MEMO

January 23, 2022

To: Occupational Diving Community Stakeholders

Re: Results of the MTS Diving Committee Technology Survey

Overview

In 2016, The Diving Technical Committee of the Marine Technology Society (MTS) prepared a survey intended to gather information from occupational diving community stakeholders regarding current and proposed program activities which embrace the use of new diving technology within occupational settings. Responses were solicited directly via email to multiple professional communities and agencies, as well as indirectly via social media. The survey remained open through 2020.

Instruction to Survey Responders

The survey was also intended to reflect the perceptions of individual divers involved with occupational diving. Thus, it was to be considered that while many 'new' diving technologies or apparatus are likely not 'new' to some (usually better funded) segments of the diving community, if they were considered new to a program activity, they were to be considered 'new' within the scope of this survey. Likewise, for the better funded programs that are engaged in technology driven programs, 'new diving technology' then refers to any other technology which is considered new to the survey participant.

'New diving technology' was to be considered any tool, invention, structure, or equipment that is intended to enhance diver safety, proficiency, work efficiency, and/or extend current human intervention capabilities by way of depth, duration, or other access to novel environments. Such technology includes life sustaining equipment but is not limited to life sustaining equipment.

'Occupational setting' was considered any diving conducted for work purposes, be it commercial diving, scientific diving, underwater filmmaking/photography, diver instruction, or other tasks which result in some type of compensation (directly or indirectly) by monetary or non-monetary gain, sponsorship, or endorsement.

Results & Data Use

The MTS Diving Technical Committee’s goal with this survey was to collate results and use them to guide a roundtable discussion at a suitable forum, and subsequently publish a summary for community benefit.

Enclosed are the raw survey data presented for community review. The Committee Chairs have reviewed this information and intend that it guide ongoing discussion related to future Committee activities.
During your occupation as a diver, dive supervisor, or dive program manager/administrator, what set or sets of regulations do you defer to for operational and safety standards and procedures? (Select all that apply.)

- ADCI: 12 (21.8%)
- AAUS: 40 (72.7%)
- CMAS: 1 (1.8%)
- IMCA: 6 (10.9%)
- OSHA: 3 (5.5%)
- NAUI, DAN, CalOSHA: 1 (1.8%)
- New Zealand diving standards: 1 (1.8%)
- Standards Australia; ADAS: 1 (1.8%)
- PADI: 1 (1.8%)
- US Navy: 1 (1.8%)
- NOAA: 1 (1.8%)
- CSA: 1 (1.8%)
- USACE: 1 (1.8%)
- osha: 1 (1.8%)
- Cal OSHA: 1 (1.8%)
- CAUS (Canadian Association of Underwater Science): 1 (1.8%)
- US Navy Diving Manual: 1 (1.8%)

Do you personally use new diving technology within the scope of your occupation?

- Yes: 40%
- No: 60%

If you answered "yes", can you give us an example?

CCR
Rebreathers
CCR's, survey devices, anything that would benefit the students safety or survey methods
Rebreathers and DPV's.
Oxygen ccrs
As the DSO I usually undertake the initial assessment / trial of new computers, loggers, equipment etc then provide feedback to the DCB regarding potential for the wider program. Currently we are trialling the Blue Buddy data loggers. After using one myself, I thought the logger has a place in our program so 10 of our divers are now trialling it also.
divers with ROV's and the new AUV that is RF controlled to be a partner in diving
ROV/AUV diving collaboration
Diver tracking systems, comms, ROV-assisted diving
Closed-Circuit Rebreathers, Mixed-gas, technical diving.
Rebreathers Jet Boots Scooters
rebreathers, UDI computers (allow text messages underwater), acoustic trackers
Dive computers, gas analyzers
Telemed systems, harnesses, flotation, gear, umbilical, Diving Hemlmet
Surveys with small ROV's
Train scientific divers; scuba-based field labs for most courses I teach.
ADS
As a maritime archaeologist I use it to document and assess shipwrecks.
Designed and fabricated tools and protective clothing for geological diving and diving in support of Navy activities.
Scanning sonar, ROV, other electronic tooling
AP Closed-Circuit Rebreathers- new to our program
Inspiration CCR
USBL-based diver tracking systems
Underwater scientific measuring equipment. pH and other autonomous units.
As a former diver and co-chair of the SNAME/MTS Marine Forensics committee, I want to keep track of this stuff even if I never use it personally again. Keep up the good work.
Specifically engineered equip for task, ie tooling
mixed gas
Latest generation dive computers. Underwater instrumentation including chlorophyll, nitrate, flurometer, CTD, etc. Diver transponders, wearable for assistance with communication. NITROX to 40%, and electronic gas analysis testing equipment.
closed circuit rebreathers
Rebreathers NERD's Hyper-Filter DPV's Diver Recall Systems
Record very precise temperature and depth measurements
Dive computers, underwater tools and equipment
New hydraulic tools
Does your organization support the use of new diving technology, as defined above, whether on a regular or intermittent basis? 55 responses

Is new diving technology used by employees, subcontractors, or volunteers? (Select all that apply.) 47 responses
If you answered "yes", can you specify? 44 responses

AAUS

AAUS standards

AAUS and SDI

AAUS, CalOSHA

ADCI Commercial diving - or 'work dives' that fall out of the scope of the scientific diving exemption. - We now contract out dives previously done by scientific divers to commercial diving companies.

I am a Dive Safety Officer for AAUS, we use their standards (and of course comply with OSHA and other Governmental requirements.

AAUS Standards

AAUS as applicable. Also our dive manual stipulates that users must be signed off on any modes of diving or gear not already referenced

Rebreathers/mixed gases.

Manufacturer's operating procedures and standards in diving safety manual

AAUS rebreather standards, as well as rebreather standards from other organisations as appropriate

ASME PVHO 1 and 2 ADCI

ADCI Census Standards AAUS

Aaus

PADI

If the new technology meets are standards of safety it is allowed.

IMCA, DMAC, and IOGP call out the necessary medical requirements, and standards

Approved for Navy Use (ANU) list-established process for implementing new technology

AAUS standards section two American Fisheries Society safety standards

AAUS Dive Safety Manual and Dive Control Board

NOAA Diving Manual and Scientific Diving Standards

ADCI, OSHA

Dive policy based on AAUS/OSHA Scientific exemption

HSE
ADCI Consensus Standards and if Scientific/Research AAUS Standards

ADCI & IMCA
We have a diving panel within the Marine Forensics Committee, but they are not particularly active. Many of our investigations, (Titanic, Bismarck, EL Faro) are too deep for divers. MUST comply with IMCA standards and fit appropriately within hierarchy of control hazard mitigation framework/ individual risk matrix assessment/ JSA's/ local or Ausrtalian AS2299 diving standards

IMCA Guidelines we developed our own Diving Safety manual AAUS compliant dive safety manual, OSHA/WISHA guidelines. Also reference training materials from various equipment manufactures and training agencies.

AAUS for Rebreather Standards
CAUS, AAUS, CSA (Canadian Standards Association), Work Safe B.C. Authorized for Military Use List (AMU)

Do your current standards or codes of practice adequately cover new diving technology implementation within the organizational setting? 55 responses

![Yes (67.3%) No (32.7%)](image)

If new diving technology is not well defined by established regulations within your industry sector or organizational operating manuals, you ... 52 responses

![do not use the technology under any circumstances. (44.2%) seek variances with required regulatory bodies before usin… (38.5%) establish our own internal regulations and follow through… (13.5%) use it without any regard to established regulations. identify regulations and practices from other sectors…](image)

Health and Safety
How does your organization determine health & safety requirements for end-users of new diving technology? 55 responses
What is your organization’s perception of risk (to human health) in using new diving technology? 54 responses

- 78.2%: There is no risk to our personnel. We only use subc...
- 31.5%: We mitigate risk by relying on 3rd party evaluations of new...
- 16.7%: We mitigate risk by establishing protocols that far exceed 3rd...
- 13%: We make end-users assume risk by signing waivers of liab...
- 7.3%: We mitigate risk through progressive demonstration of...
- 14.5%: We rely on established H&S requirements by our employer, typically referencing ADCI, AAUS, CMAS / UNESCO, or...

Have you encountered projects that require use of new diving technology, but have not pursued them given questions of liability and risk management? 55 responses

- 52.7%: Yes
- 47.3%: No

Training and Proficiency
How does your organization establish end-user qualification for use of new diving technology? 54 responses
New Technology Development and Adoption
How does your organization qualify or validate the use of new diving technology? 54 responses

Does your organization develop its own new diving technology? 55 responses
Does your organization hold intellectual property related to new diving technology that was developed by an employee or work group? 56 responses

- Yes: 73.2%
- No: 17.9%
- I'm not sure: 8.9%

Innovation
Does your organization use new diving technology beyond the recommendations of the manufacturer or recommendations of other 3rd party evaluators? 56 responses

- Yes: 87.5%
- No: 12.5%

Have you used new diving technology beyond the recommendations of the manufacturer or recommendations of other 3rd party evaluators? 56 responses

- Yes: 85.7%
- No: 14.3%

Does your organization permit end-users to make modifications to existing diving technology to theoretically enhance or alter performance defined by the manufacturer or other 3rd party evaluations? 56 responses
Program Management
Does your organization have the internal expertise to address the above questions or other matters related to new diving technology? 55 responses

Would a neutral panel of subject matter experts be a beneficial resource to steer new diving technology use within your program? 55 responses

Would a set of independent regulations or at least ‘guiding principles’ regarding the use of new diving technology be a beneficial resource to steer new diving technology use? 55 responses
sounds like an review/new version of the ADC1 Consensus Standards which is a great idea, but fatally flawed by the re-certification process using staff from competitors to judge some of the questions above can't be answered by categorically picking an answer. For example our user requirements would likely be established by a combination of manufacturers recommendations, 3rd party review (if available) and any additional requirements that we felt were appropriate for our program and operating environments Our current dive program is small, about 14 active divers on scuba and we have limited funds for new technology at the moment. Its all about liability of the organization, vendor, manufacturer anything to mitigate accidents and/or loss is essential. This is Max. I did the questionnaire as a test using the two organizations for which I carried out diving as a part of my work. As a member organization, we are required to conform to AAUS standards, so any "new" standards would need to be integrated into the AAUS standards. Having a credible independent body to review new stuff is a nice idea but be super careful of legal entanglements. If you recommend or approve something and anyone gets hurt or killed, It could get ugly and expensive even if the bodies recommendations were absolutely correct. In this era of "Alternative Facts", who knows what the liability courts are likely to pull. No

We have internal diving controls with specific project approval and training for each project as required but overall we comply with CAUS and Work Safe BC regulatory authorities. Answers not 100% applicable at times, I do military diving operations. Getting Involved Would you like to get involved with the MTS Diving Committee to assist with this data collection and/or other activities?53 responses

58.2%
10.9%
30.9%

Yes
No
Possibly. We would consider using such a resource.

support it, in your opinion. Thanks