The Value of Data Analytics for Resiliency and Sustainability Efforts

Panelist
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Resilience by Decision Support

Data Analytics enable advanced Decision Support Technology (DST) . Decision Support for Sensemaking is aimed to enhance human decision making.

- Subject Matter Experts (SME) will be utilized more efficiently by having DST tools filter important information for SME attention.

- Decision Support Technology will enable use of less-skilled personnel by providing tools to enhance their decision making and reduce fatigue.

- In some cases, DST performs at a superior level than SME's (including examples from medical field). Fatigue will not affect DST tools.

Big Data Challenges and Technology

Big Data attributes pose severe challenges to traditional methods.

- **Health Care is a prime example of Big Data challenges.**
  - **Volume - some high definition videos for cancer screening require PB storage.**
  - **Variety of individual records - doctor notes, medical images, measurements, immunization records, DNA records, etc.**
  - **Variety overall – no standard for electronic health records.**
  - **Veracity – Doctor handwriting is notoriously bad.**
  - **Value – medical records are of life-saving importance.**
  - **Velocity – exists in various treatment scenarios.**

High Performance Computing and other technologies have enabled Big Data analytics approaches.

- **Digitization, Linking, and Labeling of data**
- **Newer Database Technologies and computing paradigms (e.g. MapReduce)**
- **Object Character and Voice Recognition Technologies**
- **High Performance Computers**

Information Science and Sustainment

Information Science techniques are being developed rapidly in many fields for decision support.

- Example 1: Governments funding organizations are using information science approaches to aid the detection of emerging technologies, identification of high impact young scientists, and highlight successful investments.
- Example 2: Business School entrepreneurs are searching patent databases and contemplating secondary applications for candidate dual-use patents. Leveraging previous technical investment by government and other institutions.
- Example 3: Many resilience tools are based on the Detection of anomalies
  - Cyber Security network & host tools aid detection of unusual activities
  - Fraud Prevention tools aim to identify uncharacteristic transactions
  - Detect and Locate Failures in Elements of Critical Infrastructure

Will Smart Cities be Smart Enough?

Panel Question: Are there risks within the concept of smart cities? Will replacement human decision making with automation on a city-wide scale really improve quality of life?

- Reasoning: Humans can adapt better to occasional unusual circumstances that might cause an automated system to fail.

- Counter-example: Shock-wave that can occur as cars accelerate too fast and then pump breaks to stop after a stop light changes green. Automated, networked cars would accelerate at the same rate to achieve full speed without pausing or stopping.

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Questions from audience?

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THANK YOU!

The Future of the State of Hawaii Resiliency Initiative Starts Here: Bigger Data, Bigger Analytics, and a robust Technology Roadmap

Prof. Steve Chan, PhD
Tom Klemas, PhD

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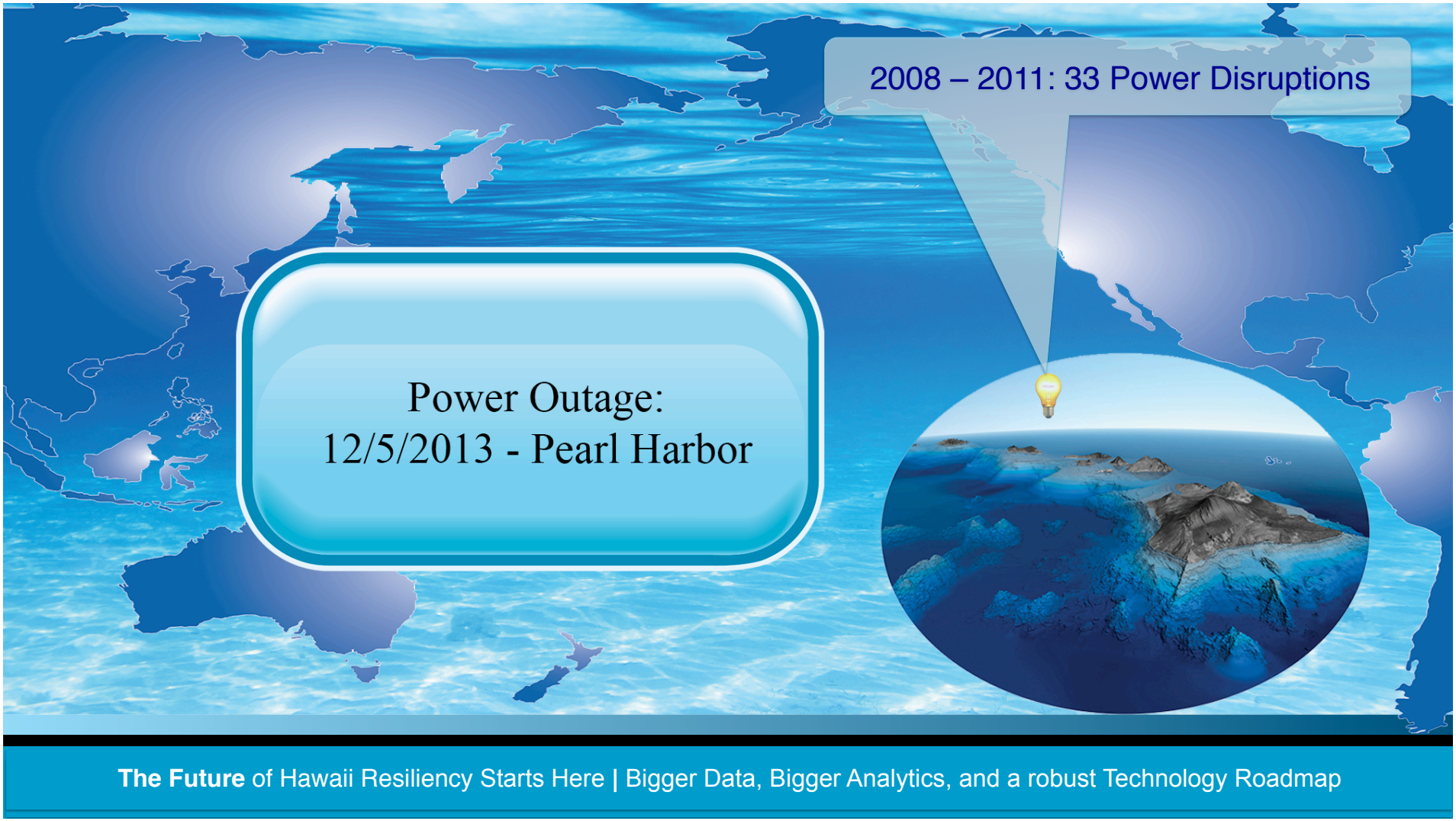
Hawaii is home to U.S. Pacific Command (PACOM).
The PACOM Area of Responsibility (AOR) includes more than 50% of the world's population and 2 of the 3 largest economies.
360,000 U.S. military and civilian personnel are assigned to the PACOM AOR.



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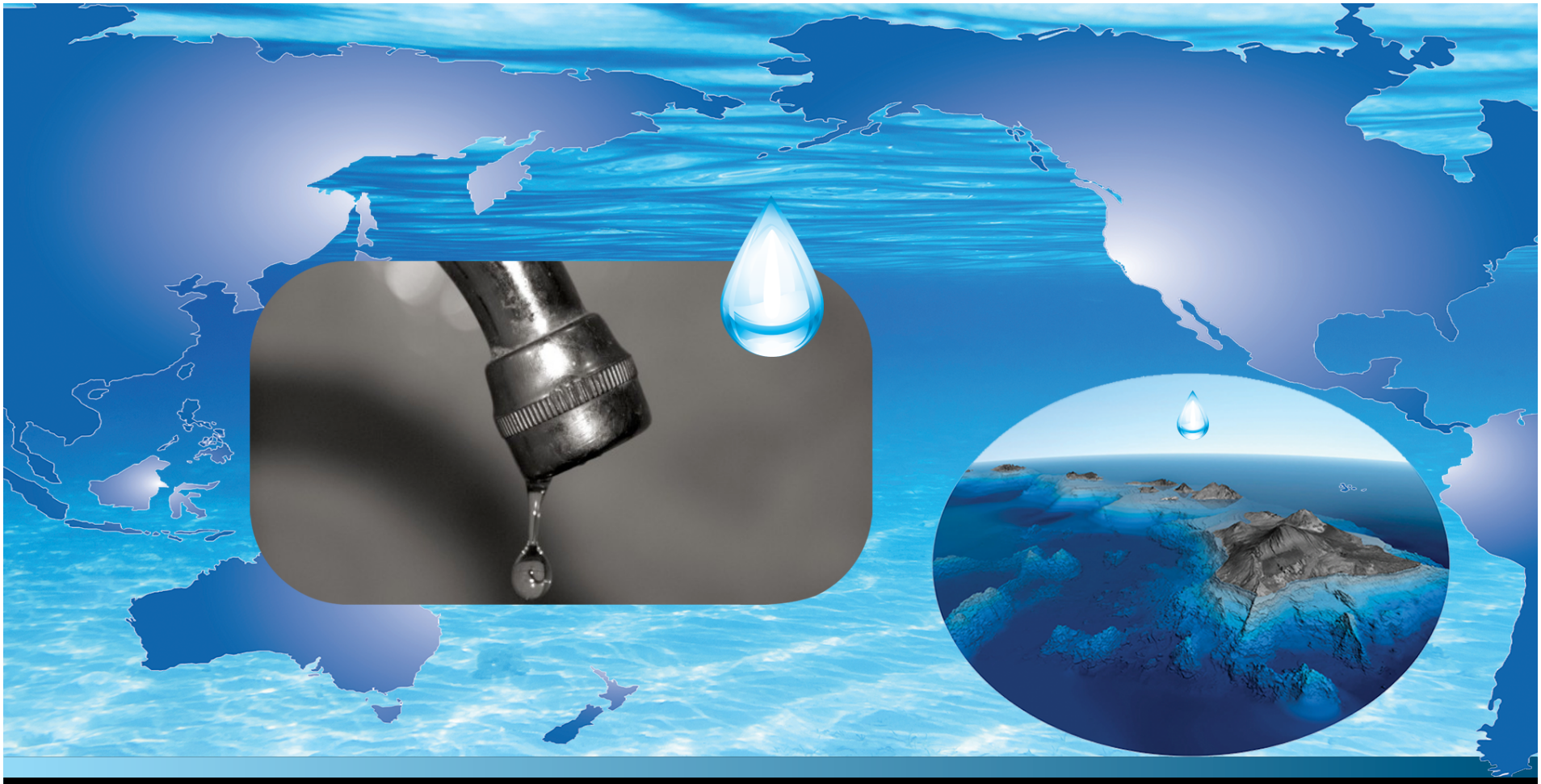

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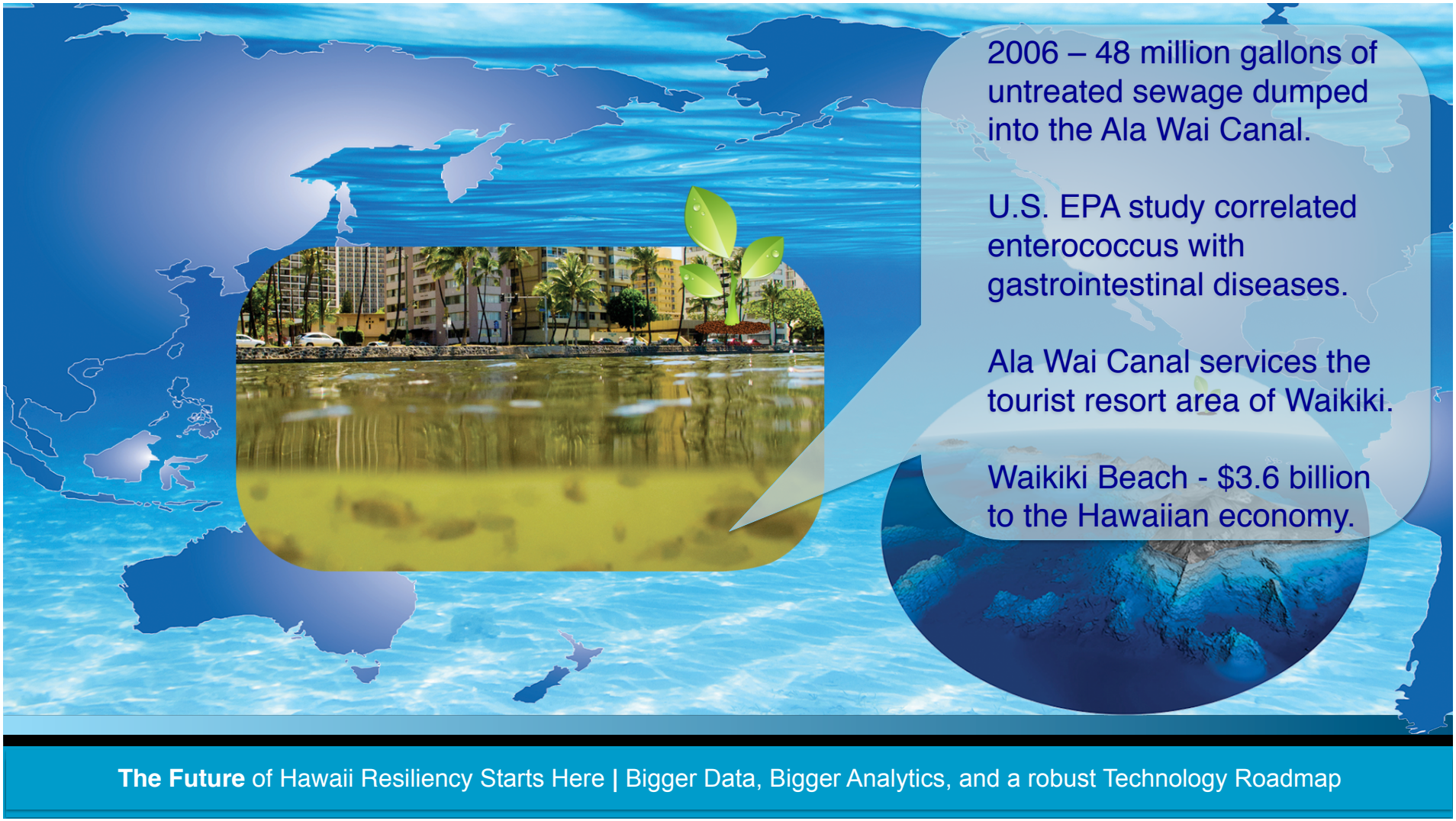
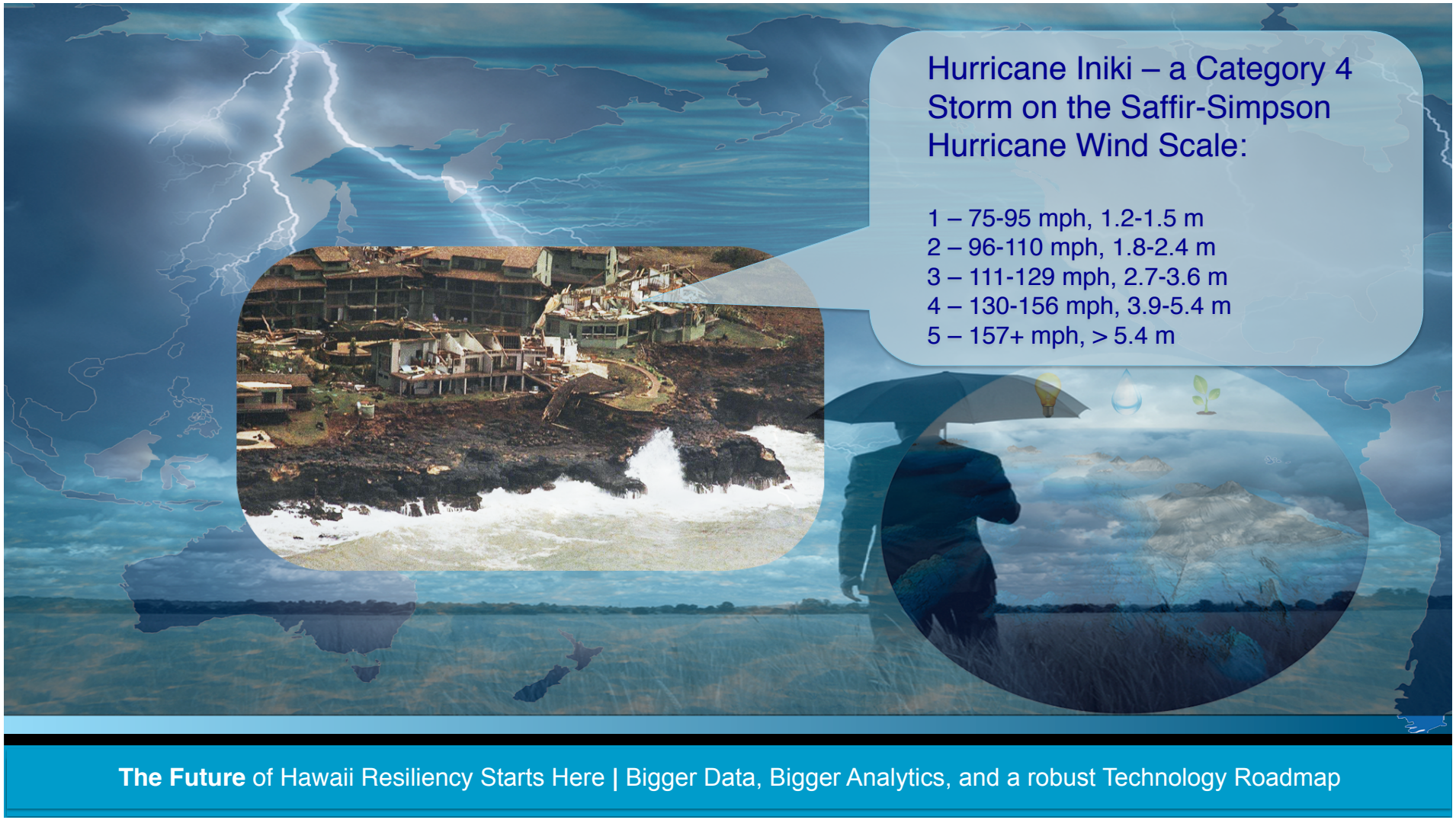

2006 – 48 million gallons of untreated sewage dumped into the Ala Wai Canal.
U.S. EPA study correlated enterococcus with gastrointestinal diseases.
Ala Wai Canal services the tourist resort area of Waikiki.
Waikiki Beach - $3.6 billion to the Hawaiian economy.



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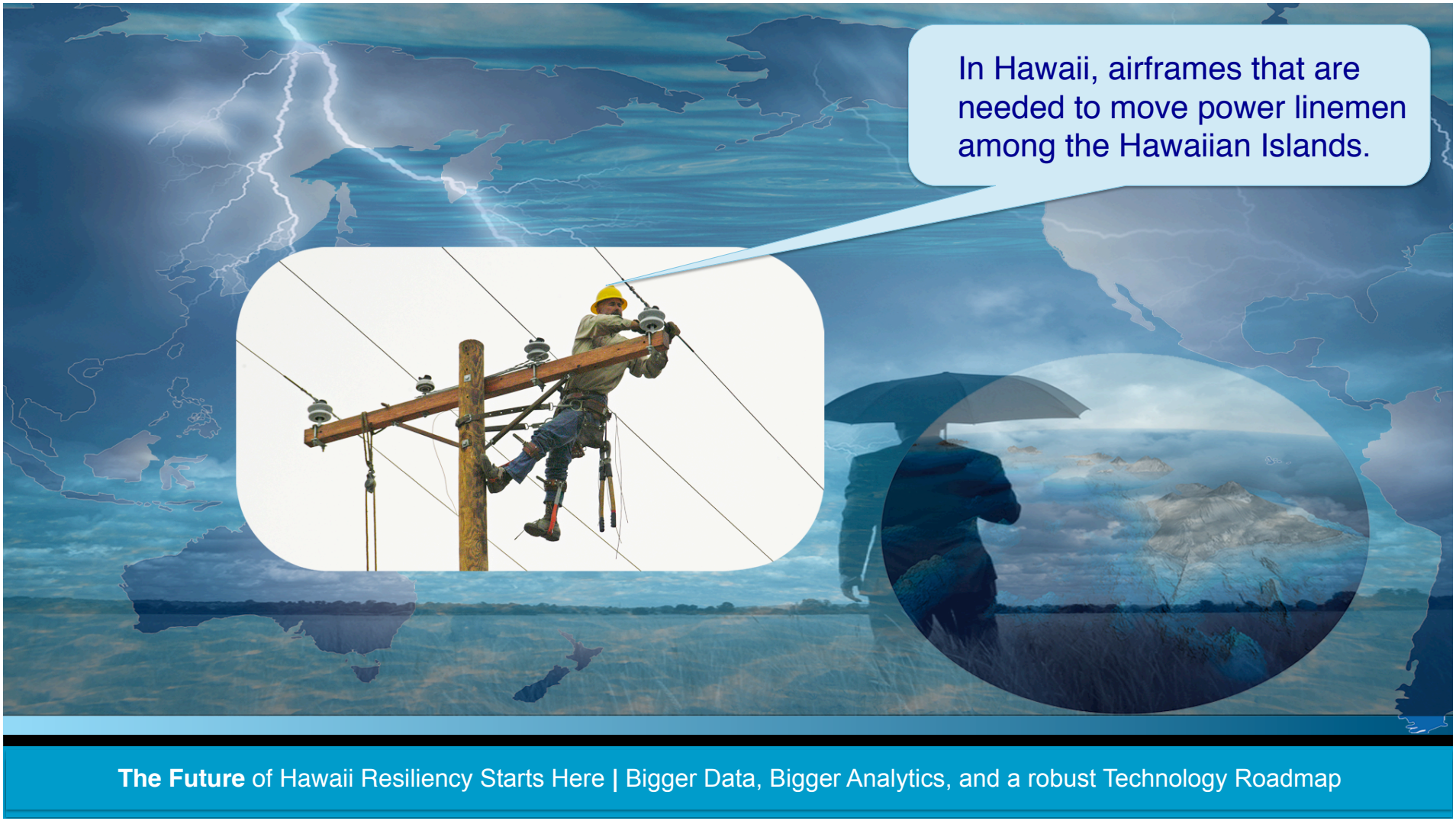
In Hawaii, airframes that are needed to move power linemen among the Hawaiian Islands.

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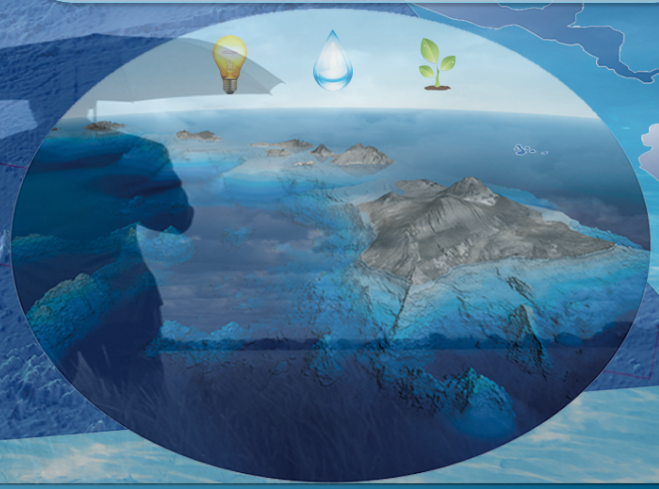
Alaskan Earthquakes:

- 1946 Alaska Earthquake (7.4) and Tsunami.
- 2014 Alaska Earthquake (7.9).

- 19 today.
- 463 this month.
- 5,313 this year, thus far.



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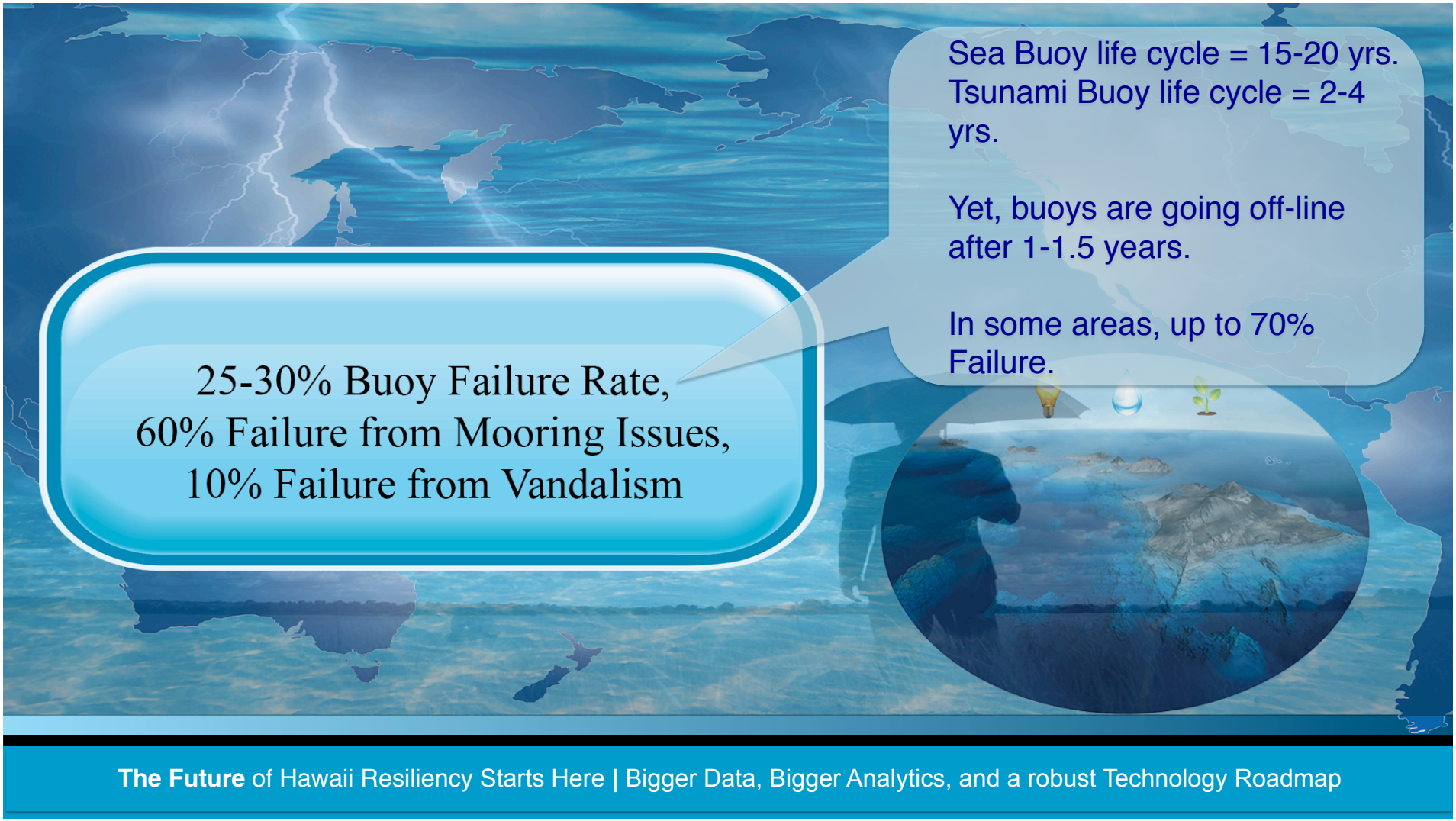
Sea Buoy life cycle = 15-20 yrs.
Tsunami Buoy life cycle = 2-4 yrs.
Yet, buoys are going off-line after 1-1.5 years.
In some areas, up to 70% Failure.
25-30% Buoy Failure Rate,
60% Failure from Mooring Issues,
10% Failure from Vandalism

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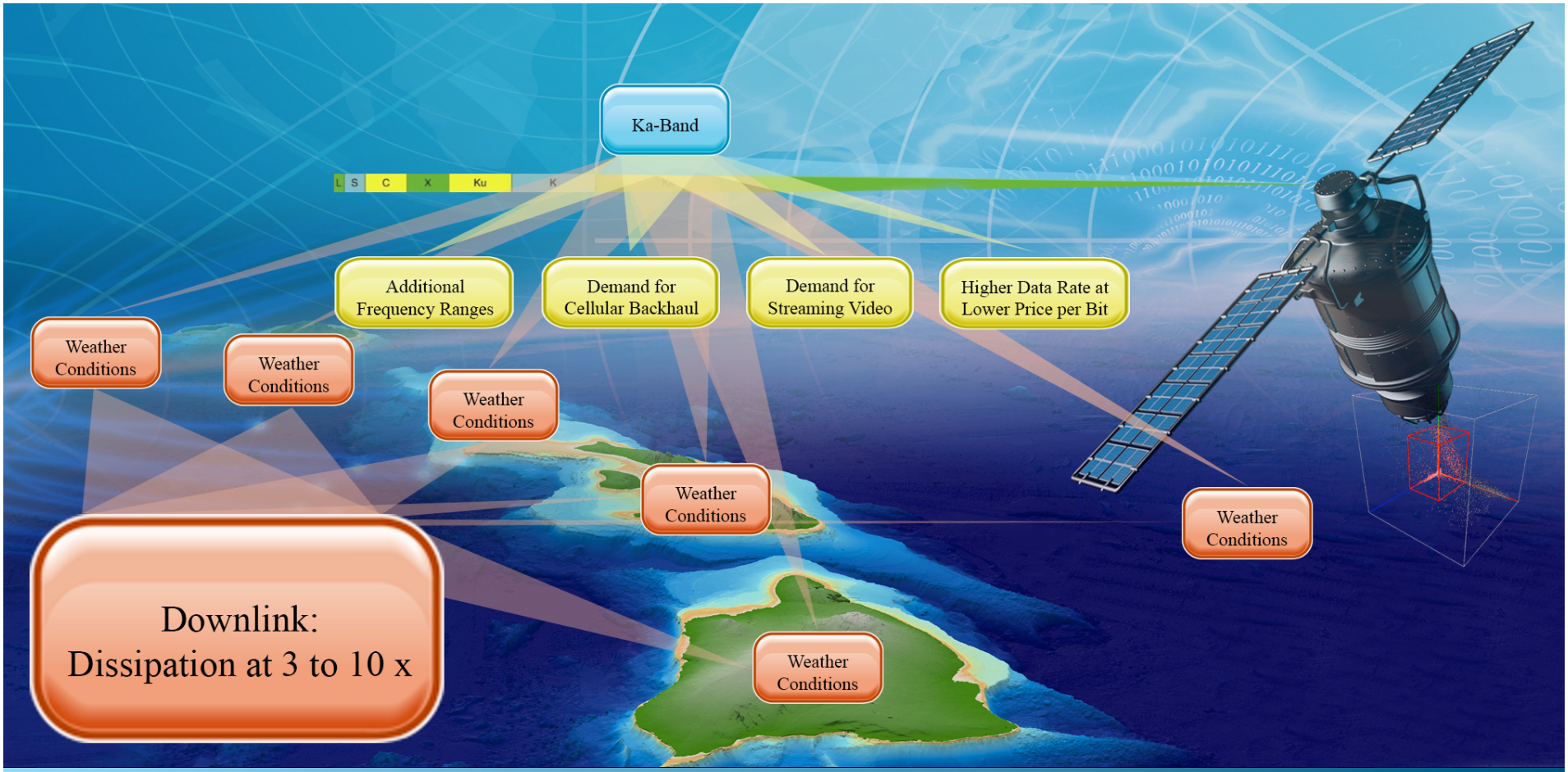

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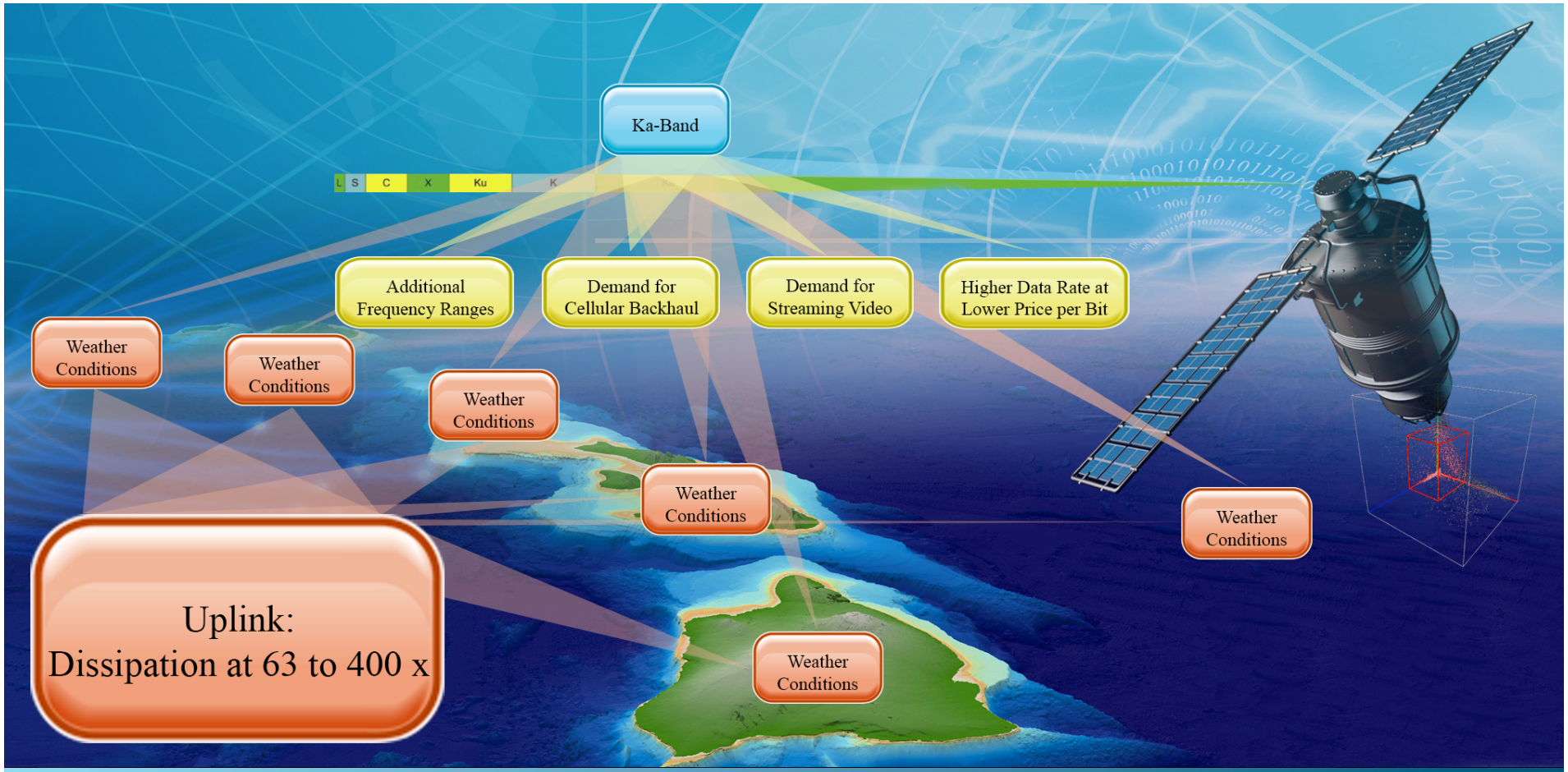

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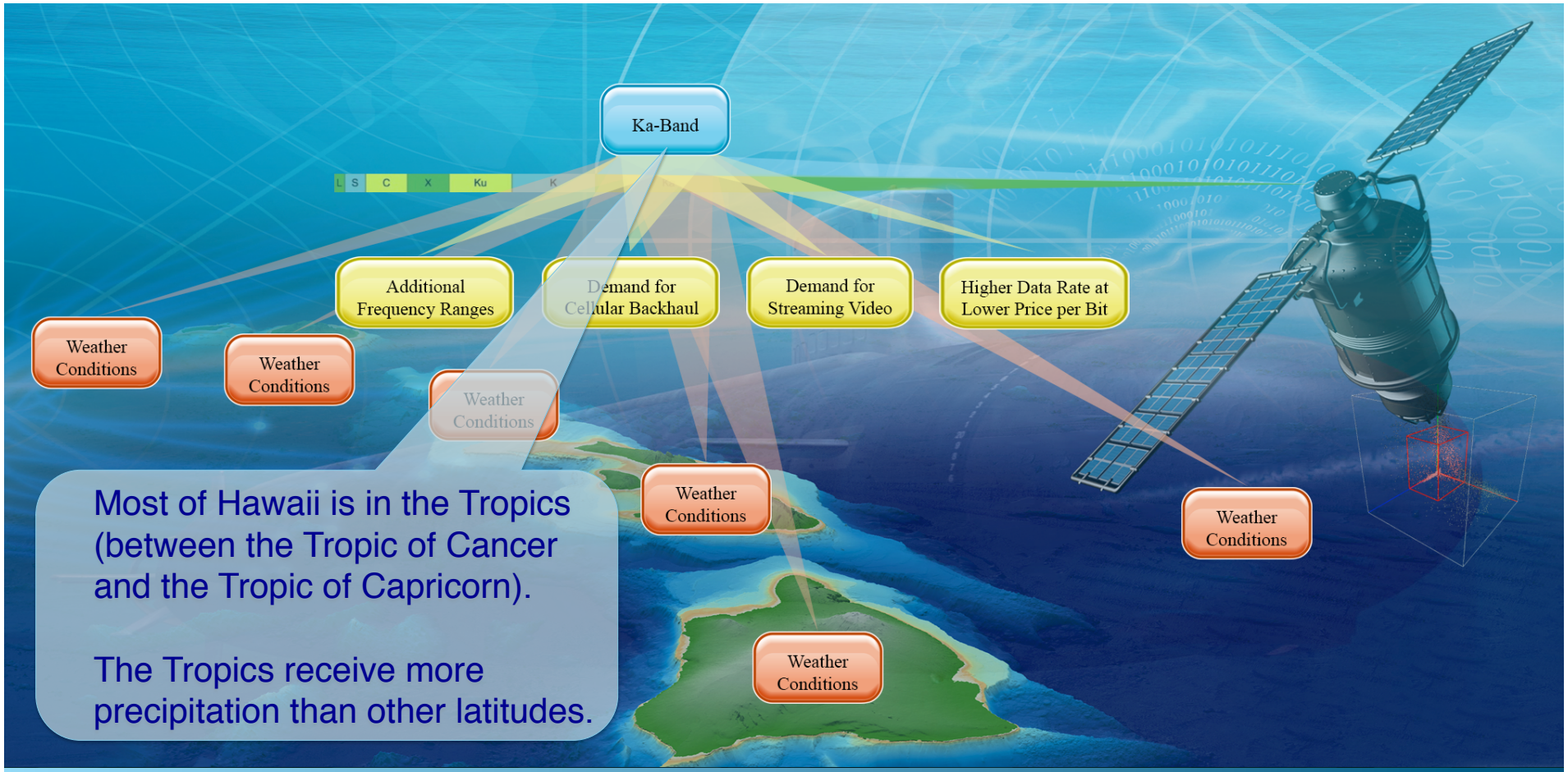
Ka-Band
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Additional Frequency Ranges
Demand for Cellular Backhaul
Demand for Streaming Video
Higher Data Rate at Lower Price per Bit
Weather Conditions
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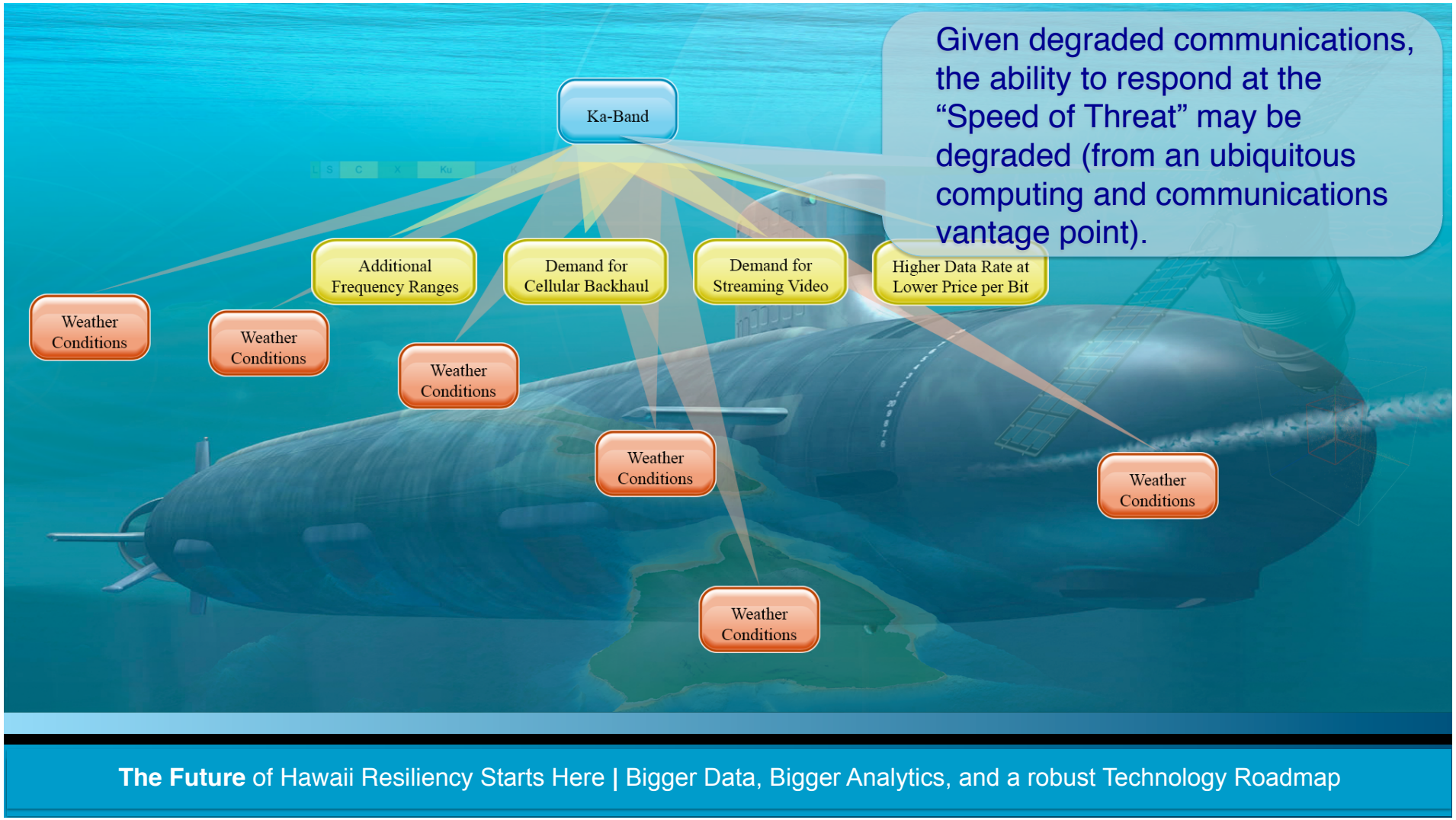
Most of Hawaii is in the Tropics (between the Tropic of Cancer and the Tropic of Capricorn).
The Tropics receive more precipitation than other latitudes.


Given degraded communications, the ability to respond at the "Speed of Threat" may be degraded (from an ubiquitous computing and communications vantage point).
Ka-Band
Additional Frequency Ranges
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Demand for Streaming Video
Higher Data Rate at Lower Price per Bit
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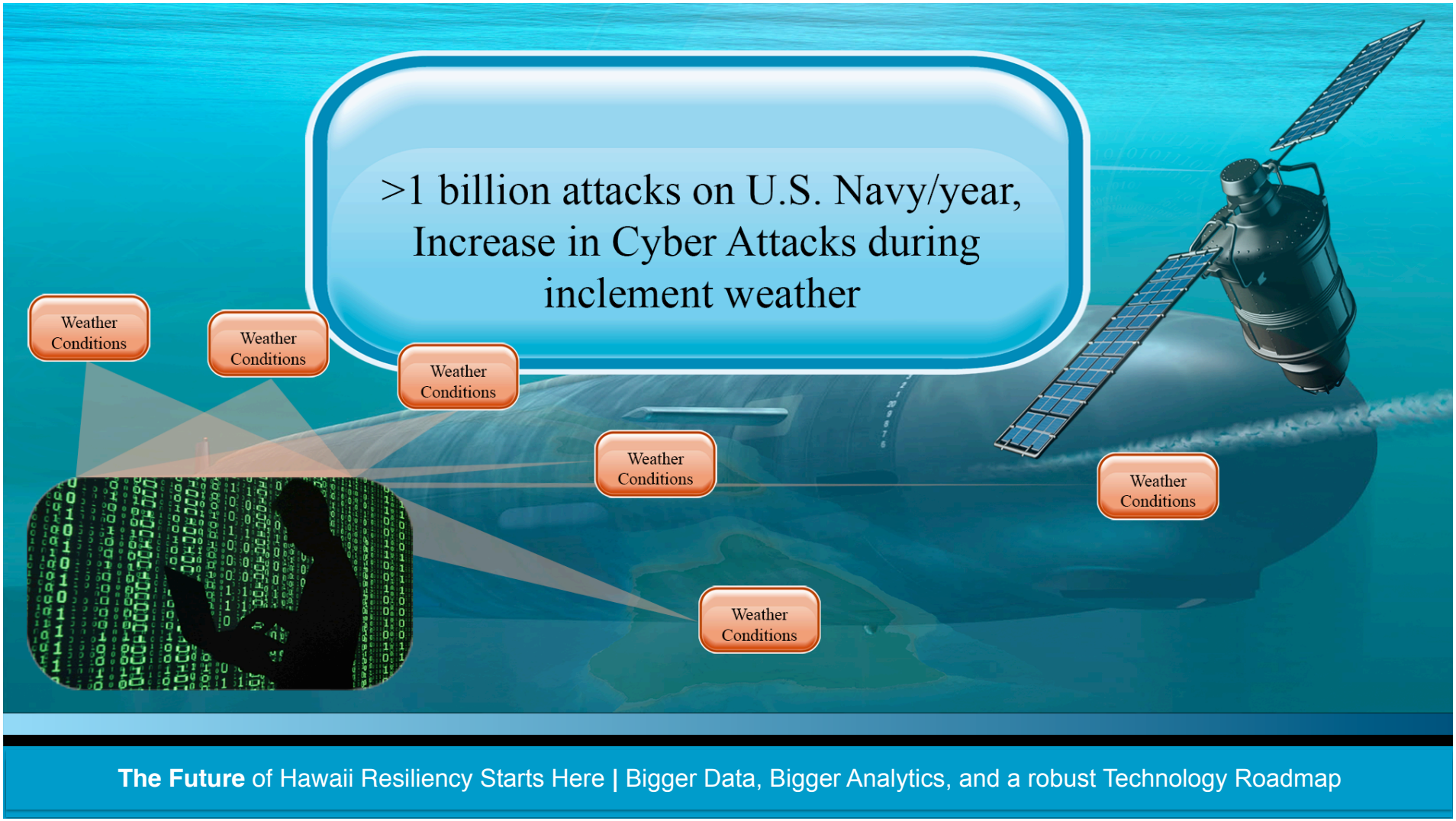

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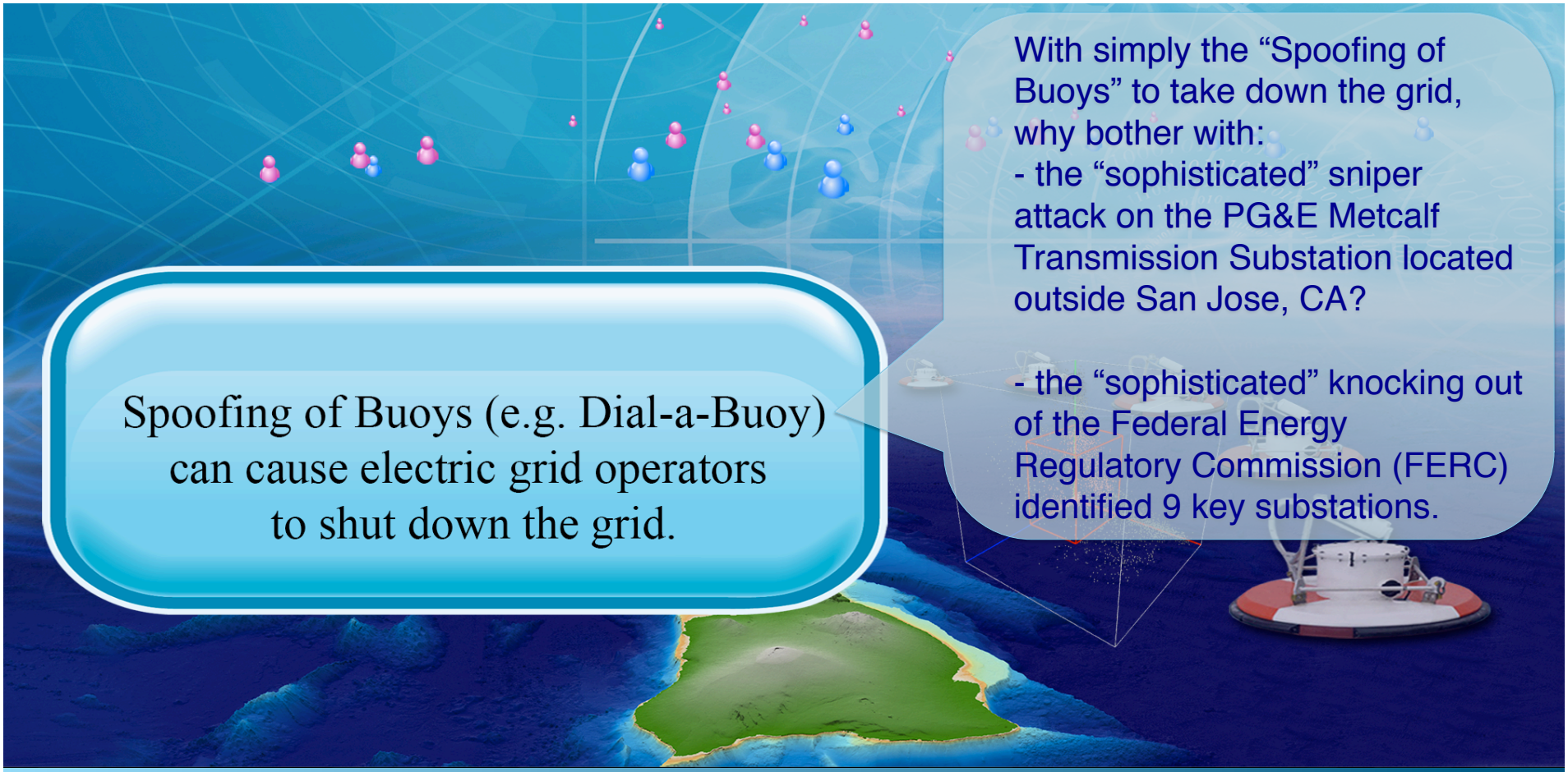
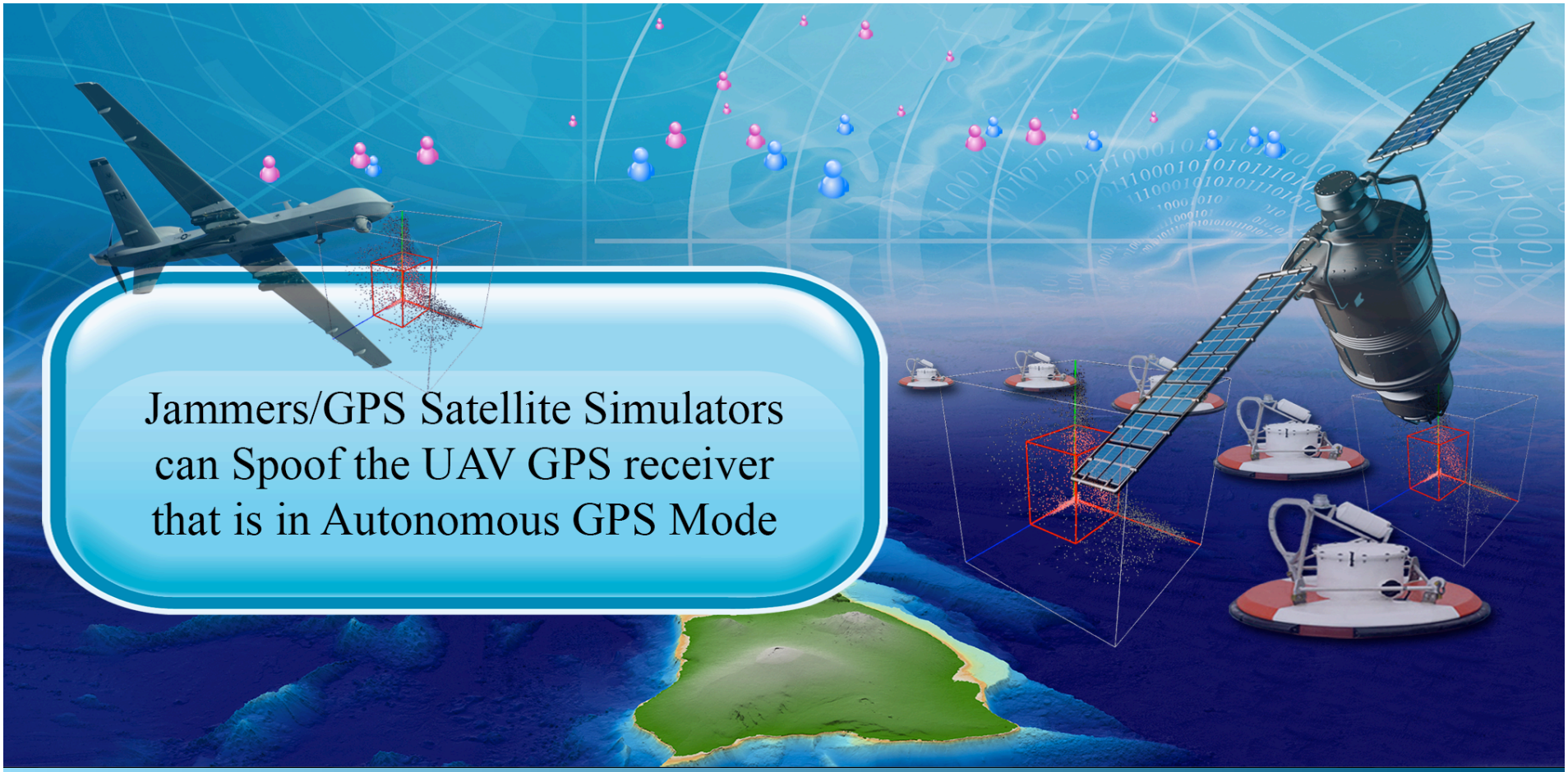

Spoofing of Buoys (e.g. Dial-a-Buoy) can cause electric grid operators to shut down the grid.
With simply the “Spoofing of Buoys” to take down the grid, why bother with:
- the “sophisticated” sniper attack on the PG&E Metcalf Transmission Substation located outside San Jose, CA?
- the “sophisticated” knocking out of the Federal Energy Regulatory Commission (FERC) identified 9 key substations.


Jammers/GPS Satellite Simulators
can Spoof the UAV GPS receiver
that is in Autonomous GPS Mode

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Localized Edge Analytics can include running 5V checks on historical temperatures, humidity, precipitation, barometric pressure, wind, illumination, etc.
GPS Clock Spoofing in ICS: Attribution Obfuscation Detection, via Edge Analytics

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Thank you!