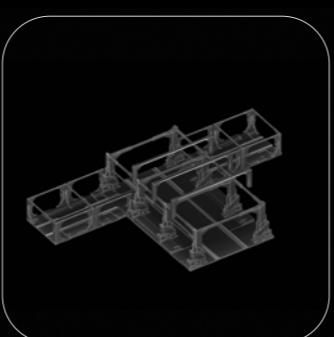


bubble-assemble factory

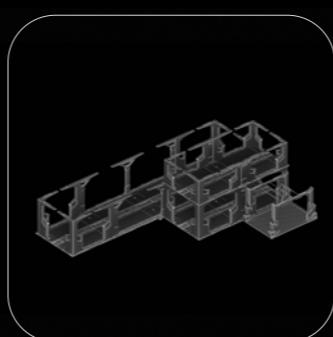
structure



hall



robot-reparing space



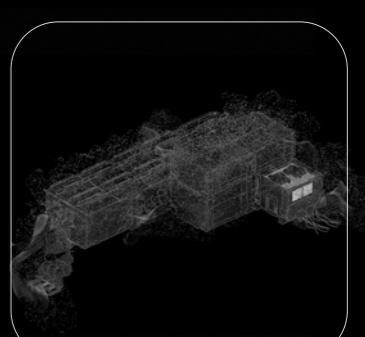
material factory



hall

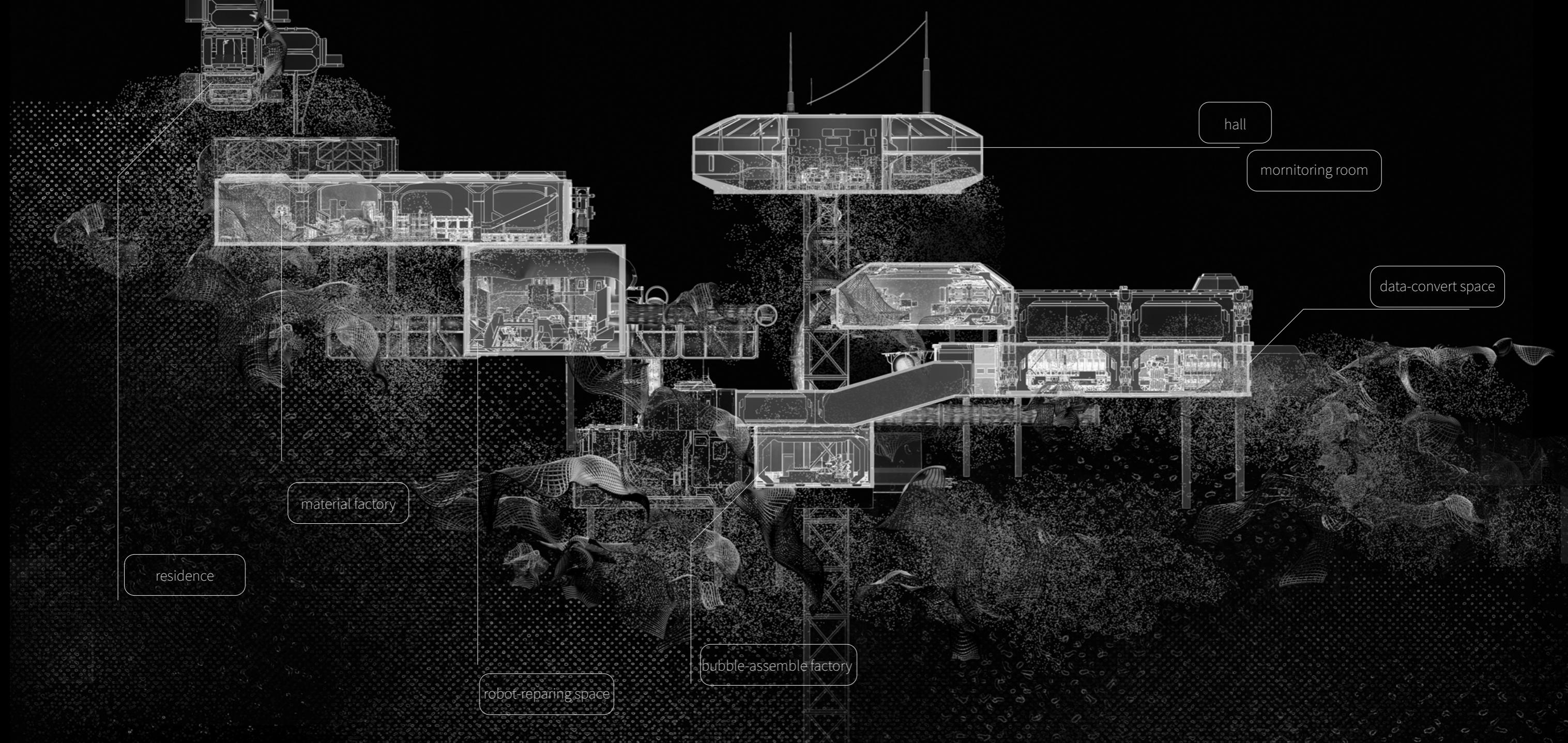


robot-reparing space



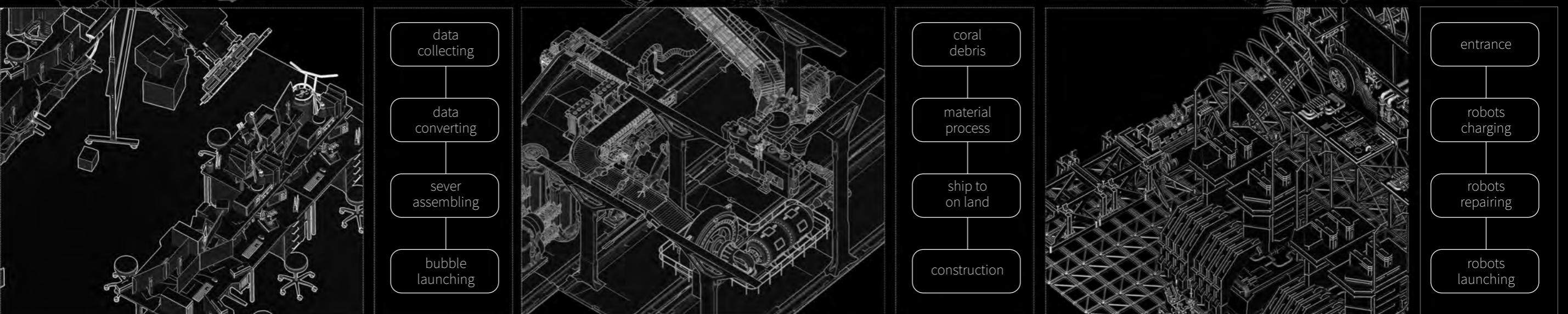
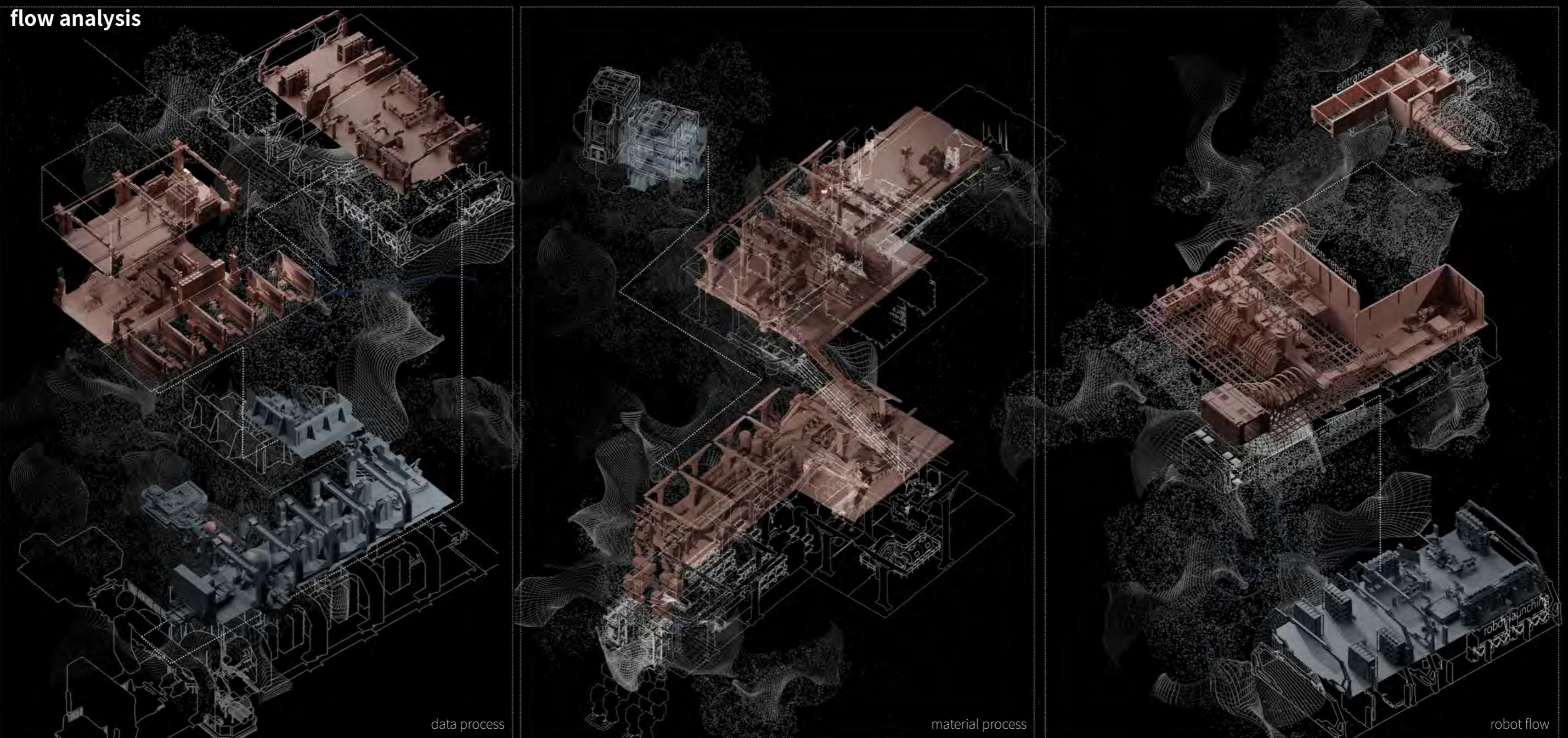
material factory

typology





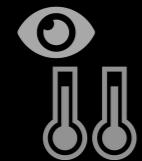
flow analysis



bubble: tensile membrane

why bubble inflate and deflate

heat visualize



tensile material



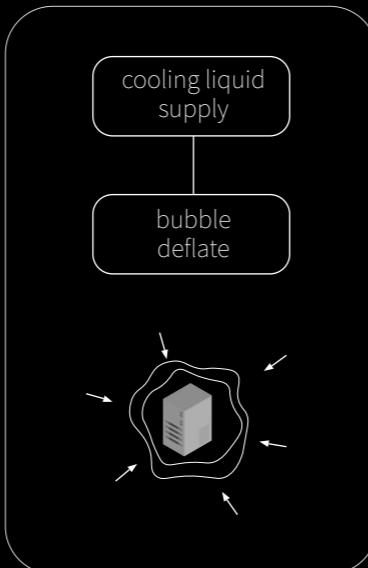
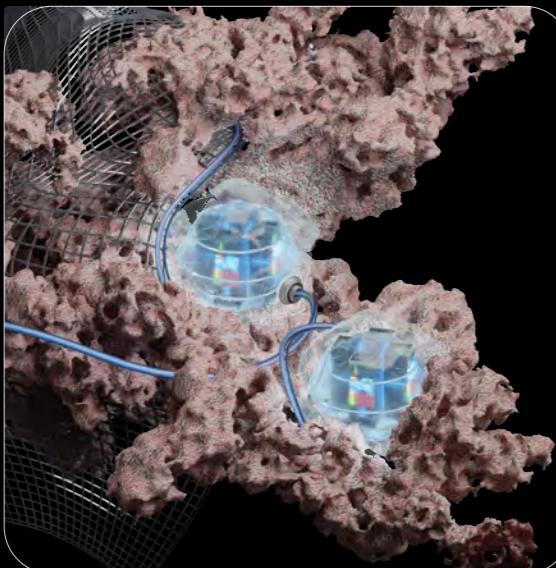
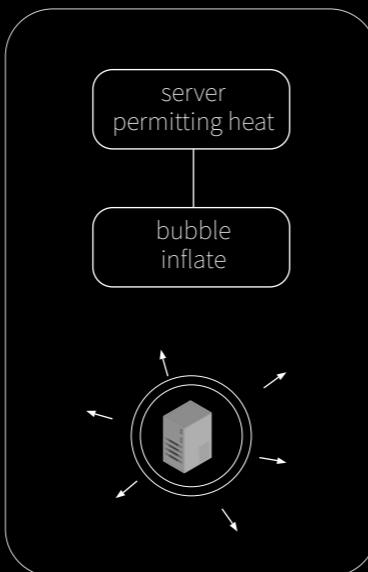
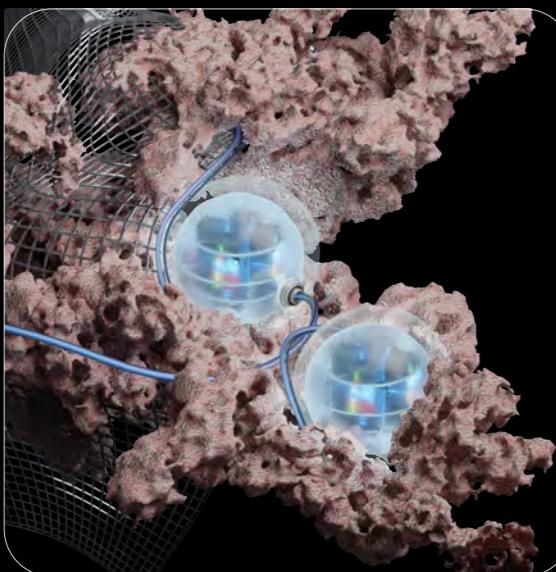
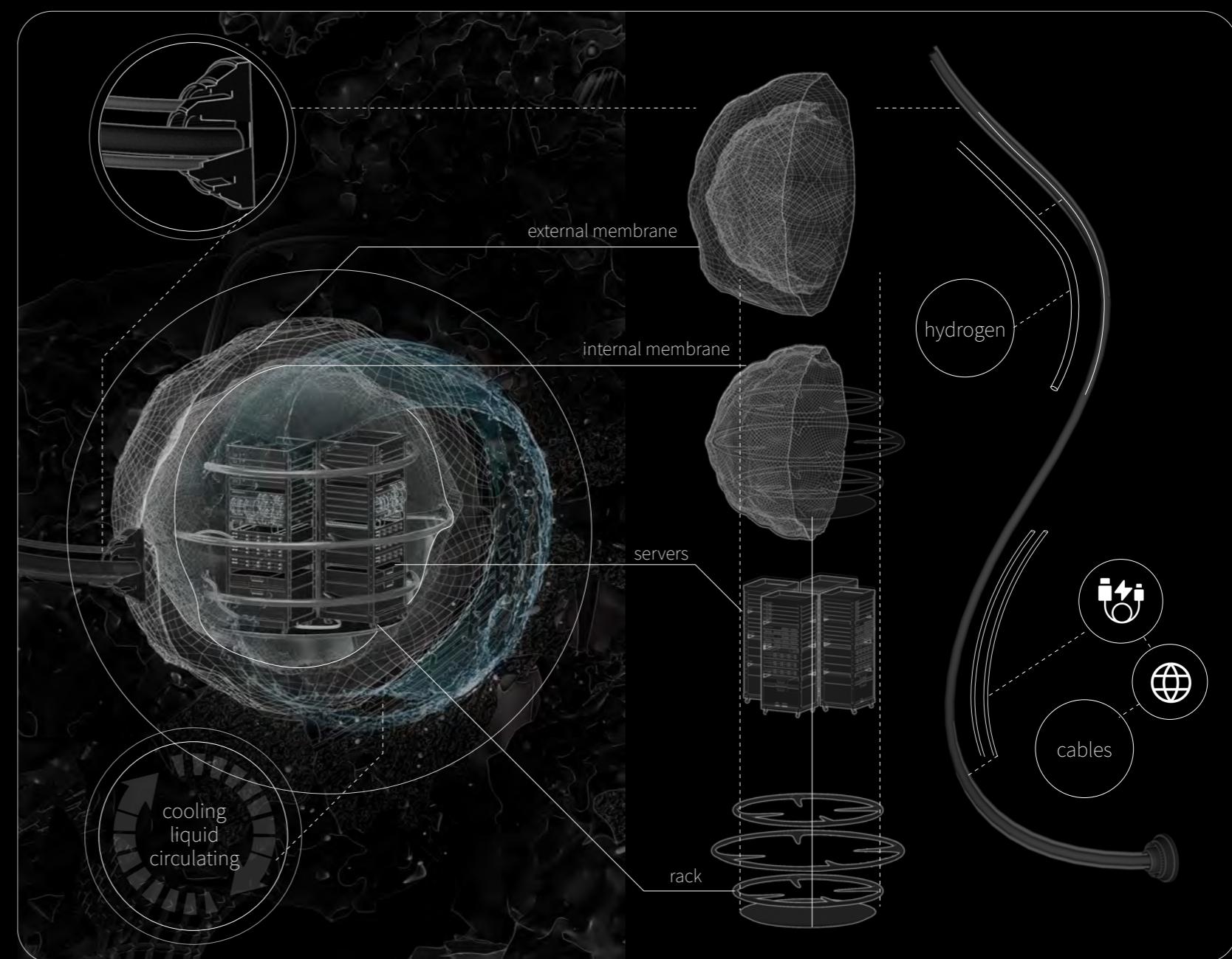
pressure issue



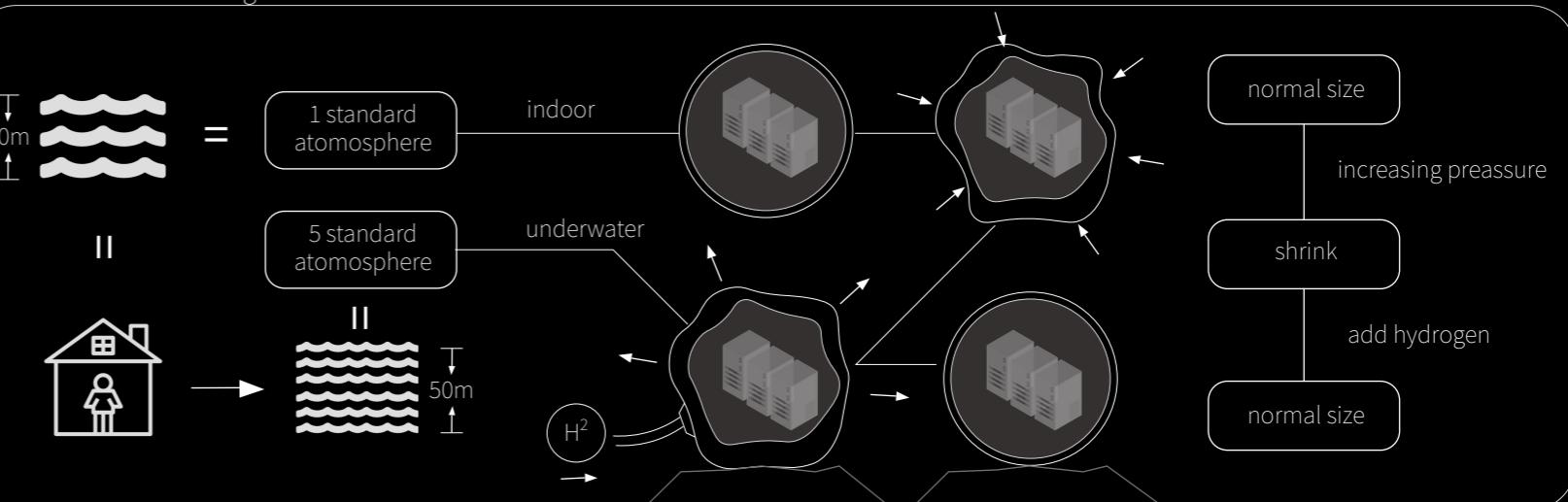
cooling liquid



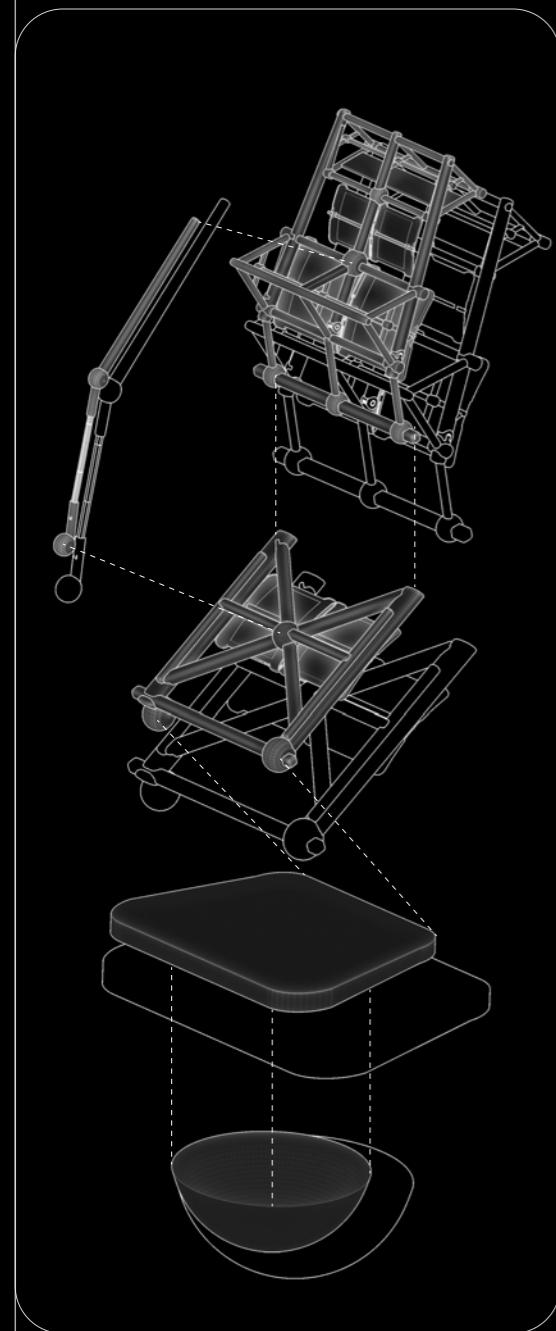
Besides the interior part of datacenter, we put the most essential module—server storage in the ocean. Gleaming bubbles breathing in the water, we make heat visualized using the tensile membrane material.



pressure issue of sending bubble



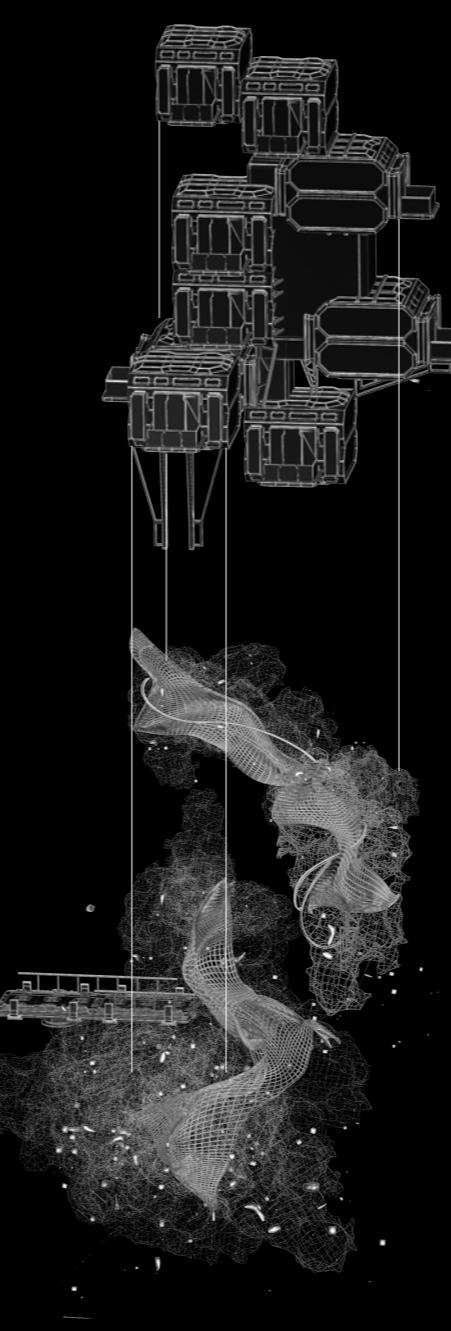
tidal energy generator



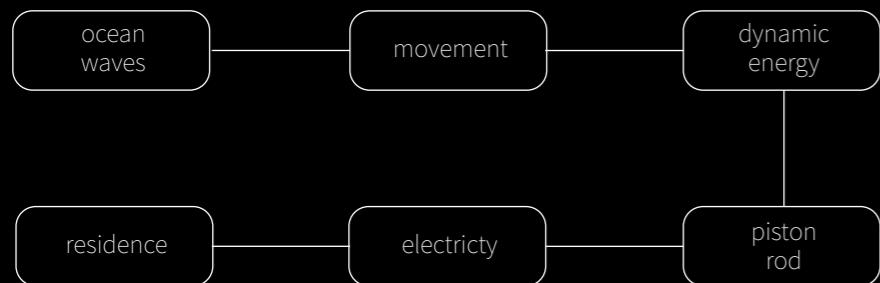
static buoy

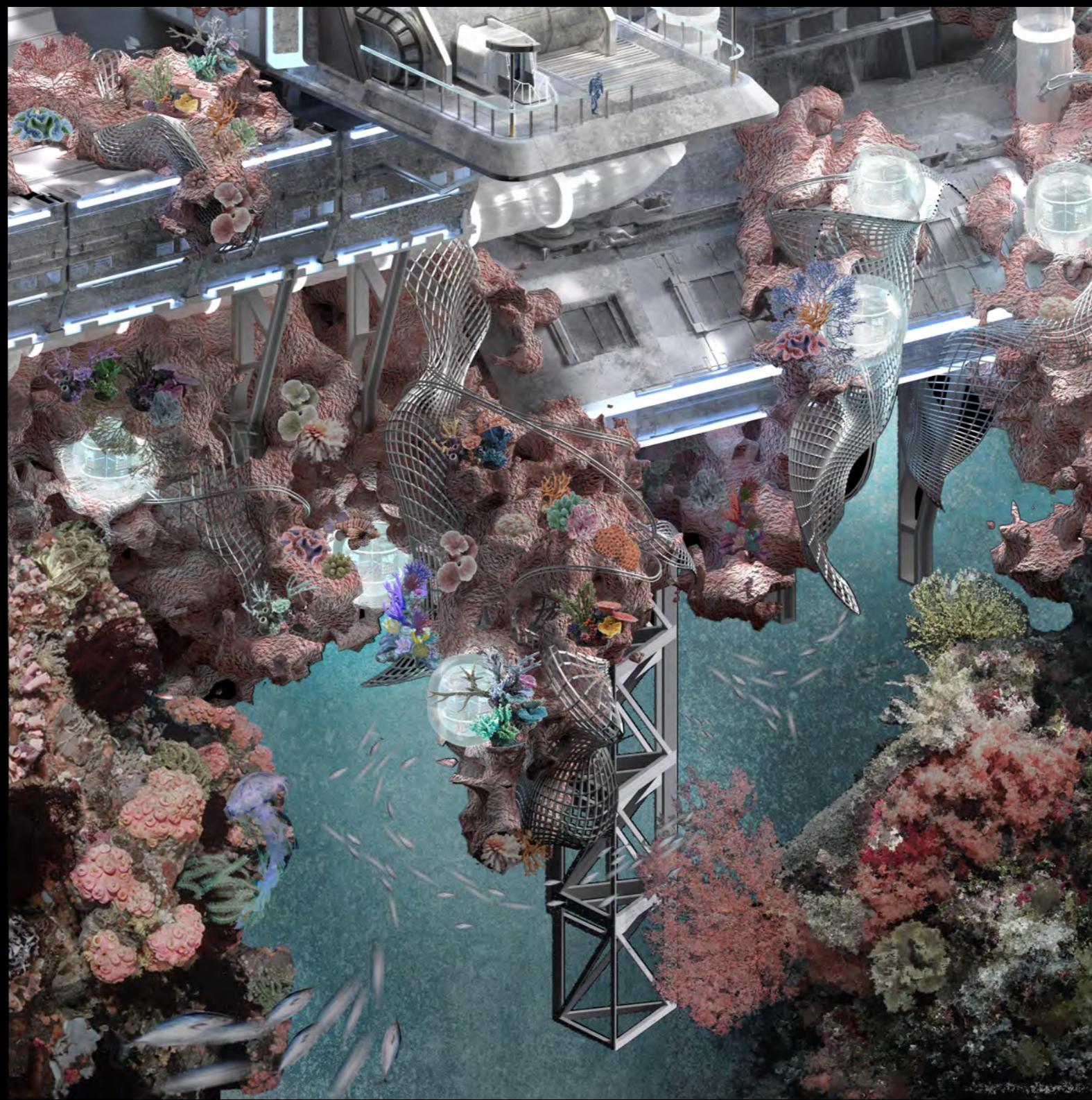


moving buoy



residence





-video-