Needs and Challenges in the Marine Energy Testing Community: Findings from the Marine Energy Testing Community Collaboration Workshops

co-hosted by the Atlantic Marine Energy Center (AMEC) and the Testing and Expertise for Marine Energy (TEAMER)
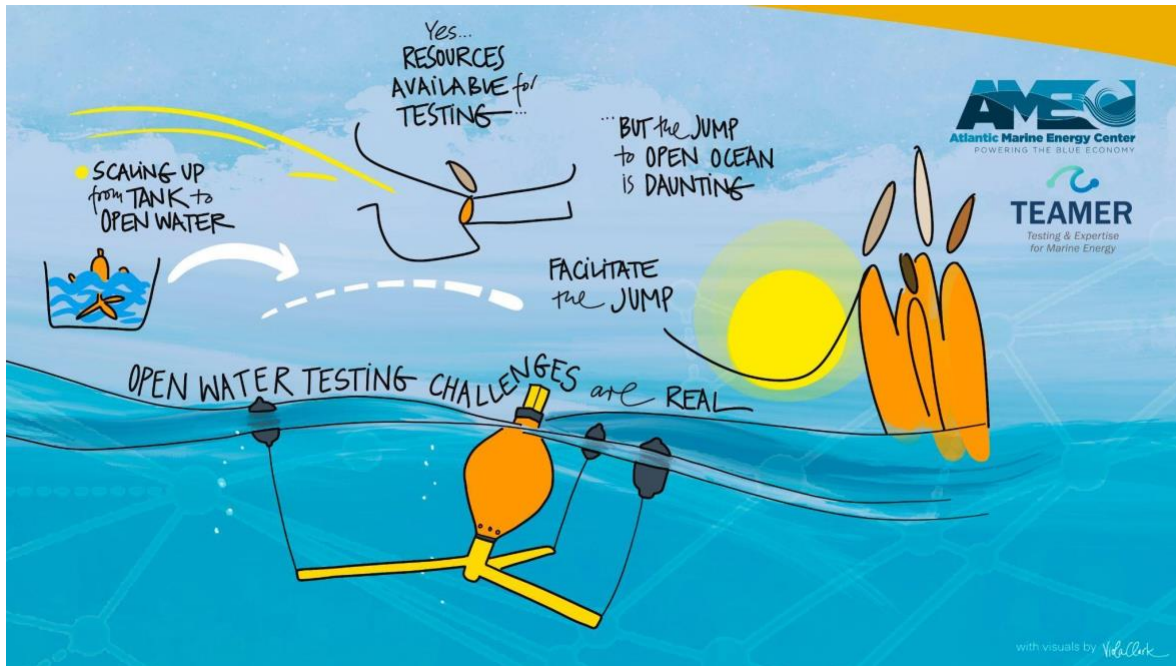with support from the US Department of Energy Water Power Technologies Office

Figure 1. The Daunting Jump graphic by Viola Clark resulting from discussion during the February 14, 2023 Marine Energy Testing Community Collaboration Workshop virtually co-hosted by the Atlantic Marine Energy Center (AMEC) and the Testing and Expertise for Marine Energy (TEAMER) with support from the US Department of Energy Water Power Technologies Office.

Needs

- Financial support to:
    - maintain test facilities and retain expert personnel to operate them.
    - allow for time and costs associated with unanticipated challenges and implementation of contingency plans.
    - address delays associated with NEPA/permitting and limited weather windows at open water sites.*

- Technical support to address unanticipated challenges and formulate contingency plans.

- High quality data (open source) for everyone to learn from (model validation, etc.)

"*" Denotes items already addressed by the TEAMER "Test Plan Post Access Report Template"

- Guidance and assistance for project scoping and testing planning, including:
  - clarity regarding information required by test facilities about devices (e.g. scale, size) *
  - inclusion of 3rd party review

- Fast access to a full suite of test facilities in and across the US available through TEAMER for short and long duration tests, including:*
  - pre-permitted open ocean sites
  - those where grid integration/power conversion is arranged by the facility

- Amenities and capabilities at open water test sites, including:
  - consistent access to equipment at open water sites*
  - access to nearby laydown areas
  - analysis of dynamic loading and frequency ranges (to avoid exciting natural frequencies of support structures)
  - ability to manipulate the wave environment (dampening or amplifying waves) to increase the availability of appropriate weather windows
  - collection and provision of environmental data as baseline
  - established protocols for environmental data collection during testing

- Technical support and guidance to facilitate transitions between testing stages (bench to tank to open water) and integration of testing learnings and outcomes (Fig. 1.):
  - systems integration (flexible capabilities)
  - transformation of data acquired from scaled testing to apply to full-scale devices
  - logistics for everything from device and component proving and validation to travel and working across time zones

- Establishment and implementation of consistency and standards, where appropriate, in:
  - data acquisition and quality *
  - data validation*
  - making measurements (turbulence was specifically mentioned) * (TEAMER requests intent for standards application but does not require that all available standards are met or that new standards be established)

- Assistance with communication among marine energy research and development community (Fig. 2), including:
  - guidance regarding the documentation of testing processes and the successes, failures, and outcomes to maximize the lessons to be learned *
  - sharing of testing processes and the successes, failures, and outcomes to maximize the lessons to be learned
  - provision of platforms and opportunities for engagement and collaboration

- Assistance with communication to public, including:
  - accessibility and messaging to end-users of marine energy and incubators

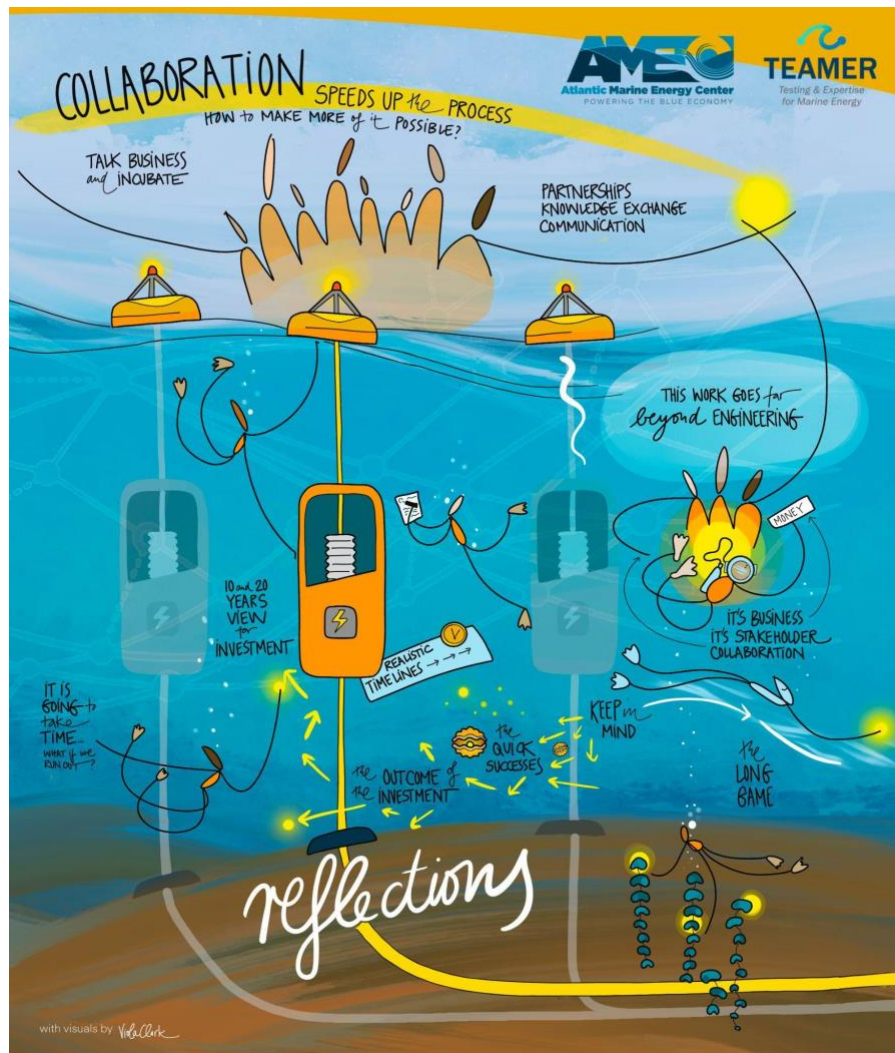"*" Denotes items already addressed by the TEAMER "Test Plan Post Access Report Template"

Figure 2. Collaboration graphic by Viola Clark resulting from discussion during the March 3, 2023 Marine Energy Testing Community Collaboration Workshop virtually co-hosted by the Atlantic Marine Energy Center (AMEC) and the Testing and Expertise for Marine Energy (TEAMER) with support from the US Department of Energy Water Power Technologies Office.

- A list of 3rd party validation vendors, specifically for moorings and anchors

- Knowledge of accessing/utilizing AI for data processing

- Guidance to move from device testing to commercialization.

- Integrated device development, stakeholder engagement, and business plan formulation

- Identification of potential high friction zones/spots during testing to target mitigation .

- Mooring system research and testing.

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Challenges

- Sharing information gained from testing experiences – points of failure, best practices, emergent needs, etc. (Fig. 3)
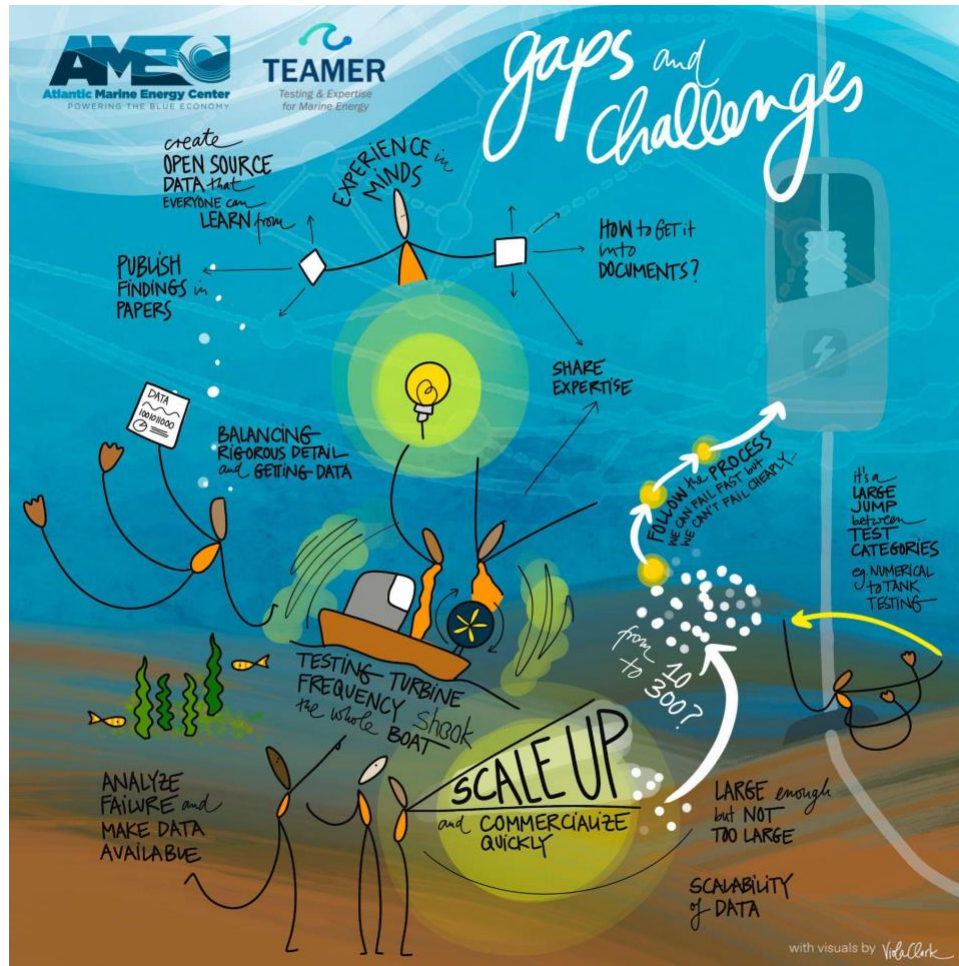

Figure 3. Learn and Share and Learn graphic by Viola Clark resulting from discussion during the March 3, 2023 Marine Energy Testing Community Collaboration Workshop virtually co-hosted by the Atlantic Marine Energy Center (AMEC) and the Testing and Expertise for Marine Energy (TEAMER) with support from the US Department of Energy Water Power Technologies Office.

- Gauging and addressing public perspectives about impacts

- Defining the different goals, needs, and desired outcomes from a test from the perspectives of the diverse entities and individuals involved *

- Defining the boundaries of safe and feasible testing conditions (climate and resource state)

"*" Denotes items already addressed by the TEAMER "Test Plan Post Access Report Template"

Key takeaways

- TEAMER is viewed as a success thus far for addressing marine energy testing funding, expertise, and logistical/planning support. The marine energy community is grateful for the program and its implementation!

- Marine Energy testing is resource intensive, in terms of funding, expertise, and logistical/planning support.

- Communication and collaboration are critical for making the best use of limited resources.

- Standards and consistency are key to making incremental progress towards commercialization and the success of the sector.