
COPPERSTONE®
TECHNOLOGIES
ROBOTICS FOR MISSION CRITICAL DATA
FROM HAZARDOUS ENVIRONMENTS

We’re on a mission to enable humanity to reach further, tread lighter, and stay safer.

Tailings are a huge liability, risk & challenge.

Difficult Access Drives Risk

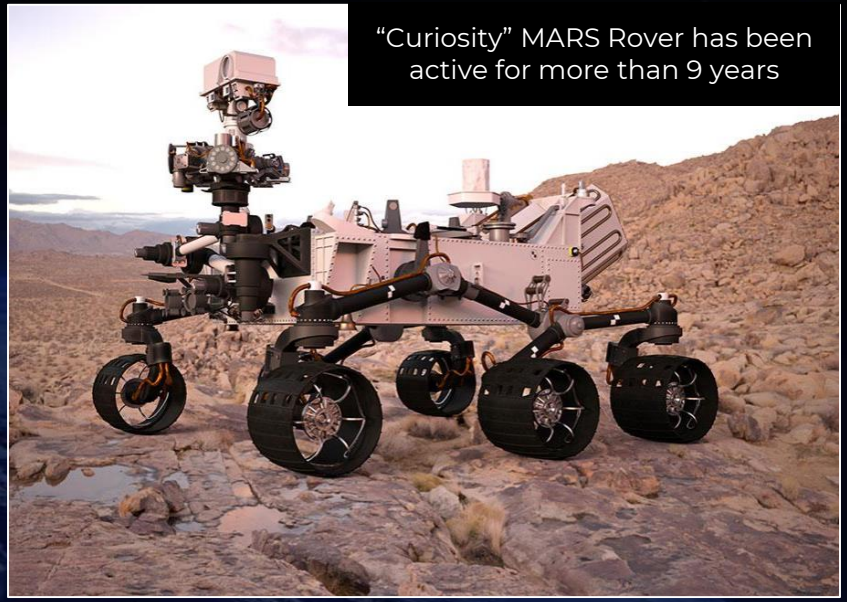
Tools & Exploration

Inspired by advanced remote sensing, Copperstone envisions **developing innovative tools and exploratory methods** to help Earth's most challenging environments.

Zero Human lives at risk.

$4B costs saved versus human-crewed mission.

Robotics & AI are the fourth wave.



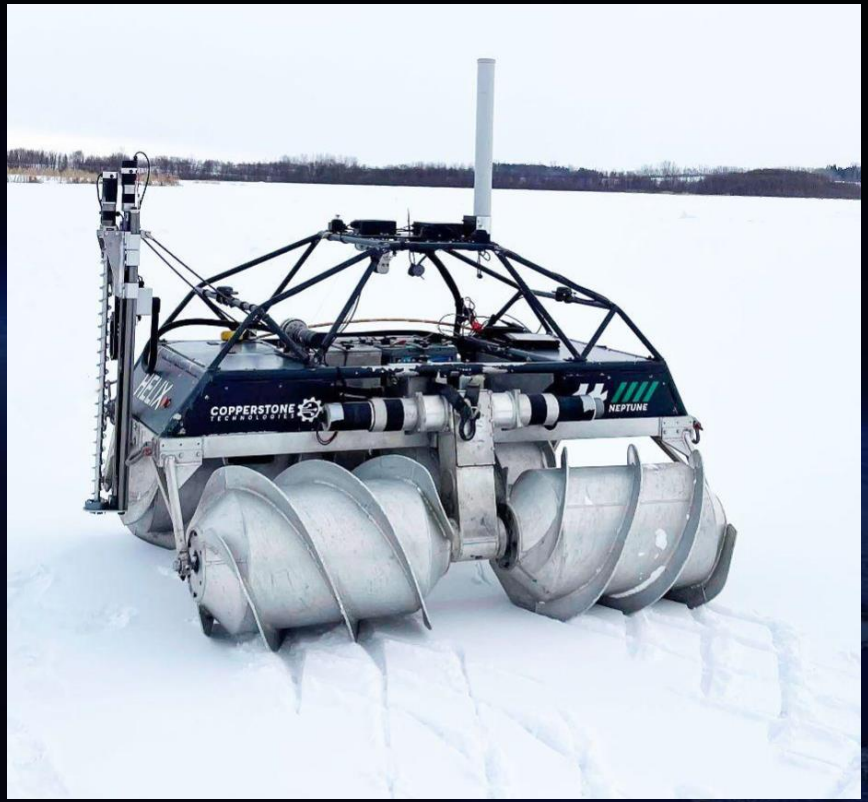
"Curiosity" MARS Rover has been active for more than 9 years

Why do we send robots to other planets?

History - Scroll propulsion


HELIX
COPPERSTONE

HELIX Robots Designed, Engineered & Manufactured by Copperstone Technologies



- Patented screw-propulsion
- Remote & autonomous operations
- Rugged, reliable & redundant designs
- Heavy payloads for geotechnical and water investigations

- **All-terrain access**
- **Safety**
- **Efficient & cost effective**
- **Electric drive & battery power**
- **All weather, all season data**

Current solutions **put humans at risk** and challenging to deploy

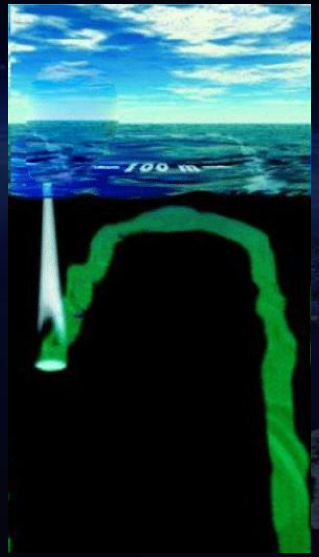
People at risk

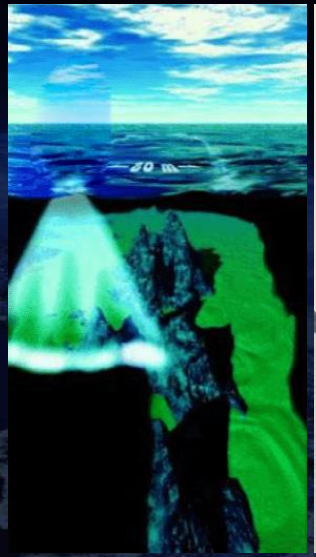
Poor efficiency

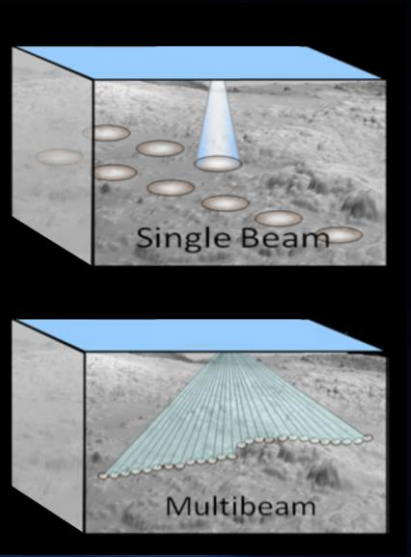
Limited access

Hydrographic Survey - Echo Sounder - Single VS Multi Beam

Single Beam: CEE Hydrosystems dual frequency, 33/200kHz, single beam
Multi Beam: Teledyne ODOM2



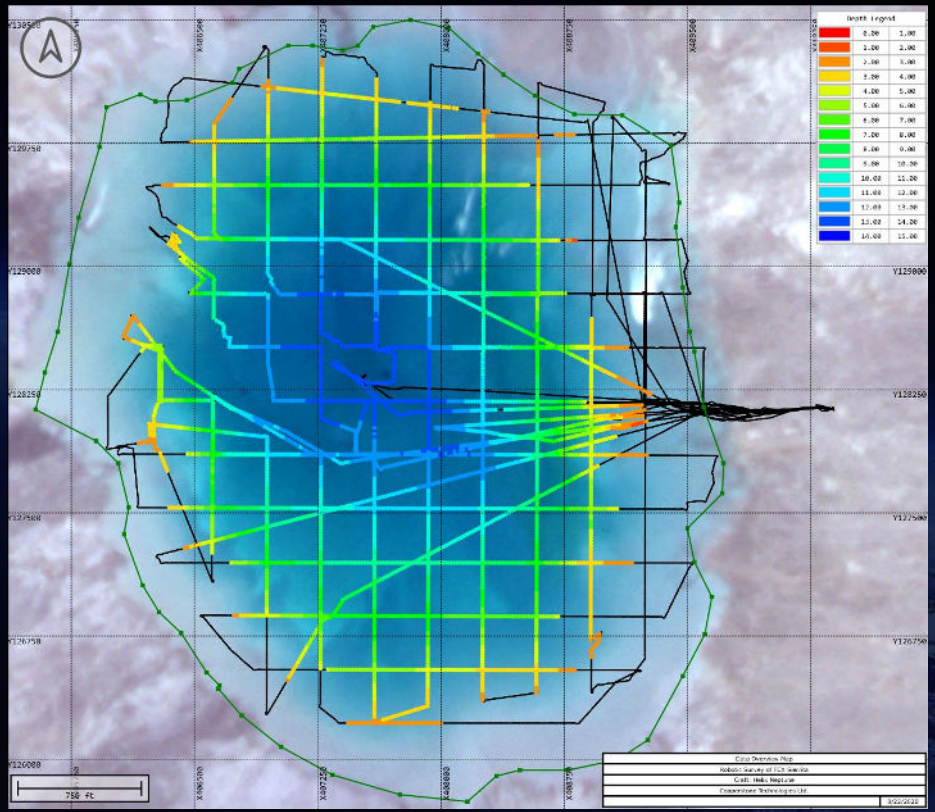


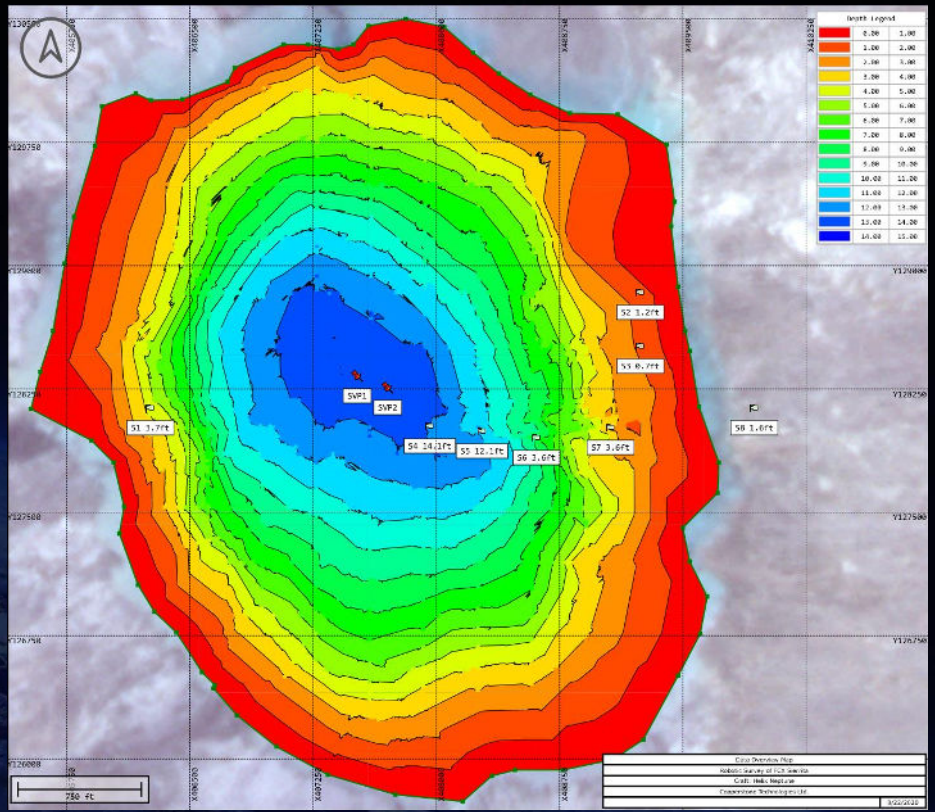


Single Beam

Multi Beam

Data Collection - Hydrographic Survey - Echo Sounder - Bathymetry Survey





Bathymetry Under Ice - Reducing seasonal blindspot of data

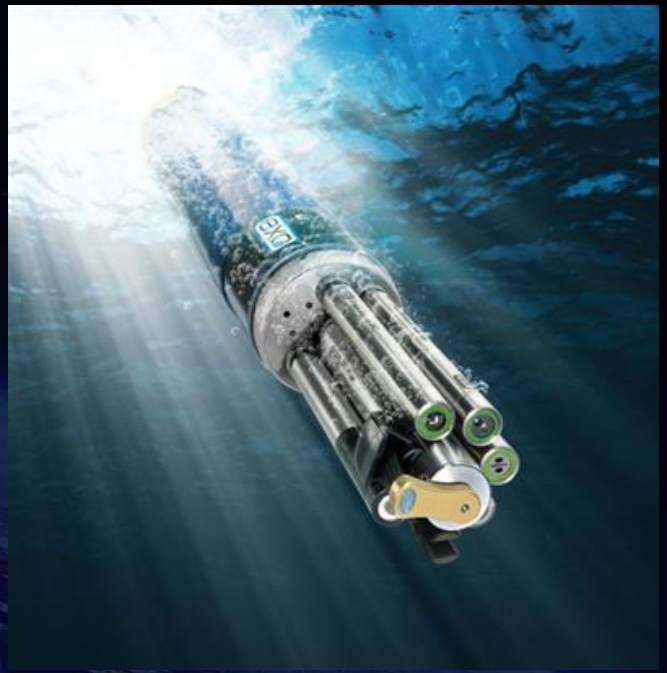
HELIX can perform water volume measurements in the winter. A hole is augured and the echosounder is lowered to create a point measurement. A series of points distributed across the TSF can yield valuable information during winter months.

Ice Thickness assessments - Safety - Humans & Equipment

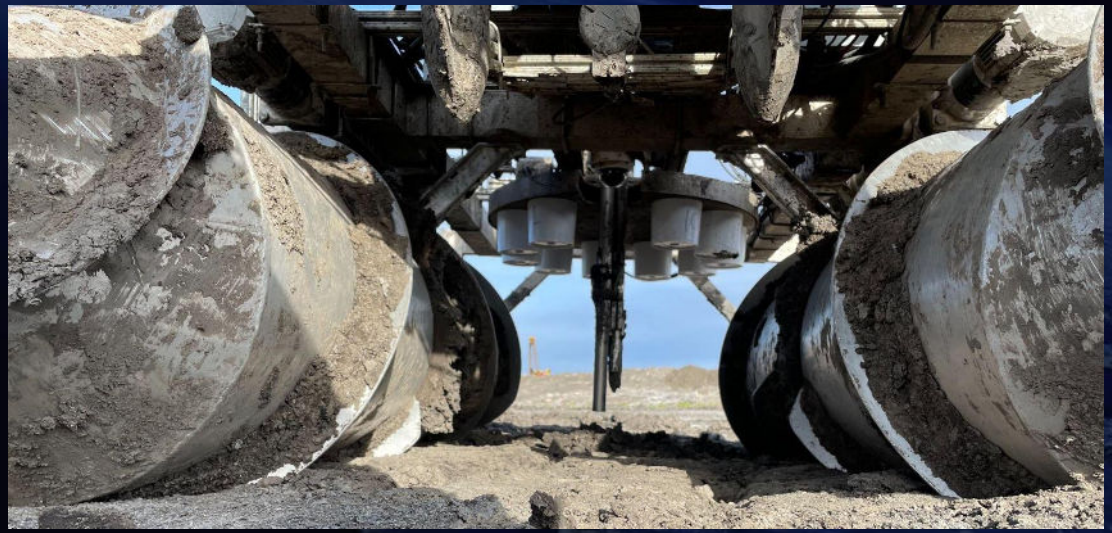
A senor-enabled ice auger can be deployed for remote ice thickness measurements up to 16-inches thick. The information can be used to determine safety factors when humans or other heavy equipment are needed to traverse on the ice. If HELIX breaks through the ice itself, it remains floating and can crawl back onto the ice surface.

Water Characterization - Physical Parameters

HELIX can deploy a van Dorn water sampler (1L or 2L). One sample per mission is achievable, with subsequent unloading and resetting by human operators on shore. YSI Exo2 Sonde deployed to measure 7 physical, electrical and chemical parameters. These tools can be deployed to 200 m deep.

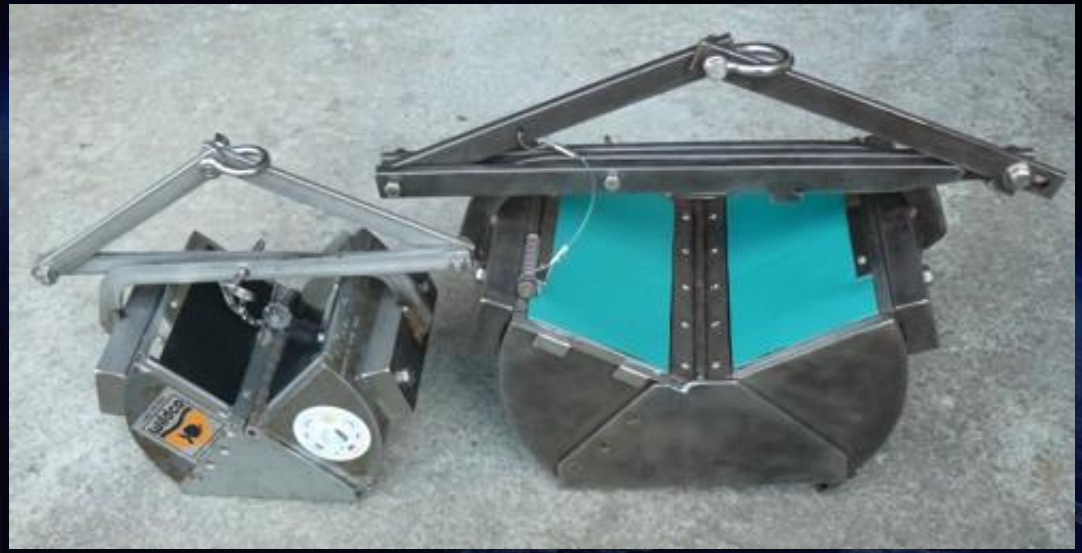


Tailings Sampling - Piston Sampling - Collect tailings & soil samples at varying depths



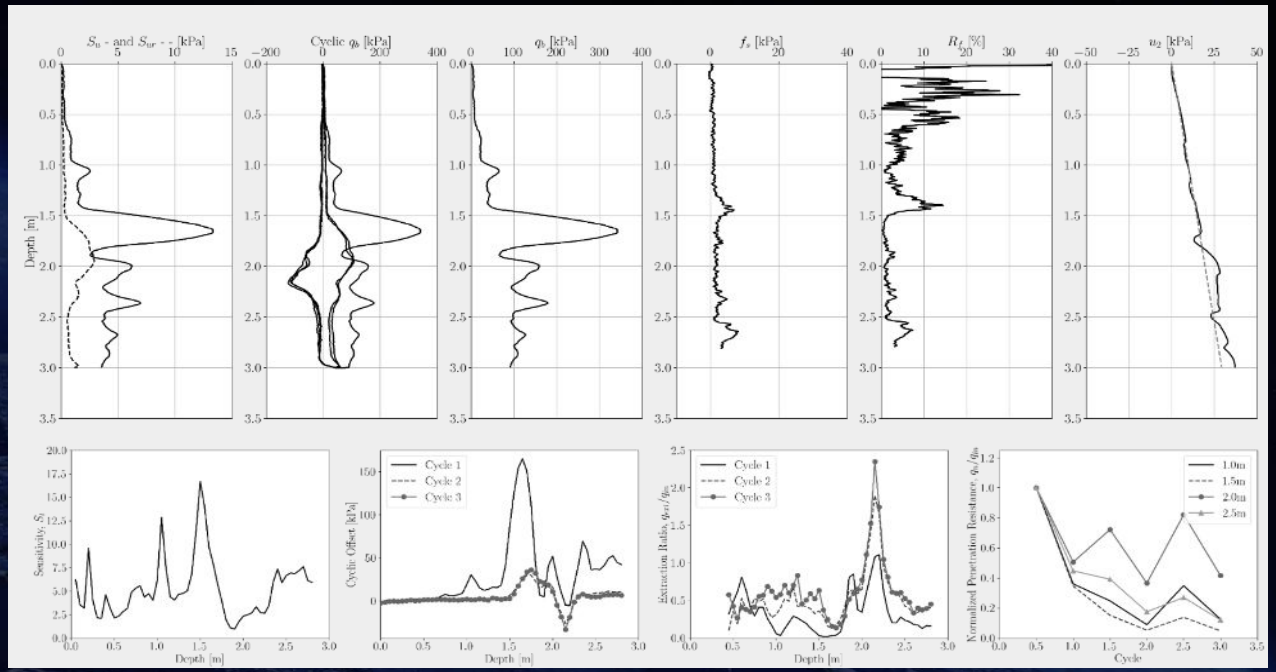
Sediment Sampling - PONAR Grab Sampler - Bottom sampling device

HELIX can be outfitted with sampling devices to collect samples from the bottom of a body or water. When the scoops strike the bottom, the tapered cutting edges penetrate with very little sample disturbance. The sample can then be collected and analysed.



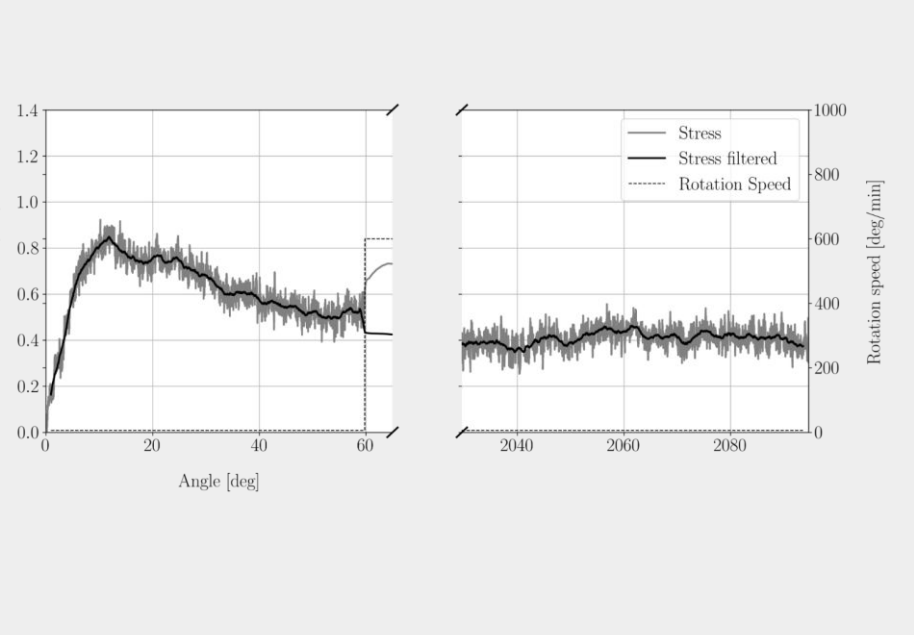
CPTu - Water Pressure

HELIX can be fitted with an electric piezocone penetrometer that measures tip resistance, dynamic pore pressure, and sleeve friction continuously during penetration. This helps to identify subsurface conditions. Copperstone's CPTu gear follows ATSM D5778 standards and collaborations with partners enables additional options and tools.



Vane Shear - Determine the undrained shear strength of soils

Copperstone uses a proprietary Field Vane Shear Tool (VST) for in-situ testing that is made to be deployed from HELIX robots. The unit and operating methods are in accordance with ASTM D2573.



Equipment Rescue - No asset left behind

HELIX can be outfitted with a rescue payload. A tow cable and hook are mounted on a quick-release arm. HELIX can drive out to stranded equipment, hook on a tow cable to a line mounted on shore. Pulling comes from shore based equipment - a truck or bulldozer.


SEED BROADCASTING
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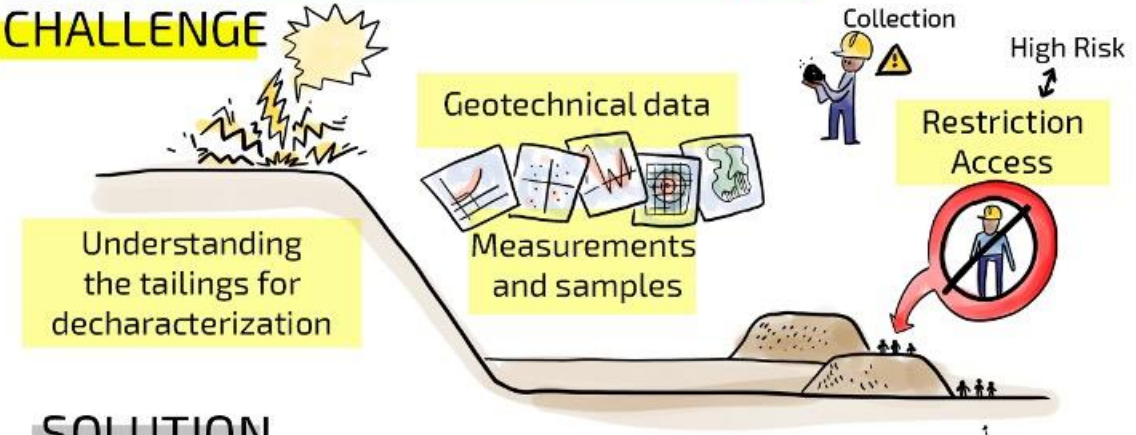
Robots-as-a-Service Surveying, sampling, geotechnical investigations and bathymetry

Copperstone typically operates as a Service, as an accessible and easy way to adopt robotic solutions for challenging environments. Sending a trained field team who deploys our HELIX robots and bring sensors or sampling payloads to site, keeping people out of harm's way, reducing costs and improving efficiencies for our clients. Helix robots can carry different payloads and collect real-time data.

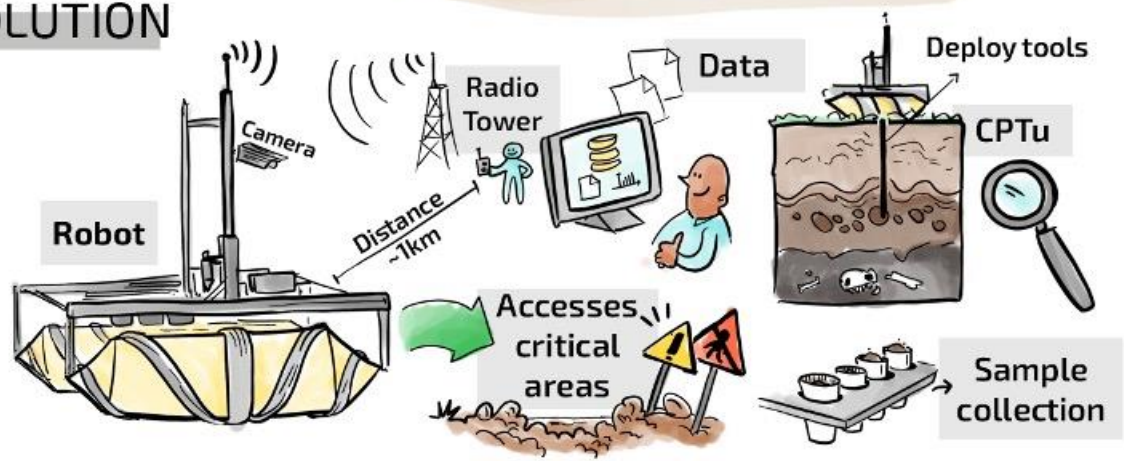
Obtaining geotechnical data in dams with restricted access for people

COPPERSTONE TECHNOLOGIES VALE

CHALLENGE



SOLUTION



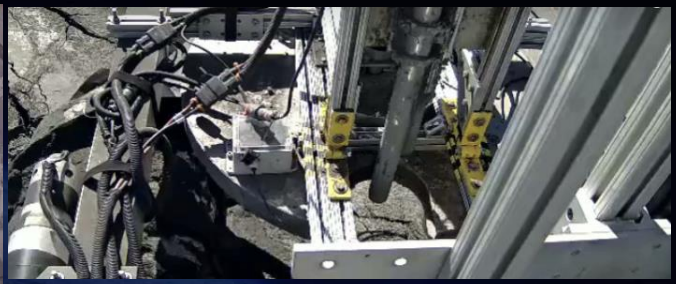
IMPACTS

Multi-Functional payloads for site investigation.









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