

## **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.

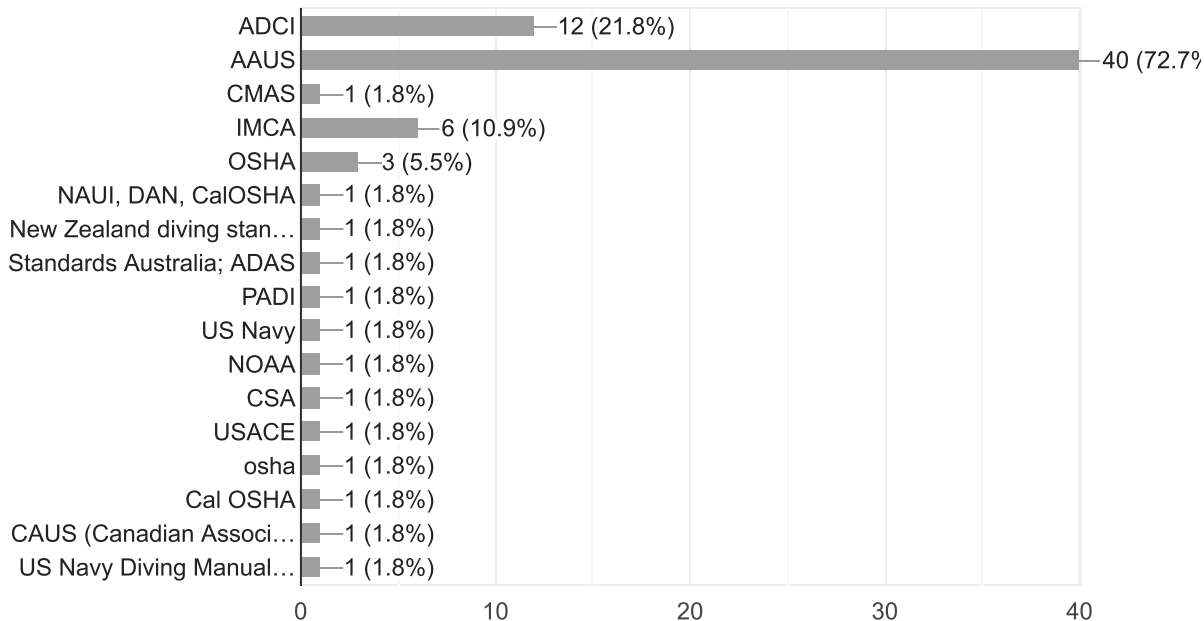
Enclosed are the raw survey data presented for community review. The Committee Chairs have reviewed this information and intend that it guide ongoing discussion related to future Committee activities.

## MTS Diving Committee | Technology Survey

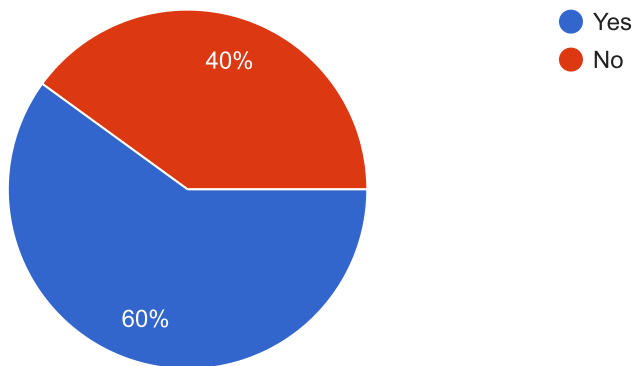
56 responses

End-users

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.)55 responses



Do you personally use new diving technology within the scope of your occupation?55 responses



If you answered "yes", can you give us an example?34 responses

CCR

Rebreathers

CCR's, survey devices, anything that would benefit the students safety or survey methods

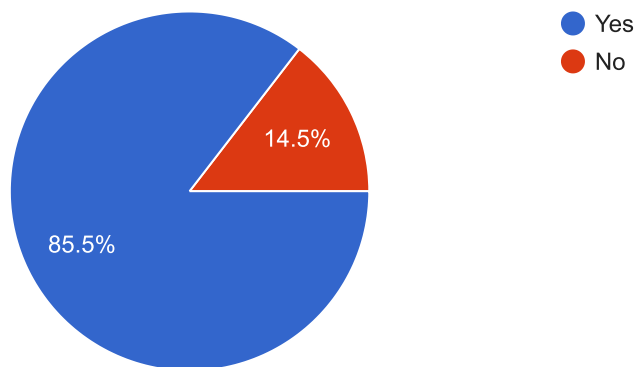
Rebreathers and DPVs.

Oxygen ccrs

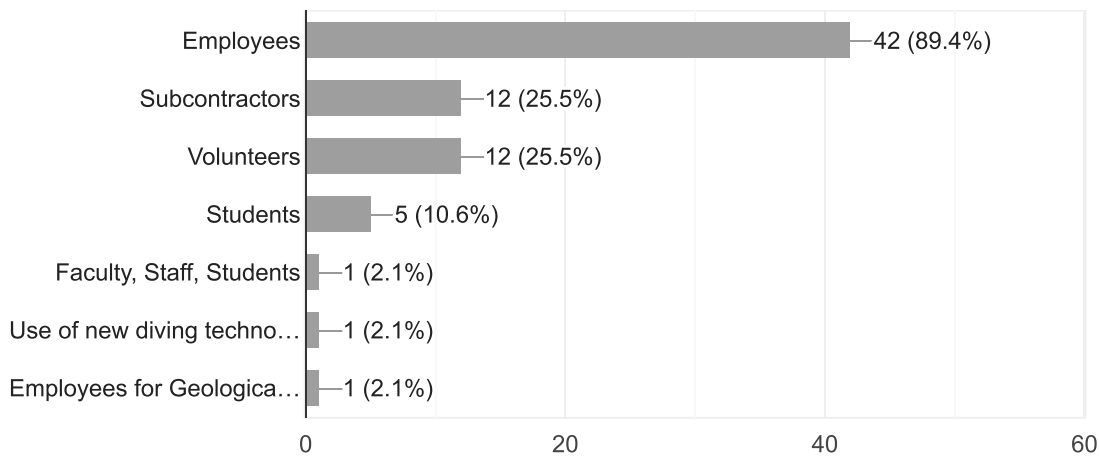
As the DSO I usually undertake the initial assessment / trial of new computers, loggers, equipment etc then provide feedback to the DCB regarding potential for the wider program. Currently we are trialling the Blue Buddy data loggers. After using one myself, I thought the logger has a place in our program 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

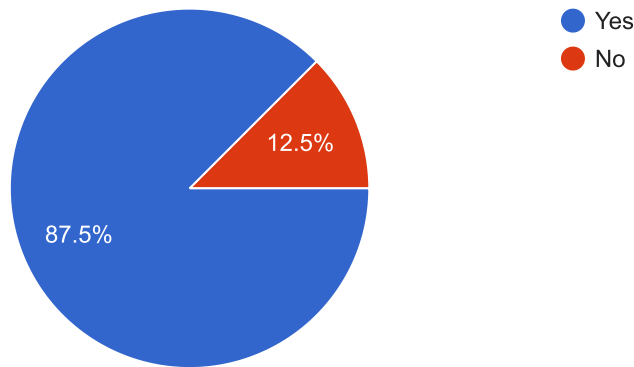
ROV/AUV diving collaboration  
 Diver tracking systems, comms, ROV-assisted diving  
 Closed-Circuit Rebreathers, Mixed-gas, technical diving.  
 Rebreathers Jet Boots Scooters  
 rebreathers, UDI computers (allow text messages underwater), acoustic trackers  
 Dive computers, gas analyzers  
 Telemed systems, harnesses, flotation, gear, umbilical, Diving Helmets  
 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, flourometer, CTD, etc. Diver transponders, wearable for assistance with communication. NITROX to 40%, and electronic gas analysis testing equipment.  
 closed circuit rebreathers  
 Rebreathers NERDs Hyper-Filter DPVs 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



ithin occupational



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 gasses.

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

U.S. Navy Diving Manual British SubAqua Club CMAS Scientific (Including precursors) Flemming, N.C. & Max, M.D. (eds). 1996. Scientific Diving. A general Code of Practice. Second Edition. On behalf of the Confederation Mondiale des Activities Subaquatiques (World Underwater Federation), Scientific Committee. ISBN 0-941332-51-9. Best Books, Box 30100, Flagstaff, Arizona, U.S.A. & UNESCO Publishing, UNESCO, Paris, France. 278pp.

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 Australian AS2299 diving standards

IMCA Guidelines

we developed our own Diving Safety manual

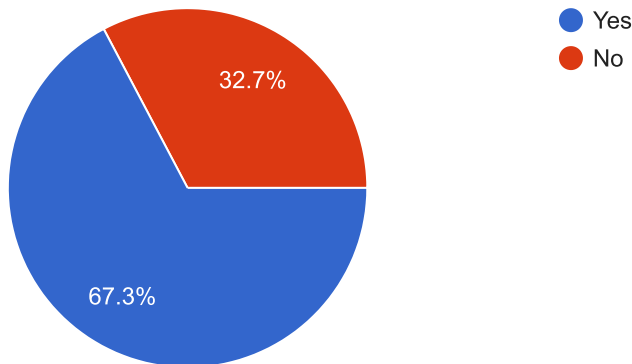
AAUS compliant dive safety manual, OSHA/WISHA guidelines. Also reference training materials from various equipment manufactures and training agencies.

AAUS for Rebreather Standards

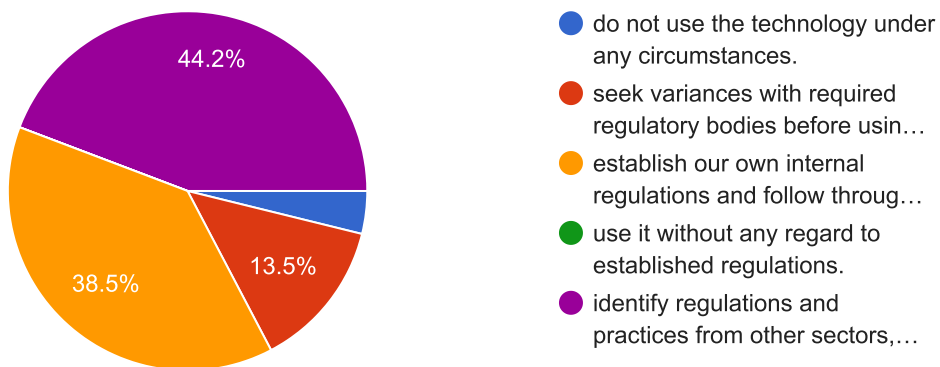
CAUS, AAUS, CSA (Canadian Standards Association), Work Safe B.C.

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

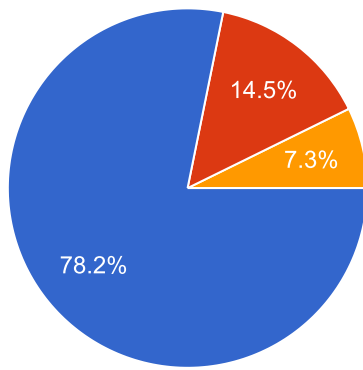


If new diving technology is not well defined by established regulations within your industry sector or organizational operating manuals, you ... 52 responses



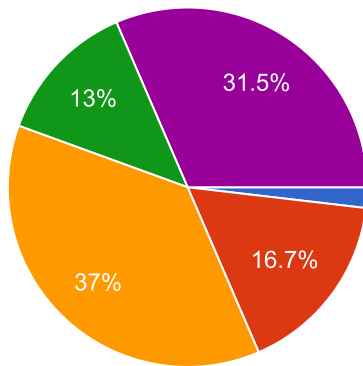
Health and Safety

How does your organization determine health & safety requirements for end-users of new diving technology? 55 responses



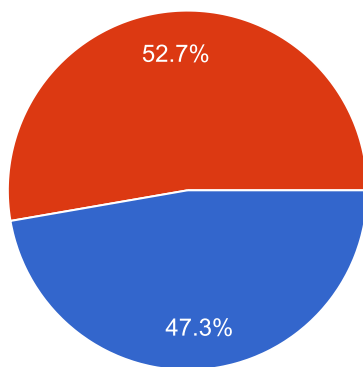
- We rely on established H&S requirements by our employer, typically referencing ADCI, AAUS, CMAS / UNESCO, or...
- We develop our own health and safety requirements that exceed established employer requirements.
- We engage professional consultation to determine if the new diving technology will im...

What is your organization's perception of risk (to human health) in using new diving technology? 54 responses



- There is no risk to our personnel. We only use subc...
- We mitigate risk by relying on 3rd party evaluations of new...
- We mitigate risk by establishing protocols that far exceed 3rd...
- We make end-users assume risk by signing waivers of liabi...
- We mitigate risk through progressive demonstration of...

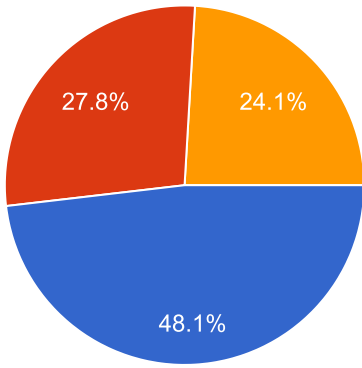
Have you encountered projects that require use of new diving technology, but have not pursued them given questions of liability and risk management? 55 responses



- Yes
- No

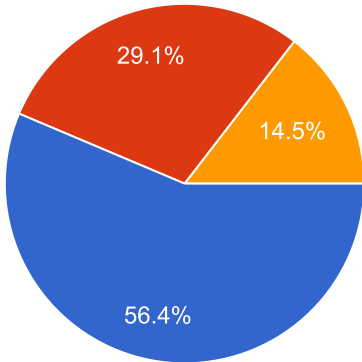
### Training and Proficiency

How does your organization establish end-user qualification for use of new diving technology? 54 responses



- We develop our own internal training and operational procedures.
- We rely on independent, 3rd party training programs.
- We rely on training from the manufacturer.

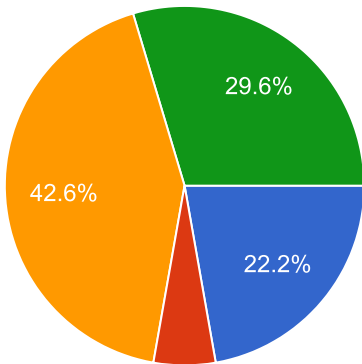
g technology?55



- We develop our own internal proficiency regimens.
- We rely on independent, 3rd party standards that define proficiency.
- We rely on recommendations from the manufacturer.

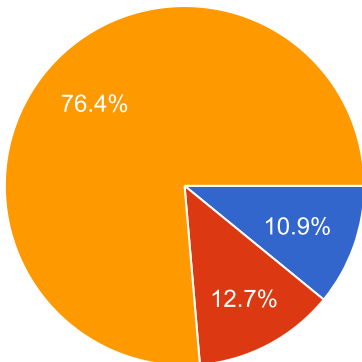
### New Technology Development and Adoption

How does your organization qualify or validate the use of new diving technology?54 responses



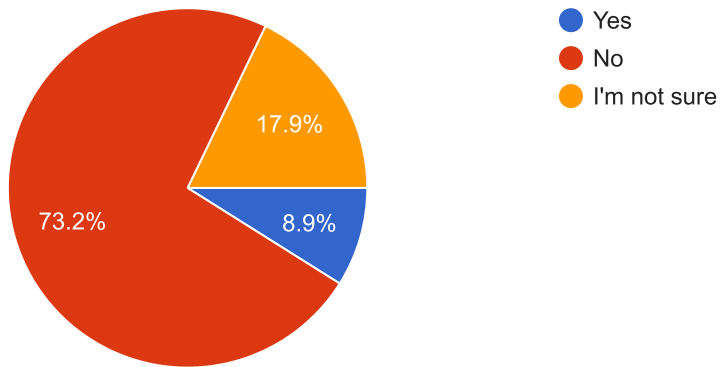
- Must be verified to some independent, 3rd party testing criteria that establishes safe u...
- We rely on recommendations of the manufacturer.
- We test/evaluate the diving technology on our own to determine suitability of use.
- We only follow suit, after other parties have adopted the new...

Does your organization develop its own new diving technology?55 responses



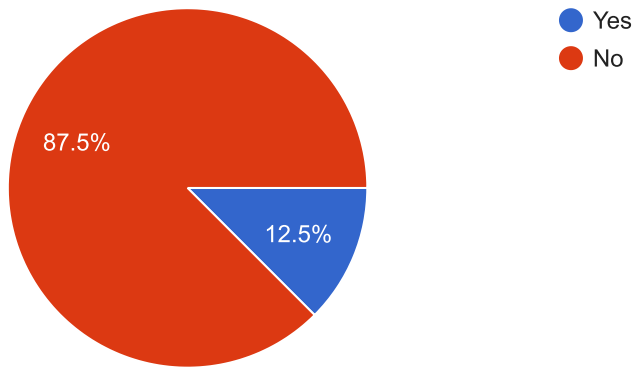
- Yes, it remains proprietary.
- Yes, and at times it is brought to market, or at least used by others outside of our organization.
- No, we do not develop new diving technology.

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

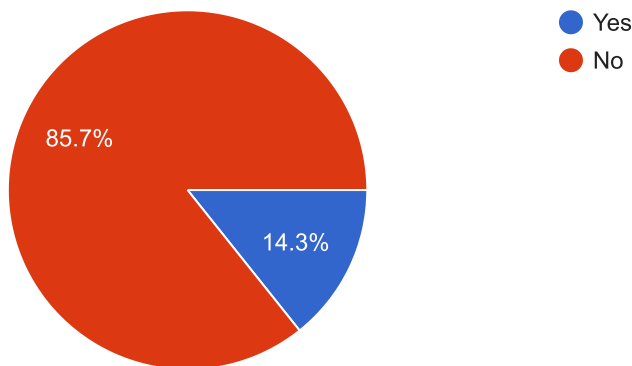


### Innovation

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

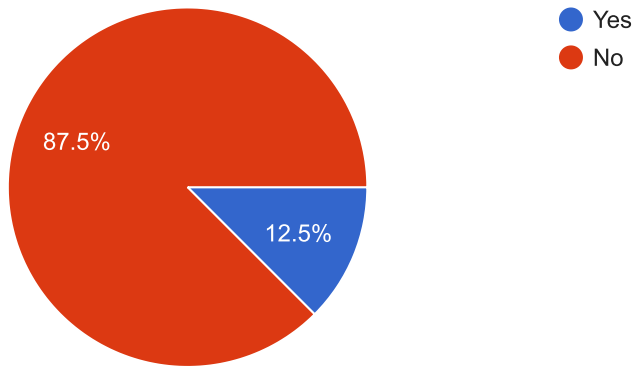


Have you used new diving technology beyond the recommendations of the manufacturer or recommendations of other 3rd party evaluators? 56 responses



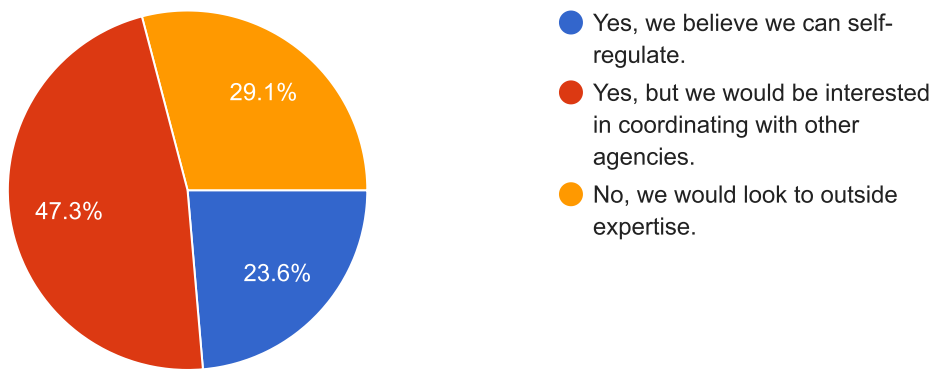
Does your organization permit end-users to make modifications to existing diving technology to theoretically enhance or alter performance defined by the manufacturer or other 3rd party evaluations? 56 responses



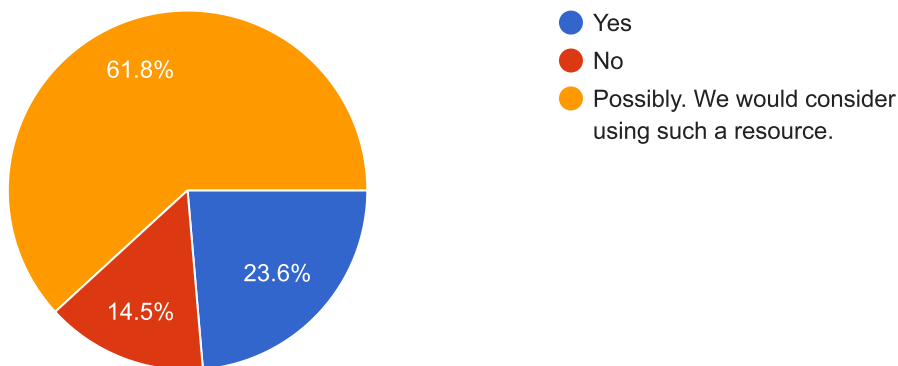


**Program Management**

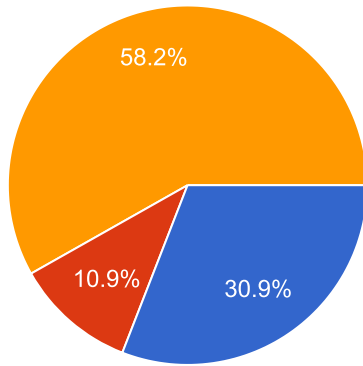
Does your organization have the internal expertise to address the above questions or other matters related to new diving technology? 55 responses



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 the least 'guiding principles' regarding the use of new diving technology be a beneficial resource to steer new diving technology use? 55 responses



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

support it, in your

operate under the  
i. Thanks

sounds like an review/new version of the ADCI 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 cataegorically 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.

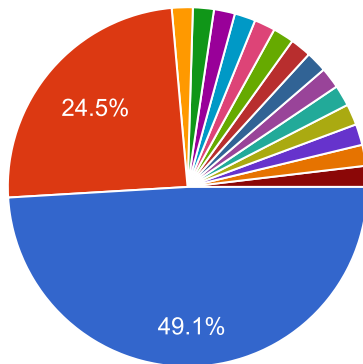
No  
no

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



- No
- Yes. My email is below:
- maybe
- Interested in helping, if possib...
- depending what my time restr...
- we are pretty basic at this poi...
- Pnewsu@adc-int.org
- mpamatat@hawaii.edu

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