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Development of a new Dive Computer and Enhancing the Experience of Scuba Diving

Simplifying and focusing on the essentials of user needs, a radical new design and the combination of a digital platform and physical device

Master of Science Thesis in the Master Degree Program, Industrial Design Engineering

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SUPERVISOR: HÅKAN ALMIUS

EXAMINER: HÅKAN ALMIUS

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Chalmers University of Technology
SE-412 96 Goteborg, Sweden
Telefon +46(0) 31-772 1000

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CHALMERS UNIVERSITY OF TECHNOLOGY
SE 412 96 Gothenburg, Sweden
Phone: + 46 (0)31 772 10 00
Web: www.tekniskdesign.se

PREFACE

This report is part of a master thesis project covering 30 credits performed at Chalmers University of Technology in Gothenburg, at the Department of Product- and Production Development. The project has been a collaboration between Chalmers and Poseidon Diving Systems AB. The project was initiated in January and finished in June 2017.

We would like to express our deepest gratitude toward our supervisor and examiner at Chalmers, Håkan Almius, for being a constant support and for his sincere interest in the project. He provided stability, input on ideas and concept development and helped guide us in a number of areas. He always had a keen interest in our project and our stages of development, always being at hand when needed.

We would also like to thank our supervisor at Poseidon, Thomas Oskarsson for all his help and support throughout the project. Thomas had a great interest in our work and also good understanding of the nature of the thesis project, which made the process better and more giving for both parties. In addition, we would like to thank Jonas Brandt, CEO of Poseidon for the opportunity to collaborate on this project and also for being an active participant in all stages of the project. Mostly we would like to thank both of them for providing and allowing us to explore the industry with an open mind and for their proactive way of dealing with product development and industrial design.

During this project, there have been a number of people that have provided positive energy and feedback to our thoughts and ideas. We would like to thank them as well. For our final presentation and the short concept movie presented there we would especially like to thank Ida Larsen for her contribution in the making of that short movie.

Lastly, we would like to express our gratitude to everyone who in any way contributed to the project in particular, as well as everyone we have had the privilege of interviewing or meeting with to discuss scuba diving.

Jacob Evaldsson

Jonas Jacobsson

ABSTRACT

This master thesis project was carried out during the spring of 2017 at Chalmers University of Technology, at the department of Product- and Production Development, Division of Design & Human Factors. The project was conducted in collaboration with the company Poseidon Diving Systems AB based in Gothenburg, Sweden.

Exploring the oceans and underwater world has always evoked curiosity and fascination among humans and our ways of doing so has evolved over history. The industry of scuba diving has advanced significantly since the introduction in mid twentieth century of the first self-contained underwater breathing-apparatus and today offers great technological equipment for people to explore deeper, longer and in environments not consider possible earlier. One of the most important piece of equipment in scuba diving is the dive computer, which main purpose is to monitor, provide information and safeguard the diver during the activity. From once being a simple time keeper and water resistant watch, the dive computer has been revolutionized with the emergence of computer technology. As more and more functions have been added and potential of the device has advanced, the actual product in terms of functionality, design and usability has been somewhat static. While there are many technical and professional applications within scuba diving, the majority of users are within the recreational segment where the main purpose of the activity circles around the experience of exploring the underwater world.

This project aimed to, through user-centered studies, investigate how users within the scuba diving community interacts with their computers and identify key selling points for Poseidon that can utilize the potential of dive computers and expand their recreational segment. The purpose was to develop a concept based on the foundation of user studies and evaluative feedback that enhances the experience of scuba diving. The culture of scuba diving was also analyzed to find areas of improvement that could help grow the community and attract new users.

The methodology and process of the project included a foundational pre-study consisting of market analysis, user studies, interviews, benchmarking, personas which concluded in a more defined problem definition and identified needs. This was an important part of the project that helped guide the direction towards a function analysis and what features of a dive computer that are essential to provide a necessary balance between safety and freedom.

The results of the project were a dive computer concept with a radically new design in terms of usability and functionality, focusing on intuitive use and limits the number of functions to only the most essential. In addition to the new dive computer, a new digital platform was developed to compliment the concept and designed to be both the starting- and ending point of the concept, resulting in a holistic solution with a physical device and a digital community for the users. While the concept fulfilled the aim and purpose of the project, more real-world testing and evaluation would have strengthened the feasibility of the concept.

List of Abbreviations

ATM - Atmospheres
Diving - Scuba Diving (unless stated otherwise)
NDL - No Decompression Limit
SCUBA - Self Contained Underwater Breathing Apparatus

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1. INTRODUCTION

In this chapter, the project foundation and background is described, providing a framework for how the thesis was conducted. It includes aim and purpose of the project as well as the limitations of the project with regards to the thesis timeframe. The stakeholders of the project are also stated, in addition to the set deliverables.

1.1 BACKGROUND

Poseidon Diving Systems is an industry leader for development and manufacturing of high end diving equipment (Poseidon, 2017). Their product range includes all types of equipment related to the experience of diving, always with a focus on three fundamental values - quality, safety and performance. Their current market segment is focused on elite users such as rescue divers, technical divers and professional divers working in various types of applications as well as military usages. The industry of diving and the community naturally includes much more applications and the culture around diving, specifically in sport- and leisure divers, is active and engaged. Broadening the company's customer base has obvious benefits including increasing return on investment on R&D by marketing products to a greater audience as well as acting as a hedge against operating in a single, relatively small industry.

The diving industry is generally divided into two sections, *recreational-* or *professional* applications. Common practices within the professional area are applications such as scientific research, rescue and safety as well as for military purposes although all uses in which the diver gets paid to perform their task is regarded as professional diving. A significant difference to recreational divers is that within many professional applications the user will be subject to extreme- and at times hazardous conditions. A user within this branch of diving will therefore have to go through much more rigorous safety training (Divers Institute of Technology, 2017) and uses equipment that can withstand and function in extreme conditions (Divers Institute of Technology, 2017).

Diving computers are a vital part of each diver's equipment, telling the user crucial information such as remaining oxygen, time left at a certain depth, if the other equipment is working properly and much more (PADI, 2017). Naturally there are options aimed at professional applications with more advanced functionality as well as lighter and less technical options for more recreational uses. The looks of the computers vary, many options resemblance the aesthetics and form factor of a traditional watch.

1.2 Aim and Purpose

The aim of this thesis project is through market research and user studies within the diving industry and primarily dive computers, explore and identity key selling points that could expand the market for Poseidon Diving Systems AB.

The purpose of this thesis project is to develop a new concept, primarily within the area of dive computers, that enhances and simplifies the experience of scuba diving, within a recreational segment, based on identified key features.

1.3 Research question

- How can a concept be designed in order to simplify and enhance the diving experience, while still delivering the necessary safety functions?

1.4 Limitations

Due to the wide scope of the project, several limitations have been set to make the project feasible in relation to the extent of the course (PPUX05);

- The master thesis can potentially have several outcomes. While the focus is on the diving industry and to some extent also diving computers as a benchmark product in this field, the results is not limited to be a physical diving computer. Given the uncharted field of the project, it may take a variety of directions.

- Although Poseidon is a diving equipment developer, the project is not limited to a concept solely purposed for diving. A broader scope of water related activities and lifestyle may be considered.

- The result of the project will not be a finished product ready for production.

- The extent of the project is limited to 30hp/person. The project starts 16-01-2017 and has a preliminary end in 13-06-2017.

1.5 Stakeholders

The project has several stakeholders that have different responsibilities, positions and deliverables. To highlight this, the following section will describe the various stakeholders that are part of the project.

1.5.1 Project Team

The project team consists of two students from the master programs Industrial Design Engineering and Product Development, respectively, that will initiate this project as part of a Master thesis (PPUX05). In collaboration with Poseidon Diving System AB the project team has developed the purpose, as well as set the goals and limitations of the project.

1.5.2 Poseidon Diving Systems AB

Poseidon Diving Systems AB (referred to as *Poseidon*) is the employer and owner of the project. Poseidon will act as the client of the project and will be the recipient of the result and outcome. The company will also provide support in consultation and assistance to the project team as well as play a role in decision-making. In addition a supervisor, Thomas Oskarsson, has been appointed by Poseidon to assist the team throughout the course of the project.

1.5.3 Chalmers University of Technology

Chalmers University of Technology will act as a facilitator of the project and will provide a supervisor, Håkan Almius, to guide and assist the team. Chalmers will also be the examiner of the results with regards to the Master thesis (PPUX05).

1.5.4 User

A key stakeholder of the results of the project is the set target group of users that will make up the majority of potential customers and users, which will be based on the user studies. Needs, both outspoken and latent, of the target group will be taken into consideration and will serve as a fundamental platform to develop the concepts and prototypes from.

1.6 Deliverables

The project will culminate in the deliverance of the final concept and prototype to Poseidon from the team. As noted in *1.3 limitations* of the project, the results will reflect the nature of the direction that the project takes. More specifically, the end results will be delivered in the form of a simplified physical model of the prototype in addition to a more detailed CAD-model with a higher level of realism (table 1).

Deliverables			
Deliverable	Stakeholder	Verification	Deadline
Planning report	Poseidon, Chalmers	Approval by both parties	27/1
Prototypes/Concepts	Poseidon	Approval	Continuous
Final report	Poseidon, Chalmers	Approval by both parties	13/6
Final Presentation	Poseidon, Chalmers	Approval by Chalmers	13/6
Opposition	Chalmers	Approval	13/6

TABLE 1 DELIVERABLES

2. THEORETICAL FRAMEWORK

In this chapter information and the theoretical foundation regarding the project will be presented. Theoretical basis in the area of scuba diving, certification standards, ISO standards and key equipment used during the activity of diving will be presented, in addition to a framework of how different segments of diving functions. This chapter will also present foundations of working via a user centered approach in the development process.

2.1 SCUBA DIVING

SCUBA is originally an acronym “for Self Contained Underwater Breathing Apparatus” and is now being used more frequently as an adjective and/or noun (Joiner, 2001 a). The basis of scuba diving is commonly defined and known as an activity where a person can stay underwater for a longer period of time than holding your breath would allow. Simplified, the diver carries a tank of breathable air (or other gas mixtures with specialized aim towards being used under water) connected to a breathing device (known as a regulator) enabling the diver to move under water for a longer endurance. Within the area of scuba diving there are several technical pieces of equipment that a diver needs to carry with him- or herself in order to be able to perform a safe and successful scuba dive.

2.1.1 KEY EQUIPMENT IN SCUBA DIVING

Diving cylinder/gas tank - The tank is consisting of a steel- or aluminum cylinder fitted on the back of the diver, from which the compressed air and gas is connected to the diver's mouth via a circuit and regulator, from which the diver breathes (Joiner, 2001 b). The main function is to easily transport pressurized breathing gas so that the diver can move under water for an extended period. There are many forms of configurations, including single-tank or multiple tanks as well as tanks connected with multiple regulators.

Regulator - The main feature of the regulator is to reduce the pressurized gas from the tank to breathable air for the diver (Joiner, 2001 c). A regulator consists of one or several valves that reduces the pressure from the gas tank and diving cylinder, and via a hose transports the gas/air to the diver through a mouthpiece or attached to a full-face mask.

Open- or closed circuit - In an open circuit (OC) system, the diver inhales and exhales the breathing gas directly into the environment (Joiner, 2001 c). A closed circuit (CC) means that all or part of the exhaled breathing gas gets processed back into the breathing system by removing the carbon dioxide from the exhaled gas and replacing it with oxygen (Joiner, 2001 d). A closed circuit is less common than an open.

Rebreather - In a closed circuit, a diver needs a rebreather that actively re-uses that the breathing gas primarily so that the time of the dive can be extended (Joiner, 2001 d). In addition, a rebreather releases very little amount of bubbles to the environment which can be an advantage in certain situations where discreteness is important. Closed circuit systems and

rebreathers are technically more advanced, requires more training before being used and demands a higher level of monitoring by the diver of the levels of effects on the body.

Wetsuit & drysuit - Depending on the environment of diving, a wetsuit or drysuit is often used to protect the diver from cold conditions and other environmental impacts (Joiner, 2001 e). It also serves the purpose of simplifying the equipment used in diving in that allows the gas tank and other larger equipment to be easily attached or removed.

Dive computer - The dive computer is used as a device to measure a number of functions during the dive and for collecting data used after the dive (PADI, 2017). Most dive computers have main functions in showing actual depth, remaining bottom time, time of the dive, ascent rate and remaining time before decompression. The data that a dive computer records during the activity is often used in a dive log after the dive in which the diver can see statistics and useful information about the activity. Most dive computers have a variety of sensors in them to calculate functions, which can include a low pressure sensor, high pressure sensor, thermometer and accelerometer.

The main functionality of using a dive computer is that in contrary to classic decompression tables used earlier within scuba diving, a dive computer can perform continuous calculation during the actual dive and therefore provide direct and exact information to the diver.

Fins - Fins are used by the diver to propel the diver efficiently under water and are attached to the diver's feet (Joiner, 2001 f). They are put on just before entering the dive since it makes movement on land more difficult.

Diving Mask - To provide good visibility for the diver while under water, a dive mask is used (Joiner, 2001 g). Since sight under water is different to above the surface in many ways, primarily due to that water has a higher refractive index, a dive mask needs to incorporate features to help the diver with sight under water. The difference in refraction creates a form of far-sightedness (hypermetropia). In order to minimize this, the lens of the mask needs to be flat and the mask should have air space between the lens and eye. Still, due to the different circumstance under water, objects appear closer and larger in water than above the surface.

BCD - Buoyancy Control Device (BCD) is the primary piece of equipment used to maintain and control the depth, as well as allowing the diver to properly perform descents and ascents safely (Joiner, 2001 h). The basic purpose of the BCD is that it allows a diver to make themselves lighter or heavier, depending on the environment and situation. A BCD generally resembles the look and function of vest that a diver wears but can also have jacket-like styles as well as special, lighter BCDs for travelling. Regardless of the variations of styles, a BCD should feature functions such as expandable bladders for inflating air, deflator mechanisms, adjustable straps for attaching bands and or weights. The BCD also allows for the gas tank to be attached to the back of the diver.

2.1.2 SCUBA DIVING PROCEDURES

Conducting a scuba dive involves several key steps to keep the activity safe and successful. A dive begins well before the diver enters the water and requires planning ahead. During the dive, there are a number of important factors to keep under control and informed about in order to adjust and take actions. After the diver exits the water it is important to have access to data and information collected by a dive computer during the dive to be able to put together a dive log. This is especially important for more advanced divers and when planning consecutive dives in a short period of time.

2.1.2.1 Pre-dive

Scuba diving can be a riskful activity and therefore requires planning ahead to assure that the dive can be conducted safely (Joiner, 2001 i). Depending on the level of diving, the planning ahead of the dive can be more or less extensive and can vary much. While professional diving is constrained by legislation ensuring that the diver performs a correct dive according to the profession, recreational diving and technical diving can be less formal. Regardless of level of the diver, a thorough check on all gear so that it is all working properly should always be performed.

Generally, a dive plan includes assessing what locations you are going to visit during the dive, what depths those are at, how many divers will take part of the dive, necessary equipment and air supply for the activity and if there are any specific activities or exercises needed during the dive (Joiner, 2001 i). Depending on the difficulty of the dive and/or the experience of the divers the pre-dive planning will vary much, as will it be depending on if the environment of the dive is familiar or new to the divers. Other circumstances like accessibility of the dive site, tides and currents, visibility, surface conditions, air temperature and wind chill factor will also impact the dive plan significantly.

One important aspect to include in the pre-dive planning is with regards to emergency situations and possible need of assistance (Joiner, 2001 i). The more advanced and technical the dive is, the more attention needs to be focused on safety in order to have a clear agenda on what to do if something does not go according to plan.

2.1.2.2 During dive

A diver needs to be aware of several different parameters during a dive in order to assure that the dive can be completed safely. Primarily a diver need to monitor four different aspects during a dive to make sure a safe diving experience these are: depth, time, no decompression time and ascent rate.

Depth

The depth a diver descends to will have a large impact on a number of different areas. Since gases are highly compressible a diver will consume more air at deeper depths (Averill et al., 2011). At 10 meters the volume of the gas in the tank will be half of the volume at the surface, at 20m it will be a third, at 30 meters a fourth. Consequently, the deeper a diver goes the quicker he/she will consume the breathing gas. The pressure changes impacts how nitrogen

dissolves in the body. In terms of the gas pressure, a diver must make sure there is enough breathing gas left in order to safely make it back to the surface for both themselves and a buddy diver (in case a buddy is out of gas or encounters a problem).

The depth might also be useful to understand the environment the diver is in and help to navigate the diver during the dive for example, points of interest might be located at certain depths. It will also inform the diver that he/she stays within their own educational and physical limit.

Time

The total time a diver has been under water is important so that a diver can track how long the dive is and when to return to the surface. A diver ascends to the surface when the beforehand agreed upon dive time is over or when the air supply is running low or the no decompression time is out.

No decompression time

One of the risks associated with diving is the accumulation of inert gas in tissues in the body. Because the ambient pressure changes during a dive, the gas the diver inhales will dissolve in the blood and transfer to tissues and slowly reach an equilibrium (Davis, 2017). During ascent, the ambient pressure changes again and the body will dissolve the inert gas to reach a state of equilibrium with the pressure at that depth. If a diver ascents to fast (maximum 9m/min), the body is unable to dissolve the gas quickly enough, the excess gas could form bubbles and cause decompression sickness. Therefore, a diver would sometimes make decompression stops during ascent to lover the amount of inert gas in tissue.

Recreational dives (30m and above) do not usually need to make decompression stops since the amount of inert gas will not have had time to build up to dangerous levels (depending on dive time and previous dives). The “No Decompression Limit” (NDL) is the limit to which a diver can stay at a certain depth before the amount of nitrogen in the body is at a level where it is no longer safe to ascend to the surface without decompression stops (Davis, 2016). However, it is recommended to make a safety stop at roughly 5m for a few minutes regardless if you are diving within the NDL. It is important to note that even if a diver stays within the NDL, nitrogen will continue to dissolve in the body even after a dive. Consequently, if several dives will be performed in a short period of time, the residual nitrogen levels in the body will affect the next dive lowering the no decompression time a diver has at a certain depth. A dive computer calculates the no decompression time with the residual nitrogen taken into consideration.

Ascent rate

When it is time to end a dive, the speed of which a diver ascends is usually recommended to 9 m/min (30 ft./min) (Smith, 2012). If the diver ascends too fast, as previously mentioned, the risk of decompression sickness increases because the inert gas in the body does not have time to be offgased with regular breathing. Other perils with ascending to quick is local body problems where for example the gas in the ear canals expands too quickly because the body does not have time to equalize the pressure change.

2.1.2.3 Post-dive

After the dive, there are generally two main areas to take into consideration - the checkup of equipment as well as analyzing data and dive log from the dive. Directly after getting up from the water, a diver should always attend to the gear and make sure that everything is still working properly and if not make the necessary adjustments and repairs when needed. Doing this post-dive as well as pre-dive ensures that there is minimal risk of gear failing during the actual dive. Checking on each other's gear within a group is always encouraged.

In addition, the information stored and collected by the dive computer during the actual dive might be used afterwards for the creation of a dive log (Averill et al., 2011). Depending on how advanced the dive computer is it may produce and store a complete version directly that can be viewed on the actual device following a dive, or that you can transfer the data over to a desktop and load it into a software specifically designed for dive logging. Other dive computers might offer simpler output about data such as maximum depth, average depth, temperature, points of interests, total dive time, ascents and descents and similar, allowing the diver to manually create dive logs post-dive. Depending on the level of diving the post-dive information and dive logs can have varying importance. For a professional or more advanced technical dive the dive log is often essential, while for more casual recreational divers this information is more of an interesting and informative summary.

2.1.3 Recreational Diving

There are several different standards and certification levels for scuba diving. These certifications decide a number of factors such as how deep and where a scuba diver can perform a dive. The International organization for standardization define three substandards for recreational diving. ISO 24801 contains standards for "supervised diver, autonomous diver, dive leader". There are also several different certification levels for divers to prove their experience and knowledge of a diver. PADI is one of the most common certifications around the world (PADI, n.d. a). There are a number of different certification organizations as well. PADI's entry level certificate is called Open Water and gives divers knowledge to descend to 18 m/60 ft. (PADI, n.d. b). The next level of certification are Advanced Open Water, Rescue Diver and Master diver.

In terms of equipment, a recreational diver would have one tank of gas and dive computer showing the essentials (PADI, n.d. c). The gas mixture used would be air or enriched air (referred to as nitrox) with a higher concentration of oxygen. Diving with nitrox gives the diver the potential to stay at a certain depth longer because the gas mixture would have less nitrogen and therefore dissolve in the body slower (Ange, 2008). However, a higher concentration of oxygen could lead to acute oxygen toxicity which can have dangerous effects. Thus, diving with nitrox requires special training and certification.

2.1.4 Technical Diving

A branch within diving with a higher demand on the diver is called technical diving. Originally starting with cave diving, technical diving allows the diver to go beyond the recreational limits of scuba diving (Scott, 2013)). Technical diving entails more risks and hazards reqiuring a higher level of training, but offers the diver an opportunity to explore places few people are able to explore. In order to call it technical diving one or more of these factors need to be present during the dive according to Scott (2013):

- Diving beyond 40m
- Required stage decompression
- Accelerated decompression or the use of variable gas mixtures during the dive
- Diving in an overhead environment beyond 40 linear meters of the surface

PADI offers several technical diving certificates for divers wishing to step outside of the realm of recreational diving. For example, the certificate TEC 40, will allow divers to ascend to a depth of 40m with decompression (PADI, n.d. d). Technical diving requires more advanced equipment than recreational diving (PADI, n.d. e). Usually a technical diver would use twin gas tanks or a CCR (closed circuit rebreather) and a dive computer with the ability to switch to different gas mixtures in order to optimize decompression.

2.2 The diving environment and external forces

The diving environment is a harsh environment and there are many factors that need to be considered when developing a product to be used several meters below the water surface. Below are three major factors that affect a diver when underwater.

2.2.1 Pressure

Under water the ambient pressure increases the further down you get. On the surface the ambient pressure is equivalent to that of 1 ATM (or ~1 bar or 101325 Pascal) for every 10 m/33 ft the pressure increases 1 ATM (Averill et al., 2011). The pressure affects the volume of the gas in a diver gas tank, therefore a diver consumes air faster the deeper they go. The pressure also affect the equipment a diver uses and their levels of waterproofing. Normally a dive computer used for scuba diving needs to be able to withstand pressure at 100-200 m (10-20 ATM).

2.2.2 Vision and colors

As light passes from air to water it bends creating a magnifying effect of roughly 33 percent on objects (Averill et al., 2011). Furthermore, objects appear 25 percent closer than they really are. It is also commonly known that our perception of color changes underwater. When light passes through water certain colors of the spectrum are absorbed and we are unable to see them any longer (fig 1). Reds and oranges are the first to disappear at around 10-15m. The rest of the spectrum gradually disappears the deeper you go. Blue and indigo colors are the last to disappear. Because of this, it is common for divers to bring flashlights or for dive computers to have backlit displays based on these colors.

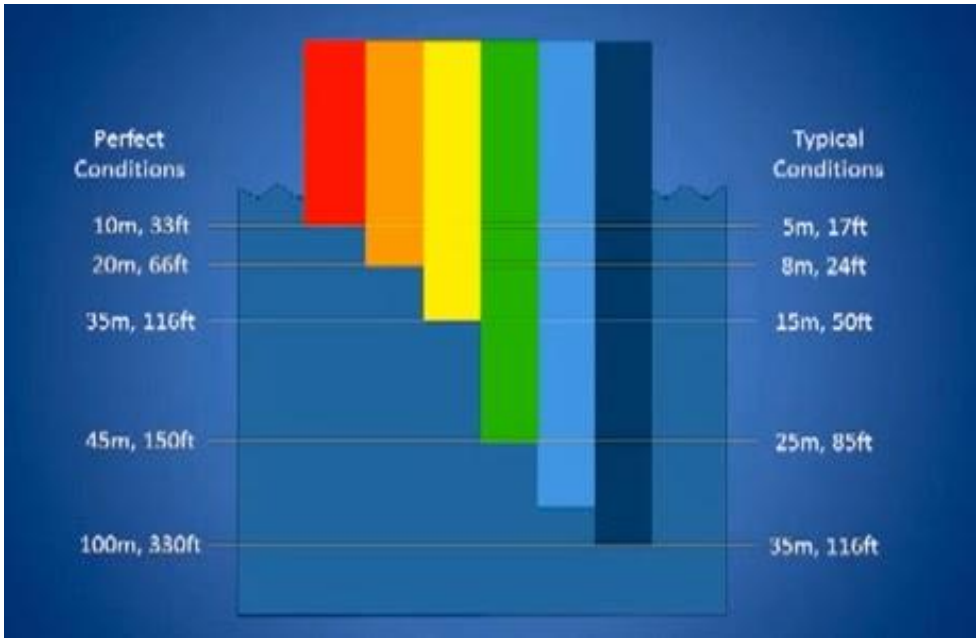

FIGURE 1 COLOR RANGE UNDER WATER

2.2.3 Acoustics

Sound travels four times faster in water than it does in air therefore making it difficult to hear where a sound comes from, as the sound reaches both ears much faster than in air and therefore makes it harder to determine the correct origin (Joiner, 2001 j). This is since sound is produced by waves of vibration and the denser the medium is, the faster these vibrations can travel. While this can have benefits in long distances, it makes it hard for humans to adapt to the new circumstances under water compared to above the surface. Sound also consequently travels further in water which makes it difficult to assess how far away the sound is coming from.

Since water also varies in density due to the variations in temperature and salinity (saltwater or freshwater), it also affects how sound can travel (Joiner, 2001 j). In all water, there are various levels of temperatures, also known as *thermoclines*, and when sound travels from one thermocline to another, it loses energy. This means that a diver can have a difficulty hearing a sound in a different thermocline, even though it may only originate from a few feet away.

2.3 Freediving

Within the scope of underwater diving there is also a form called freediving, in which the diver is completely liberated from technical gear assisting the breathing function. As the name suggests, freediving means the diver is solely depended on holding their breath before resurfacing (Usfreediving.org, n.d.). This form of diving has been around longer than scuba diving since it does not require any technical equipment, and has since the development of modern scuba diving evolved into an alternative form more focused on athletic performance and liberating experience compared to scuba diving.

Freediving has benefits compared to scuba diving in that there is practically no need for decompression time, easier handling and less preparation due to the lack of equipment and fewer distraction of sounds or bubbles. This form of diving is also largely carried out in a recreational way, primarily due to the natural form of diving and accessibility (Usfreediving.org, n.d.).

There are also some considerable risks in freediving, in addition to those in scuba diving. In contrast to scuba diving that serves to extend the time underwater by assisting with technical equipment, freediving is primarily limited to the physical capabilities of the human body. Holding the breath and pushing the limits of how long a person can travel underwater under a single breath is in nature a riskful aspect and is central to freediving. Holding a breath and consequently not letting in any oxygen affects the body in a number of ways all connected to serious risks and hazards. Performing safe and successful freediving generally demands extensive training on how to control the body while holding your breath and how to sense the bodily reaction mechanisms.

2.4 Wearable device

The definition of a wearable device is that it is some form of electronic technologies or computer that can be worn on the body or in some form of clothing (Tehrani and Michael, 2014). Dive computers can therefore to some extent count as a wearable device, making it interesting to compare the area of dive computers to other forms of wearable devices in other types of uses such as sports watches, fitness bands and similar. Depending on the fields of technology, wearable devices can have varying implications and functionality but the common characteristic is that it should actively or passively provide useful information to the user in the related activity and raise the level of experience of that activity.

Wearable technology can have strengths in healthcare, gps and locations, clothing technology, augmented reality and much more (Tehrani and Michael, 2014). While innovations in wearable technology mainly was used for military purposes earlier, more and more new technologies and innovations in the field has started to make its way to the consumer market, which has brought out new types of product categories and functionalities. Many developers, such as Finnish brand Suunto is both active in the area of dive computers as well as other sport and fitness devices, often combining functions from one sport to another in their wearable devices, blurring the lines between different areas of usage (Suunto, n.d. c).

2.5 User-centered studies and development

A basis for this project is user-centered studies and user experience. User experience is defined as “...a person’s perceptions and responses that result from the use or anticipated use of a product, system or service” according to ISO Standards (Kraft, 2012). The core of creating successful products, systems and solution starts with that it is anchored clearly in identified user needs - both outspoken-, perceived- and latent needs. In order to find all those different needs one have to do market research in order to find the target group, conduct in depth interviews and talk to the users and dig deeper into how users interact with their products. A

key is to find what needs are fundamental and what needs that are not yet outspoken by the users, this in order to really be innovative in the development of a new concept.

A large factor for users when investing in a new product is usability and how well a product has been designed based on that (Han et al., 2000). More technical products, such as computers in all forms, often must balance between adding more functions to the preservation of usability. This due to that adding more functions often results only in more complex products that consequently lowers the enjoyment and usability from the user's perspective, rather than raising the experience as was the original intention. Today, the trend is that focus on making the experience easier and more intuitive is becoming more and more important in the development of new products and services. As more and more products are able to offer a wider range of functions and possibilities, users are instead increasingly seeking a easier and faster way to receive information and to perform tasks. This is especially evident in consumer electronic products, including dive computers.

Including user-centered approach at an early stage of the product development and continuously incorporating feedback and evaluations from users will help the process and raise the level of usability (Han et al., 2000). As a result of this, using this methodology would also improve the level of satisfaction from users, focusing on the experience rather than purely the performance.

Interviewing and talking to current users and also potential users of a product and service is essential to find out how the interaction between user and the product can be improved (Kraft, 2012). To go beyond the outspoken needs of users, more qualitative and deeper interviews are preferred. Comments and spontaneous thoughts can thus be explored further via questions, which may at first not seem to provide a direct answer and solution. It can be hard for users to imagine and answer how a perfect product looks or functions, but feedback on what is lacking today in the interaction can provide useful and crucial information for the later stages of the concept development regarding design and usability.

3. METHOD

This chapter describes and explains the methodology used in the project. It intends to give the reader a good understanding of how and in what order the respective tools and methods were used. The order in this chapter corresponds to the chapters covering the results, in order to provide easy ability to see the respective methodology linked to the results.

3.1PRE STUDY

The project pre study was divided into a number of subsections. An analysis of the market in terms of products and brands as well as the scuba diving culture and external forces. The main section, user studies, is where the expressed opinions of the user are categorized and analyzed.

3.1.1 MARKET ANALYSIS

The market analysis was done mainly in order to clearly map out the different actors and brands on the market as well as their respective products. A benchmark analysis was developed to identify the current standard of dive computers in different levels of functionality. A thorough investigation about the scuba diving market and culture was conducted to understand the market, its users and the potential for new products. Included in the research was the demographics and market size.

Developing products for scuba diving means that products have a different framework to function in than products above water. Thus, conditions and forces causing strain on the product was analyzed and summarized within the boundary for the market analysis.

3.1.2 PORTER'S "FIVE FORCES"

The method, *Porter Five Forces,* was used in order to identify the framework and context in which Poseidon functions in as a company. The aim of this is mainly to analyze how the forces around a product or industry affects the potential of bringing a new product to the market (Porter, 2008). It takes into account five different influences;

1. The threat of new Entrants: what does it take to enter the market of diving, what demands does the industry have on required knowledge, investments and other capabilities.

2. Bargaining power of Suppliers: how does key suppliers influence the industry and what hold do they have on the other players in the industry?

3. Bargaining power of Buyers: as with the previous points, this section looks at how buyers and customers ultimately can influence the industry.

4. Threat of Substitute products or services: are there similar offers in products or services outside the industry that offer more or less the same thing?

5. Rivalry among existing companies - Industry Competitors: who are the direct competitors and how is the intensity of a possible rivalry affecting the industry and outcome?

3.2 User studies

As a fundamental part of the understanding the context in which the project takes place, a thorough study of users was conducted. It included interviews, development of personas, an identified target group based on the interviews as well as a user journey mapping. User studies within the area of diving was an important step in order to get a good understanding of the area. It also served as a foundation for the continued tools and method in user centered design.

3.2.1 Interviews

Interviews were a fundamental step in the user studies phase. Focus here was to build a deeper understanding of the users and on gathering qualitative data that could be used as support in the development of the concept. The subjects used in this phase were a mix of users and experts in the area of diving and related fields, however primarily recreational divers. One of the key objectives in this process of interviewing was to probe and dig deeper into areas of interest that could boost the understanding of the diving experience. Semi structured Interviews were recorded and saved upon agreement from the subjects, to be able to go back and identify future connections and aspects found in other studies (Boeijen et al., 2010). A main objective in this method was to keep the interviews exploratory and open minded.

3.2.2 Development of Personas

Building on the information gathered in the interviews but also the market analysis, the development of personas was conducted. Analyzing the content from the market in combination with what users thought and had opinions about, certain characteristics and traits in potential users and customers to this concept could be developed (Boeijen et al., 2010). Identifying patterns was a key step to find areas of interest and that would ultimately translate to certain traits in personalities. The aim of this step was to provide aid in the direction of the development and something that could be used in the later stages of the ideation phase and concept generation.

3.2.3 Target market

Information from the interviews and from Poseidon will serve as a basis for how the targeted market segment was positioned relative the current market segment. Parameters like age, lifestyle and attitudes was assessed in order to find a target market.

3.2.4 User journey mapping

Partly based on the information gathered in the interviews, a structure over how a typical user would interact with a similar product was mapped out. Expectations of how a certain product might be performing will ultimately affect the overall experience, which marks the importance of a complete overview of the journey between user and product. In a journey mapping, a general story over how the different stages affects the user's attitude, experience and feeling were marked out, based on a number of evaluation points such as: *interaction*, *impressions*, *benefits & disadvantages*, *possibilities* etc. (Wikberg Nilsson, Ericson and Törlind, 2015).

A structure of the experience diving both before a dive and after a dive was mapped out in order to provide a clear overview of how the focus on the experience and the focus on technology, respectively, varies during a dive. The analysis, based on user studies, was then compared to what the expected/wanted experience focus and technology focus based on five different stages of a dive. Pre-dive planning, descent, exploration phase, ascent, post dive logging. This method would give a clear picture and an overall estimate of where in the dive experience potential areas of improvement would lay.

3.3 Problem definition

Building on the market analysis and the user studies a problem definition was specified to cement the direction of the project. During the interviews and market research both latent and outspoken needs were identified. These were then translated into a clear problem definition. The definition is a summary of the potential for product development within the areas found in the pre study. Specifically, the main problem identified and who the user group affected were. Moreover, it is outlined what the root cause of the problem is and how the users experience the problem.

3.4 Product specification

Alongside the pre study and as the projects formed a clearer direction, a *function analysis* was developed to translate user requirements to product requirements. From that, a more concrete and defined outline over the identified key functions was decided, to help with the coming phases of idea generation and concept generation.

3.4.1 Function analysis

A function analysis (Boeijen et al., 2010) in the form of a verb-noun table divided into *main functions*, *sub functions* and *supportive functions* was generated with the user studies as a base. Functions and areas of potential were extracted from the user studies and market research. This way idea generation could be performed structurally around sub functions.

3.4.2 IDENTIFIED KEY FUNCTIONS

From the function analysis, a more concrete list of the most important functions was created. This list differentiates from the function analysis since it only lists the required diving functionalities of the concept. Since a concept could potentially be packed with numerous functions this was of importance in order to specify exactly what functions this project would deal with.

3.5 ITERATIVE PROCESS

The course of a product development process is seldom linear. The process did and should contain several loops iteration to produce a final concept with a thought through functionality and form factor. In order to do this an iterative process (fig 2) has been followed were in particular the concept generation, concept development and concept evaluation has been done in several loops.

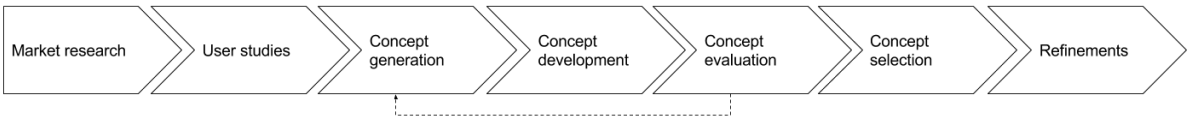

FIGURE 2 PROJECT PROCESS

Early concepts (first loop) were evaluated towards the company stakeholder, whereas later concepts (later loops) were evaluated towards users, dive store, focus groups and various types of selection matrices. The iteration loop was executed as many times as the time frame of the project would allow.

The iterative process means that several methods described in this chapter would be done on several occasions. The concept generation phase of the projects with methods such as brainstorming, and the concept selections methods where a few of these methods that has been interative throughout the project.

3.6 CONCEPT GENERATION

Building on the foundation of the product specification and definition, a thorough process of generating concepts was conducted. In this phase, tools in idea generation, brainstorming, mapping, scenarios and morphological matrixes were used in order to bring a wide variety of concepts that could be tested and later evaluated in regards to set function analysis.

3.6.1 MOODBOARDS

Creating moodboards consisting of images and inspiration within the field of study was used as an early step to increase the creativity and flow ideas. It communicates feelings and notions that might want to be used later in idea generation and concept generation stages. Material for the moodboards was collected from various types of media however mainly image material, and then later put together in board of different images that together made up a moodboard. Moodboards are shown in appendix I.

3.6.2 Idea generation

In between the creation of moodboards and the brainstorming sessions, and open discussion in the project team about spontaneous and non-restricted ideas was done. The purpose of having this more informal space of discussion ideas was so that it could provide a greater variation of ideas, even with regards to brainstorming. Allowing for open discussion about ideas and thoughts was important also after the brainstorming sessions in order to identify and explore unexpected potentials. This phase was continuous throughout the project.

3.6.3 Brainstorming

The method of brainstorming aims to develop a great number and variety of ideas with high diversity (Wikberg Nilsson, Ericson and Törlind, 2015). In the project the method was used in order to take advantage of the creativity of the project team and value the different ideas that came up. The focus was on quantity rather than quality at this stage. The brainstorming sessions started from the defined problem questions and general theme around the stated thesis of the project. Based on this, all ideas around the topic was written on post-it notes and then collected in an idea bank. In some cases, certain interesting ideas was brought up for discussion within the team and further developed, however the main focus here was on the quantity and variety of ideas to proceed with on in the continuation of the project.

3.6.4 Idea mapping

In order to create a structure of the content of ideas created in the brainstorming sessions and earlier idea generations stages, a mapping and categorization of the different ideas was done. The output and quantity of ideas was too great to properly handle, which was why a clear mapping into categories was needed, providing a clearer and more structured direction moving forward in generating concepts.

3.6.5 Scenarios

Scenario mapping goes into the earlier stages of user studies and connects to how users typically interacts with said product or service (Wikberg Nilsson, Ericson and Törlind, 2015). The purpose with scenarios was to develop criteria for user interaction and in order to further understand the core of how a user might think and adapt to a certain situation.

Scenarios are an important method for validation and checking ideas feasibility as well as being used as a means to come up with new ideas. In an industry revolving around safety measures, scenarios are a good way of screening ideas or further developing ideas in order to account for different situations that can occur under water. The scenarios were developed from the basis of the user studies and market research.

3.6.6 Morphological matrix

A morphological matrix (Wikberg Nilsson, Ericson and Törlind, 2015) was used to further place and combine ideas from the earlier mapping and categorization. In this step of the process the combined ideas started to become sub-solutions to and a supporting foundation to a full

concept. Handling one function and category at a time meant that during this method several complete concepts could take shape and be decided. Different alternatives of ideas and solutions were combined and tested in order to see how that could create varying forms of concept, all with regards to a bigger picture of the problem definition. The goal was to put together five different concepts that could be explored further in the concept development stages.

3.7 Concept development & Evaluation

Moving from the phase of generating ideas and concept, the next step was then to further develop and evaluate the concepts. As with the previous steps of continuously generating ideas, the development phase was also to a high extent an iterative process in which the ideas and concepts moved back and forth between user evaluation and refinement.

3.7.1 Early concept discussion with company stakeholder

To get a nuanced perspective over the developed concepts in addition to user tests and verification, a discussion with the company (Poseidon) stakeholder was conducted. Each of the early concepts was explained and elaborated on between the project team and company stakeholder with following discussions on each of the concepts. The identified areas that the concepts were based on was also part of the discussions in order to connect the user needs with the development of ideas and concepts.

3.7.2 Mid-level stage concepts

With the input from the early discussion mid-level concepts were generated with higher functional accuracy and with a higher level refinement and visualization. This stage provided the project a clear direction, since some early ideas and concepts had been eliminated. The mid-level concepts were the concepts later evaluated towards users and targeted market.

3.7.3 User test and evaluation

An important step in evaluating how the ideas and concepts are perceived was going back to the user base and letting them bring their perspective and feedback about the concepts. In order to get a nuanced picture of the concepts the evaluation was based on several different perspectives. Concepts were evaluated against a focus group, a dive store, user interviews, weighted objectives matrices and the company stakeholder.

3.7.3.1 Focus group Evaluation

In order to get a varied perspective and feedback on the concepts, a focus group was used (Boeijen et al., 2010). The group consisted of both users within recreational diving as well as non-divers was put together. Having both divers and non-divers as participants was important so that the discussion within the group would get different inputs from both potential existing customer but also potential new customer. The project team held a presentation with a summary and the purpose of the project as well as a brief overview of what recreational diving is about, in order to let the non-divers get a sense for what a diver might be looking for.

Feedback from the group was allowed during the presentation if any spontaneous thoughts or ideas came up from the participants. A reference dive computer (Suunto Zoop) was presented so that the participants had a good understanding of how most products look today and what they offer.

After the summary of the area and the reference product, the three concepts, Cascade, Riptide and Pandora was presented and explained to the group. It covered the main features of the concepts and questions from the participants were allowed in order to fill in areas not touched upon.

The participants had thoughts and feedback continuously during the presentation, primarily asking questions on how the different concepts functioned. Since the concepts at this stage was not meant to represent a final concept, the questions were expected and answered accordingly to the extent that they could be explained. In this phase, some feedback from participants could also lead to interesting perspectives and potential solutions on the concepts. Since feedback from users were allowed during the informal presentation in addition to after the presentation and during specific areas such *safety*, *Usability*, *Information*, *Warnings system*, *Form factor* etc., it led to open discussions within the group. It was purposely put together so that the climate of the discussion would be open so that nothing would get held back or suppressed in the feedback, which resulted in that feedback on the areas and the respective concept was handled as the session went along

3.7.3.2 Weighted objectives matrix

A weighted objectives matrix was used to ensure that the customer needs found in the pre-study were met (Boeijen et al., 2010). The remaining concepts were evaluated against the criteria from the product specification. The weightings of the criteria is based on a scale from one to five, five being the most important and one the least important function. The concepts will be weighted on how well they fulfill each criterion and awarded an internal ranking from one to three, three being the best. The criteria weighting and the score of the concept will then be multiplied together to give a score on that criteria. All scores are then added together to give the concept a total score. Consequently, the concept with the highest score is the concept best meeting the customer needs.

3.7.3.3 In-depth interviews

In order to stay connected to the users and their needs, also in the evaluation process, several in-depth interviews were conducted. The interviewees were given a presentation about the aim and vision with the concepts as well as their complete functionality. The interview would then be centered around how the interviewee felt about the different concepts in relation to a number of focus areas.

Safety and usability, were the major focus areas but also price and everyday usage was discussed. In terms of safety and usability the interviewees would be asked to draw upon their own experiences with diving and thereby compare and contrast how the presented concepts would have an impact on their diving.

3.7.3.4 Dive store evaluation

In addition to interviewing users, evaluating the concepts towards a dive store provided a different perspective and feedback which was also of big importance. Since the dive store handles customers on a daily basis and both listens as well as recommends products this was an important feedback to include and consider in the concept development. In this stage, the project team conducted an interview with two persons of the personnel at a local dive store in Gothenburg. Since the personnel at the dive store regularly handles customers, listens to the direct feedback from users and also has a clear incentive to sell attractive products. During the interview, each of the concepts were presented and briefly explained respectively, followed by the interviewees providing feedback and comments. The aim during this phase of evaluation was to keep the climate of the interview open and exploratory, following up with questions that could go deeper into the interaction between diver and dive computer according to the personnel at the dive store.

3.7.4 Mid evaluation with company stakeholder

To make sure that the development of the concepts brought in continuous feedback several angles, a mid-discussion regarding each of the concepts was held between company stakeholders and the project team. This was done approximately four weeks after the early discussion and meeting on the concept development. A shorter presentation of the ongoing work regarding the development of the concepts since the early discussion was first held, in which the project team highlighted the vision of the concepts, what steps that had been made since the early discussion and how the concepts had started to take form.

Following the short presentation an open discussion between the project team and company stakeholder was conducted, in which the feedback from the company was of importance. The feedback and discussion was put into consideration for the continued development of the concepts.

3.8 Concept selection

The concept selection was made considering the four different kinds of evaluations by analyzing and comparing them. The company stakeholder, the user studies, the dive store and weighted objectives provided a nuanced picture of the concepts because of their different points of view. With the use of four different evaluation types, the result can be considered to bring a fair selection.

3.9 Final concept

The selected concept was developed further to account for all the feedback received in the evaluation stage. All the concept functionalities were outlined and elaborated upon to provide a clear overview of the solution. The concept was visualized with the use of application prototyping software and 3D prototyping software. Thereafter 3D printed in order to get a feel for how the product would look in real life. The final concept also included a development of a digital platform that was visualized in a mobile application and website. A graphical profile and

brand identity of the concept was developed to fit the target market profile and assess the current identity of the brand position. Environmental considerations in terms of manufacturing and business proposition was elaborated on. Material selection and components as well as how to sell the concepts are key aspects taken into consideration while assessing the sustainability of the concept.

4. Pre study

This chapter describes the pre study of the project including an analysis if the scuba diving market, a comprehensive user study and a clear problem definition. This section is intended to give a thorough understanding of the needs and drives of the users and to investigate where potential for a new product can be found.

4.1 Market analysis

The market analysis section is a description of the Scuba diving market in terms of economical factors and competitive brands as well as analysis about how Poseidon as a company is positioned on the market and its power to bring a product to the market.

4.1.1 Scuba diving market

The scuba diving market is relatively large, in the US alone there are over three million active scuba divers in 2015 (Sfia.org, 2016). According to Prnewswire.com, (2016) the scuba diving equipment market is expected to grow with the Compound Annual Growth Rate, CAGR of 3.78% between the years 2016-2020. It is also noted that one of the challenges for the scuba diving market is the high cost of equipment. An increase in interest for water sports like snorkeling, surfing and diving is a driving factor for growth of the industry.

Furthermore, DEMA (2014) reports over the American scuba diving market show the following numbers for the scuba diving market. The distribution of participants as “open water divers” are 65% male and 35% female. Distribution of people buying dive equipment is 78% male and the majority is between the ages 46-55 years old. The product scuba divers are most likely to buy within a year (2014) is an electric dive computer, 17.8%.

This shows the potential for the development of a new product directed towards a recreational segment. Overall, the majority scuba diving market is slow to adapt to new technology. One reason for this can be that the actual technology that is needed, for example dive computers can be used for a very long period of time. For example, the first dive computer by Suunto was released in 1998 and provided the basic functionalities that is found in a dive computer today (Suunto, n.d. a).

4.1.2 Benchmarking

The benchmarking serve as a representation of three product segments categorizing dive computers, entry level, mid-range, advanced. It includes a representative product from each category. The products described in the chapter are from well established brands in the scuba diving community, Suunto, Scubapro and Shearwater. It is common for one brand to have a product in all three of these product segment.

An entry level dive computers for recreational use show the essentials information, often priced between 2000-4000 SEK. The mid-range dive computer that allows divers more functionality and information, priced around 6000 SEK. The Advanced dive computer used by professionals

and technical divers offering advanced options for controlling gas mixtures, rebreathers and a high level of customization to suit most needs, priced around >1000 SEK.

Suunto Zoop) - resale price of 2500 SEK

The Suunto Zoop (fig 3) is an entry level dive computer from Finnish sports- and dive brand Suunto (Suunto, n.d. b). It is the cheapest offering in the line-up at around 2500 SEK and this computer represents a typical entry-level for most brands in the scuba diving industry. The Zoop is aimed towards beginners within scuba diving but is also quite commonly used among enthusiasts. Even more advanced divers may occasionally use it in more shallow dives and as a secondary device to their main computer. Depending on the users experience and level, the Zoop supports both dives involving decompression as well as dives without. It is waterproof to a depth of 100 meters (ISO 6425, EN 13319) and weighs 68 grams.

Featuring a round housing in plastic and composites at around 60 mm in diameter, the Zoop has a back-lit LCD display in monochrome and with function buttons. It is being marketed as simple to use but also as a computer that you can grow with, as it both supports air- and nitrox mode as well as continuous decompression mode. It is meant to be used on the wrist similar to a normal watch, and the band is made of expandable elastomers so that it can adapt to a variety of arms and diameters, even if the diver is wearing a thick wetsuit and/or other clothing underneath. Targeted to a beginner segment the choice of materials and design is therefore not the most advanced, as the “glass” of the dive computer is made of acrylic rather than sapphire like in more expensive and advanced watches.

In terms of warnings and settings for notifications, the Suunto Zoop will alert the diver if the ascent rate is too high, if the divers is stepping over the threshold of decompression, reaching maximum depth and remaining time on dive. Following a dive the user can access a detailed graphical dive log via the included Suunto DM5 software that is bundled with all Suunto dive computers.

FIGURE 3 SUUNTO ZOOP DIVE COMPUTER

Scubapro Galileo Sol - resale price of 6000 SEK

The Scubapro Galileo Sol (fig 4) is marketed as a dive computer that offers the most versatile experience in terms of functionality on a “wrist-mounted dive computer” (Scubapro.com, n.d.). It has a single band that attaches around the wrist similar to a regular watch. While incorporating a large amount of functions, the interface of the Galileo Sol is somewhat adjustable as the user can switch between different modes of showing information depending on need and personal preference. The device can be worn in landscape mode or in portrait mode and the interface will adapt to that.

Targeted to an advanced user in diving, the Galileo Sol allows a diver to use up to three different mixes of nitrox during a dive (Oxygen levels between 21%-100%). In order to get as exact measurements as possible it also offers PDIS (Profile Dependent Intermediate Stops) which calculates where necessary intermediate stops need to be had, based on N2-loading, current and previous dives and breathing mixes. The user can also add information about age, physical condition and experience level to further adjust the calculations. In addition to the actual device, the Galileo Sol also can wirelessly, via an integrated tank sensor, measure remaining bottom time depending on air consumption which directly affects the decompression calculations. An integrated heart rate monitor also allows data on effort to be incorporated in the calculations, which delivers a more precise estimation.

The maximum operating depth of the Galileo is around 330 meters, which comfortably allows technical divers to use this device, also with the functionality mentioned above. It also features storage enough for pictures, tables, tissue loading status as well as the last 100 hours of diving. For underwater navigation, the Galileo Sol incorporates a full tilt digital compass that remains an accurate direction regardless of the inclination.

FIGURE 4 SCUBA PRO GALILEO SOL DIVE COMPUTER

Shearwater Petrel 2 Fischer - resale price of 13 000 SEK

The Shearwater Petrel 2 (fig 4) Fischer is the most advanced offering from Shearwater and places itself in the category of professional and technical dive computers (Shearwater Research, n.d.). It is consequently targeted towards primarily technical divers that requires comprehensive information during the dive and to those that need extensive information during the dive in order to make accurate decisions in difficult situations. The Petrel 2 features a rugged design with a 2.4-inch display of color LED that can be customized in a variety of ways (6 different modes) depending on the user's preferences, as well as two function buttons on the side for navigating through the interface. While the device is targeted and priced according to a professional segment, less experienced divers also opt for this dive computer largely based on the large display, not because they need all the functionality.

Rated to withstand pressure of 300 meters of depth as well as functioning with up to 5 gases/mixtures in both open circuit (OC) as well as closed circuit (CC) during a single dive, the Petrel 2 attracts technical divers looking to have a wide range of options. It has a function for decompression, dive planning, dive logging, digital compass and many more functions often demanded by technical divers. Bluetooth integration allows for the Petrel 2 to share information and data to a PC, Mac or iOS device, from where the user can access the information through the included software.

The actual dive computer is fitted into a rugged housing with the dimensions of (W x H x D) 120x100x77 mm, weighing in at 380 grams in total (only dive computer 260 grams).

FIGURE 5 SHEARWATER PETREL 2 FISCHER DIVE COMPUTER

4.1.3 External analysis - Porters Five Forces

This model was used in order to analyze the state of the market on which Poseidon operates. In summary, the diving market in general is quite slow moving and no brands particularly stand out. Therefore, it is considered that bringing a new innovative product to market with an already established brand like Poseidon has a high potential for success.

Threat of New Entrants (Low to moderate)

Well recognized brands on operating in the industry. If a new brand is to gain traction specific knowledge about diving is required. Other (larger) sports equipment companies that have a strong brand could possibly enter and become a strong player if the right diving knowledge is acquired.

Bargaining power of suppliers (Moderate)

In terms of components there is a large variety, however since the diving industry is relatively small the batch sizes will be small and therefore increasing the bargaining power of the suppliers.

Bargaining powers of buyers (High)

Several brands and multiple different product categories/models will leave the bargaining power of the buyer very high. Purchasing on particular brand will not lock the user to that brand, it is fairly easy to switch. Poseidon holds a high quality reputation which will lower the power of the buyer.

Threat of substitute products or services (Low)

The diving industry is a slow-moving industry, however there is, as of now, no plausible threat to the diving computer or scuba diving equipment to achieve the same result. Thus, the threat of substitute products can be considered very low.

Rivalry among existing companies (moderate-high)

Poseidon faces tough competition from several players. Primarily, Shearwater, Suunto but also many others. The threshold for changing brand is low given the number of competitors and the relative similar functionality of the different brand products.

4.1.4 Visual brand identity

Poseidon has a guide for their visual branding and how they market themselves in campaigns, manuals, leaflets, exhibitions and digital media (Poseidon - Brand guidelines, n.d.). They have a set guide for how to make use of fonts, color palette and photography. In terms of fonts they make use of a number of different ones, including *Helvetica Neue LT Std* (for printing material and digital material in with bodies of text), *Bank Gothic* (headlines, marketing and product names) and *Underwood Champion* (corporate communication, brand book and product sheet).

Regarding the color palette of the brand, Poseidon uses a combination of Poseidon Yellow (hex: FED100), Poseidon White (hex: FFFFFF), Poseidon Black (hex: 000000), Poseidon Gray

(hex: 727272) and Poseidon Light Gray (hex: C3C3C3) for their visual language. The yellow is a core color for the brand and is used primarily in the logo of the brand and is therefore a strong connection and recognizable factor for the brand. In terms of the logo it consists of a circle, a fish, a trident, two waves and the names *Poseidon*, *Göteborg* and *Sweden*.

FIGURE 6 POSEIDON LOGO

In terms of photography Poseidon also has a profile outlining the use of images and photography, with the majority of the images conveying a storytelling profile. It is both monochrome and in color, depending on the purpose and use. In most images the logo in yellow and black is clearly visible and something that anchors the brand in the image.

4.2 User studies

In this section the result of the user studies conducted in the project is presented. The chapter consist of an interview summary that serves as a foundation for customer journey mapping, personas, target market and identified key areas.

4.2.1 Interviews

Eleven interviews have been conducted, most the interviews were done over the phone (due to geographical distances) and recorded. A satisfactory span of ages, gender and level diving of diving skill was achieved. Full compilation of interesting responses can be seen in the analysis document in appendix II. Full transcripts of the interviews can be found in appendix II. Below is a summary of the interviews categorized based on common topics spoken about during the interviews. From the interviews, together with the market analysis these five main areas of interest were identified that affects the diving experience. These areas later served as the basis for idea generation as well as a point of reference in the evaluation and selection of concepts.

Dive computer interaction

One of the major areas where potential was found came from the user's interaction with a dive computer. During a dive, the dive computer conveys several types of information to the diver. Generally, a more advanced dive computer contains an array of functions whereas a simpler computer for recreational diving contains the basic functions needed to complete a safe dive.

However, task load becomes an issue in every category of users. An experienced diver says: “You suddenly realize how much you've been concentrating on the technology and you miss things” and “I think task load is huge for first time divers”.

The level of physical interaction with the dive computer differs depending on the type of dive in question. However, all dive computers have some sort of buttons to control the various functions. Some computers have a button for light and some have controls where the diver can choose to display more information currently not showing on the display. Users stress that this interaction can be annoying: “A lot of button-pressing is annoying”.

In regards to the information displayed, more advanced computers often have a bigger, brighter and more colorful screens where more information is shown. A problem stressed by multiple users is the importance of seeing the information clearly. “seeing the information is the most important thing”, “Everything that has to do with safety should be more clear”, “... see stuff in different colors instead of putting more gimmicks in it”. One interviewee explains how dive computers are sold: “People are forced to buy more advanced computers than they need just so they can get a bigger screen”.

Normally information on dive computers are shown as numbers where for example information such as depth, dive time, temperature and no decompression time are shown simultaneously. Customization and color coding the different information is something users seem to appreciate. About what is the best thing about the computers, “I can choose how much information is displayed”, “different color coding”, “LED-lights and big numbers has made it much easier and safer”.

Underwater communication

In terms of underwater communication, there are a few common factors discovered in the interviews. Firstly, communication under water can be troublesome and misunderstandings are common. Another key insight found was that the fact that you are unable to communicate is part of the allure where the “task” is being left up to you is adding to the experience. One diver expressed the later opinion of communication “Everything is left up to you, you need to be able to cope with the task yourself” and another said “it’s pretty nice that there is not so much chatter… it’s part if the enjoyment”. However, if the aspect of safety is taken into account divers express the opinion that more communication, or at least clearer communication could provide an increase in safety for divers “I believe it would be safer if you could communicate more”.

Functionality

Other interesting aspects from the interview was a great amount of ideas the divers themselves were missing or thought could increase their diving experience. This ranged from locating buddies to a simple cross platform (not bound by a specific brand) for logging dives.
Another very interesting point raised was when talking about what functions a diver wanted in their dive computers. Several of the interviewees specified the importance of just having the functionality they needed for that dive. Some stressed the opinion to be able to customize their equipment and some expressed an unwillingness to purchase products with functions they

would never use “why buy a function you don't need?” which ties into what is mentioned earlier about what information is showed on a dive computer.

Dive culture

In regards to the diving culture and community the interviewees agreed that there could be a lot of improvement in the marketing of the sport in general as well as marketing dive sites and dive clubs to introduce new divers to the sport. Because of the certification system one diver expressed concern that the focus is shifting from the experience of diving to “what course can i do next”. The diver described it in the following way: “it needs to be more about the diving”, “they progress quickly through courses but don't really have a lot of diving experience”. Also, keeping newly certified divers has proven to be a challenge, because the threshold of getting in the water is quite large. Divers need expensive equipment, boat, dive buddies etc to just get in the water.

Areas of usage

When interviewees were asked about if they could see themselves wearing a dive computer/watch in another context than diving, for example to other sports or as an everyday type watch, the result was a mix. Some considered the dive computer a tool solely for diving whereas other would wear it as an identity accessory if the price was correct and the styling of the device looked stylish for other situations as well.

In summary, a large amount of interesting opinions and knowledge has been found during the course of eleven interviews. Since the interviews were designed to be of an exploratory nature the breadth of the analysis will reflect that, thus covering a lot of different areas. Each of the areas have a magnitude of subsections with potential for exploration. Ideally all of the five identified areas could be covered within the limits of the project however time restriction and a pursuit of producing a complete concept at the end of the project made this an impossible feat. Consequently, the idea generation determined what areas (or subsections to areas) are considered to be most interesting to proceed with. However, the derivative of the interviews can be summarized with the phrase “the diving experience” and how different aspects can elevate or lower that experience.

4.2.3 Customer journey mapping

To concretize the interaction with equipment (specifically dive computer) two different graphs have been synthesized from the user studies. The graphs are a walkthrough of how much focus, during the course of the dive, is put on interacting with devices and what the desired state is. The dive has been sectioned into five main sections/activities:

Pre-dive planning	***Descent***	***Exploration phase***	***Ascent***	***Post dive logging***

Pre-dive planning - Time before a diver enters the water and plans the entire dive, this would include deciding time limits and depth limits and setting of air/gas mixtures.

Descent - The diver enters the water and begins descending toward the planned depth
Exploration phase - The main part of the dive, where the diver explores the environment oftentimes this phase is the main purpose of the dive.
Ascent - During the ascent the diver makes his/her way to the surface, monitoring the rate of ascent in order to avoid decompression sickness.
Post dive logging - The diver reviews the data from the dive and keeps a log for future reference.

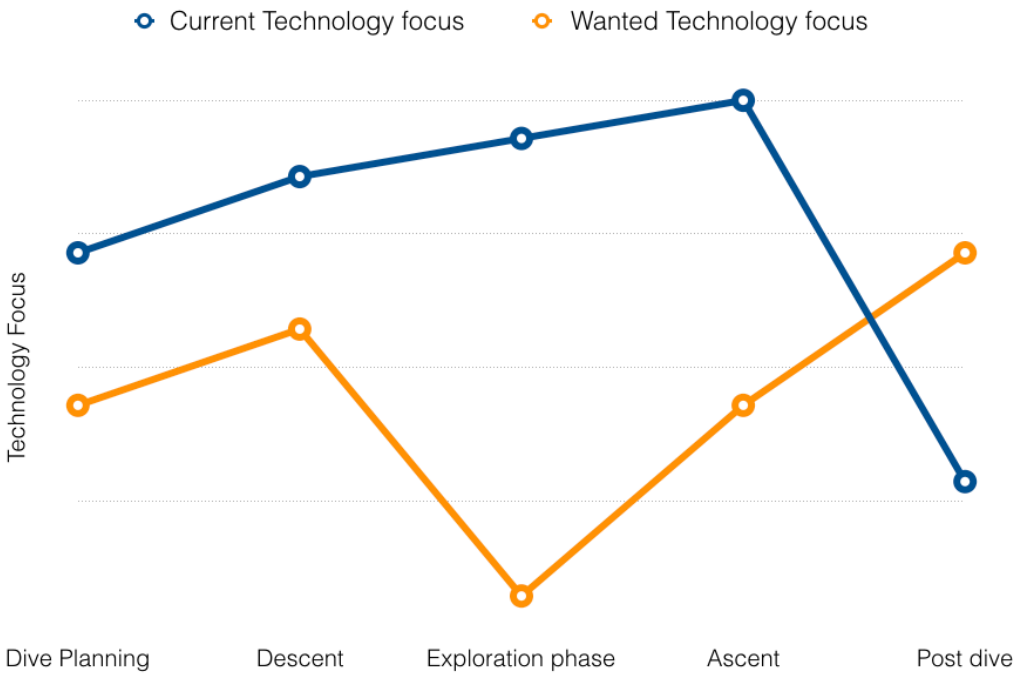

FIGURE 7 DESIRED TECHNOLOGY FOCUS VS CURRENT TECHNOLOGY FOCUS

FIGURE 8 DESIRED EXPERIENCE FOCUS VS CURRENT TECHNOOGY FOCUS

When comparing focus on the technology the graph (fig 6) is a direct result of what has been found in the interviews and also a judgment from the project team. The consensus between interviewed divers is that technology is necessary to perform a safe dive but preferably you would like to spend less time interacting and monitoring it. The technology also increases the task load, especially for novice divers, decreasing the enjoyment of the diving experience. If the technology focus could be minimized but still provide divers with the tools to dive safely, recreational divers could spend less time worrying and more time immersed in the experience. Thus, developing a device with less functionality could be preferred.

The experience focus (fig 7) is an estimation of how much focus is actually spent enjoying an experience rather than spending time on activities not providing value. The preferred state of experience focus is to, throughout the dive, lower the task load and thus be able to focus more on the experience, which was what the diver sought when the dive was initiated. Therefore, the conclusion that can be drawn is to develop a device where the experience is put central and technology will be a means to that end.

4.2.4 Development of Personas

Four different personas have been created to summarize the majority of divers on the market. All but “the technical diver” represent different types of recreational divers. The recreational divers will be the target divers in this project.

The Cocktail diver

- 5 dives per year
- Only goes diving during vacations in tropical waters.
- 35-55 years' old
- High income
- Does not own dive equipment except for dive computer
- Goes diving to see colorful fish and corals
- Dislikes complicated dives with low visibility little fish
- Content with their diving certificate level

Freshman diver

- Just took their certificate
- 18-25 years' old
- low income
- Does not own any dive equipment
- Enjoys just being under the surface
- Dislikes long briefing session before being allowed to jump in the water
- Dives only with friends at the same level

Technical diver

- Dives as often as possible no matter where
- 40-60 years' old
- High income
- Owns all equipment, only the most advanced gear
- Enjoys wreck and cave diving
- Always wants to achieve a higher certificate level
- Dislikes inexperienced divers

Hobby diver

- Dives 10-25 times per year
- Dives during live aboard and during summer time
- 25-40 years' old
- Medium income
- Owns the essentials: dive computer, wetsuit, tanks, regulator etc.
- Enjoys diving in new places and seeing new things
- Dislikes cold waters

4.2.6 TARGET MARKET

The current market segment for diving products at Poseidon can be summarized as a slow moving and conservative. Typically, users are men, ages 40+ that are very performance oriented. Given the characteristics of the diving community and market, the diving industry is lacking the speed and innovation that other adventure sports produce. New technology does

not gain traction quickly and companies like Poseidon therefore struggles with economic stability and slow ROI on their R&D.

In order to attract a bigger market segment, it is suggested to target a market more in line with outdoor mentality, meaning less focus on performance and more focus on the experience itself. People who are aware about and interested in new technology but are not as performance oriented but rather are interested in a product that can elevate the experience. This segment within the diving community can be grouped and summarized as recreational divers. This group contains the majority of divers and thus provides a great target market for Poseidon in contrast to their current segment. This is a younger segment, age ranging from 20-35 years. The target segment is considered to have a willingness to purchase products in line with their image and personal motivation. Therefore, an opportunity has been identified where the diving industry can attract an enthusiastic new, young, tech-savvy segment interested in new experiences like diving and other water activities to increase the development rate and increase the pace on ROI.

4.3 Problem definition

Given the inaccessibility of the scuba diving environment, divers are faced with several challenges while performing a dive. The attention and focus of the diver is to a large extent centered around safety in terms of checking levels and status on equipment. However, the underlying drive is originally to experience the underwater world and get a sense of freedom. Thus, a conflict appears where the wanted focus is on the experience but the actual focus, instead ends up on the equipment in order to ensure safety.

The more experienced divers experience less task overload and have learned how to cope with it to a larger extent than new divers. However, it remains a problem regardless of diver skill and level of experience. Diving within the limit of 30m is generally not as extensive in the information that a diver needs, only requiring more fundamental functions (described in section 4.4). This, in addition to the fact that Poseidon today offers a solution in the M28 dive computer to the more advanced users, motivates that the aim of this concept/product should be towards the recreational divers for an optimal market penetration.

Furthermore, the diving community, as a whole has, trouble attracting, and most of all, keeping new divers interested in the sport. The threshold in the sport is rather large and getting in the water takes a lot of planning. Consequently, newly certified divers (e.g. certified on a holiday in tropical waters) find it difficult to keep up with the sport.

Solving these problems will elevate the diving experience for recreational divers and direct the focus back towards the ocean environment rather than equipment and technology. All while still ensuring the safety of the diver and making sure that the necessary information is provided.

4.4 Identified needs

The main desire that was identified in the pre study was to increase the amount of focus a diver can have on the experience. The pre study gave a good indication of around what areas the

experience could be elevated and what the underlying problems was that caused the diver to not being able to focus on just that. The identified needs for a diver to feel safe and be able to focus more on the experience are listed below

- Remove unnecessary functions
- Provide safe diving zone
- Decrease workload
- Simplify information display
- Provide a solution to attract and keep divers
- Communicate to a certain extent

5 PRODUCT SPECIFICATIONS

The product specification is divided into two major areas, a function analysis describing what the main function of the solution should be and a compilation of key functions that need to be present in a concept in order to make the user feel safe and elevate the diving experience.

5.1 FUNCTION ANALYSIS

The function analysis contains three main functions - enable freedom, elevate experience and enable usability. These three areas were chosen because they represent what has been found in the pre-study to be the main things lacking in today's market. A closer explanation of each main function can be seen in table 2 below were the different sub functions to the main functions are presented. Lastly in the table are the supportive functions to the main functions, they are functions that must be in place to support the main function.

The purpose of the function analysis is to highlight how the diving situation can be changed in order to get divers more immersed in the experience and how the diver's experiences can be elevated with the use of technology instead of being distracted by it.

Function Analysis				
Nr.	Function		Classification	Additional comments
	Verb	Noun	MF= Main function R= Required D= Desirable U= Unwanted	
	Main functions			
Nr.	Function		Classification	Additional comments
1	**Enable**	Freedom	MF	
2	**Elevate**	Experience	MF	
3	**Enable**	Usability	MF	
	Sub functions			
Nr.	Function		Classification	Additional comments
1.1	Relieve	Stress	R	

1.2	Introduce	Diving	D	Get new users interested
1.3	Avoid	Disturbance	R	Of unnecessary feedback or signals
1.4	Provide	Ergonomic fit	R	Be natural and easy to wear
1.5	Provide	Flexibility	D	In wearing
1.6	Allow	Movement	R	Freedom in wearing
1.7	Fit	Human	R	Have a flexible size
1.8	Minimize	Unnecessary Interaction	R	Goes in hand with the usability focus of the product
2.1	Minimize	Complexity	D	In product interaction
2.2	Provide	Useful information	R	About the area, certain lifeforms or wrecks/diving sites
2.3	Minimize	Interruptions	D	Of non-urgent feedback
2.4	Provide	Feedback	D	Of when the body “feels happy”
2.5	Collect	Experiences/Impressions	D	Video, photo, sounds?
2.6	Offer	Connectivity	D	Transfer of collected data to other platforms
2.7	Offer	Social interaction	D	Between divers
2.8	Minimize	Interaction	R	Reduce taskload
3	**Enable**	**Usability**		
3.1	Easy	Cleaning	D	

3.2	Adjustable	Fit	R	The device should be easy to adjust in fit
3.3	Effective	Fit	R	The device should fit properly and tightly
3.4	Allow	Multi-use	D	For a variety of activities
3.5	Allow	Multi-platform	D	Use data in other services (e-service)
3.6	Offer	Compatibility	D	With other products from Poseidon Diving
3.7	Provide	Simplicity	D	
3.8	Eliminate	Complexity	R	
3.9	Express	Intuition	R	In interaction
3.10	Provide	Interaction		
3.11	Offer	Reliability	R	The product should be reliable in various conditions
	Supportive functions			
Nr.	Function		Classification	Additional comments
4	**Resist**	**Environment**		
4.1	Effective	Tightening	D	Against environment
4.2	Be	Waterproof	R	Against environment
4.3	Offer	Protection	D	From the environment, for example drops of a certain height
5	**Be**	**Environmentally responsible**		
5.1	Enable	Manufacturing	D	Technically

5.2	Enable	Repairability	D	Possibilities to fix when broken
5.3	Enable	Disassembly	D	
5.4	Make use of	Recycled parts	D	
6	**Provide**	**Information**		
6.1	Communicate	Depth	R	m/feet
6.2	Communicate	No decompression time	R	
6.3	Communicate	Time	R	total dive time
6.4	Communicate	Position	D	between divers
6.5	Save	Data	R	Log
6.7	Track	Location/position	D	In case of emergency
6.8	Distinguish	Signals	R	In case of emergency
7	**Express**	**Identity of brand**		
7.1	Provide	New direction	R	Signal that the brand is targeting and acknowledging new potential users
7.2	Elicit	Playfulness	D	
7.3	Maintain	Core identity	D	The main identity of the brand is strong and needs to be preserved
7.4	Provide	Connection to oceana and water	D	The color palette should have a connection to water and ocean

TABLE 2 FUNCTION ANALYSIS

5.2 IDENTIFIED KEY FUNCTIONS

The identified key functions of a dive concept have been found to be the following presented below. These functions will be sufficient to perform a completely safe recreational dive to 30 m. A key function that the device should express is the importance of staying within safe margins during a dive. A diver should not deviate from the set plan and not push limits, the device should focus on the user interested in the experience foremost thus leaving those users focused on the performance of the dive outside of the targeted segment.

Depth - information, notifying the diver about the depth.
Time - limiting factors

- Depth - amount of time allowed on actual depth
- Gas - amount of time left on dive based on gas levels.
- No decompression time - time left before going in decompression.

Ascent* - Speed of ascent must not exceed the recommended ascent rate.
Warning/notification/deviation from plan **-** Notify the diver about changed from the plan and dangerous situations and malfunctions.
Dive planning - Being able to, before a dive is performed, set the limiting factors of the dive.
Safe diving - Dive within safe margins, divers should not push the limits.

6 Concept generation & Evaluation

The following chapter describes the result of the concept generation phase and the sequent evaluation of concepts. Concepts and evaluations are divided into early and mid-level stages in terms of the level of concept refinement.

6.1 Early stage concepts

The concept generation phase was initially centered around the five areas of interest derived from the user studies. The first brainstorming session was conducted in the five stages, equal to the five areas of interest, *dive computer interaction, functions, underwater communication, area of use* and *dive culture* with emphasis on how the experience could be elevated and more have a bigger focus on usability. The whole spectrum of ideas can be found in appendix IV. Over 100 ideas in total and about 20 on each area were generated.

Given the amount of ideas ranging over a large spectrum of functionality five concept ideas were created using a morphological matrix (appendix V). Thus giving a more complete picture of how these conceptual ideas would improve the given situation and elevate the diving experience. These concepts were in turn made more concrete with rough sketches and a short description, however still on the base created in the brainstorming phase.

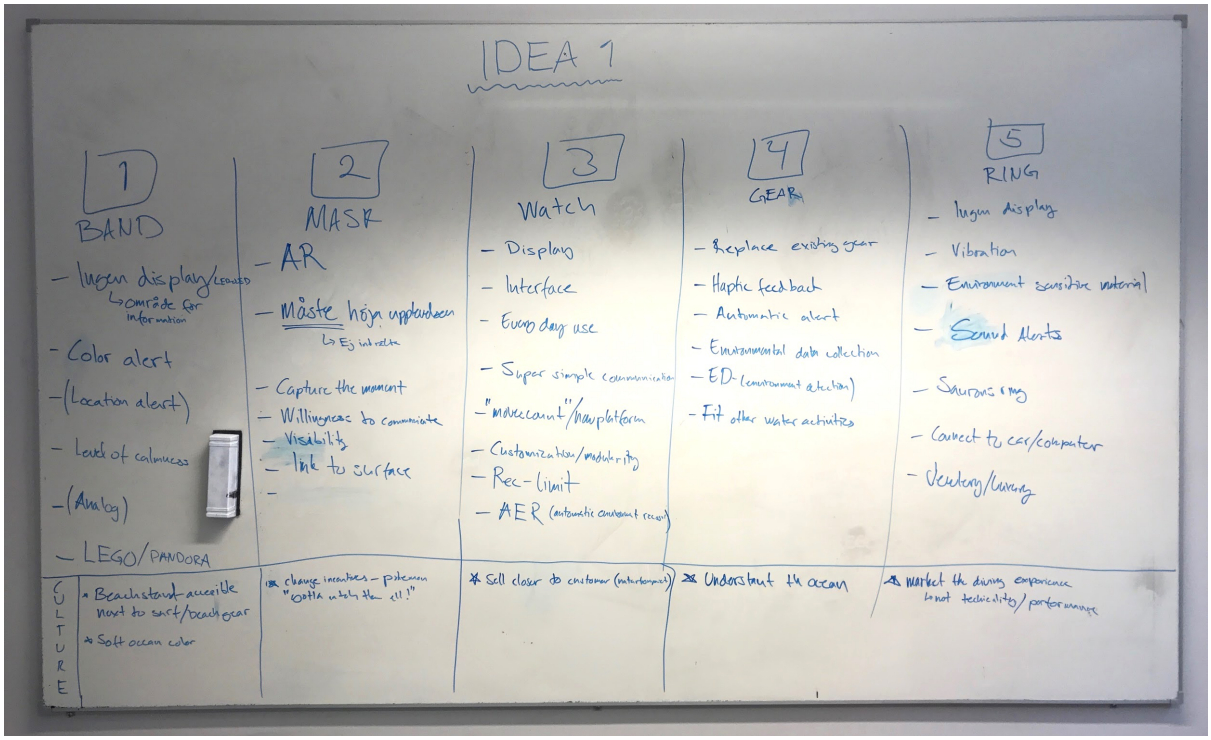

FIGURE 9 CATEGORIZED IDEAS

Idea 1 - "The Band"

- No display/screen (Simply, simply, minimize impressions)
- Color alert (in situations, as safety and or as indications of depth/no deco or similar)
- Location alert

- Level of Calmness
- Analog
- LEGO/Pandora modularity
- Accessible with other gear/sports such as surfing, snorkeling
- Soft, fun colors

“The Band” concept’s main idea is to challenge the dive computer by providing information without a display at all. Other areas of information display can be used such as lights and haptic motions. Also, a key element of this concept was modularity. Different functions could be added onto an analog band for user customization.

Idea 2 - “The Mask”

- AR (Augmented Reality)
- Must elevate experience, not interfere or distract
- Capture the moment function
- (showing) Willingness to communicate
- Visibility
- Link to surface (information/safety)
- “Gotta Catch ‘em All” - attitude

“The Mask” idea provides the user with all the information, needed throughout a dive, visually. Augmented reality, AR, is the key concept where information is presented in real time on the mask lens providing an opportunity to include functions such as point of interest (i.e. fish, corals, wreck) as well as giving the diver the opportunity to send information/livestream to others for example the boat.

Idea 3 - “The Watch”

- Display
- Interface
- Everyday use
- Super simple communication
- “Movescount”/new platform
- Customization/modularity
- Recreational Diving limit (parameters that make the product simpler and sleeker)
- AER (Automatic Environment Recognition), basically understanding where the product is and then automatically switching to that mode)
- Sell closer to customer (i.e. Naturkompaniet)

“The watch” is a concept designed to function as both a dive computer as well as a watch for everyday use. The key areas of function is here a display with a simple interface to show information and changeability to enable the user use of the device in a different context.

Idea 4 - “Gear”

- Glove, fin, part of wetsuit - it should “replace” existing gear

- Give haptic feedback as form of information communication
- Automatic alert (if anything goes wrong, for example the color of the fin will turn red)
- Environmental data collection (passive function)
- ED (Environment Detection)
- Could be used in other water activities

The concept “Gear” was created with the idea of using existing gear a diver would use (fins, gloves, wetsuit) to provide the diver with information. Given the size of these products possibility to attach bigger elements like water quality sensors or light signaling becomes an opportunity. Furthermore, including functionality in existing equipment could possibly decrease the workload for diver.

Idea 5 - “The Ring”

- No display
- Vibration/Haptic
- Material sensitive to environment (and changing thereafter)
- Sound alerts (MORSE)
- Lord of the Rings (an instructor can have the “master ring” and the student/other divers in group can wear one ring each that connects them)
- Connect to computer/other areas of use
- Jewelry/luxury
- Market diving experience, not technical performance

The key aspects with the concept “The ring” was to provide a different variation of the kinds of wearable device that can be used. A ring could be used to both provide information as well as allow communication between divers. For example, between dive instructor and dive student to help insure safety and help new divers improve on site rather than find out after a dive. Also ability to connect to other devices, for example a car or a computer was included in this concept idea.

6.1.1 Early concept discussion with company stakeholder

The early discussion around the developed ideas and concepts took place on the 16th of March, 2017 at Poseidon between representatives of the company and the project team. Initially the discussions started out around the identified areas from the pre study, market research and user studies. Focus was primarily on what users had said during interviews and how different segments of the diving industry have different areas that they feel are important to them. More specialized and performance interested divers are likely more open to a larger amount of information from the dive computer than in-experienced divers. Still, even experienced divers had expressed concern on the amount of information and task load that they have to deal with during diving, which was something both surprising and a bit of a new perspective to Poseidon.

Based on this, the topic of the discussion turned to the identified key areas that the idea generation and consequently concept generation had been based on. It was important to

exchange thoughts between the project team and the company in how the process had been up to that point, in order to get the best and most valuable feedback.

Since the concepts ideas at this stage were a bit undefined, very young in their nature and basically a rough result from the morphological matrix and brainstorming sessions, the concepts could only be explained to a certain extent. Many features and specifications of each of the concepts had still to be decided, but it was still valuable to get feedback on the sense of direction in the concept from the company and their expertise in the area. Each of the five early concepts were briefly explained in their overall set of features, what set them apart and how they connected with the identified key areas from the pre study.

After a general discussion following the walkthrough of the concepts, the near future of the project was put into context and how well the concepts fit in with the defined problem of the project. Aspects such as how close a concept was to the production or if it could be more of a future product was also taken into consideration. The concept around a mask-solution with augmented reality features was considered to be interesting but also more of a future development, in contrary to the ring, two-face watch and band concepts respectively. The gear-concept involving a glove or fin was considered interesting at this stage but not something that would-be part of the continued development in the project, mainly due to the fact that the company had been exploring similar solution at an earlier project and had found it to be not a product that would could have desired impact in the market.

Rounding up this early discussion and meeting around the early concepts it was decided that main focus in the continued development should be on the concepts of the band, ring and two-face watch. While the primary focus should be on those concepts, new input and ideas could still be added to the concepts and re-evaluated in the continued development.

6.2 MID-LEVEL STAGE CONCEPTS

The remaining early stage concepts were iterated in several loops until three more complete concepts took shape from the foundation of the early development. The band, ring and two-face watch could be synthesized into concepts that would allow divers to complete a safe, recreational dive. Although the early concepts had features from every identified area, the new concepts were more focused on the actual diving experience since it was judged that the diving experience could be elevated the most there. The mid-level concepts described in this section are refinements of the remaining concepts from the early concept discussion. The digital platform *Poseidon Reef* is not a stand-alone concept but part of each of the three concepts.

6.2.1 Digital platform - *Poseidon Reef*

Serving as a main platform for each of the three following concepts, a mobile application for smartphones was developed to serve a number of functions supporting the physical concepts. *Poseidon Reef*, “the app” was developed to be the first and last steps of each concepts. Building on the foundation that smartphones are established as part of the vast majority of people's daily life and something that most are comfortable using in conjunction to a variety of

activities and products, having an app to control a device is most often advantageous and preferred. In addition, many wearables and similar devices with small buttons and/or screens can be hard to use via touch or physical interaction when aiming to set detailed functions, which consequently also motivates having an app on a smartphone with a better and larger interface to interact with.

The app will be downloadable to all larger operating systems for smartphones such as iOS, Android and Windows Mobile and will be offered for free. While in the app, a user will be prompted to create their own unique user connected to the Poseidon Reef platform. Following this, a user is free to explore the community within the platform in which users can interact with each other, exchange thoughts and ideas around diving and related subjects, discuss equipment, preferred diving sites and much more. The platform is meant to be a place for all divers to connect with each other, expand their interest and passion for the sport as well as sharing experiences. Since all of this happens within the platform it also builds support and interest for the Poseidon brand and allows the company to build trust and loyalty to its users and customers. Since the app is free to use for everyone, even people not currently engaged in diving can connect to the platform if they are curious and interested and thus learn more with a very low threshold.

In addition to the community in the app, the platform will also have a major function in using the physical concepts, respectively presented below. When a user has purchased a device, the functionality of the app will be extended so that the user can control the device via the app. The connection via smartphone and device will be through wireless Bluetooth. When connecting the app to a user's device, the app will remember their unique users' device for future use and thereby minimizing any issues with connectivity. In a way, the app is meant to display and showcase part of the functionality of the device so that the functions needed for a safe dive does not physically set the parameters of the device. Rather than having complex physical buttons or the need for a large screen on a device, those functions can be accessed and set via the smartphone and app instead with superior usability. Therefore, the app allows the device to be fundamentally simple in its design and usability.

Before starting the dive, a user will enter the gas (nitrox/oxygen concentration) that will be used and what the planned depth(s) are for the dive. Following this, the app will provide an approximate time for the dive and a suggestion for potential deep stop and safety stops. The calculations/algorithms in the app have margins to conventional limits on time, ensuring that every dive will be conducted without risking reaching any limits on time, gas or depth. It also allows and encourages users to have plan ahead and decide on important factors before getting in the water. Focus here is ensuring that a user will have a safe experience while being able to completely focus on the experience, trusting that the app and device work together to create this safe environment. Settings that are entered in the app are then consequently transferred wirelessly to the device and a message on the smartphone will let users know that all is synced and ready for the dive.

Following the dive, the app will again become useful as the data and statistics from the dive will be wirelessly transferred to the app. Again, the app and smartphone is the better way to display

such information as the user can explore interesting information about the dive in a visually attractive way and also be able to share experiences with other users via the platform. The app will log and store a history of activity, which opens up new functionalities such as long term statistics, gamification and much more. Rather than focusing on performance in the gamification features, challenges between users can instead focus around rare fish, corals, wrecks or similar.

In addition, the app, users will also be able to access the Poseidon Reef platform via the web. While the appearance of the platform can have a slight difference between mobile application and desktop version, all the main visual design language will remain the same. There is possibility to display more demanding and advanced functions via the desktop version of the platform.

6.2.2 Cascade

The concept Cascade (fig 9) is a simplistic and minimalistic design of a dive computer. The main channel for communication information on the cascade is via a digital LED display. This display will show relevant dive information the diver will need to complete a safe dive. Exchangeable armbands enable the device to be used for everyday use and provides customizability to suit different users.

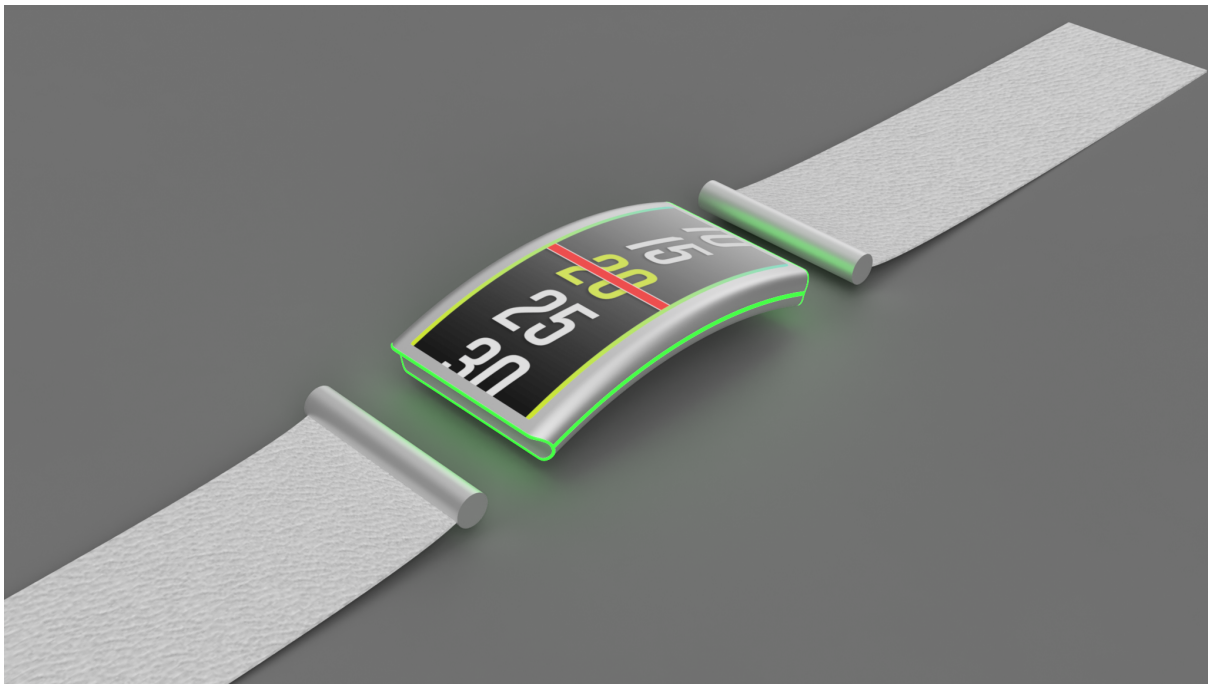

FIGURE 10 CONCEPT CASCADE

Since there are no buttons on the cascade no interaction with the device is possible under water. In order to set up the device the Poseidon Reef app will be used. In the app, the user plans his/her dive with all relevant parameters, such as gas mixtures, maximum depth, planned time etc. All this information will then be displayed on the cascade during the dive. Consequently, divers will specify a safe zone - the outer barriers of the dive will be decided by planned maximum depth, dive time and no decompression time. If the barriers of the safe zone are breached or if the divers draws near the boundaries, a number of warnings will be issued. A

perimeter light will switch from green to red light, if the diver continues the breach the barriers both haptic and audible warnings will be issued. The warning system will give the diver more freedom to enjoy the experience since the device will alert him/her when he/she breaches the safe zone. As long as the diver is within the safe zone there is no need to look at or interact with the device thereby lowering the focus on technology.

Another feature of the Cascade is situation recognition, meaning that the display will show different information depending on the situation and phase of the dive the diver is currently in (fig 10). For example, will the interface for ascent and descent show the depth and necessary decompression stops. Whereas during exploration, the main focus will be on time and air consumption. This way the space of the screen can be used more efficiently and the actual screen size can be smaller, which in turn lowers the size of the device so user can feel more comfortable using the device every day. The size, together with simplistic design that differentiates itself from other dive devices, means that users can use the device as a more multifunctional device and thus get a greater value out of the product.

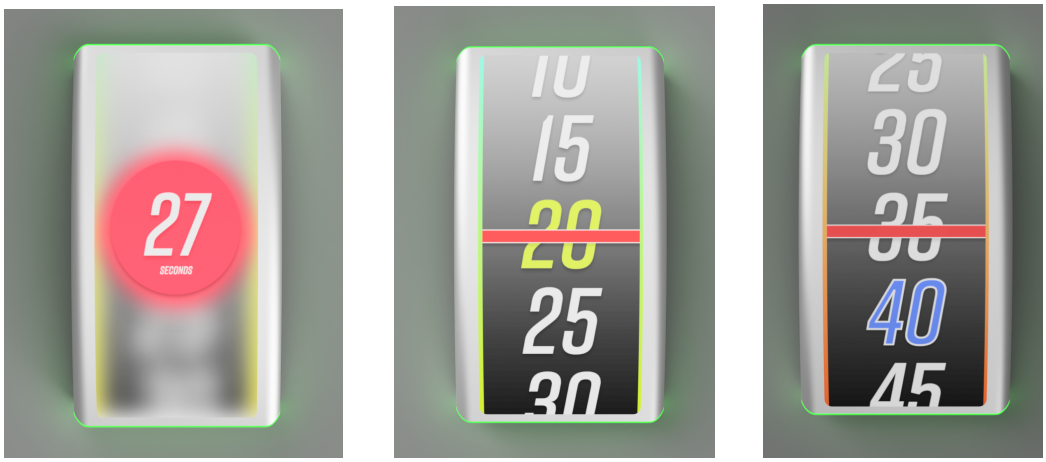

FIGURE 11 DIFFERENT SITUATIONS AS THEY WOULD APPEAR ON THE CASCADE

After a completed dive, Cascade syncs with the Reef app and a complete dive log and statistics of the dive will be shown. In the app, the diver can share the dive with the community and enter notes about the dive, or start planning the next dive taking the previous dive into consideration in terms of nitrogen diffusion.

6.2.3 Pandora band

The Pandora concept is divided in two different modules that provides the diver with information. One module displays information regarding movement, and the other module will display information about time. These two modules will provide the diver with all the information needed to complete a safe dive.

The modules are set up using the Poseidon Reef app. There, all important parameters of the dive will be set, gas mixture, maximum depth, planned time and no decompression time. These will be the boundary lines for the diver “safe zone”. If boundaries are breached the diver will be notified with the use of light signals that switch from green to red and if diver does not get back

in the safe zone, haptic feedback as well as sound warnings will be issued. This will ensure that the diver can enjoy the experience within the safe zone and will be notified when a boundary is close and or breached.

The two modules are divided into movement and time (fig 11). The movement module will provide information about how the diver moves in relation to his/hers set points. The maximum depth will be the bottom line on the module. Should the diver go below this depth a warning will be issued to notify the diver. This way divers will be aware of their relative position in contrast to their set limits but without having to interpret numerical information. This module will also add any necessary decompression stops that the diver might need to complete. These stops will need to be complete in order for the diver to continue ascending, and will be shown as bars that fill the module.

The time module displays all information with regards to time factors. It displays time as a bar with green and red light where the green light represents the remaining time. Since this module shows planned time, no decompression time as well as air left as one single bar, whichever factor that is limiting is shown. The result of this will be that once the time bar has run out, it is time to start ascending towards the surface and end the dive. The diver will receive notifications to be warned if the safe zone, with regards to time, is breached.

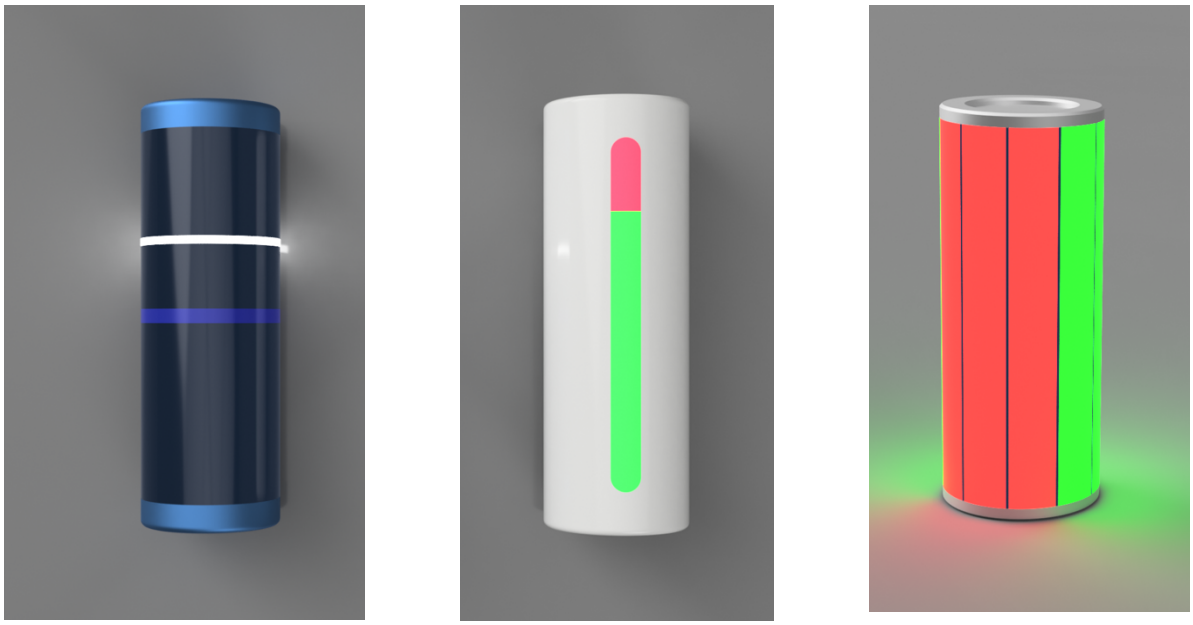

FIGURE 11 MOVEMENT MODULE, TIME MODULE AND ASCENT

6.2.4 *Stoplight*

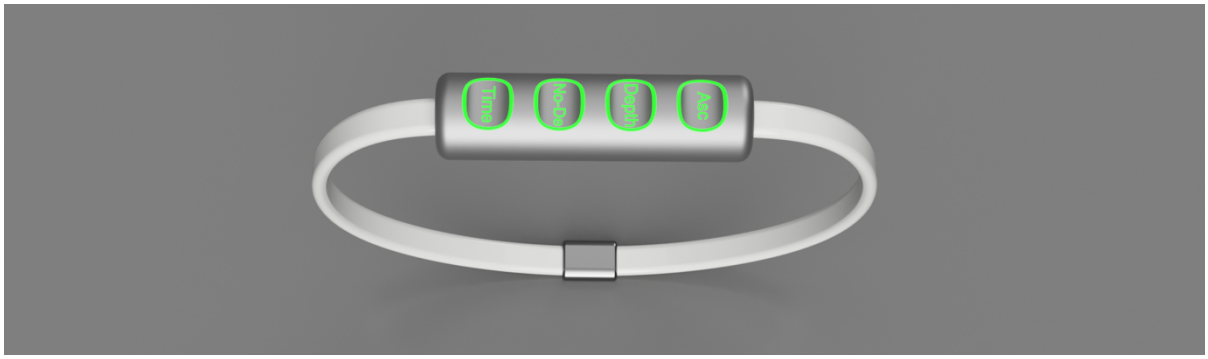

FIGURE 12 STOPLIGHT CONCEPT

Building further on the concept of making the diving activity more simple and intuitive, the *Stoplight* (fig 12) exemplifies the ultimate version of simplified diving. Stripping down on unnecessary functions and highlighting the most fundamental and critical states of situation such as remaining time, depth, decompression mode and ascent/descent, the result is a minimalistic cylinder with clear, yet discrete lights/focal points. The Stoplight concept functions extremely simple in that as long as all states remain within the set limits and safe zone they remain showing a green light (fig 13), telling the user everything is proceeding as planned. If any of the states changes are nearing the limits, the lights will shift to a slowly, pulsating yellow color and alert the user that the specific state is changing and nearing the planned limits of the dive. In addition, the Stoplight will notify any change via vibration and/or sound. If a user still continues to cross a boundary and breach the safe zone the color will switch to a more rapidly pulsating red color.

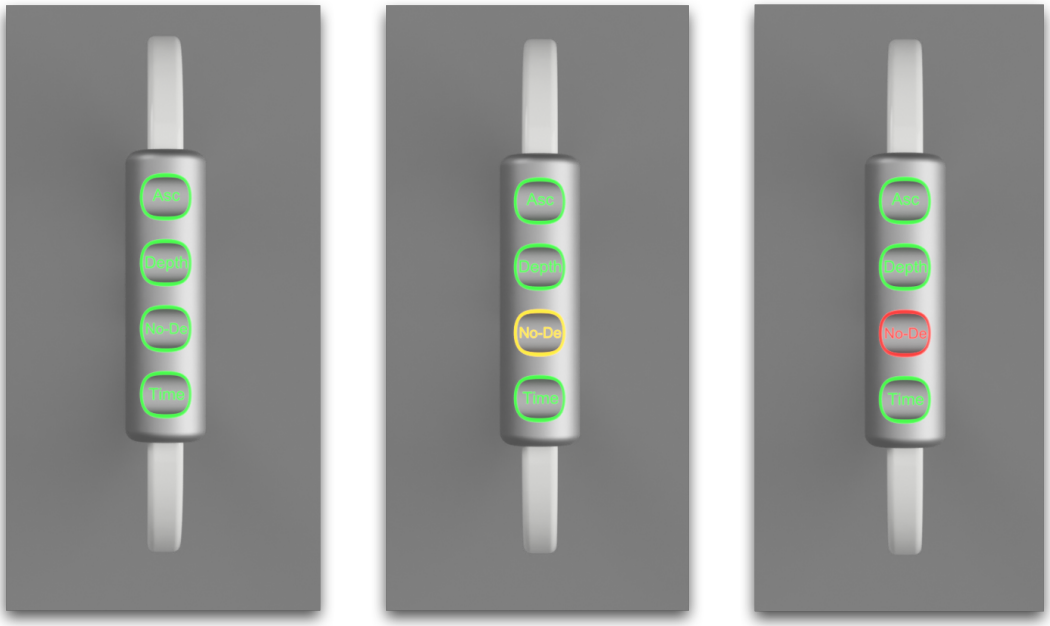

FIGURE 13 STOPLIGHT SHOWING THE THREE DIFFERNT MODES ON THE DECOMPRESSION LIGHT, GREEN, YELLOW AND RED

The cylinder body is connected at both ends with a small band that is interchangeable and can be alternated when used in diving and for everyday use, or based on personal preference.

6.3 User evaluation and verification

The user evaluation and verification of the concepts are described below. The concepts evaluations are presented one at a time and the respective evaluation from the focus group, dive store and interviews are specified for each concept. Together with weighted criteria and a company discussion make up the foundation for concept selection. The transcripts of the interview can be found in appendix VI, focus group in appendix VII and dive store in appendix VIII.

6.3.1 Cascade

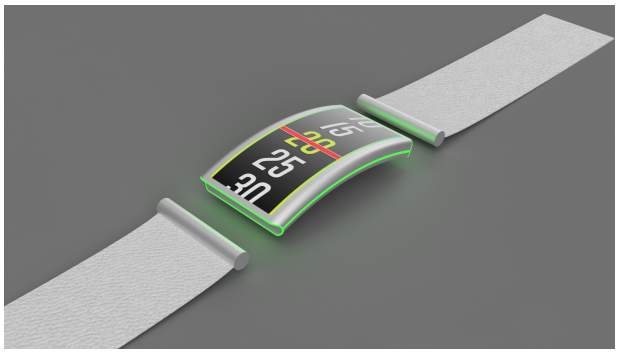

FIGURE 14 CASCADE CONCEPT

Focus group

The spontaneous and direct response from some participants of the group was that Cascade should be the safest concept, based on that the display allows the information to be more detailed. This opinion was not however shared by everyone, although everyone agreed that could potentially be the case. With the screen and the incorporation of an interface however also means that the level of interpretation and complexity is higher compared to other concepts, according to the group. This depends, as the participants noted, on how a final interface would look like. In addition, the automatic switch of modes between ascent/descent and exploration is a key issue, so that a user would feel safe and trust that the device functions in a reassuring way, as noted by the group.

There were some questions regarding the interface switching automatically, how much trust a user would feel secure to have in that. One participant had the opinion that "...the device seemed unnecessarily complex while still being so simple in function". The group said that you should be able to get more out of Cascade than you do at this stage of the concept, noting that a more complete and iterated version of this concept might provide that. Regarding the automatic switch between the ascent/descent and the exploration phases there were some input from the participants that wondered if that is more appealing to a beginner or to a more expert user. They discussed about not being able to control the device once in water, if that is a good or bad feature to have.

Interviews

The feedback about the Cascade concept was to a large extent about its ability to change display type depending on the situation. This feature was to many of the interviewees a source of uncertainty. If the display did not change in time you would be left with information that was not relevant for your situation. Sometimes you follow a slope and thus it would be difficult for the device to understand if you are in ascent/descent or exploration. Otherwise the users liked the fact that it showed numerical values and would give you clear indication on where you needed to perform a safety stop and how long you needed to stay at that depth.

Whether or not the display would be lit constantly was also something discussed with the users. In general divers would like for it to be lit all the time since it removes any annoying interaction with the device like pushing buttons to light the display. However, when doing a night dive, some user expressed the opinion that it should be turned off as to not interfere with the experience. An interesting solution to this would be to include an accelerometer that would sense when the watch is being monitored.

One of the aspect users really liked with the Cascade concept was the slimmed and simple looks. One user explained that this was a device that could be worn outside diving, but also that the slimmed look of the device would help in a diving situation. It was expressed that the more slim a device is the easier it would be to put on the rest of the gear, because it would be less, likely to get caught in a harness.

Dive store

The Cascade concept received mixed feedback from the dive store interviewees. Initial reactions were focused around the automatic switch in the interface between ascent/descent and exploration mode. There were concerns about how reliable and sensitive this automatic switch would be in real-life situations, and something that could be both annoying and potentially dangerous if not working properly. Lack of buttons that could control the switch of modes was mentioned.

While the aim of reducing the amount of information and only display the most relevant data in the interface was accepted by the interviewees, there were comments and question on why it could not show more information if it indeed had a display like most other dive computers. This could lead to that the Cascade concept would be viewed as more of a fun device than a sufficient replacement to a conventional dive computer. The longer the interviewees had to study and understand the concept, the more they insisted that they actually want more information such as average depth, time to surface and more information about dive buddy.

Regarding the notifications, there were comments on that the haptic vibrations would likely be the best option to go with, as sound rarely works properly if wearing a hood in cold waters and lights could also be less effective for beginner and recreational users as they tend to keep their arms further out from the body, consequently missing vital light-based notification. The interviewees noted though, that haptic vibration only works well to a certain thickness in wetsuits.

6.3.2 PANDORA

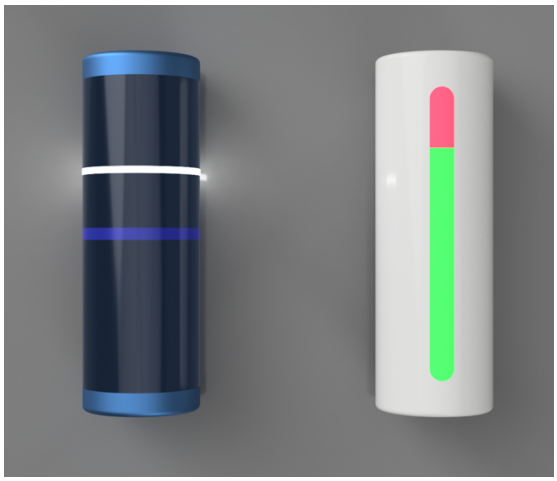

FIGURE 15 PANDORA CONCEPT

Focus group

Instant feedback from the focus group when presenting the Pandora concept was the obvious similarities between Pandora and Stoplight, mainly in the cylinder-shaped modules. A lot of the discussion in within the group touched on the subject if it would be possible to combine the two concepts based on their respective strengths. Other thoughts on the device was that putting the modules on and off the band has to be simple and secure, since the environment in which a diver uses this can be both unstable (i.e. dive boat) and unreliable (close to water) and you want to avoid losing them. Switching the modules between wearing them when diving and having another pair of modules for everyday situations also has to be seamless and convenient.

Regarding the task load when interacting with the device, feedback from participants pointed towards that Pandora likely would demand the highest amount of thought process from a user. Since the vision of the project and the concept had been to minimize the task load needed from users, this was regarded as a primarily negative point. There were questions from the group regarded the modules and how the one meant for ascent/descent would automatically switch look when entering deco-mode, as well as the module displaying remaining time and how the increasing red color could potentially have a stressful effect on a user.

In addition, there was feedback from the target group on the possibility of a connection between the charging case and the modules, providing a location function in that the modules would be aware of the direction and distance to the charging case. This could a benefit when for example diving from a boat and the location of the boat varies slightly as it drifts in the ocean. At this point, this was only a idea that could have a very positive effect on the concept, not a decisive factor.

Interviews

Initial reactions of the Pandora concept was that since it would show more detailed information than the Stoplight concept this would enable the diver to perform a slightly more advanced dive. Because the position module would give the diver a reference depth some divers would feel that all the information they need is presented to them. One user said that adding reference

rings on the position module, for example halfway points would be good to help the diver receive more information. When asked about how colours would affect the diver, the interviews agreed that red would be a good marker for showing danger. However, if red is used unnecessarily, it could cause an unwanted stressful effect. But some interviewees also noted that if it shows a red light then you should be stressed because you are in an unsafe position and need to act accordingly.

As for the shape and form of the concept one user expressed concern that it might be fiddly to get on and off the band. Thus, you would run the risk of dropping it on the boat or in a rock crevice, especially after i dive when your hand can be cold and stiff. The round modules seemed not ergonomic according to one user but one interviewee said that the design look really good and that they would wear this also outside of diving.

The charging case was considered by the majority of the interviewees to be a good solution, whereas one user didn't think it would add anything to the functionality of the device but rather act like a battery power bank that you could sell separately.

Dive store

With the Pandora concept being presented last of the three, the initial reaction from the interviewees were that they wanted to combine all three concepts or at least their respective strengths. It took some time for the interviewees to fully grasp the idea and basis of the concept, partly explained by the fact that the it is in a way the most drastic idea out of the three. When eventual questions had been answered by the project team, they did clearly state that they liked that you were able to see depth and remaining time quite easily, even though the diver does not get exact figures but rather a reference indication.

Regarding the ascent/descent module and how the interface shows depth, safety stops and actual position, there were some questions regarding how that works if you would be out on a dive-boat and conducts several dives in a series. If the parameters of the dive still is set via the app on the phone, how would the diver know for certain that the new parameters for the following dive has been updated on the Pandora? The lack of a verification in this area was something that the interviewees felt a bit insecure, since a diver could potentially be below the surface and well into their next dive with no chance to see if they are diving according to the new parameters. If the device were to show figures of the max depth, that would both give the diver notice that the settings and parameters has been updated but also give the diver more information during the actual dive. As with the other concepts, more information and data would be primarily beneficial to more advanced divers, since beginner divers still would not be able to take much alternative actions even with the addition of other functions or data. The amount of functions being shown here in Pandora is in other words sufficient

6.3.3 STOPLIGHT

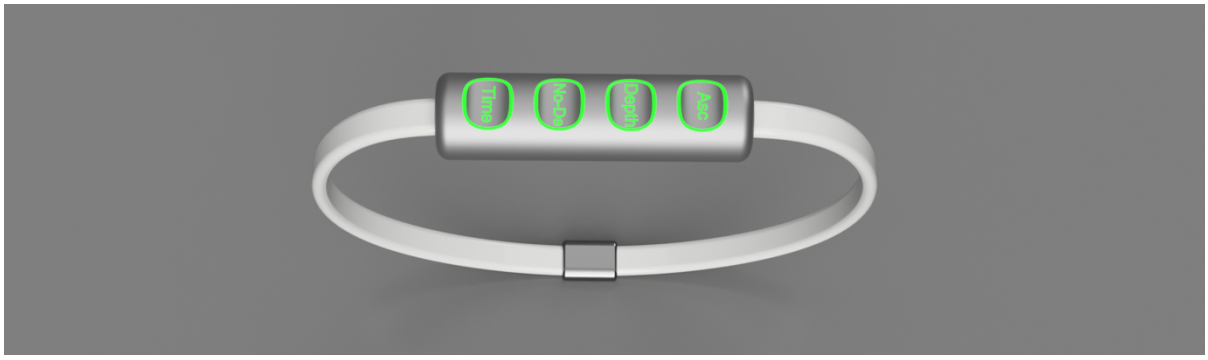

FIGURE 16 STOPLIGHT CONCEPT

Focus group

On the Stoplight concept, the overall impression was that is was very simple in its form and function, impossible to misunderstand. In this feedback, the participants expressed that it would be easier to understand and make the interaction with the device easier during the dive, while at the same time the simple functionality could limit what actions the device could be able to do. More advanced areas such as how it would display/express decompression mode, if it could indicate more details that the green/yellow/red levels and similar was highlighted as areas of further improvement. Since this was something that the project team also had identified as areas of need, there could be discussions with group during the session on how that could *have been solved* in a more complete iteration of the concept.

At the same time, there were varied opinions on how the simplicity of the device would be experienced. Some participants noted that as long as the device fulfils the main function of letting the user know when it is moving within the safe zones and barriers of the dive, it is doing the intended job and function, while other participants wondered if a user might be interested in getting more detailed feedback on how the dive was progressing. The balance of simplicity in the product was key here and could, as the participants agreed in, play both to the advantage as well as disadvantage of the concept. Participants noted that the Stoplight concept would likely be a good option for diving within a recreational segment, but not as much suited for a more advanced user.

Moreover, regarding Stoplight, participants said it would be good if the device could show the green color around any of the functions to decrease along the edges and show more accurately how much time you have, not only go from fully green to yellow and red. Other thoughts included if you as a user should be able to push the function areas just like you do on physical buttons, in order to display more advanced information. Could the text on the function areas instead be symbols, would that make it easier to quickly react to a situation? The group also expressed some similarities between Stoplight and Pandora, for example that you can add the ascent/descent module of Pandora to the Stoplight, and said that a possible combination

of the two concepts could be interesting to explore further. That way the strong aspects of both features could potentially make one more complete concept together.

Interviews

The Stoplight concept was generally first met with hesitation, however most interviewees would then argue that in its simplicity it actually showed most of the information that they really need. The fact that it is so different and that the education system teaches numbers makes them initially feel that the information is not adequate to complete a dive. However, many stressed that for beginner divers, and for uncomplicated dives this information would be enough.

The main problem with the Stoplight concept was that it did not show the actual depth. Since depth is something divers use for a lot more than just making sure they don't dive too deep. It is also used to navigate and find certain points of interests and also used during safety stops to make sure you remain at the same depth. Thus, the divers interviewed would like to be given this function more clearly than just a light indicator. A suggested solution for this was to pre-set checkpoints in the application so you would receive a notification that you would have reached a certain depth for example or that you have half a tank of gas left.

In terms of safety, it was argued that it would be possible to perform a completely safe dive with this device. Some user expressed the concern that if something would go wrong during the dive, it is not possible to alter once plan and recalculate. Furthermore, there is no way to check your set parameters during a dive, and interviewees would want to have a double check before going in the water to assure that all parameters are correct. The use of light signals with color was considered a good way of presenting dangers (or parameter breaches). Also, that the device attracts attention using haptic feedback the interviewee thought to be a great idea in order to not intrude too much on the experience. Just in emergencies the device should give an audible alarm since many interviewees did feel confident that they could hear through their diving hoods. The shape of the concept, one user explained, would be improved if it fit better around the arm. This would help with the haptic feedback so it could be easily felt. One diver also questioned the thin shape, and worried that it might disappear in one of the creases on a drysuit.

Dive store

Initial reactions from the two interviewees at a dive store regarding the Stoplight concept was that it maybe would not provide enough or equal the information that they are used to from their existing computers. Which they pointed out is not something it is meant to do or necessarily a bad thing. A more recreational segment would be better suited for this amount of information. Also, the longer they had to understand and look at the concept, the more they leaned towards that it may in fact provide the necessary information that they would need in most dives, only perhaps missing the depth and/or time in actual figures. This may be due to the fact, they said, that the Stoplight concept neither looks or functions similar to a conventional dive computer, explaining that the initial reaction change as you understand the functionality.

According to the interviewees at the dive store, you would not be able to plan ahead or change your initial dive plan during the actual dive, which is something a more advanced computer

would allow you to do. A technical diver would likely want the possibility to change the parameters of the dive in order to maximize the time allowed. The interviewees again noted that this is mainly for technical divers and not for the intended target group. One issue with this concept would be if something unexpected happens during the dive where you might need more precise information in order to make thought-through strategic actions.

The main feedback and reaction from the dive store focused on that the Stoplight would be a very good match for the recreational segment of divers, providing just enough information in a very simplistic way. The interviewees noted that beginner divers and recreational divers that perform roughly 5-10 dives per year does not need a complex dive computer that frankly would not be ideal for them anyway. One of the two interviewees mentioned that a "+5" function, where the divers gets notified that staying at the current depth for five more minutes is okay, would be a good thing to implement. At multiple times both the interviewees said that the Stoplight concept would be an ideal primary device to use, even for more experienced and technical divers, where the diver can have the Stoplight on the arm and very easy get informed that everything is fine and only have to look at a more advanced and physically cumbersome device (that would be attached at the side/hip of diver) in case of unexpected and emergency situations.

From a selling standpoint in the diving industry the Stoplight would be a very interesting and attractive product to offer, both to recreational divers buying their own individual dive computer, but also to dive centers and institutions where this concept might see its biggest upside, according to the dive store. For new divers and recreational divers' it would be an attractive option and something that differs from what is offered today on the market, having a fundamentally simpler interface and interaction. For dive centers, it could be a perfect match to buy, as divers coming to these dive centers usually conducts dive in a group with a guide or instructor. Allowing the group to use the Stoplight concept in combination with the guide having a more advanced and technical computer would be a great combination in that it would provide a better experience for the divers and if something were to happen during the dive the guide would have the more technical information to make a decision for the group.

6.3.4 Application feedback and add on features

Add-on features

During the in-depth interview woth users and with the dive store, other focus areas in the project was also presented and discussed. Regarding the area of environment and if a function in a concept related to this would have any effect on the value of the product. The majority said that it would likely not affect the actual willingness of purchase but that it could have a potential positive effect of the brand. The main point was the device must still be the best functionality-wise out of the competition. It can never make up for some of the main functions being less good even if it as some environmental functions like for example collecting water samples. User would rather that the device was manufactured in a sustainable way that add functionality that would impede the main functions. It was noted that a lot of divers do connect with environment-related issues and that they are often the first to see some of the effect it has on the underwater world.

Regarding communication under water, the interviewees at the dive store noted that it is an important area and something that could raise the attractiveness and functionality of a concept. Both interviewees and the dive store noted that if it would be possible to include a function in which a diver could notify the other diver(s) via some sort of communication, that would be very helpful and appreciated by all levels of divers. This would allow users to focus more on the environment because time of the dive is not lost trying to get in contact with dive buddies.

Application and community

The idea to set up the device with the help of an app was something all user including dive store and focus group thought to be a very good idea, since many had experienced setting up a dive computer using unintuitive buttons to be annoying. It also seemed natural since almost everyone has a smartphone and the usability of a smartphone easier than using buttons on a dive computer. The interviewees would also stress the fact that because you set the parameters of your dive before you would have no choice but to stick to the plan, and that is something that will increase safety. One interviewee said “it supports correct diving, which is a good thing”. Some negative feedback according to the users where if you would run out of battery or when not being able to bring a phone (for example on a small rubber boat).

As for the application platform as a whole, where they also could log dives afterwards and receive more detailed information about the dive the interviewees considered to be something good. This would enable them to share their dives and keep an organised record of their dive logs. Some of them would also enjoy a gamification feature. However, it was also argued that this would not be as good for divers who do not dive regularly.

Community in the sport of diving is also something that the interviewees thought could be a potential area to improve on. If a device and concept included a new platform for divers to interact and also spread the sport to new potential divers, that would be very interesting according to the dive store and what they see and hear their customers asking for. They noted that a potential platform and community, likely internet-based, would have to be free so that it gains the necessary number of users. The user also described frustration that there was not a platform in which one could upload dive logs in a format not bound by a specific brand. Being accessible via an app in smartphones as well as via a website would be good way to to get the majority of divers access.

6.3.4 Weighted objectives

Providing an alternative perspective and method in addition to the focus groups, in-depths interviews and discussions with the company stakeholder, the weighted matrix was based on the set criteria from the function analysis, as seen in (table 3) below. The concepts were evaluated against the criteria and consequently placed in a one to three order, with three being the highest score. Each criterion was discussed, elaborated upon and motivated by the project team in order to find a fair and correct judgement.

Based on the assessment, the concept receiving the highest score out of the three was Stoplight with 89 total points, followed by Pandora (80) and Cascade (69). Following this a discussion and review of the results was held within the project in order to verify the legitimacy and correctness of the method. It was agreed that this method indeed provides a different perspective on the evaluation of the concepts, while it is still very much needed to have the other forms of evaluation to complement the results.

Criteria	Weighting	Stoplight	Pandora	Cascade
Minimize interaction	4	3	1	2
Everyday/other use	2	1	3	2
Safety	5	1	3	2
Provide information	4	1	2	3
Appearance	2	1	2	3
Simple to use	4	3	1	2
Ergonomics	2	3	1	2
Intuitiveness	3	3	1	2
Increase experience focus	5	3	2	1
Minimize tech focus	5	3	2	1
Complexity	2	3	1	2
Community	4	1	3	2
Total		**89**	**80**	**69**

TABLE 3 WEIGHTED OBJECTIVES MATRIX

6.3.5 Evaluation with company stakeholder

The meeting took place on the 19th of April and started with the project team giving a presentation of the vision (based on the feedback from the pre-study and user studies) of the concepts, as well as a walkthrough of the concepts and their primary features, respectively. The company representatives thereafter filled in with their feedback and thoughts on the concepts.

The vision to increase the experience focus and decrease the technology focus was the reference point for the concept presentation. In terms of the mobile application, "*Poseidon*

Reef" and the idea that all dive planning and settings of the device should be done with it the general feedback was overall positive. Since dive instructors and educational platforms urge all divers to set a plan for the dive - and then stick to it - the idea to pre-set the dive device was considered a good idea. Consequently, divers would enjoy diving within a "safe zone" and therefore make diving simpler. A short mention around the willingness to pre-set a device without the possibility to change settings below the surface was made. Poseidon today has an app for another device where divers pre-set values. According to Poseidon, primarily technical divers seem interested to change setting during a dive thus for the intended segment the proposed Poseidon Reef app would probably work well.

As for the concepts, the general consensus of Poseidon was that the "Stoplight" concept was favored because of its simplistic nature. Concerns regarding it was that the use of letters would limit the potential market to western countries and unable to sell in Asia, a switch to symbols was a suggestion to make it more global. The case idea for the Pandora solution was something that could be useful even in the Stoplight model. Also, the modularity of the Pandora concept was something that Poseidon found interesting to include in the Stoplight concept, in order to add value in usage in between dives. The cascade concept was also interesting but Poseidon argued that it might be to close to what is already on the market. Furthermore, issues around manufacturing was highlighted around this concept, specifically the curved screen. In contrast to the Stoplight were manufacturing would not be a limiting factor according to Poseidon.

6.4 CONCEPT SELECTION

The three different concepts, Stoplight, Pandora and Cascade were subjected to evaluation from five different point of views: Focus group, interviews, weighted objectives, dive store feedback and company stakeholder feedback. The overall conclusion was that the main focus should be on the concept Stoplight. This because all evaluations had been positive to its simplistic way of showing information and thus increasing the experience focus. However, some of the user concerns which had been expressed in user evaluations would be implemented in the final concepts. This included:

- Putting a stronger emphasis on the depth feature that needs to give divers a more exact reading, possibly using numbers.
- The ascent feature can remain as it is but needs to be able show a “safety stop“.
- The time feature would preferably be more detailed or have the function of pre-setting halfway points.
- Changing to symbols to account for a global market.
- Provide the device as a stand-alone product as well as that it can be used with more advanced computers or larger dive groups to simplify the experience.
- Use haptic feedback as main notification source, light as second and sound as third.

From the other two concept these main points was taken into account of the final concept:

- Shape of the Cascade (curved to fit wrist) to increase haptic sensitivity.
- Reference value of the Pandora to give user more exact information about depth and time.

The application would in the final concept be used to pre-set the parameters of the dive to create a diver safe zone. It would also serve as platform for a community based diver experience, where diver can log and share their diving experiences with others. Also, in order to increase the experience further a buzz-to-notify button was something a lot of divers found interesting and extremely useful. A haptic vibration would be enough to attract attention and would not impede the experience focus too much.

7 Final concept

The final concept is based on and is a result of the theory of user-centered design, user studies and extensive evaluations. The final concept stems from Stoplight presented in chapter 6.2 (Mid-level stage concepts) and has been evolved in some areas to account for the evaluation and feedback from users, as well as alterations in order to account for a complete diving functionality. The essence with the concept is to provide clear, easy to comprehend information and provide divers with the essential information at the time it is needed in order to create a safe diving environment. This will allow recreational divers to focus more on the experience than the technology itself while still feeling safer than with any other product. The final concept is divided into two main areas - the diving device *Riptide* and a digital platform *Poseidon Reef.*

7.1 Riptide

The Riptide (fig 17) concept is a new product in the dive industry that envelopes the essence of diving. It lowers the technology focus, thereby elevating the experience by allowing the focus to remain on the diving experience. This will lower the technological barrier for new divers while at the same time allow more experienced divers a complementary product that can be used a with existing technology to simplify diving.

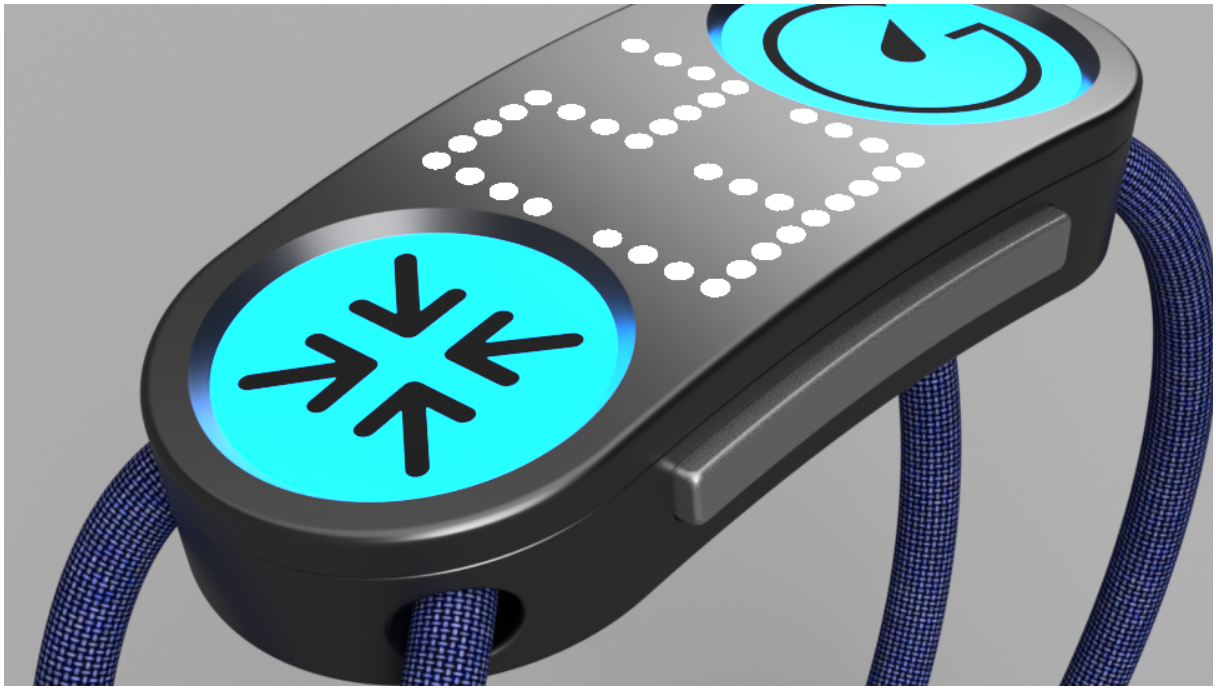

FIGURE 17 FINAL CONCEPT, RIPTIDE

Furthermore, the device will be pre-set in the app to specify a “safe zone” in which the diver is free to move within. The parameters of the diver safe zone are pre-set in a dive application, Poseidon Reef the parameters will then be synced with the Riptide using a Bluetooth connection. The safe zone creates a limited box in which a diver does not need to worry about safety, but instead can focus on the surroundings. The device will give the diver information about four parameters: *Ascent, Depth, time, no decompression.* Should a diver approach one

of the set boundaries of the safe zone, Riptide will notify the diver and the diver can adjust accordingly. The Riptide device will provide divers with three means of information, visual, haptic and audible. Visual feedback will be provided as the primary source of information, haptic second and sound third. If a diver approaches a boundary the corresponding light (depth, time, no decompression time or ascent) will change color to yellow and a vibration activate. Should the diver be on one of the boundaries the light will change to red, a more aggressive haptic feedback will be activated and an audible signal will sound.

The graph below depicts an overview of what the different notifications on the device means. To show consistency and to make it as easy for the user as possible the notification will mean the same thing no matter what function it concerns. The breakdown of notification is organized as follows: *Within safe zone*, *Close to boundary*, *On boundary* and *Boundary breach*.

	Within Safe zone	close to boundary 10min left: +0.5m	On boundary 2min left: 0.5-1.5m	Boundary breach 0min left: >+1.5m
Light	Blue	Yellow	Red	Flashing Red
Vibration	-	Light	Aggressive pulsating	Aggressive continuous
Sound	-	-	Beeping	Continuous beep

TABLE 4 NOTIFICATION LEVELS BREAKDOWN

The reason why green has been replaced by blue as the color for “within safe zone” is because even tough green light is visible under water when new LED light is introduced the eyes may perceive it as yellow because of the surroundings. Thus, blue light will give a more clear contrast when the light changes to yellow.

7.1.1 Main functions

The main features of the dive device Poseidon Riptide are described below. It is outlined where functional areas are located physically on the device as well as how the information will be displayed and notified to the user.

Depth

The depth indicator is located in the center of the device. It shows the current depth in integers using a 9x9 LED light-matrix. Should the diver go near the boundary of the the pre-set depth, the light matrix will switch color to yellow. At the same time a vibration will notify the diver of the changed light and thus attract the diver's attention to the device so that appropriate measures can be taken. Should the boundary be breached (the diver crosses the maximum allowed depth set in the planning phase) the light will switch from yellow to red. This will also trigger a more aggressive vibration as well as an audible alarm.

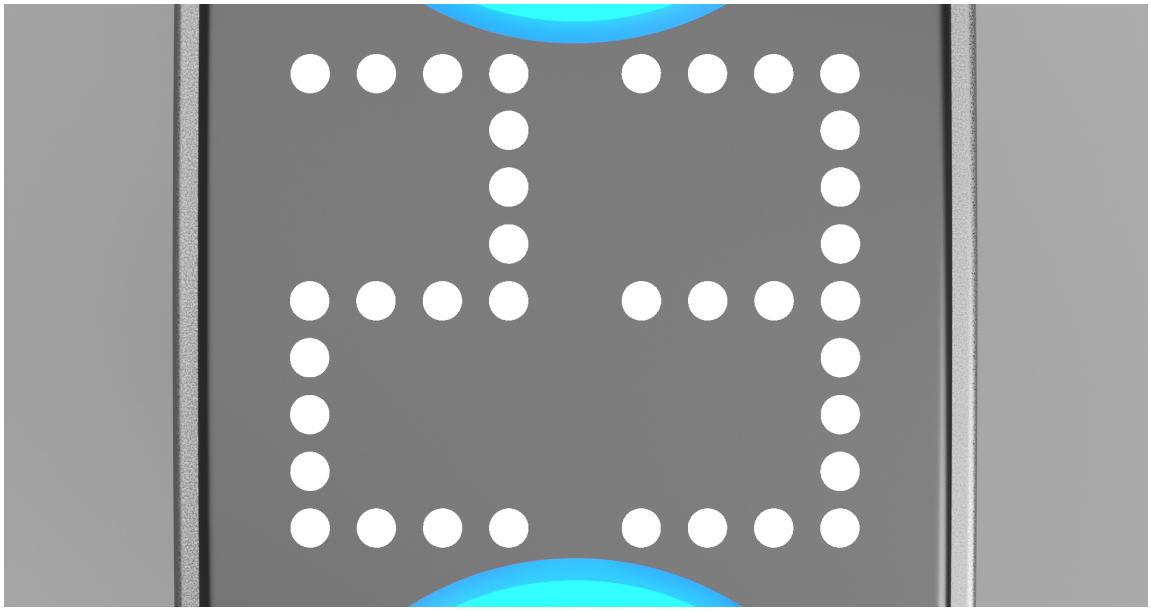

FIGURE 18 DEPTH DISPLAY

Time

The time indication of the Riptide shows a clock symbol in blue LED lights and is located on the top of the product. The time indication will show a blue light as long as both total dive time and air consumption is within the set parameters of the dive. When the diver has 10min left of the set time or has 10min until he/she needs to start the ascent in order to surface with a safe buffer of air, the blue light will switch to a yellow and a vibration signal will sound in order to attract attention to the device. When the time is up, 2min buffer, and the diver needs to begin ascending in order to surface in time the light will switch to red and a more aggressive vibration signal will notify the diver as well as an audible alarm. Should the diver continue to breach the safety zone the light will start to flash and the vibration and sound will be aggressive and continuous.

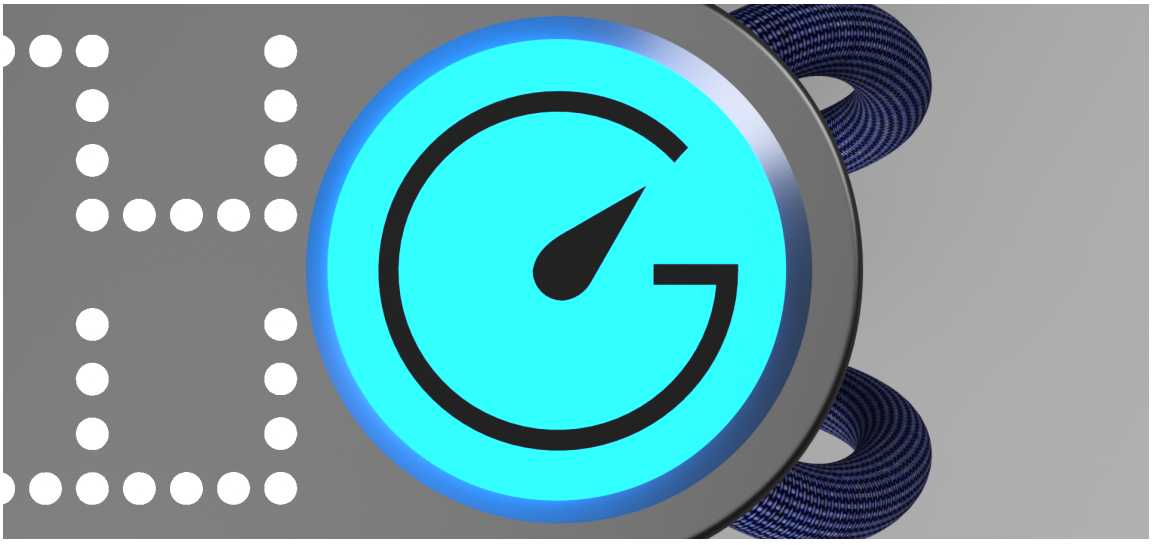

FIGURE 19 TIME DISPLAY

No decompression time

The no decompression time indicator is located on the bottom of the device and depicts a decompression symbol. The decompression symbol will show a blue light to indicate that you are within the no decompression time limit that your depth will allow. Should a diver stay at a certain depth for a longer piece of time the light indicator will switch from blue to yellow when there is 10min of no decompression time left. This will also be indicated by a vibration signal to attract the attention of the diver. When the diver has 2 min left of no decompression time the light will switch from yellow to red and a more aggressive pulsating vibration as well as sound that will go off. If the diver continues to breach the decompression time limit the light will start to flash and the aggressive vibration as well as the audible alarm will be continuous until the dive device goes into decompression mode. Should this occur the diver will be guided through decompression stops. (see ascent and safety stops).

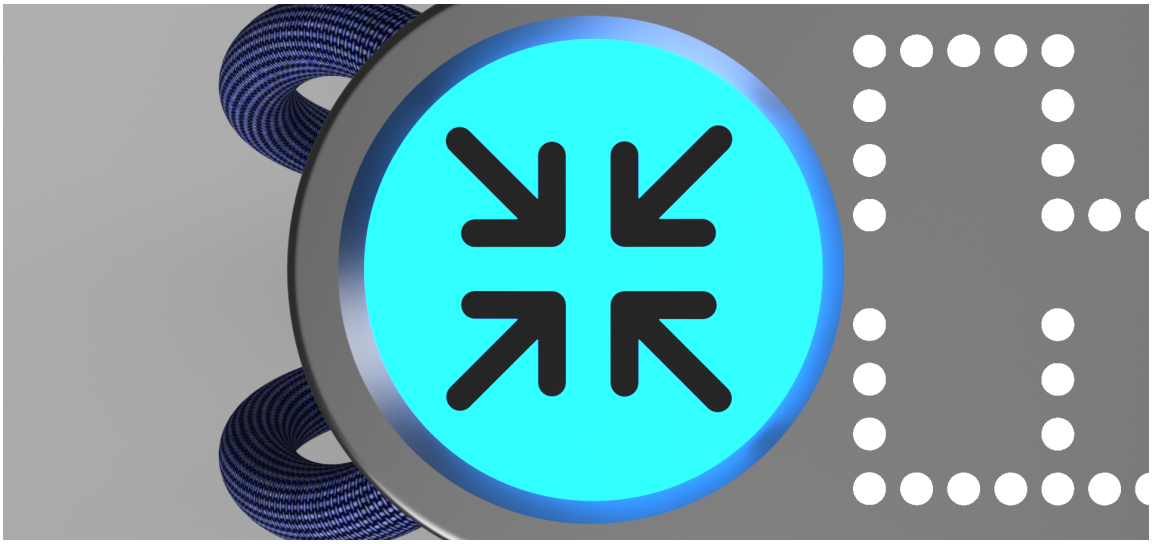

FIGURE 20 DECOMPRESSION DISPLAY

Ascent

The ascent rate indicators, two LED strings shown in fig 21, are located on the sides of the depth indicator. During the majority of the dive these two indicators will remain unlit. However, should the diver exceed the ascent rate of 9m/min these will start flashing red, and a vibration signal will be issued to attract the divers' attention. When the diver has slowed down to a pace under 9m/min the lights will again be switched off. In the event that a safety stop or a decompression stop should be required the LED strings will alternate flashing in white light at the depth that is required for the safety stop. This will continue until the safety stop or deepstop is done and the diver may continue the ascent.

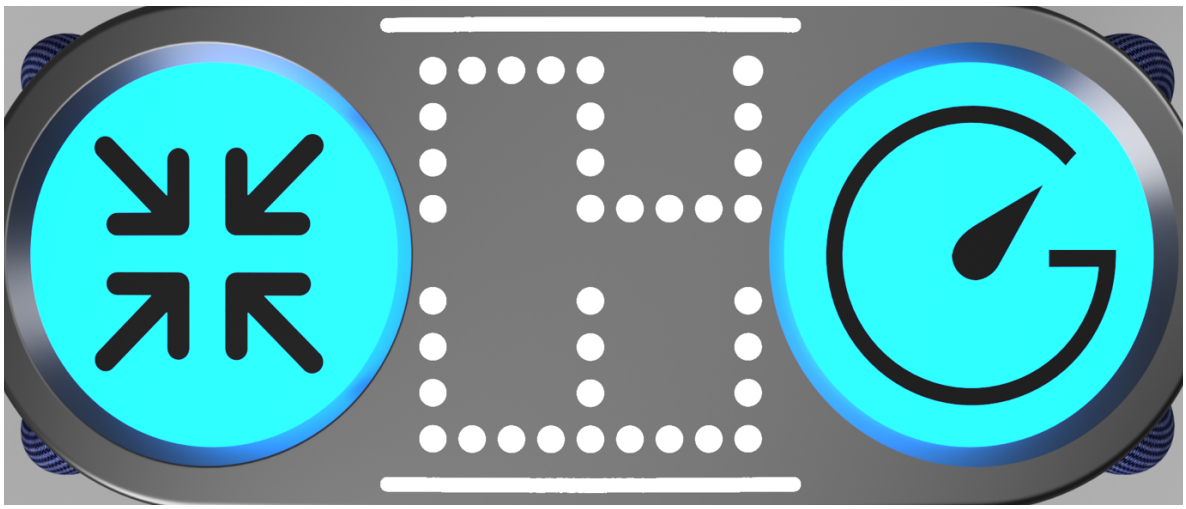

FIGURE 21 ASCENT DISPLAY

7.1.2 Buzz-to-notify

In order to enable communication between divers while at the same time not intrude on the experience the communication feature of the Riptide is a simple buzz-to-notify. Pushing two buttons (fig 22) on the side of the device will trigger a vibration on the a dive buddy's Riptide device. This way one diver can get the attention of another diver and thereby minimize the time that needs to be spent on trying to find or get the attention of your dive buddy and maximize the time spent on enjoying the experience.

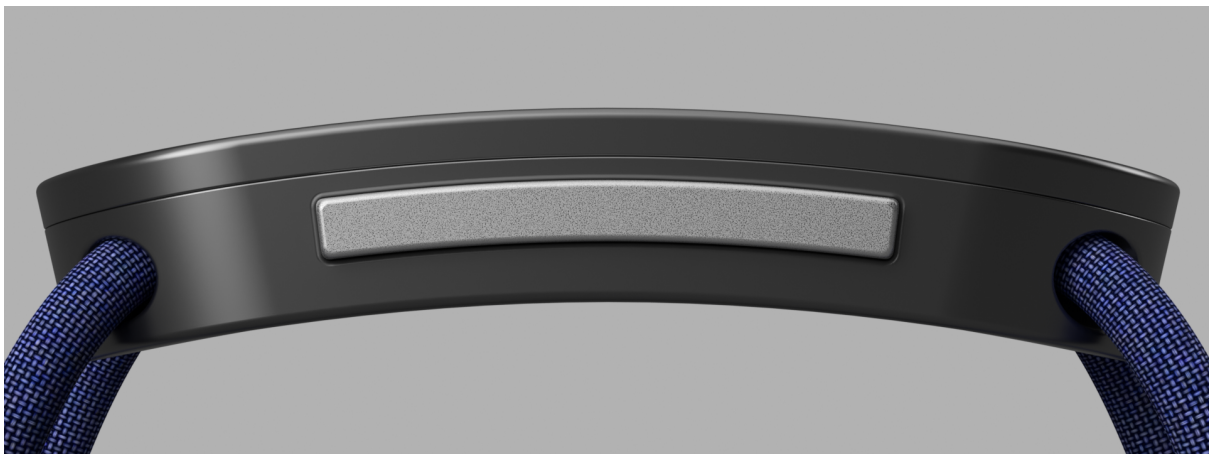

FIGURE 22 BUZZ-TO-NOTIFY BUTTON

7.1.3 Design and form language

The design of the Riptide is a fundamental part of the device itself and what it represents in this industry of scuba diving. From the standard and existing alternatives in the market of dive computers this new device offers something else completely in terms of design, form and handling. In most aspects, it challenges the norm of how dive computers are meant to be designed, and it is designed to be a pioneer.

Originating from the simplicity and general form factor of the Stoplight concept, the Riptide features a band-like design and aesthetics rather than that of a watch or wrist computer. The main body is made up of a flat, pill-like design that is fundamentally simple in form and therefore feels more natural to wear as a device. It lowers the threshold of how a dive computer can look like, while still incorporating the necessary and required functionality demanded. On top of the body there is a clear lack of a display, instead opting for two circular LED-surfaces with symbols for time and no decompression, respectively. These circular surfaces at the top and bottom of the device provides a balanced and harmonious expression, unlike any other offering on the market. In the center of the device there is symmetrical 9x9 pattern of detailed LED-lights providing information about the single most important feature in diving, actual depth. These forms and shapes together define the overall expression of intuitiveness and simplicity, and extreme contrast to existing dive computers. Eliminating the need for a display and potentially a complicated interface dramatically improves the level of usability and user centered design.

The riptide features a dual-band made up of elastic fabric material, providing both a higher level of functionality and form expression. Opting for elastic materials means that the device will allow for superior ability of putting the device on the arm since the user can extend the length of the bands when putting it on and thereby quickly make it fit the arm without any complicated opening and closing mechanisms. It feels natural and intuitive to use, continuing on the purpose of simplifying the experience when using a dive computer.

Using lightweight metal, preferably aluminium or brushed steel, in the main body provides a sense of quality both in the looks and feel of the product. Combined with the ability to use bands of varying color and possibly also material makes the Riptide still appear playful and keeps the threshold of technology low. The Riptide is designed to feel and appear visually attractive, moving away from the technologic and dark form language and expression in most other options in the market, instead eliciting a cleaner, more intuitive and fundamentally simpler design.

7.1.4 New visual brand identity

In this new concept for Poseidon, a new graphical and visual branding profile will be included in order to fully present a new and holistic new initiative on the direction of the brand. It will affect the device Riptide, digital platform Reef and all parts of the Poseidon brand connected to this new concept. It signals a new identity for the brand, primarily towards new potential users.

Regarding the use of fonts and typefaces, the new concept is based on the *San Francisco* font for all general use in the app, on the web and social platform *Reef* as well as for marketing material connected to the concept. The San Francisco font is developed by *Apple* in 2014 and was chosen due to the widespread recognition and familiarity among many users (Ciotti, n.d.). San Francisco is offered in a variety of styles, which makes it flexible depending on the use. It is also recognized as a neutral and modern font which strengthens the aim of the concept being contemporary and forward thinking. In addition, the font *Rift* is used mainly for displaying numbers and figures on the digital platform. This font was chosen due to the very defined and distinctive design which helps the user and gives a secure and clear impression. The current logo of Poseidon will remain in current form in this concept as it is considered a strong visual cue connected to the brand among many existing users, linking the brand forward in this new concept for those users also.

In order to make Poseidon and this new concept more attractive to new users and open up towards beginners and enthusiasts at a larger scale, the colors of the brand needed to shift. In this new concept the colors chosen are a nuanced variety of slate gray as base colors that in contrast to earlier where Poseidon used black, white and grey, has a touch of blue tones and appears more harmonious. The base colors are used primarily in backgrounds and as foundation in the digital platform.

The accent colors of this new concept are *Poseidon Seagreen* (Hex: 6BFDB4) and Poseidon Cornflower Blue (Hex: 7197FF), providing a new identity of the brand that expresses values of being *playful*, *open*, *genuine*, *modern*, *kind*, *forward-thinking* and also a strong connection to water and ocean. These colors are used extensively throughout the digital platform and provides a new and fresh direction to go along with this new concept of the Riptide and Reef. Using this new visual branding, based on the new fonts and brand colors, also unifies the digital platform Reef with the physical device Riptide in a logical way.

7.1.5 Dive center and advanced usage

The Riptide device, in its simplicity, offers a great potential to be sold in a different way than ordinary dive computer. As has been found through the user studies and evaluation a majority of recreational divers, completing around ten dives per year, oftentimes rent their equipment at the particular location for a dive. Thus it does not need to be sold solely as a stand alone product. As was found in the evaluation with a dive store, selling it directly to dive centers could have a big potential.

Riptide can thus be sold directly to dive centers and be used at diving excursions with a guide. For inexperienced divers or divers not interested in understanding every aspect of a dive but would rather focus on the experience, Riptide can be used to lower the threshold of diving. The dive guide would have an advanced computer and the other divers one riptide each. This way the guide can keep track of the divers more easily because of the clear displays, while at the same time the other divers can come to the guide if something occurs during the dive and the

guide can make an appropriate decision on how to proceed. This will reduce the amount of information and need for decision making for a new diver that instead can focus on the surroundings.

There is also a possibility to sell the riptide as a complement product for more advanced diving. The diver would set up the Riptide for the dive and use it as a primary source of information. Should the riptide notify the diver that one of the boundaries are getting close the diver can look at his/her advanced dive computer to assess the situation further. Using Riptide as a primary source, the diver is not as bound by checking the dive computer as often and thereby elevating the experience.

7.1.6 List of components and specifications

Necessary component and component specifications to realize the Riptide are described below. All components specifications are estimates, and originates from reference products on the market and are not in any way tested. The total cost of the product is difficult to estimate since the volume of components have a major impact on the cost. But depending on what components are used and how large ordering quantity the cost would be likely to be around 400-800SEK.

- Battery with a capacity of 150-200mAh would last roughly up to a week of regular dive use (estimated based on the performance of apple watch, Fitbit charge, moto 360, Samsung gear fit). The battery needs to be in a hard case to resist any type of pressure change that might occur inside the casing
- Motherboard chip
- Processor with built in memory to store dive logs and pre-set dive information transferred from the application
- Bluetooth 4.0 chip
- Depth sensor
- Thermometer
- Haptic engine
- LED-lights (9x9 matrix for depth display and larger for ascent, no decompression time and time)
- Speaker

Listed below are specifications for Poseidon Riptide. Several of the listed functions are not thoroughly explained above since they are a matter of programming rather that user experience. However, their existence is important to provide a competitive product.

Function	Specification
Nitrox (and air)	Yes
Gas	1 Gas, 21-50% oxygen
Dive time -	0-999min
Surface time	0-99h
No fly time	Yes
Safetystop	Yes (5m)

Deepstop	Yes
Decompression model	The Bühlmann decompression algorithm
Altitude adjustment	Yes
Maximum pO2 for gas	1.2-1.6
Dive planner	Yes
Dive history	Yes in app
Dive notifications	Light, haptic, audible
Water resistance	100meter
Battery time	1 week
Lighting	LED

TABLE 5 PRODUCT SPECIFICATION

7.2 POSEIDON REEF

The Poseidon Reef digital platform has two major functions: firstly, it is working together with the Riptide to pre-set the safe zone and all dive parameters, secondly serve as a community base for divers. The digital platform is offered as a mobile application and as website. The application will be necessary in order to use the riptide and provides a user-friendly way of setting all important parameters and plan the dive. The community base for Poseidon reef will provide a place for everyone interested in diving to interact, share and discover new experiences.

7.2.1 APPLICATION AND RIPTIDE

In order to use the Riptide it first needs to be set up in the Reef app, there all the important parameters of the dive will be specified: gas mixture, planned depth, bottom time, total dive time.

After the dive the riptide is again synced with the Reef and a detailed dive log will be shown the app. Although the Riptide only shows four functions during the dive, it records more data passively. The dive log will show a detailed overview of the dive as well as the passively recorded data that the diver might find interesting after the dive such as temperature, average depth and air consumption.

Go dive

The “Go Dive” section (fig 23) of the application is where the diver sets up the Riptide before a dive. The safe zone is specified based on the parameters depth, time and gas mixture. The process of setting up the Riptide will also help divers to learn the importance of making a plan - and sticking to it. The parameters will be set up individually and be dependent on each other. For example, the no decompression time will be a result of the depth, previous dives and gas mixture.

FIGURE 23 SETTINGS BEFORE A DIVE

Statistics

The statistics section of Poseidon Reef (fig 24) application is where a diver would find the logs of all previous dives. There a complete display of all collected data from the dive will be shown, including: Depth profile, average depth, maximum depth, dive time, temperature, air consumption.

In order to create an environment where divers will be incentivized to continue diving and continue to try different kinds of diving the statistics section will also display achievements. These achievements are for example “Dive on all continents” or “Altitude diving” etc. There will also be a leveling system that shows your diving experience based on how much you have been diving rather than what kind of certificate level you have obtained. The app should not encourage pushing limits or performance diving but rather experience.

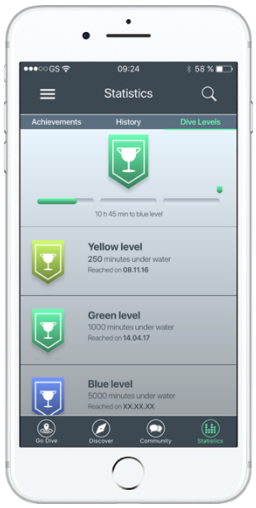

FIGURE 24 STATISTICS PAGE

7.2.2 Digital platform

Discover

The discover section (fig 25) of the application will allow all diver’s (not just divers with a Riptide device) to discover new sites. The section will offer a search feature where you can find scuba diving spots and snorkeling spots around the world. You can discover what the typical animals are at the specific spot as well as other points of interests like shipwrecks and natural formations. The discover feature will show how to get to a certain site, if you can dive from the shore or need a boat, what kind of certificate level you need and at what depths points of interest are located.

FIGURE 25 DISCOVER PAGE

Community

The community section (fig 26) gives divers a place to interact with each other, read interesting articles, find new equipment, find events nearby and see leaderboards. This way diver, new and old, can have an attractive area in which the diver community can share their sport with each other and a platform to attract new divers. Perhaps more important would be to keep divers that take a diving certificate but does not have the motivation to continue diving, the community would provide a place where these diver can get inspired and continue diving.

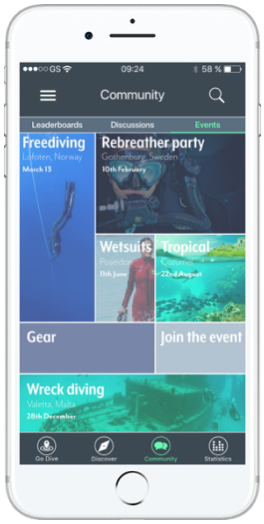

FIGURE 26 COMMUNITY PAGE

7.3 Environmental consideration

Environmental aspects of the concept solution is presented in the following section. Sales model as well as manufacturing and recycling is outlined for the concept.

7.3.1 Product service system

The concept solution developed in this report is more than just a product. Since it is operated with the use of an application and accompanied with a digital platform the value proposition is combined between both product and system. Furthermore, given its opportunity to target dive centers instead of only private buyers, products can be used more efficiently.

Since a lot of recreational divers do the majority of their dives abroad in tropical waters with dive centers and guides. A product targeted towards that market segment with the intention of offering it as a product for rent and not purchase, material savings will become apparent while usage for a single product can be multiplied. Mont O (2002) argues that the notion of product service system can be sustainable if it leads to the reduction of material and consumption by offering a product to be rented or leased. This would allow for a more environmentally friendly consumption of material and products, while still offering a large customer base in the form of dive centers.

7.3.2 Manufacturing, material and recycling

In terms of manufacturing and material selection the Riptide will strive to achieve as high a level of recyclability as possible. This entails using materials that are easily recycled and providing a platform that can be disassembled to extract recyclable materials.

The main materials used are metals which are highly recyclable. Aluminum is the main body of the device and the components inside are made up of several metals and plastics. The battery is a lithium battery that needs special sorting in the recycling process. Being a device that need to withstand high pressures, disassembly will require some effort however the components themselves are to a large extent recyclable.

8. Discussion

This chapter looks critically on important aspects of the project. Has the purpose of the project been satisfied and did it fulfill the aim? It also evaluates if the product solution is viable to continue developing and implementing for Poseidon Diving Systems AB and how it possibly changes the scuba diving culture.

8.1 Process

Over the duration of the process a user centered development process has been adapted. The user studies and user evaluations have been key components in the process. A satisfactory number of interviews have been conducted although with a slight majority of male participants. In an ideal situation, a quantitative survey might have helped the pre study to be more extensive and therefore perhaps more accurate

Since the project is strongly focused on scuba diving it has been a challenge for the project group since they possess very little knowledge in the field. Therefore, initially in the process, time had to be spent understanding the environment and the driving forces behind the industry and its users. However, this made it possible to enter the project with a different mindset and a different way of looking at how things are done since the project group is not a part of the diving community. This was also something the company saw as an advantage since the diving industry struggles to adopt new technology and ideas.

8.2 Scuba diving culture

Over the duration of this project it has become apparent that the diving culture differs from that of other sport or extreme sports. The diving industry is driven (or at least presented as such outwards) by technical and performance oriented products and websites. The nature of scuba diving is characterized by safety and thus technology is developed thereafter. Ultimately this is something positive, however for most recreational divers the primary driving force is not the performance of diving but rather the experience of diving. Consequently during the project, it has been found that there is a major potential in developing products that are designed to increase or highlight the experience more. This could be something worth exploring further.

In the project, the majority of diver interviewed are divers active in the British and Nordic countries. Thus, the cultural image described in this report is strongly influenced by these countries and most likely culture differs depending on where in the world diving activity is performed. Tropical waters like Indonesia and Australia might not have the same culture as in California or Florida and it can not be said for certain that the diving culture is the same all over the world.

The Riptide and Reef are developed to be different from products available today and by being developed with the experience as the main driving force. Hopefully this will increase the interest from new divers and keep the already existing divers. The digital platform, Reef is supposed to change the notion that diving is about improving your certificate level and how deep you can

dive. It should instead encourage divers to dive more and experience more by going to new places and discovering more of the ocean's animal life.

8.3 Further development

In order to launch the product on the market, further development is necessary. Although every prime function is clearly explained and developed, actual test in water environments is necessary to understand the full implication of every function. Decisions are based on the experience of users, the knowledge of the company and diving literature, however test in real situations would have been preferred. Furthermore, further testing regarding how the size and form of the products works underwater and with different wetsuits and drysuits. The product could for example be offered in different sizes (Small, Medium, Large) in order to accommodate all needs.

Exact component structure and specification is not taken into consideration. A brief list and explanation of needed components are outlined and can act as a preliminary basis for further development. The components specifications however are not tested, only compared to current market solutions.

Something that would improve the usage of the riptide for dive center use would be to create a more advanced computer to be used by the guide. This way the guide could more easily keep track of the group of divers and monitor their data. This would further elevate the experience for the divers since they can feel comfortable that the guide is monitoring safety aspect. Poseidon already offers a more advanced computer in the M28 dive computer which is targeted to the more experienced and technical divers and a newer version on this could potentially serve as the computer used by the guide.

The digital platform is on a conceptual stage, and the designed frames are not coded. Thus, in order to be able launch Poseidon Reef, the application and website needs to be coded and filled with the actual content. Since the site is user driven, content will be created by users but need an initial level of content to be attractive for new users.

8.4 Aim and purpose fulfillment

The aim of the project was to identify key selling points for Poseidon that could expand the market. During market research and user studies it was found that a great potential would lie in a product targeted towards a recreational segment with reduced functionality to increase the experience focus. Furthermore, It was identified that divers does not currently have an attractive platform where it is possible to share the diving experience and attract (and keep) new divers. From these identified key selling points the Poseidon Riptide and Reef was created in order to expand the market for Poseidon Diving Systems AB.

The purpose of the project was to enhance and simplify the experience focus of recreational diving. The resulting solution, the Poseidon Riptide and Reef, offers the diver an easier and more intuitive way of planning, performing and sharing the diving experience. It allows new users to come in contact with the sport and lowers the threshold of diving. Primarily the Riptide

enhances the experience by lowering the amount of focus the diver needs to put on a dive computer with its simplified way of providing information. The diver does no longer need to process and interpret numerical values for time and no decompression but are instead shown and (more importantly) notified if the device requires attention and an action needs to be taken.

Although the diver's attention can be focused more on the surroundings than before, the Riptide is still a device that the diver needs in order to receive important information. Consequently, a technical device like the Riptide is undoubtedly a device that will infringe on the experience because the diver is dependent on it. However, in order to ensure that all safety features are taken into account this is necessary. That the diver is dependent on a device can be taken as an advantage rather than solely an obstruction of the experience focus. The riptide takes advantage of this with the buzz-to-notify feature that allows divers to attract each other's attention. Instead of wasting time trying to attract a buddy's attention or getting separated this function will lead to a smoother dive without major interruptions from the experience.

8.5 Profitability

Profitability of the concept solution is difficult to assess due to several reasons. The targeted market of recreational divers is large but given that a lot of divers rent their equipment on location instead of owning it, means that selling to dive centers might be a profitable solution. The cost for a Riptide is preliminary set to 2500-3000SEK based on entry level dive computers. However, it is important to set the price with reasonable margins based on the components needed. Thus, it is difficult to set a certain retail price. Furthermore, it is important to note that the development and maintenance of the digital platform must be taken into account.

8.6 Feasibility

The feasibility of the concept Riptide and Reef are considered to be high. The riptide uses components that are readily available, and most components come standard with a dove computer. There are a few components not usually used within the diving industry but feature heavily on the wearable device market like haptic engines and Bluetooth chips. The biggest difficulty comes with the size of the product. All components, most importantly the battery must fit within the cramped compartment inside the device. Reference sized batteries that have need investigated are slightly too big, however they power a device and a screen. Given that LED light have a lower energy consumption rate than LCD screens the riptide should be able to function properly with a smaller dimension and less powerful battery (but needs testing).

The feasibility of Poseidon reef is largely dependent on the ability to cement the digital platform as the one platform every diver use for getting and sharing information. The platform need to attract a large enough segment that would not only include divers using Poseidon equipment. There is no adequate service on the market today that has the same functionality. Thus, it can be considered that there is a good possibility to achieve that goal with Poseidon Reef.

9 Conclusion

The concept solution the project resulted in offers Poseidon a new product that can be targeted towards a recreational segment. The underlying driving force for many recreational divers is to experience the underwater environment and come closer to a world very different from that on the surface. However, in order to ensure that a dive is completed in a safe way, the experience focus was a direct consequence of the technology focus. Previously a diver was forced to monitor a dive computer regularly and was bombarded with information that needed to be processed and interpreted. With Poseidon Riptide recreational divers can focus more on the underwater environment without feeling that the regard for safety is being neglected. Information is presented using symbols and colors instead of numerical values. The depth indicator shows the actual depth in integers and will change color if the diver descends too deep. The use of vibration signals will notify the diver if the device requires attention and that a safety boundary is getting close. Moreover the Riptide is elevating the experience by being able to contact a buddy underwater which in turn reduces time spent trying to get in contact with another diver and increasing the time spent on enjoying the experience. By implementing a new way of providing the diver with information, less time can be spent focusing on technology and more time can be spent exploring the oceans.

The digital platform does not only eliminate the need for annoying and cumbersome dive planning using dive computers, but offers divers and people interested of diving a platform to share and discover diving experiences. Poseidon reef serves as a base for a change in the diving industry, from the technical and performance based towards an experience based. This will hopefully expand the market and attract new people interested in diving and therefore strengthen the Position brand.

Both Riptide and Reef are significantly different from anything on the market today and is quite a bold move for such a slow moving industry. This solution is what we believe to be what the industry must strive for in order to get rid of the technical and performance based culture and again start to appreciate the wonders of the underwater world.

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APPENDIX I - MOODBOARDS

APPENDIX II - SELECTED INTERVIEW QUOTES

UPPLEVELSEN DYKNING:

- Just att **det är en helt annan värld**, och dels har jag använt det här som **mitt lilla andningshål när jag jobbar väldigt mycket**.
- ...ett ställe att komma till för mig där man kan få uppleva någonting utan att man har möjlighet at**t tänka på något annat.**
- **Sen var det lite att utmana sig själv**
- **Vara ute i naturen och på båtar och kunna dyka.**
- **Fascinationen av att kunna vara länge under vatten**, sen var det mycket den **känslan av viktlöshet**
- **Någon typ av frihetskänsla och så lite fascination av att det funkar att vara under ytan**
- **...**att saker och ting kan hända så det gäller att du **är på tå hela tiden med det du håller på med**.
- ... framförallt är det upplevelsen och **är man ute och reser så kommer man oftast längre bort än om man åker på en charter…** (om att varför man fortsatt med dykningen)
- ...**en annan värld en annan växtlighet**.
- Glädje, **man blir upprymd sen kommer det adrenalin** emellanåt.
- For me it's **seeing a piece of history so seeing a wreck in its final resting place**. It also **how technology work**, coming from an engineering background.
- **Well it is about the challenge maybe, the sport. It's like extreme sport in a way. The experience, you see stuff that you don't do otherwise, and the deeper you go the more new things you see.**
- I mean before it's about the excitement, a bit nervous checking all the gear that everything is there and working. **When you're in the water and diving I feel very comfortable and in the moment. Happy, just looking around and enjoying the experience.** Afterwards you feel relaxed and happy.
- **jag dyker det för att jag är intresserad av själva upplevelsen och själva naturupplevelsen**
- **Jag tycker om den här känslan att vara här och nu**
- **en del tycker ju om att fotografera under dyk men då blir man så fokuserad på kameran**
- **Problemet med dykdatorer som jag ser det är att dykare uppmuntras till att inte använda hjärnan och de utmanas att dyka så nära marginalerna som möjligt**
- **Om man skulle säga så att man dyker utefter datorn, då kollar man ju hela tiden på datorn efter hur länge man kan vara där och fokuserar på det**.
- **Med rätt träning och förståelse skulle man kunna säga att man kan bli mer självständig och mer fri, utan en dykdator snarare än med en**
- **Sen om det dyket är till hundra meter eller betydligt grundare spelar mindre roll. Det handlar om upplevelserna, det handlar om att ha roligt och att ha skôj**
- **på grund av den anledningen att man inte ska fokusera på att pressa gränserna utan att njuta av upplevelsen**. **Och bara ha roligt**.
- **Ja, all onödig information bidrar ju till en task overload**. **Jag är ju av åsikten att dykning handlar om "less is more"**
- **Från mitt personliga perspektiv skulle inte en dykdator förändra min upplevelse men jag skulle kunna tänka att det kan vara så för andra**

- **Gemenskapen är ju annars det man kommer ut för att dyka för lite**

DIVE COMPUTER INTERACTION

- **...**Men sen naturligtvis under hela dykets gång när man kollar så att man **inte går in i Deco**. (om man kollar på sin dator)
- **Om man strular till det att det indikeras tydligare.** Blinkar eller något.
- **Belysningen, man aktiverar den på Vipern men den är inte tänd hela tiden så man måste trycka på den.** Man **hade kanske önskat att den vore tänd hela tiden eller iaf enkelt kunna ställa in** så att den var det
- Ett **normaldyk brukar vara någonstans runt 40min beroende på vart du är, kanske en timme när man är i tropiska vatten och kanske 35 när det är ett vinterdyk. Från början tittar du kanske inte så mycket på den, kanske var 5e minut.** Sen så **beroende på vad det är för dyk man har gjort** och hur djupt man har varit så blir det **mer frekvent ju längre dyker går**.
- ...**ju djupare man är desto mer frekvent tittar man på dykdatorn**
- **Dyker du enkelt så kanske man knappt kollar på datorn**
- Medans **längre och djupare dyk kollar man oftare för att ha koll på tiderna och under uppstigningen.**
- Ibland känns det som att det **lite onödig information.**
- Man lär ju sig en dator innan man börjar använda den men **inte alltid att den är så intuitiv så att den man bara försåt den direkt**.
- **Viss information använder man ju knapp inte och viss information vill man ha lite större eller lite mer av.**
- Man säger att det **absolut viktigaste är dyktid och hur långt det är kvar tills Deco och har man en luft kompatibel dator så är det naturligt luftmängd som är kvar.**
- **Då tittar jag på den hela tiden**. **Dels så att man gör stopp om det krävs. Den talar ju om precis vad jag ska göra.** (på frågan om interaktionen under uppstigning)
- Kollar vad jag har gjort, får fram en dykprofil (efter dyk).
- **Sen tar jag in det i datorn och där får jag ut loggen**. (efter dyk)
- **Being able to see the information is the most important thing.**
- Well it is quite easy, I think it is about safety so that is why it is that way. **A good thing that it's a safety thing, as long as you remember how to do it!**
- **Well we only interacted with it more or less before the dive, setting it up, not during the dive.**
- As with everything in life I think it's the people mainly. **For the watch I think it can make it easier so that you can focus more on what's around you. That lets you enjoy the experience more, if you don't have to look that much.**
- **självklart övervakar jag mina gaser och min maskin men jag vill helst ägna det så lite tid som möjligt medan jag självklart vill ha det säkert**
- **Jag tittar på datorn men jag interagerar inte med den**
- **Men skulle jag tex göra ett 40m dyk på enkelflaska så tittar jag ju jättenoga att jag inte går in i deco**
- **Marknaden sätter liksom standarden och man har skapat en produkt lite som inte dykvärlden kanske behöver**. (om dykdator)

COMPUTER INTERFACE

- **Allt som egentligen har med säkerheten, akut säkerhet, att göra borde vara mer tydligt**
- **Är det något som är farligt så ska det vara rött och gult om det är lite mindre farligt**
- jag skulle vilja ha **tydligare indikering på om man går upp för snabbt.**
- ...inte alltid det är superenkelt att se med en gång, utan **det krävs lite tid att lära sig sin dator.**
- **Sämsta är att allting är ganska enformigt.**
- **OLED- skärm på och den har ju olika värden i olika färger, det är något man saknar på dykdatorer. Det skulle jag nog vilja ha, som är dåligt på dom befintliga datorerna.** Om man skulle kunna **utveckla det lite med möjligheten att se saker i olika färger istället för att stoppa in ännu mer lullull i dom.**
- **...Suunto datorerna är nog överlägset bäst av alla dykdatorer. Suunto Zoop är ju en sån helt fantastisk nybörjardator** med stora klara siffror…
- **Att bygga säkert och sen gjort det enklare för dom..**
- **...**med **LED ljus och stora siffror har gjort det mycket enklare och tryggare**. **I många år har man fått leta efter siffrorna** men nu är det superenkelt.
- ...sen har jag en **oceanic botten timer** också som backup, **den är med men jag förstår inte vad det är för siffror jag tittar på**.
- Superlätt, **jag kan välja hur mycket information jag vill ha på displayen**.
- **Sen kan jag ha larmsignaler och olika färgkodningar**.
- Det är **färgen helt klart**.
- ...Jag **kan välja helt själv** vad jag vill ha med det finns **3 olika färguppsättningar** som jag kan välja.
- **Ja om det är fara så blinkar hela den svarta bakgrunden röd**. Så **det ser hela omgivningen**. Så det är jättetydlig **även om du är inne i någonting så missar du inte det**. (om den visar färg som indikation på fara)
- **Being able to see the information is the most important thing.**
- ...I am, **I'm concerned that Poseidon made it to fancy**
- From what I've heard it sounds **a little bit to gimmicky**. That's not what diving is about, **diving is about information at hand...**
- **Om jag bara gör ett 20m dyk är jag inte intresserad av så mycket av data**. **Den ska bara ge mig den data jag behöver och jag ska kunna se den och den ska va pålitlig**
- **Man kan bli förvånansvärt korkad under vattnet om man håller på med flera saker samtidigt och något är fel**. "Jag har inte så lågt tryck" sen kommer jag upp och **kunde lugna mig och inser att jag hade tittat på temperaturen, asså det säger bara någonting om hur dum man kan bli om man är stressad**.
- **jag kan välja att stänga av det jag inte vill se**
- **Tid och djup är väl ändå måsten men sen är mycket upp till användaren tycker jag**.

FUNKTION/KOMMUNIKATION

- Det som jag **saknar ibland är ju kommunikationen, ett enkelt sätt att kommunicera med dina dykbuddies.** ...Det skulle nog kunna **höja min dykning på ett enkelt sätt utan att du behöver köpa prylar för 10000kr till.**
- **Jag tycker att det är en del av tjusningen att man inte kan kommunicera så lätt**

- Man är **utlämnad till sig själv, att klara av uppgiften själv.**
- När man dyker så skapar **man ett ganska nära band till dom man dyker med**.
- **Man vill kunna dyka på sitt eget sätt men ändå med någon ifall något händer.**
- Jag vet att det har funnits försök där man har läst om dykdatorer som pratar med varandra, **som har haft kommunikations med varandra under vattnet och det är något som man saknar.**
- **Misskommunikationen under vattnet är något som man märker är vanligt.**
- **Likaså om någon försvinner så kan dom ha en sån tracking historia för att hitta.**
- Nej jag tycker **det är rätt skönt**, **just att det inte blir så mycket snack**. Så det är väl en **del av nöjet** också.
- **Buddy contact or something that can tell you the direction of the body.**
- I'll tell you **what would be good, something at actually measures fitness under water**. maybe **your heartbeat and blood pressure because that is huge in diving at the minute.**
- **...Not necessarily to assure you on the dive but when you download the data you can see it at different points.** (building on the previous point)
- **I've tried full faces masks with coms and stuff. We would never use them in deep water exploration.**
- **Mainly the bottom time, showing you have long you can be on a certain depth and that you don't have to calculate that yourself. It makes it so much easier. Safer. And then it shows you the surface intervals.**
- **Of course sending a complicated message gets a bit difficult, but otherwise it works okay I think. Sometimes it's trouble to communicate but in recreational diving it is mostly simple messages like "oh look at that fish" or similar.** Maybe more advanced diving require more. **So it is mostly about getting those simple messages between one another.**
- **It would have to be very simple also.** If you're a recreational diver that dive like three times a year then it shouldn't take long to learn how to use such a function
- **Jag har gjort nästan hälften av alla dyk med samma kille och jag vet nästan vad han kommer signalera innan han gör det och då kan man fokusera mer på dykninge**
- **Jag tror att det hade blivit säkrare om man hade kunnat kommunicera mer**
- **Jag vill kunna lägga in egna checklistor eller komihåg-listor I vanligt textformat eller något sånt**
- **Så hade jag uppskattat om den kan interagera med annan teknik. Min rebreather kommunicerar med IR, stenåldersteknik.**
- **att den hade kommunicerat på ett enkelt sätt med tex telefonen så man inte är beroende av Poseidons program**.
- **Sen tror jag att personer är väldigt olika så det hade varit bra att kunna customize produkterna**
- **Många knapptryckningar är jobbigt också**!
- **Instrument-mässigt tycker jag inte att det är någon skillnad vad jag skulle använda i de olika miljöerna**
- **Utan med ett par enkla basverktyg kan du utforska otroligt mycket grejer**.
- **Varför köpa en funktion som man inte behöver?**
- **Den är inte kompatibel med exempelvis en app i telefonen**
- **lägga in "waypoints" i din plan så** att man ha med det. OCh så kan man **jämföra sen efter dyket om man höll sig till sin plan med**

INFORMATIONSDELNING

- **Och det är ju både i slutna grupper med närmaste dykgänget och öppet också till alla vänner**
- **Det sprider sig fort mellan kompisar.** Dykarna.nu kan ju ibland dyka upp någon spännande plats.
- **Det är svårt att förklara… ...roligare att prata med dom som dyker som man vet har varit på liknande platser.**
- **Man märker att om man lägger ut något som är sådär dykrelaterade så är det väldigt många även icke-dykare som ändå gillar och kommenterar det man har lagt** ut.
- **Jag delar inte med mig av datan/loggen**. Har **vänner som delar dykloggen på Facebook**.
- ...blir lite mer att man tar lite bilder och så lägger man ut dom (på facebook) och **talar om vart man har varit.**

NYA DYKARE/BREDDA SPORTEN?

- Det är nog **många som tar det utomlands** (certifikat) och **sen tror man inte att det finns så mycket att se när man kommer hem.**
- **Man inser inte att det finns bra dykning i Sverige, riktigt bra dykning.**
- Dels så är det **ganska dyr sport** om man ska ha sina egna dykprylar.
- Man har **kanske inte samma mål med sin dykning som den man gjorde certifikatet med**.
- **När du ska dyka kommer du liksom inte i vattnet utan utbildning och det är ganska meckigt att komma i**. D**et är många som tar det (Cert) på sina semestrar men sen när man kommer hem så blir det inte mer av det.**
- ...**ganska dyr är det svårt vad jag har förstått det.** Men **det är otroligt många som har certifikat men inte utnyttjar det mer än en semester en vecka om året…**
- **Mycket kommer tillbaka till att man inte bara kan dyka om man inte har utbildning.**
- **Nåbarheten till att få dyka på egen hand är ganska kostsam och lång.**
- **Tröskeln att kliva ombord är ganska hög** om man inte är genuint intresserad av just dykning i Sverige.
- **Väderförhållanden**, om det är för kallt eller vind och vågor.
- **Tid, ett dyk är inte bara något du kommer på** och 20min senare är man igång det är en längre process från att man bestämmer sig.
- **Det är mycket grupperingar** så, **“jag vill inte dyka med den eller jag vill inte dyka med den”**.
- ...vi har ju utfärder varje dag och **det är ju öppet för alla**.
- Men det är ändå **svårt att får med dom här som är själva att ta steget och åka**. **Utomlands så dyker man med en guide** och man kan va 4-5 stycken.
- (angående parkamrater) **Där tycker jag att vi som klubb skulle kunna göra mycket. och då tror jag att det är lättare att få med dom som är nya.**
- **I andra sporter för man med sina åldrar eller så kan det vara väldigt mansdominerat**. (hävdar att det inte är det inom dykning alltså)
- **I vattnet är vi alla på något sätt jämställda och det gäller även kvinnor och mä**n. Och det är ju få sporter som är så.

- Jag vet ju att det är svårt, **det gäller nog att man har tagit certifikaten på rätt ställe och att man blir uppfångad**.
- ...jag tror att **man behöver en push**. **Annan blir man den här cocktail-dykaren som åker utomlands**.
- ...men det är mycket häftigare just för att det **inte är så tillgänglig**t (i Sverige)
- ... **här hemma blir man inte mättad, det blir en wow-upplevelse varje gång.**
- It all good and well when you take new divers i a pool, but in the uk then you would take them out on a lake and put them i semi dry and **it's not as enjoyable since its a little bit cold and not as cool. out of 10 people try it 1-2 take it up.**
- **The problem is that when everybody progresses from rec (recreational).**
- ...**They think they haven't actually made anything of themselves until they done a bit of decompression.**
- **It's agency driven, instead of just getting out and getting experience diving,** it's what course can i do next. And **they progress quickly through courses but don't really have a lot of diving experience.**
- **It needs to be more about the diving again.**
- **The newbies… are relying on the person they are with like the instructor or more experienced diver.**
- **I would like to see more promotion on tv to attract new divers. Be promoted more like a sport.**
- **It is sometimes considered an extreme sport and that it might be a mental gap, that people are afraid to do it.** But on the other hand, **it could be that you need a lot of equipment before you can actually dive. It's not like snorkeling where you can just put on fins and go snorkeling.**
- **And also that a lot of people maybe do diving like a one-time experience and don't intend to continue it afterwards. Like trying out some activities when you're on holiday. A cool thing but perhaps nothing more.**
- **The cost of course,** but that is hard to change. **Maybe the community could be one thing, someone that like helps you on the way and encourages you to come along. That would make me dive more I think.**
- Yes I guess so, I think it could affect me. **If I see that a lot of people and friends around me go and do some kind of activity it would be natural for me to be curious about that.** (if a service could enhance the experience)
- **Yes. I mean the community of diving is pretty strong and there usually a good connection within a group.** (identity of being a diver)

UTSEENDE/VARDAGSBRUK

- **Den hade jag kunnat tänka mig att använda dagligen egentligen**. **Den är ju snygg som en klocka fast det är en dykdator**.
- **Den är ju lite tjock**. **Den är inte så stor men den är ganska tjock**. (sämsta med dykdatorn)
- **Jag behöver inte forska i bilden vad det är jag ser.** (bästa med dykdatorn)
- **Ja absolut**. (om personen i fråga kan tänka sig använda dykdatorn i vardagen och andra vattenaktiviteter)
- **Ofta är dom väldigt stora**, nu finns det ju några som är mer klocklik som man kan ha i vardagen. men den jag har nu är **alldeles för klumpig och den är dykmässig enbart**.
- Men ser man dom här nya med **integrering med telefon** och Facebook så är det ju mer allround.

- I don’t want to wear something everyday that i use for diving, it FOR diving. **I mean I have a Garmin with gps and heart rate monitor but i would never dream about wearing that on a night out.**
- **I would want to wear something that looks like an evening watch that really look swish and expensive to go diving.**
- The trouble is that we've had so many of the same, **like the d6i from Suunto and dx, they where like evening wear in stainless steel.** I’ve seen people buy them, **but would it be for me? No, i like a big, big dive computer that's going to tell me all the information.** Also the site of the watch is going to be limited for vision**. A lot of the divers are older people and their vision is not what it could be.**
- Like, I can read the message on my phone. **Also, a lot of the smart watches are really ugly. I don’t consider it stylish.**
- **Men om jag väljer någon (suunto som ser ut som en klocka) av dom så är det inte för att kunna ha dom på land**.
- **Det är ju motsägande, det finns i mina ögon ingen produkt som skulle kunna fungera så, för då har man börjat kompromissa**
- **den har framförallt ett safirglas som tål allt**.
- **det får aldrig vara en kompromiss**.

MARKNADSFÖRING

- Jag tror **många dykcenter kan vara betydligt duktigare marknadsförare än vad dom är idag**
- **Det professionella saknas och det här med att sälja in dyksporten**.
- ...**skapa en dykpark genom att kartlägga alla vrak och skriva historia kring det.**
- **Jag läser men är inte så delaktig**. (med i en dykgrupp)
- Nej, det är väl **många kända dykplatser som inte ens behöver marknadsföra sig.**
- **Padi have a great marketing strategy that makes it very interesting as a challenge,** you want to progress and become more advanced all the time. You want move forward.
- **man jagar mycket priser och konkurrerar med fel saker när man egentligen borde fokusera på kvalitet och upplevelse i sina produkter/tjänster**
- **Jag är övertygad om att om man marknadsför just upplevelsen och det fina med dykningen kommer man kunna attrahera fler att testa och utöva sporten**

STÖRANDE MOMENT INOM DYKNING

- **Nedskräpning stör mig**.
- **Skräp i vattnet är vanligt.** Men jag tycker inte det är något stort problem så
- **People not being prepared. Not checked their gear.**
- **First steps in the pool is fantastic, you get all the smiles and enjoyment and all that**. **When you get to the lake… it's a lot more focus oriented, a lot more serious in the cold water. more gear on an a lot more to think about.**
- **I think task load is huge for first time divers…**
- It’s a lot different being out in a lake or the north sea. Its the challenge and then **they reflect in in “i didn't do that thing right…” but actually they've done an awful lot right to get to that point. I think a lot of divers put too much onus on the performance.**
- **There always something from the dives that you look back in an think was that actually there? I take a GoPro helmet in… And sometimes when you watch**

those back. you suddenly realise how much you've been concentrating on the technology and you miss things. You look back at the video and actually that was something really cool i missed there.

ALLMÄNT/BLANDAT

- Om det är en **luft-kompatibel dator, som Suuntos cobra** som är luft integrerad som sitter på manometer slangen, Så är det **naturligtvis luftmängden, den är den absolut viktigaste.**
- **Sen har jag D4i som funkar som klocka och är väldigt smidig att ha på sig…** ... I mitt jobb finns det **risk att man skadar den så jag har den inte så ofta. (om personen använder den till vardags)**
- **Poseidon är ju ett roligt företag som sticker ut när dom väl gör något**.
- **...poseidon ligger väl lite i framkant**.
- **The average age of scuba divers is 29**,
- **Is it data for research information or is it to look at how much people are using their scuba equipment?** (miljö)
- **Many divers volunteer for research (how many species etc) for organisation like seasearch.**
-
- **It would depend of you would have to buy a device on like water quality, i don't think divers would like that. …if its free of charge i would do that. It would be cool … but making it into an engineering reality is a massive milestone.**
- **My thoughts are that, it Swedish it's very well build, it a clever unit, it won't let you get in the water unless you do all the checks.** (Poseidon as a brand)
- ...**that's the problem with Poseidon they promise stuff to early it sits and sits and sits until people buy another dive computer.** (thoughts on the brand and tactics)
- **Sen är det väldigt många som vill förklara saker för mig. Jag vet inte varför om det är för att jag är tjej eller något annat**
- **Sen är det väldigt många som vill förklara saker för mig. Jag vet inte varför om det är för att jag är tjej eller något annat**
- **Men jag vet inte, det är lite tungt men där tänker jag ibland att jag kan vara en förebil, om jag som är 1.55 liksom, kan dyka RB så kan vem som helst som är frisk göra det**.
- **Jag tror det är en självförökande loop. Några fler kvinnor så kanske dom drar mer sig fler kompisar**.
- **Jag tycker det borde finnas ett certifikat fler att du är en "förnuftig dykare" och då får du dyka på extra känsliga platser**
- **Ibland snöar dom in tror jag typ som med apple telefonerna (Poseidon som brand)**
- **är att man aldrig lär dykare hur våran gasupptagning i våra celler fungerar.**
- **Hade man fått lära sig att dyka med mer basala former hade man också istället fått mer erfarenhet snabbare och byggt upp en förståelse.**
- **Om det inte påverkar funktionen under vattnet för mig som dykare under vattnet är det givetvis något som hade förbättrat produkten. En passiv tjänst liksom.**

Utrustning/Funktion (positivt och negativt)

- Framförallt typ **klocka med barometer** och **höjdmeter**,
- Annars om man **bara är ute och "lufsar" så är det ju det att man vill helt enkelt veta var man är**
- man **kanske behövde den där pulsklockan i början**, **men sen slutade man mer och mer att fokusera på den**.
- **Egentligen bara min GPS-klocka,** ibland också telefon. (vad man har med sig vid träning/löpning)
- Jag vil**l framförallt ha distans, karta/område, höjdskillnad är ganska kul, speciellt efteråt**. **Så lite som möjligt egentligen…**
- **Inga störande moment** egentligen, framförallt **inga samtal** eller så från en telefon. Känner **inte heller att jag behöver puls, det känner jag att jag vet min kropp redan**. **Puls-info skulle nog till och med ta över upplevelsen för mycket** tror jag.
- **Mer under tiden**, så att man vet att man behöver typ springa lite längre, **för att slå sitt tidigare rekord typ**. **Vissa år har jag också fört statistik över min träning, det sker lite automatiskt med den klockan jag använder** (Garmin Forerunner, 5-6 år gammal).
- **Empatisk design, en produkt som ska känna av hur lycklig du är lite.**
- Sen **designen, något lättare och smidigare**.
- Jag hade absolut **kunnat tänka mig att ha en klocka på mig hela dagen om jag kände att den passade rent estetiskt** också.
- **Vilken cool grej, vet kanske inte direkt hur jag skulle använda den.** Möjligtvis är det **bra att veta på vilka sträckor som är schyssta att starta och sluta på**. **Löpning kan ju vara en ensamsport så via en sån här tjänst kanske man kunde få lite mer inspiration**. (Movescount)
- **Man skulle vilja veta mer om sträcka, höjd och plats.** (resande, hiking, trekking)
- Det handlar ju **mycket om att ta in naturen, friheten och avslappning.**
- **Displayen eller informationen ska bara ge tydlig och relevant info**. Det **kanske man kan ställa in personligen**.
- Man vill **bara ha det nödvändigaste**, **inte massvis med siffror eller information**. I **vilken ordning saker ska komma - typ trycker jag en gång kommer detta och två gånger detta - osv.**
- **Vattentäthet också**, man ska inte behöva vara orolig för väder eller så.
- Njaa, den **tjänsten som har jag idag till min klocka är rätt plain.** (angående e-tjänst tillhörande klockan)

Upplevelse outdoor inkl. hav

- Det är ju mycket **avkoppling**.
- Det är **frihet**, man vill ju bara styra ut mot horisonten
- Vi **gillar ju när det inte är så mycket folk**
- Mer om **sig själv och friheten**, inte lika mycket sport
- Min kille Per tycker **mer att det handlar om att förbättra sin andningsförmåga** och så, l**ära känna sin kropp**
- Sen är det ju mycket **koppling mellan yoga och fridykning**, **hitta sig själv**
- **Friheten, att koppla av helt och hållet.** Jag tycker så **mycket om skogen, tystnaden**. Det är en helt **annan grej att försöka ta sig fram genom naturen än på en färdig väg**. Man känner sig ett med skogen, man blir **uppslukad av stunden och naturen.**
- **Det är så himla mycket frihet**
- att **komma bort från det andra**
- Där handlar det mycket **mer om att ta in omgivningen**. (resande, hiking, trekking)

- Att man är där själv i naturen, **att man har med sig endast det man behöver.**
- **När man kan fokusera på dem "enkla" behover känner man sig oftast lyckligare tycker jag**
- **Stillhet, tysthet**. Man kan **komma sjukt nära djur** som man kanske inte annars kan. När jag är ute och paddlar **kajak har jag typ inget med mi**g, minimalt med grejer. (havskajak)
- ...mycket i vårt sommarställe i norge, där är **det så klart vatten**. (dykning/snorkeling)
- **Det är ju lite en annan värld liksom när man kommer under ytan**. Jag tycker det är **sjukt kul med arter och natur i allmänhet** också.
- **Ja** det skulle jag säga. (angående om miljömässiga bitar betyder mycket)
- Om man gör det **enklare och mer tillgängligt**. **Så att fler får upp ögonen för det och känner att de kan bidra med något**. (angående hur man skulle kunna få fler intresserade av miljön)

Nya platser

- Men kanske att **man missar mycket nära i sin omgivning?**
- **Sen kan det ju vara så att många inte berättar om sina "smultronställen",**

Informationsdelning

- Jag vet inte om vi pratar så mycket om det egentligen, **man vill ju kanske inte avslöja sig för mycket**
- Jag är **inte så mycket för att berätta att jag sprungit 5 km**, men i den **sociala kontexten tycker jag det är bra**
- **Sen kan det ju vara så att många inte berättar om sina "smultronställen",** det kan ju vara lite lurigt. Jag tror många vill hålla vissa grejer för sig själva

Vad stör upplevelser

- framförallt vad gäller **typ små plaster som hittas överallt**
- **Leta efter prylarna och göra i ordning efteråt. Det ska vara enklare.**
- **När det typ immar igen** och **man är på platser man inte känner till**. **Man vill veta hur det ser ut.**
- **Framförallt mycket bättre GPS**, det ska bara funka.
- **Jag vill ha riktigt bra kunskap om hur det ser ut och var jag befinner mig**.
- **Dåligt väder kan ju också avskräcka,** där vet man inte riktigt hur man hade reagerat eller agerat i den typen av kontext.

Om jag skulle ge mig ut någonstans **där jag inte känner till platsen ser jag till att informera mig innan om omgivningen.**

APPENDIX III - INTERVIEW TRANSCRIPTIONS

25, Studying

- What is your experience in diving?

I have an advanced open water certificate, I think I have completed around 11 dives. Mainly in southeast asia, not at home here in scandinavia.

- Why have you not dive at home?

Well it is quite expensive with the equipment, and it's a natural part to do when you're on holiday.

- What made you dive in the first place?

Well it is about the challenge maybe, the sport. It's like extreme sport in a way. The experience, you see stuff that you don't do otherwise, and the deeper you go the more new things you see. When you're abroad it is also about the overall experience I think. Tropical days. It's a new world in a way.

- Do you think of diving more as a sport or just the experience? Performance or the experience?

I think it's both. **Padi have a great marketing strategy that makes it very interesting as a challenge,** you want to progress and become more advanced all the time. You want move forward.

- Do you sometimes feel that the challenge of progressing gets in the way of the experience?

I think it depends a lot on the person, if they like to just swim around and watch things or if they want to push themselves.

- If you describe a typical dive, can you elaborate on your level of engagement before, during and after the dive?

I mean before it's about the excitement, a bit nervous checking all the gear that everything is there and working. **When you're in the water and diving I feel very comfortable and in the moment. Happy, just looking around and enjoying the experience.** Afterwards you feel relaxed and happy.

- Do you own any diving equipment?

No, students are poor!

- If you were to own equipment, what would that be?

I think mask and fins, maybe a wet suit first. It's important that they fit well. With the BCD and diving computer it is not so important, they require more expertise and is more difficult to serve. It's easier to just rent them, unless you're diving a lot.

- Looking at the technical aspect, do you feel that there is a certain task load that hinders you before you get into the water? Could it be easier?

Well it is quite easy, I think it is about safety so that is why it is that way. **A good thing that it's a safety thing, as long as you remember how to do it!**

- What is your experience with dive computers/watches?

I've used them maybe on 5-6 dives and I do like them. **Mainly the bottom time, showing you have long you can be on a certain depth and that you don't have to calculate that yourself. It makes it so much easier. Safer. And then it shows you the surface intervals.**

- What brand was it?

Suunto. Quite cheap one.

- How was the interaction with it?

Well we only interacted with it more or less before the dive, setting it up, not during the dive.

- Do you think people and/or equipment could make the experience of diving better?

As with everything in life I think it's the people mainly. **For the watch I think it can make it easier so that you can focus more on what's around you. That lets you enjoy the experience more, if you don't have to look that much.**

- Diving community. Why do you think the sport of diving is a bit small?

It is sometimes considered an extreme sport and that it might be a mental gap, that people are afraid to do it. But on the other hand, **it could be that you need a lot of equipment before you can actually dive. It's not like snorkeling where you can just put on fins and go snorkeling.** In diving you need all the equipment, know how to use it and also the logistics. The knowledge of the dive sites.

- A lot of people take a certificate when they are abroad, but they don't use it as much when they get back home. Why do you think that is?

Well, it's cold! Also that that the sea and water itself is much more attractive in those kind of places than the baltic sea perhaps. Although I've heard that it is actually quite good here.

- Some argue that the experience of diving at home is not better or worse, but different?

Yes, but you also need even more gear here. Like a thicker wetsuit. **And also that a lot of people maybe do diving like a one-time experience and don't intend to continue it afterwards. Like trying out some activities when you're on holiday. A cool thing but perhaps nothing more.**

- Do think of anything that would make the sport attractive when you get back home? Something that you miss.

The cost of course, but that is hard to change. **Maybe the community could be one thing, someone that like helps you on the way and encourages you to come along. That would make me dive more**

I think. More actively like, “do you want to try this out?”. Otherwise there is a lot of effort from the individual. And maybe if they try it here they would be more willing to try it more afterwards.

- Are you familiar with Suunto movescount? (Showing the service and explaining)

No not really (taking a look).

- Do you think the service could enhance the experience?

Yes I guess so, I think it could affect me. **If I see that a lot of people and friends around me go and do some kind of activity it would be natural for me to be curious about that.**

- Again, during the dive, how do you feel the communication works today?

Of course sending a complicated message gets a bit difficult, but otherwise it works okay I think. Sometimes it’s trouble to communicate but in recreational diving it is mostly simple messages like “oh look at that fish” or similar. Maybe more advanced diving require more. **So it is mostly about getting those simple messages between one another.**

It would have to be very simple also. If you’re a recreational diver that dive like three times a year then it shouldn't take long to learn how to use such a function, don’t know if it would be worth it.

- Do you use other types of wearables? Smart wearables?

I have a regular watch only. I am not that interested in playing around with such a product. Like, I can read the message on my phone. **Also, a lot of the smart watches are really ugly. I don’t consider it stylish.** If it doesnt go with a shirt and suit I would not use it daily.

- Do you like the identity of being a diver?

Yes. I mean the community of diving is pretty strong and there usually a good connection within a group.

- If there would be a product that you could use in diving and also outside that showed the identity of diving, what are you’re thoughts on that?

Yes, well maybe. But again it is about the looks of it. Perhaps also if I was a more active diver perhaps.

- Images of Suunto Zoop.

It is very simple. It is not something I would use outside of diving but it fills it purpose when diving. I have used it before. Like, some of that information is nice to know after the dive. Well **I like that I can have all the information on one screen, even if there is a lot of digits on the same screen. I would not want to have to press a button to flip through different pages.** If the settings I am interested in change between dives I would not want unnecessary information of course. **Nice to see that I know how my time I have on a certain depth.** It is nice to know that I am not coming up to fast, dynamic.

- Would you use it outside of diving? Why?

No, because it is not pretty. In diving it looks good because it matches the context but not outside of that I guess.

- What about material choices? Buttons?

The range of dive computers range from like a 100 to a 1000 (euro) so I understand that it is plastic and that is okay. Depending on what you pay for it. **I mean you would want it to be high grade titanium, super strong and super sleek, but then of course, what do you value the most…** If you use just a few times each year, maybe not worth that high grade material. And **even if it looks that good and sleek maybe you would not want to wear it anyway outside of diving since you would be afraid to scratch or damage this 1000 euro product on your arm..**

- If you could input during the dive other than through the display, what are your thoughts on that? Haptic input?

We all forget to look at it so yeah, it could be good to get feedback without looking at it. Maximum depth or something like that. Not going up to fast, things like that. You look at the watch because you have to. It is a tool. Situation awareness basically. I mean I don't go under water to look at a screen or a watch, I go to look what's really there! It is mainly a tool.

Maybe if it could tell me something about air supply and other information like that as well. Some haptics would be good, because I don't really want to look at it. Also because it is a safety thing.

- Would you consider investing in such product?

Maybe if I already have some other equipment first then I could possibly be willing to invest a couple of hundred (euro) in it, but for a long time I think I would just rent it. **You need to be a really active diver before you buy this kind of product and so if people rent it, it also has to be really easy and fast to learn.**

- Looking at the Petrel 2.

Obviously it looks more high end, more professional. Mainly because of the material choices, switching from plastic to metal. Also the finish is more stylish.

- Does the shape (round, rectangular) mean anything?

No it does not. **It is about the screen and choices of metal that makes it better. More high end.**

- Other observations?

It gives a lot more information. More info on a smaller space I guess, so more advanced divers know what to look for more I think.

- We have talked to people saying that they almost forget about the actual dive and just look at the dive computer too much. What are your thoughts on that?

Yes well maybe you get distracted from the actual dive, especially in performance related dives. If you have some sort of competition or similar you would only look at the computer, not focusing at all in the surroundings.

- What about color in the display? Could it make the experience better? Highlighting?

Maybe, but I don't want it to steal the attention. Maybe it is better to have it only when something is going wrong, as a safety issue. Not like a rainbow all the time. You stop seeing colors when you go deeper, I don't know how it works with a back-lit screen.

- Would you consider wearing this after the dive and in the daily dive?

No, it is pretty big and would be impractical. Clearly equipment that you put back in the box after the dive. So no it is not an all-around tool, much more specified.

- If you were diving on a more frequent basis, would you opt to buy something like this?

Maybe, but then again **I would probably go for something lower end than this and maybe just rent the this when I need to.** Maybe if you were like a marine biologists or something like that, maybe then. If you want like all the functionality like knowing your position all the time and GPS would be useful to know how to get back to certain place where you found something. **Only then if I really need the extra functionality.**

- Would you be interested in knowing your dive, like with diagram over your depth/chart or similar? Like a log?

Absolutely not, but I know others may like it. I think it would be something nice to check after a dive, but it is not a major thing for me.

- Vad har du för erfarenhet inom dykning?

Jag började dyka för ett gäng år sedan, är en aktiv dykinstruktör idag där jag utbildar alltifrån nya dykare till lite mer erfarna. Företrädesvis skulle jag säga att jag dyker mycket vrakdyk personligen. Djupa vrak, desto djupare man kommer desto mer orörda är dem. Och framförallt i våra kalla vatten här i norr. Aktiv instruktör på Swedtech Diving (https://www.swedtechdiving.se), en liten udda nisch av dykvärlden.

- Vad skiljer i upplevelse mellan dykning på semester och här i norr?

Det är olika saker. Det som skiljer framförallt är ljuset mellan olika miljöer. Desto ljusare miljöer man har desto mer tillväxt längre ned och det medför ofta också högre nivå av exploatering i viss mån. När det är lite mörkare här i våra vatten blir det lite mer orört. Jag gillar också att dyka utomlands ska sägas, men det är lite olika miljöer och olika krav. **Instrument-mässigt tycker jag inte att det är någon skillnad vad jag skulle använda i de olika miljöerna**.

- Vad har du använt för utrustning inom dykdatorer tidigare?

Min första var nog en Suunto Viper som jag fick begagnad. Och den höll jag väl på med kanske ett par hundra dyk. Den höll väl bra egentligen hela vägen tills jag började dyka RD (Rebreather Diver) och då slutade jag dyka helt med datorer då min dykning började bli mer och mer teknisk. Då dök jag

sen bara på djup och tid. Så gick jag över till att bara köra uwatech (?) och liquivision instrument. Liquivision har ju en jättebra och tydlig skärm i jämförelse med Uwatechs lilla.

- Om du tittar på övriga personer i din närhet, hur resonerar ni kring dykdatorer?

Det är väl lite olika ståndpunkter, hur man ser det. **Problemet med dykdatorer som jag ser det är att dykare uppmuntras till att inte använda hjärnan och de utmanas att dyka så nära marginalerna som möjligt**, det vill säga att man stannar nere så långt som möjligt och man går upp till ytan så fort som möjligt. Det innebär att du i princip går upp till ytan med maximal övermättnad du bara kan. Detta i kontrast mot om du dyker genom dyktabell, då gör du upp en plan och håller dig till den därefter och majoriteten av gångerna belastar du inte kroppen så hårt som planen håller för. Det innebär att du kommer upp med en större säkerhetsmarginal. Givetvis kan man göra det med en dykdator också men då är det mycket snack och man väljer ändå inte att göra det.

- Hur skulle du säga att upplevelsen dykning förändras om man använder dykdator eller inte?

Jag tycker väl inte att den gör någon skillnad egentligen. **Om man skulle säga så att man dyker utefter datorn, då kollar man ju hela tiden på datorn efter hur länge man kan vara där och fokuserar på det**. I motsats till om du har gjort en plan från början och håller dig till det. Du håller dig till den planen och behöver inte spendera lika mycket tid och energi till att kolla efter dator. **Med rätt träning och förståelse skulle man kunna säga att man kan bli mer självständig och mer fri, utan en dykdator snarare än med en**.

- Vad använde du för instrument idag för att ta reda på det du behöver idag?

Mina bottentids-instrument är ju den Liquivision eller en Uwatech då, som ger mig medeldjup och bottentid.

- Hur har din relation till “upplevelsen dykning” förändrats i relation till att du blivit mer avancerad i din dykning?

Man går i en cykel kan man väl säga, även om det är väldigt personligt. Först kanske det handlade om att utmana sig själv lite och se vad man kunde göra, medans det numera är mer kanske om synsättet kring hur man kan göra ett bra genomfört dyk, på en bra plats liksom. **Sen om det dyket är till hundra meter eller betydligt grundare spelar mindre roll. Det handlar om upplevelserna, det handlar om att ha roligt och att ha skôj.** Skillnaden kanske kommer med erfarenheten. Ett rekreationsdyk för mig kanske innehåller ett bredare spektrum än för andra.

Till exempel gjorde jag och en dykkompis ett vrakdyk utanför malta på 60-70 meter som vi bara i princip stack iväg på för ett avslappnande dyk. Inte för att det var ballt eller utmanande på något vis utan helt enkelt för upplevelsen. Det bara är gött, roligt.

- Vi har prata med den del andra aktiva inom branschen som säger att man kanske har tappat lite fokuset på själva upplevelsen i jakten på prestanda. Är det något du upplever?

Ja, jo men det kan det göra. Jag sitter och diskuterar ofta med många av mina elever som jag har, alltifrån nybörjare till mer avancerade och därimellan så pratar vi en del om utrustning och **hur många pressar framåt i utvecklingen**. Och där gjorde vi ju om hela vårat kursprogram på Swedtech enbart **på grund av den anledningen att man inte ska fokusera på att pressa gränserna utan att njuta av upplevelsen**. **Och bara ha roligt**. Man behöver inte hela tiden ha så stora grejer, eller prestanda eller så jäkla tufft. **Utan med ett par enkla basverktyg kan du utforska otroligt mycket**

grejer. Och det är det som jag ser som sagt, det borde gå att hindra folk från att bara köpa stora nya grejer istället. Många vill ju köpa nya dyra instrument, när man kanske egentligen kan köpa en bottentimer och ändå kunna göra exakt samma dyk. Du får inget extra för den, mer än att den är tuff och cool. **Marknaden sätter liksom standarden och man har skapat en produkt lite som inte dykvärlden kanske behöver**. Det är samma saker inom alla branscher att man skapar produkter för att sälja grejer bara. Givetvis ska man köpa bra instrument men jag brukar iallafall försöka hålla tillbaka nybörjare från att köpa nya, dyra grejer och istället bara njuta av det man håller på med.

- Tror du att branschen som sådan (typ Padi) har bidragit till att man vill hela tiden "level:a uppåt"?

Ja alltså tillgänglighet skapar ju efterfrågan och eftersom alla dessa kurser finns tillgängliga så har det säkert bidragit till att man vill pusha framåt. Inte nödvändigtvis bra, men det är lätt att sälja.

- Blir det ibland en så kallad "task overload" hos nybörja som ska hantera en ny dator i samband med andra saker att tänka på i dyksammanhang?

Ja, all onödig information bidrar ju till en task overload. **Jag är ju av åsikten att dykning handlar om "less is more".** Alltså ju mindre kring och krafs som du har desto bättre är dina förutsättningar. **Varför köpa en funktion som man inte behöver?**

Det största problemet jag ser med organisationer inom dykning (t. ex. Padi) **är att man aldrig lär dykare hur våran gasupptagning i våra celler fungerar.** Det gör att de inte heller förstår sina begränsningar eller fördelar med olika instrument. Man fattar egentligen inte vad man får. **Hade man fått lära sig att dyka med mer basala former hade man också istället fått mer erfarenhet snabbare och byggt upp en förståelse.**

- Är du nöjd med de produkter du använder idag?

Nej jag är inte nöjd med produkten som den här, alltså det finns förbättringsområden. Den drar otroligt mycket batteri, den har inget bra data-överföringssystem till andra enheter. **Den är inte kompatibel med exempelvis en app i telefonen**. Sådana saker är sådant jag skulle tycka vara intressant. Det är dem funktionerna som idag finns i medeldjup, bottentid/timer och sånt.

Sen rent funktionsmässigt skulle jag gärna se i gruppdykningen att man kan **lägga in "waypoints" i din plan så** att man ha med det. OCh så kan man **jämföra sen efter dyket om man höll sig till sin plan med** "här var vi vid det djupet vid den tiden" osv.

- Är du nöjd med ergonomin och interfacet hos produkten?

Ja den har som sagt en lagom stor skärm där **jag kan välja att stänga av det jag inte vill se** och det tycker jag skiljer sig väldigt mycket mot andra produkter där du kanske inte kan göra det. **Tid och djup är väl ändå måsten men sen är mycket upp till användaren tycker jag**.

- Behöver du interagera med produkten under dyket?

Jag utläser bara information, alltså tid och djup.

- Tycker du att produkter och/eller människor förhöjer upplevelsen?

Det finns en viss typ av dykutrustning som skulle få dig att dyka mer… **Från mitt personliga perspektiv skulle inte en dykdator förändra min upplevelse men jag skulle kunna tänka att det kan vara så för andra**. Om man fått synproblem också kanske, om man ser bättre med tydlighet.

Gemenskapen är ju annars det man kommer ut för att dyka för lite.

- Om det fanns en produkt som erbjuder det du är ute efter men som också fungerar i en vardagskontext, hade du varit intresserad av en sådan produkt?

Det är ju motsägande, det finns i mina ögon ingen produkt som skulle kunna fungera så, för då har man börjat kompromissa. Något som fungerar halvdassigt på båda områden lite. Det är lite så att man antingen får anpassa för olika ändamål. I mina ögon helt enkelt.

- Använder du en klocka annars till vardags?

Ajemän, jag har klocka. En Omega Seamaster. Det är en lång historia, **den har framförallt ett safirglas som tål allt**. Sen är den automatisk är bra.

- Hur blev det just den klockan? Har det koppling till dykning?

Det är helt en slump egentligen, det var den som jag tyckte om mest rest estetiskt i den prisklassen.

- Rent hypotetiskt, hade det varit intressant som har den funktionaliteten ändå som du söker i dyksammanhang men som också har den estetiska delen?

Alltså när jag dyker ska jag ha det bästa som jag kan ha då, **det får aldrig vara en kompromiss**. Den ska vara bättre funktionsmässigt än allt annat.

- Hur tycker du att marknadsföringen inom dykning i Sverige fungerar?

Man marknadsför sig med felaktiga grunder, **man jagar mycket priser och konkurrerar med fel saker när man egentligen borde fokusera på kvalitet och upplevelse i sina produkter/tjänster**. Väljer man bara att vara tydlig kan man ta betalt för det man vill. Ska vi ha en levande dykiddustri måste vi kunna ta betalt för våra produkter. Man priskrigar för mycket.

- Dykning kräver en del utrustning, tid och pengar för att börja dyka. Vad har du för tankar med att binda nya utövare till sporten?

Alltså det faller in på det vi pratade om innan här. Det har med en felaktig marknadsföring om fel saker. **Jag är övertygad om att om man marknadsför just upplevelsen och det fina med dykningen kommer man kunna attrahera fler att testa och utöva sporten**. Men det krävs ju att man fokuserar på upplevelsen också.

//Allmänt snack på slutet//

Det finns många gamla sanningar/myter som lever kvar som tyvärr påverkar industrin och sporten mycket, jag tror det finns mycket att forska vidare om.

- Om det fanns en produkt som kunde hjälpa till att samla in data i miljösynpunkt för att bidra till att förbättra vår havsmiljö, hade det varit intressant?

Vi landar väl på det här med funktion igen då. **Om det inte påverkar funktionen under vattnet för mig som dykare under vattnet är det givetvis något som hade förbättrat produkten. En passiv tjänst liksom.**

//kände ej till Suunto Movescount//

44år

0.04 *Vad har du för certifikationsnivå och erfarenhet?*

Jag hållit på med **dykning i 15 år**. Jag är dive master jag har Tec-utbildning så kan dyka med helium och har certifikat till 60m. Har ingen exakt siffra men det räcker inte med 1000 dyk.

0.45

Har minskat lite med åren med jobb och barn men ambitionsnivå finns att fortsätta dyka iaf.
har jobbat en del professionellt i en dykbutik i stan.

1.03 *Hur kommer det sig att du började med dykningen?*

Jag gjorde ett prova på dyk och tyckte det var jättekul, och blev fast.

Har dykt mestadels i sverige, ett 25-30 tal dyk utomlands. Mycket Vättern och mycket Östersjön.

1.50 *När du gjorde ditt prova-på dyk, vad tror du det var som gjorde att du tyckte att det var så häftigt?*

Det var många saker. Dels **intresset för tekniska saker**, det är ju rätt mycket teknik i dykning. Utrustning, **datorer, flaskor med tryck.** Det blev lite kul och spännande. **Har ganska stort teknikintresse för all typ av teknik.**

Sen var det lite att utmana sig själv, det är inte självklart att man börjar med dykning.

Behövde en hobby, och tyckte att det var en bra kombination, jag gillar att vara nära vatten och ute på sjö och hav och den typen av fritidsaktiviteter. **Vara ute i naturen och på båtar och kunna dyka.**

Fascinerad av vrak.

3.30 *Första gången du kom ner under ytan vad var det som va gjorde att du blev uppslukad?*

Fascinationen av att kunna vara länge under vatten, sen var det mycket den **känslan av viktlöshet** och en delen.

Någon typ av frihetskänsla och så lite fascination av att det funkar att vara under ytan.

4.14 *Vad har du för utrustning?*

Suunto - D3 - bottom timer och **Viper**.

5.55 *Har du provat fridykning?*

Har provat på med mina barn som går varje fredag men enbart i pool. Jag är så d**ålig på hålla andan**.

7.00 *om du tänker tillbaka på ett dyk som du gjort flera gånger vad tror du skulle kunna höja en sådan upplevelse? Teknik personer etc.*

Nja jag vet inte, dyker mycket i Vättern och dom vraken som finns i Vättern. **Vättern är väldigt kall så det är vanligt att man börjar frysa. Bättre utrustning för att kunna hålla värmen.**

7.45 *vad tycker du om kommunikationen med andra dykare?*

Nja det är skönt att slippa, jag har inget behov av det. Jag tycker att det är en del av dykningen att man är själv så att säga. Man är ju inte själv men just att **man inte kan kommunicera så himla lätt**. Man är **utlämnad till sig själv, att klara av uppgiften själv.** Och det det är ju lite mer i teknisk dykning. Man ska ju ha utrustning att klara sig själv i alla lägen. **Jag tycker att det är en del av tjusningen att man inte kan kommunicera så lätt.** Kanske låter lite märkligt. Så kommunikation är inte jätteviktigt för mig.

8.53 *Hur ofta behöver du kolla på dykdatorn? under och innan*

Innan ett dyk ställer man in sin gas. Under dyker beror det på vilket typ av dyk man gör självklart. **Dyker du enkelt så kanske man knappt kollar på datorn.** Medans **längre och djupare dyk kollar man oftare för att ha koll på tiderna och under uppstigningen.** Det varierar men under ett mer komplicerat dyk tittar man ofta.

10.00 *hur väl funkar det med informationen du får på dykdatorn? Är informationen relevant?*

Ja det tycker jag.

10.15 *tycker du att den presenteras på ett bra sätt?*

Ja överlag, jag skulle vilja ha **tydligare indikering på om man går upp för snabbt.** Det indikeras men är inte jättetydlig och det är väldigt viktig information egentligen. **Om man strular till det att det indikeras tydligare.** Blinkar eller något.

Allt som egentligen har med säkerheten, akut säkerhet, att göra borde vara mer tydligt kan jag tycka.

11.10 *Tycker du att det är lätt att läsa skärmarna och har du någon gång tyckt det hade varit bra med färgskärm?*

Nja det är inget jag har saknat direkt. Möjligtvis för att indikera det här med säkerhet. **Är det något som är farligt så ska det vara rött och gult om det är lite mindre farligt.** Någonting sådant, det är ju ganska självklart med färger egentligen - fara är rött osv.

11.50 *vad är det bästa med din dykdator och det sämsta?*

Jag är rätt nöjd med den. Det är väl möjligtvis det här med säkerheten. **Belysningen, man aktiverar den på Vipern men den är inte tänd hela tiden så man måste trycka på den.** Man **hade kanske**

önskat att den vore tänd hela tiden eller iaf enkelt kunna ställa in så att den var det. Gör man ett djupt dyk och det är mörkt, det är ju en grej till att man måste trycka på den hela tiden. Den slocknar ju efter 10s så man får trycka på den ganska mycket.

13.00 *varför tror du att det är så få utövare inom dyksporten?*

Det är nog **många som tar det utomlands** (certifikat) och **sen tror man inte att det finns så mycket att se när man kommer hem.** Att det bara är svarta sjöar och inte så mycket djurliv i havet. **Man inser inte att det finns bra dykning i Sverige, riktigt bra dykning. Den kunskapen inte riktigt finns.**

13.45 *Hur tror att man skulle kunna ändra på det?*

Jag tror **många dykcenter kan vara betydligt duktigare marknadsförare än vad dom är idag**. Många är ju hängivna dyksporten men man **man kan inte riktigt det här med marknadsföring och information.** En del är jätteduktiga men många är inte det. Lite för mycket amatörmässigt så att säga. **Det professionella saknas och det här med att sälja in dyksporten**. Det gäller att **fånga upp både nya och befintliga dykare.**

14.43 *Hur delar du med dig av dina dykerfarenheter? Både dykare och andra*

Jag pratar dykning överallt. Facebook är ju bra när man kan lägga upp bilder och sådär. **Och det är ju både i slutna grupper med närmaste dykgänget och öppet också till alla vänner**. **Sen har jag varit på många vänner och bekanta att dom ska följa med och göra prova på dyk i och med att jag är dive master**. Och det är väl några som har fastnat och tagit cert.

15.50 *Vad är det du stör dig på mest när du dyker. Omgivning eller annat.*

För mycket dykare i vattnet, jag gillar ju det här att inte ha massa folk runt omkring. Nu är det ju sällan så men om man är på något väldigt populärt dykställe. Sen väljer man ju själva vart man dyker.

16.48 *Ser du mycket nedskräpning?*

Ja det är ju tråkigt. **Skräp i vattnet är vanligt.** Men jag tycker inte det är något stort problem så.

17.22 *Vad är största hindret för att du inte ska ge dig ut och dyka?*

Det är jobb och barn, man har inte tid så att det räcker.

17.48 *Känner du att du alltid kan hitta dykplatser att åka till?*

Det är finns massa platser, det är **mycket att man åker till dom nära platserna.** Man **hinner inte åka iväg till kusten eller på båtutfärd**.

18.15 *Hur får du reda på nya dykplatser?*

Det sprider sig fort mellan kompisar. Dykarna.nu kan ju ibland dyka upp någon spännande plats.

18.46 *använder du din dyklocka till vardags?*

Nej ingenting

18.56 *Är det något du hade kunnat tänka dig att göra eller till andra vattenaktiviteter, simning kajak etc?*

har varit lite sugen på Suunto D9an dom är rätt snygga tycker jag men dom är lite för dyra. **Den hade jag kunnat tänka mig att använda dagligen egentligen**. **Den är ju snygg som en klocka fast det är en dykdator**. Men dom är för dyra om man jämför med Viper som innehåller samma funktioner

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49 years

0.05 Hur länge har du hållt på med dykning?
Jag började dyka 88'

0.27 Vad har du för dykcertifikatsnivå?
Tec-50

0.37 Hur kom det sig att du började med dykningen?
Min pappa dök, så jag är uppväxt med dykningen. Och mina grannar dök på 70 talet.
Fick inte ta certifikat i Sverige så därför åkte jag utomlands.

1.13 Hur kommer det sig att du fortsatte med dykningen?
Det har gått i perioder. Så mycket som jag har dykt nu har jag inte gjort tidigare. Har ju varit en riktig sån **cocktail-dykare**. Men framförallt är det upplevelsen och **är man ute och reser så kommer man oftast längre bort än om man åker på en charter** semesters och man träffar lite andra människor. Så det är alltid roligt att ha något att göra.

1.48 Vad mer specifikt i upplevelsen är det du tycker om?
Det 3-dimensionella att man rör sig 3-dimensionellt i vattnet och sen är det ju alla djur, **en annan värld en annan växtlighet**. Helheten, jag kan inte säga att jag gillar bara vrak eller bara fiskar. Men framförallt det 3 dimensionera rymden tycker jag är fascinerande.

2.20 Vad får du för känslor när du dyker
Glädje, **man blir upprymd sen kommer det adrenalin** emellanåt.

2.30 är det en viktig faktor?
Nej det tror jag inte. Visst det triggar ju, är man lite äventyrare går man igång på det.

3.00 Vad tror du skulle höja en dykupplevelse? Personer teknik
Stora fiskar höjer ju men det är svårt att säga, allt har sin tjusning. Det finns ju mycket småfisk. Sen är det stora stenformationer. Men det är fantastisk dykning. Men det är svårt att övertala någon.

4.15 I form av teknik tror du det finns något som skulle kunna förbättra situationen?
Tycker vi är rätt nära där just me dom nya dykdatorerna som har gjort det mycket mer tillgängligt för kreti och pleti också. **Att bygga säkert och sen gjort det enklare för dom** som kommer upp lite i ålder att se dom här datorerna, med **LED ljus och stora siffror har gjort det mycket enklare och tryggare**. **I många år har man fått leta efter siffrorna** men nu är det superenkelt.

5.11 Vad har du för dykdatorer?

En **xdeep** ganska liten och enkel men ganska stora siffror. Sen har jag en **oceanic botten timer** också som backup, **den är med men jag förstår inte vad det är för siffror jag tittar på**. Jag gillar normalt att läsa manualer men dom här hade inte ens en manual med bara en snabbguide i kortformat. Jag gillar när man får läsa långa manualer. Det ska göra det enkelt.

6.40 Om du beskriver interaktionen med dykdatorn inför ett dyk.
Jag ställer in gaserna om det nu är så, är det ett vanligt dyk så gör jag ingenting med datorn.

Under nedstigning?
På min ser jag väldigt tydligt hur fort jag går ner och det är väl det jag kollar på. Egentligen kollar jag nog någon gång i början så att den är med sen kollar jag nog inte förrän jag är nere på det djup jag ska till, så länge det inte känns konstigt.

Nere på djupet, hur använder du den och vilka funktioner använder du dig av?
Framförallt **tid och djup**. Inte ofta jag använder kompass

Under uppstigning
Då tittar jag på den hela tiden. **Dels så att man gör stopp om det krävs. Den talar ju om precis vad jag ska göra.** Så då är den med konstant.

Efter dyket
Kollar vad jag har gjort, får fram en dykprofil där jag kan se precis upp och nedgångar. Sen brukar jag kolla temperaturen. **Sen tar jag in det i datorn och där får jag ut loggen**. Och då brukar jag lägga in luftförbrukning och så. Det är kul att veta.

Tycker du att informationen är lätt att ta till sig under dyket?
Superlätt, **jag kan välja hur mycket information jag vill ha på displayen**. Jag kan bara ha bottentimer om jag vill. **Sen kan jag ha larmsignaler och olika färgkodningar**. Den är väldigt övertydlig om något är fel eller om något inte stämmer. Och det går liksom inte missa.

Hur delar du med dig av dykupplevelsen?
Jag delar inte med mig av datan/loggen. Har **vänner som delar dykloggen på Facebook**. Det är lite roligt.

Det blir lite mer att man tar lite bilder och så lägger man ut dom (på facebook) och **talar om vart man har varit.**

Är du med i dykforum/grupper?
Jag är med i en klubb i Hbg, man läser mycket artiklar och man är med i sådana grupper men den är inget jag brukar lägga in. **Jag läser men är inte så delaktig**.

13.00 Varför tror du att människor inte tar sig ut i vattnet trots att de har certifikat?
Man har **kanske inte samma mål med sin dykning som den man gjorde certifikatet med**. Man kanske vill fortsätta men inte sin kompis. Då står man kanske själv.

Är man utomlands så anmäler man sig till en utfärd och så är man en grupp som åker. Men i Sverige så funkar det inte riktigt så. Nu är vi en grupp som är väldigt öppna för alla och så, det är inga problem men det är inte överallt det funkar så. **Det är mycket grupperingar** så, **"jag vill inte dyka med den eller jag vill inte dyka med den"**.

Vi har lyft frågan i vår klubb, vi har ju utfärder varje dag och **det är ju öppet för alla**. Vi brukar ha det som överskrift att **Alla ska med**. Men det är ändå **svårt att får med dom här som är själva att ta steget och åka**. **Utomlands så dyker man med en guide** och man kan va 4-5 stycken. Här i Sverige är man två parkamrater och så dumpas man i själv. **Där tycker jag att vi som klubb skulle kunna göra mycket. och då tror jag att det är lättare att få med dom som är nya.**

Vad tror du är unikt med dykning som inte andra utomhussporter har?
Det är bredden tror jag, om man tittar på åldersspann och vad folk gör. **I andra sporter för man med sina åldrar eller så kan det vara väldigt mansdominerat**. Men **här dyker man ung som gammal**, och arbete eller vad man gör på fritiden spelar inte så stor roll. Alla har dykningen gemensamt

I vattnet är vi alla på något sätt jämställda och det gäller även kvinnor och män. Och det är ju få sporter som är så. Så att man inte känner att man är den svaga.

Känner du att det alltid att det finns platser att dyka eller att hitta dykvänner?
Jag vet ju att det är svårt, **det gäller nog att man har tagit certifikaten på rätt ställe och att man blir uppfångad**. Jag tror att **man behöver en push**. **Annan blir man den här cocktail-dykaren som åker utomlands**.

Tycker du att Sverige marknadsför dykplatser hemma?
Nej, det är väl **många kända dykplatser som inte ens behöver marknadsföra sig.** Men det ska bli lite ändring på det. Vi ska upp på dykmässan och presentera våra klubbar och dykplatser för dykförbundet.

18.25 Vad är det sämsta med din dykdator?
Jag har inte hittat någonting än. **Den är ju lite tjock**. **Den är inte så stor men den är ganska tjock**.

18.45 Vad är det bästa med den?
Den är tydlig, jag ser siffrorna. **Jag behöver inte forska i bilden vad det är jag ser.**

Varför tror du att det är tydligt?
Det är **färgen helt klart**. Det är på svart bakgrund. Jag **kan välja helt själv** vad jag vill ha med det finns **3 olika färguppsättningar** som jag kan välja.

19.45 Visar den färg som indikation på fara?
Ja om det är fara så blinkar hela den svarta bakgrunden röd. Så **det ser hela omgivningen**. Så det är jättetydlig **även om du är inne i någonting så missar du inte det**.

20.28 Har du provat på fridykning?
Nej men hade jag inte varit rädd för vatten är det nog någonting jag hade gillat

21.13 Hade du kunnat tänka dig att använda en dykdator till vardag och till andra vattenaktiviteter?
Ja absolut.

Vad är det som hindrar dig idag från att göra det?
Ofta är dom väldigt stora, nu finns det ju några som är mer klocklik som man kan ha i vardagen. men den jag har nu är **alldeles för klumpig och den är dykmässig enbart**. Men ser man dom här nya med **integrering med telefon** och Facebook så är det ju mer allround.

Vad stör du dig mest på när du dyker?
Inget riktigt.

23.00 Tycker du att kommunikationen är ett problem under vattnet
Nej jag tycker **det är rätt skönt**, **just att det inte blir så mycket snack**. Så det är väl en **del av nöjet** också.

23.36 Vad är största hinder som får dig att inte dyka?
Det är **jobbet, tidsmässigt.** Annars hade jag legat i vattnet hela tiden.

25.40
När man dyker i barriärrevet eller i röda havet ramlar ju allt på en. Här hemma får man ju leta lite mer efter saker och sen är det mörkare och allt kommer mycket närmre. Du ser ju bara det som är närmast eller som du lyser på. Det går inte riktigt så fort.

26.10
Jag tycker det är jättehäftigt (svensk dykning). Jag tycker inte det är roligare ska jag inte säga, men det är mycket häftigare just för att det **inte är så tillgängligt**. Man blir ju bombad i dom här fina vattnen (utomlands). Jag har sett dom där fina fiskarna nu som finns ju överallt, man blir mättad. **Men här hemma blir man inte mättad, det blir en wow-upplevelse varje gång.**

28.40
Poseidon är ju ett roligt företag som sticker ut när dom väl gör något.

31.00
Jag har ju testad deras rebreather. Och jag har ju kolla på alla märken men **Poseidon ligger väl lite i framkant**. Där får jag en maskin som tänker åt mig, det är mycket som det är med dom här rebreathrarna.

Berätta om din dykning

Jag har dykt sedan 2010, över 400 dyk och nuförtiden dyker jag rebreather som jag verkligen gillar. En Poseidon 6. Jag började dyka för att vi skulle åka till Indonesien ett gäng… och jag tänkte att det kan vara kul att ha (cert) redan innan man åker dit, så kan man dyka om det är fint.

Tog mitt cert i de vattenfyllda grustagen i Frankfurt. Och sen när jag flyttade tillbak fortsatte jag dyka med en dykskola i Lund, och lärde känna folk där som dök RB. Så kom jag in på det. Och **jag dyker det för att jag är intresserad av själva upplevelsen och själva naturupplevelsen**. sen tycker jag et är väldigt spännande med alla djur som finns. Och då var det ju väldigt kul att dyka RB så att dom inte blir så rädda fiskarna.

Har 60m tec cert på RB och på öppet system har jag rescue divers och massa specialties.

Vad tyckte du om dykningen i Indonesien jämfört med Tyskland?
Självklart var det bättre i Indonesien men jag tycker väldigt mycket om olika miljöer. Det är som att jämföra en granskog med en öken. Jag uppskattar också när det är stor biodiversitet när man kan se många olika sorters djur. Så självklart bättre i Indonesien men jag hade gärna dykt i tyska sjöar också, dom hade tex stör och det är coolt.

3.45 Mer specifikt på upplevelsen, vad är det för känslor som väcks inom dig när du dyker?

Jag tycker om den här känslan att vara här och nu, jag håller inte på att tänka på vad jag ska äta till middag eller något annat. Och där kommer man självklart in på dator också, **självklart övervakar jag mina gaser och min maskin men jag vill helst ägna det så lite tid som möjligt medan jag självklart vill ha det säkert**. Så en **del tycker ju om att fotografera under dyk men då blir man så fokuserad på kameran**, jag tycker mest om att simma runt och ta det som det kommer uppleva vilka djur som råkar visa sig just den dagen.

*4.45 Vad har du för dykdatorer idag***?**
Om jag dyker hemma så har jag en petrel dator. Om jag är på semester så hyr jag grejer och du har jag en Suunto dator, Viper.

Suunto datorn funkar bra till den typen av dyk. Eftersom petrel är så dyr känns den onödigt att släpa med den, när den inte tillför någon funktion jag behöver (för den typen av dyk)

6.17 Vad tycker du är dom viktigaste funktioner i petrel som du inte får i Suunto klockan?
Suunto kan inte hantera flera gaser. Jag dyker bara etc med RB, anledningen till att jag köpte den vart för 3 cells och DECO- algoritmerna, för jag använder inte det
Det är ju helt olika behov.

8.20 Rent användarmässigt om du jämför Suunto och Petrel vad är bra respektive dåligt med modellerna?
Om jag bara gör ett 20m dyk är jag inte intresserad av så mycket av data. **Den ska bara ge mig den data jag behöver och jag ska kunna se den och den ska va pålitlig**. Och då bryr jag mig faktiskt inte så mycket.

9.30 Beskriv din interaktion med dykdatorn under ett rekreationsdyk
Ställa in gasen på ytan och dubbelkolla så att den är i rätt mode.
Jag tittar på datorn men jag interagerar inte med den. Jag lyser på den om det är ett mörkt dyk för att kunna se vad det står. Jag vet att en del trycker på knappen med det är lite mecking, jag lyser bara med en lampa. Sen när jag kommer upp så loggar jag tid och djup.
Men jag monitorerar den under dyket.

Hur ofta?
Det beror väldigt mycket på dyket, dyker jag 10m vet jag att jag inte kommer vara i närheten av några dekompressionstider iaf den första timmen. Så då tittar jag mycket oftare på manometern, jag har inte integrerat luft och då tittar jag bara några gånger sådär mest på klockan ifall vi har bestämt en tid. Ibland kollar jag på temperaturen. **Men skulle jag tex göra ett 40m dyk på enkelflaska så tittar jag ju jättenoga att jag inte går in i deco**.

Vad tror du skulle kunna höja en dykupplevelse?
Ja om jag ska tänka helt fritt så gillar jag att se nya djurarter, Nya landskap eller vackert ljus. Det kanske är en manet som får en solstråle på sig. Sånna saker.

Jag vet inte om personer höjer en dykupplevlse men dom kan förstöra en dykupplevelse. Skräckexemplet är att man bara blir ihopparad med någon som man inte känner som har 0 koll på sig själv och omgivningen som både är dåliga dykare och ignoranta. Jag dök en gång med en tjej som hade gjort typ 5 dyk och skulle filma heltiden så då fick jag babysitta henne.

Sen tycker jag det är trevligt att prata med dykare på land men i vattnet. Om man dyker med någon man dykt mycket med så behöver man inte, klart jag måste hjälpa dom om något händer men jag

tittar på dom och ser att dom är lugna så vet jag. Men känner man dom inte så vet man liksom inte vad man ska titta efter .

Jag har gjort nästan hälften av alla dyk med samma kille och jag vet nästan vad han kommer signalera innan han gör det och då kan man fokusera mer på dykningen.

Vill inte frysa. Fast jag dyker även om jag fryser.

Sedan allt med baslogistik. Det är jobbigt att börja analysera sina flaskor sent på kvällen innan ett dyk. Viktigt att dykcenter är välorganiserade om man ska dyka med dom.

Hur tycker du att kommunikationen fungerar?
Jag tror att det hade blivit säkrare om man hade kunnat kommunicera mer. Speciellt om något är fel. När allt går som det ska så tror jag inte det är så stor skillnad.

Nu kan vi ju kommunicera lite med RBn. Man kan ju prata delvis men det låter väldigt burkigt men när man har dykt med någon länge har man lärt sig att känna igen deras röst och deras melodi.

17. 20 Kan det vara ett störningsmoment?
Ja det hade det säkert kunnat va om man dyker med någon som pratar för mycket men jag tror det är som på land man förstår om någon inte vill prata.

Vad har du för uppfattningar om dykkulturen?
Det är stor skillnad i olika länder. I Sverige är vi väldigt säkerhetsmedvetna. I Frankrike gör dom dyk som jag skulle säga är väldigt riskfyllda och korkade för att dom inte fattar att dom tar en risk. Det är en sak att ta en risk om man vet vilken risk man tar, det är var och ens ansvar.

Tycker du att det är en inkluderande kultur? Tror du att det är lätt för en ny dykare?
Jag tror det beror mycket på vilka människor man träffar. Jag hoppas att jag är en sån människa som inkluderar. Sen är ju jag inte en klassisk TEC dykare som killar, ofta ingenjörer, gillar att dyka vrak. Där kommer jag, 1,5m liksom som gillar att kolla på nakensnäckor. Jag känner mig inte som en standard teknisk dykare.

Sen är det väldigt många som vill förklara saker för mig. Jag vet inte varför om det är för att jag är tjej eller något annat. Om man är på en dykbar, jag och min standard kamrat, så kommer det fram folk berättar saker för mig. Att det finns handskar i olika storlekar och viktbältet ska sitta si eller så. och som gör det aldrig med honom. **Vet inte om man ska se det som någon typ av mansplaining**

Varför tror du att kvinnor är underrepresenterade i dyksammanshang?
Det har jag funderat jättemycket på och jag har inget bra svar, asså delvis tror jag att det är lättare att göra det ens kompisar gör. **Men jag vet inte, det är lite tungt men där tänker jag ibland att jag kan vara en förebil, om jag som är 1.55 liksom, kan dyka RB så kan vem som helst som är frisk göra det**.

Män och kvinnor kan ju delta på samma villkor
Ja utom på land. Dyker du dubbelpaket kan jag inte hanterade det på land, jag kan liksom inte lyfta det från dykskolan ut till bilen. Det kan jag inte.

Kanske att det har historiska rötter.

Sen kanske, jag tycker det finns en överrepresentation av ingenjörer som dyker och en del hantverkare. Jag skulle kunna tänka mig att om man gillar beräkna gaser och den tekniska aspekten av det så är det kanske logiskt. Och om det då är en överrepresentation av män inom ingenjörer då kanske det kan vara en förklaring. Sen är det ju rätt stor löneskillnad mellan hantverkare om man jämför med ett motsvarande "kvinnoyrke" typ förskollärare och det är ju lite smådyrt att dyka. Det är lätt att lägga mycket pengar på dykningen.

Hur tror du att man skulle kunna locka fler kvinnor till dyksporten?
Jag tror det är en självförökande loop. Några fler kvinnor så kanske dom drar mer sig fler kompisar.

Det är synd på ett strukturellt plan (få kvinnor i dykning) men på ett personligt plan bryr jag mig inte. Jag bryr mig inte så länge dom jag dyker med är trevliga. Men det är inte så att jag tycker det är synd att jag inte dyker med fler tjejer.

Vad tycker dom om performance kulturen?
Jag tänkte länge att jag inte skulle bli en teknisk dykare, jag tycker det är fint här på 10-20 meter. Men det finns säker en del som bara vill djupare och djupare.

Om man pratar med någon innan så säger man vad man har för certifikatsnivå och hur många dyk så vet man iaf statistisk var lägsta nivån ligger.

När det gäller känsliga korallrev, där tycker jag folk bara borde få dyka om dom avväga sig. Det låter elitistisk, men dåliga dykare förstör så himla mycket i undervattensmiljö. Och det finns folk som ska störa djuren och rida på sköldpaddor och så. **Jag tycker det borde finnas ett certifikat fler att du är en "förnuftig dykare" och då får du dyka på extra känsliga platser.**

Tänker du att du vill visa din identitet som dykare på land? Ha en dyklocka eller dykdator till vardags.
Det passar inte i mitt arbete att ha det. Elle ah, jag skulle inte ja något emot det. Men jag skulle inte köpa det för att kunna ha det på land. **Men om jag väljer någon (suunto som ser ut som en klocka) av dom så är det inte för att kunna ha dom på land**.

Hur delar du med dig av dykupplevelser?
Eftersom jag inte fotograferar så har jag inte några foton att visa. Men jag brukar googla bilder på saker jag ser och visa upp. Men jag andvänder inte så mycket sociala medier heller. Borttar inte för så många, pojkvännen och närmaste vännerna. Föräldrarna får väl stå ut också.

Jag läser rätt mycket på dykarna.nu men jag skriver ytterst sällan. Läser även rebreatherworld.

Jag har en grej som jag önskar att min dykdator hade:
Jag vill kunna lägga in egna checklistor eller komihåg-listor I vanligt textformat eller något sånt.
Rebreather checklista skulle jag vilja ha i dykdatorn istället för i telefonen eller på papper om det är blött på ett båtdäck eller så.
Eller lägga in övningar när man övar skills som man gör ibland. Även göra antecknar men det vet jag inte hur det hade fungerat rent tekniskt.

Sen hade jag även gillat om jag hade fått gasförbrukningslogistik från min RB, både på enkelt dyk och över tid. Och i ett sånt format som man kan dra ut i excel och göra vad man vill med. Jag vet att Poseidon är lite känsliga med såna grejer men det hade jag uppskattat.

Så hade jag uppskattat om den kan interagera med annan teknik. Min rebreather kommunicerar med IR, stenåldersteknik. Kan dra över filer i standardformat till exempel loggar och statistik. RB finns det hur mycket som helst intressant data som Poseidon inte har tillgängligt men man kan få ut med ett specialprogram. Redboxen dvs allt som maskinen har gjort och avläst när den har sprutat in mer gas eller kalkylerat sina celler. Alla såna grejer hade jag velat ha i standarformat.

Och sen **att den hade kommunicerat på ett enkelt sätt med tex telefonen så man inte är beroende av Poseidons program**.

Även planera dyk. Tex att planera deco-dyk så man inte behöver ha sin stora dator med på däck om man är ute flera dagar.

37.50 Vad tycker du om poseidon som varumärke?
Lite blandat, många saker är väldigt bra. Sen är dom väldigt långsamma på andra saker som att man inte kunde kommunicera med apple telefoner innan på Se7en. Jag menar vi lever i 2017 liksom och ska jag köpa en ny telefon för att jag råkat köpa en poseidon, det kommer inte hända liksom. Ja men blandat liksom, jag vet att dom har haft rykten om att RBn va en rekreations RB vilket den va, men sen utvecklade dom den vidare. Och jag tror att ryktet lever kvar, att det är lite oförtjänt. Och ibland är jag så trött på min maskin om det är något som händer att jag vill slänga den i sjön. Sen andra gånger älskar jag den för att jag kan komma till platser som jag aldrig annars skulle koma till. Ligga mitt inne i ett fiskstim som inte bryr sig om mig det är magiskt.

Men jag har fått rätt bra service av dom så jag ska inte klaga.

Jag va rätt så tidig med att köpa den så den kanske hade vissa barnsjukdomar.

Ibland snöar dom in tror jag typ som med apple telefonerna.

Det är ju spännande med deras nya dator, men den är väldigt dyr.

Sen tror jag ibland att folk inte fattar smarta saker med Poseidons rebreather tex det här med självvalidering.

Allmänt snack om m28, Poseidon och projekt.
Man kan bli förvånansvärt korkad under vattnet om man håller på med flera saker samtidigt och något är fel. Jag har varit med om en gång när jag tittade på min dator och förstås inte vad ett värde betydde. “Jag har inte så lågt tryck” sen kommer jag upp och **kunde lugna mig och inser att jag hade tittat på temperaturen, asså det säger bara någonting om hur dum man kan bli om man är stressad**. och då tror jag Poseidons sätt att visa det där med mätare är jätteviktigt.

Sen tror jag att personer är väldigt olika så det hade varit bra att kunna customiza produkterna. Jag tror att ni kommer intervjua folk som är precis tvärt om mot vad jag är. Sen är det klart om man har för mycket valmöjligheter så är det också jobbigt.

45.15 Många knapptryckningar är jobbigt också! om man kunde göra ett interface som gör att man inte behöver trycka på knappar så mycket

37 Years

What is it that you are drawn to, whats the experience like for you?
For me it's **seeing a piece of history so seeing a wreck in its final resting place**. It also **how technology work**, coming from an engineering background.

11.39
Buddy contact or something that can tell you the direction of the body. A lot of people have looked at these proximity things where one of you wears one and the other wears one and when you get to far away it alerts you. When you turn in different angles it will tell you which way your body was.

I'm not sure how it will work because any kind of signal under water is horrendous. That's why everything is still hardwired on rebreathers.

It there anything in your diving (before, during after) that you feel disturbs you? Computer. And what gives you a good experience and a bad one?

Checklist are a massive thing for new rebreather divers, that little card that Poseidon do is absolutely perfect you don't need anything more complicated than that.

Which diving computer do you use today?
Shearwater petrel 2. I also have a Suunto helo 2 - its nothing fancy it does trimix and everything which is what i need it to do.

14. 32
Being able to see the information is the most important thing.

14.42
How much are you looking at your computer are you lacking any functions or features?
Not really.

Are happy with the interface?
I am, **I'm concerned that Poseidon made it to fancy**, where you can upload pictures to it and you can message on Facebook or stuff like that. From what I've heard it sounds **a little bit to gimmicky**. That's not what diving is about, **diving is about information at hand.**

17.54 I'll tell you **what would be good, something at actually measures fitness under water**. maybe **your heartbeat and blood pressure because that is huge in diving at the minute.** People in the age of 45-50 and their fitness in diving for heart attacks and stuff like that.

Not necessarily to assure you on the dive but when you download the data you can see it at different points.

I don't want to wear something everyday that i use for diving, it FOR diving. **I mean I have a Garmin with gps and heart rate monitor but i would never dream about wearing that on a night out.**

Why?
Because the features and the function is specific for what i wanted it to, also it looks digital, it looks dated so i would really wear it as an evening watch. **I would want to wear something that looks like an evening watch that really look swish and expensive to go diving.**

The trouble is that we've had so many of the same, **like the d6i from Suunto and dx, they where like evening wear in stainless steel.** I've seen people buy them, **but would it be for me? No, i like a big, big dive computer that's going to tell me all the information.** Also the site of the watch is going to be limited for vision**. A lot of the divers are older people and their vision is not what it could be.**

The average age of scuba divers is 29, as is most people don't start scuba diving until they have. the funds available, ant actually buy equipment.

23.30 How would you describe the diving community, is it easy to attract new divers
It all good and well when you take new divers i a pool, but in the uk then you would take them out on a lake and put them i semi dry and **it's not as enjoyable since its a little bit cold and not as cool. out of 10 people try it 1-2 take it up.** That's the margins I'm seeing. It different if its Australia or the Florida keys. Where the water is blue and clear it easier.

The problem is that when everybody progresses from rec (recreational). If you are a red-diver you are not actually a real diver until you've done any Tec. And thats the problem we've got in the diving community at the minute. **They think they haven't actually made anything of themselves until they done a bit of decompression.**

It's agency driven, instead of just getting out and getting experience diving, it's what course can i do next. And **they progress quickly through courses but don't really have a lot of diving experience. It needs to be more about the diving again.** But it sells courses.

What annoys you the most?
People not being prepared. Not checked their gear.

What about communications under water?
I've tried full faces masks with coms and stuff. We would never use them in deep water exploration.

Are you aware of the suunto online service movescount?
Yes the DM5 the diver version. I'm not really how that fits in with me, i mean when it downloads all of that to movescount, what is its going to do with it? **Is it data for research information or is it to look at how much people are using their scuba equipment?**

Can you see a potential in a community, where you can find new places to dive or similar?
The thing is we already have sites like wrecksite.eu that tell us this information.
I used to have a windows phone and someone did a dives sites in the UK with reviews and star ratings like tripadvisor…I suppose thats a good thing
Do you think a device could help collect data?
Many divers volunteer for research (how many species etc) for organisation like seasearch.

It would depend of you would have to buy a device on like water quality, i don't think divers would like that. …if its free of charge i would do that. It would be cool … but making it into an engineering really is a massive milestone.

What are your thoughts about the Poseidon brand?
My thoughts are that, it Swedish it's very well build, it a clever unit, it won't let you get in the water unless you do all the checks. A lot people think they are to clever for what they are.

Are the poseidon sticking to their own identity?

…that's the problem with Poseidon they promise stuff to early it sits and sits and sits until people buy another dive computer instead of waiting for the m28.

Do you handle new divers as well? what are there experience and feelings?
First steps in the pool is fantastic, you get all the smiles and enjoyment and all that. **When you get to the lake… it's a lot more focus oriented, a lot more serious in the cold water. more gear on an a lot more to think about.**

Is that clouding the experience for them?
I think task load is huge for first time divers… It's a lot different being out in a lake or the north sea. Its the challenge and then **they reflect in in "i didn't do that thing right…" but actually they've done an awful lot right to get to that point. I think a lot of divers put too much onus on the performance.** I don't think we should make product that are any easier, i really don't guys.

Do you think people lose track of the experience?
There always something from the dives that you look back in an think was that actually there? I take a GoPro helmet in… And sometimes when you watch those back. you suddenly realise how much you've been concentrating on the technology and you miss things. You look back at the video and actually that was something really cool i missed there.

Are new diver even more likely to miss things?
The newbies… are relying on the person they are with like the instructor or more experienced diver. …they may not be looking at their environment there actually looking and dancing around basic stuff.

I would like to see more promotion on tv to attract new divers. Be promoted more like a sport.

---

51 years

0.50
Vad har du för certifikations nivå?

Det kallas för master SCUBA diver när man har gått rescue och sedan 5 specialties. Så långt man kan komma utan att gå in på yrkesinriktad dykning. Blev i somras divemaster, och tog även TEC-kursen 40, 45, 50. TEC-50 dykare och divemaster.

Hur länge har du dykt?

Jag har dykt ganska exakt 20 år i år.

1.35
Hur kom det sig att du började med dykningen?

Jag hade väldigt mycket vänner runt omkring mig som började dyka i samma veva och en gång så fuskade vi en jag och en kille som hade dykt ett tag, på västkusten så sa han att du måste följa med och testa. Jag va väl inte sådär jätte… Jag gillar ju att bada och dyka sådär i alla andra lägen men just då så tänkte jag att fasen vi provar, så va vi nere på ett par meter bara utanför Fjällbacka på västkusten och sen så va det liksom kört.

2.24

Vad var det som fick dig/ får dig att känna att dykning var något alldeles extra?

Just att **det är en helt annan värld**, och dels har jag använt det här som **mitt lilla andningshål när jag jobbar väldigt mycket**. Så är det här ett ställe att komma till för mig där man kan få uppleva någonting utan att man har möjlighet att**t tänka på något annat.** Du kan inte simma runt där nere och fundera på vilka räkningar du ska betala dagen efter. Just det här att man **kopplar bort allting annat och måste bara fokusera på just det man gör.**

Och just det här att det är ju lite spännande, dykningen i allmänhet i alla lägen, vad man än håller på med det kan ju gå åt helsike. Det är inte så att man simmar omkring och tänker på det heller men finns ju en **liten sån spännande del i det** hela att saker och ting kan hända så det gäller att du **är på tå hela tiden med det du håller på med**. Och **den delen gillar jag lite grann sådär då att det är absolut ingen fara över huvudtaget men man måste va med hela tiden**, man kan inte slappna av.

3.35
Om man tänker ett dyk som du har gjort många gånger, Vad skulle kunna höja en sådan upplevelse? Allt ifrån teknik till personer

Det som jag **saknar ibland är ju kommunikationen, ett enkelt sätt att kommunicera med dina dykbuddies.** Det skulle nog kunna **höja min dykning på ett enkelt sätt utan att du behöver köpa prylar för 10000kr till.** Jag menar det finns ju skrivskivor och allt ihop men det är **ändå ett moment som är väldigt analog på alla sätt och vis**. Det skulle nog höja mycket.

4.47
Vad har du för utrustning som du dyker med just nu?

… **Suunto** datorer.

5.05
Vilken Suunto dator har du?

Jag har lite olika, dels har jag en D4i när vi kör tropiska och lite enklare. och sen har jag en suunto Viper air till den ordinarie dykningen. Och sen har jag lite sånna här "x-deep bottom timer" då när vi kör Tec bara för att det är ju en mer analog dykning i och med att du räknar ut din dykning.

5.33 *Har du provat på fridykning någon gång?*

Lite grann men det är inte riktigt min grej sådär. Men det skulle man väl iofs vilja kunna lite mer men nej det är inte min grej.

6.00 *Kan du beskriva din interaktion med dykdatorn under dyk. Från att du är på land tills det att du är tillbaka på land.*

Dels så använder man ju den beroende på om du kör luft eller nitrox. Det är det första som du gör, analyserar din flaskor och sen ställer du in det du behöver. Nu har jag inte gett mig in på den delen av dykningen när man implementerar gasblandningar i datorerna så jag har inte gått så långt.

Men sen naturligtvis under hela dykets gång när man kollar så att man **inte går in i Deco**. Nu är Der ju en Suunto viper air så den kopplad till reggarna (regulatorerna) så man kollar hur mycket luft man har kvar. Bottentemperaturer, i viss mån kompassen. och sen när man kommer upp är det ju dom normala procedurens med att kolla ut mycket luft man har kvar, hur länge du har dykt och hur djupas osv.

7.20 *Hur ofta skulle du säga att tittar på din dykdator när du är nere på djupet?*
Ett **normaldyk brukar vara någonstans runt 40min beroende på vart du är, kanske en timme när man är i tropiska vatten och kanske 35 när det är ett vinterdyk. Från början tittar du kanske inte så mycket på den,**

kanske var 5e minut. Sen så **beroende på vad det är för dyk man har gjort** och hur djupt man har varit så blir det **mer frekvent ju längre dyker går**. Sen så släpper man det när man kommer upp, ett par tre gånger under säkerhetsstoppet då så att man gör sina 3 minuter på 5 meter. Det är svårt att såg hur många gånger, det är lite olika, **ju djupare man är desto mer frekvent tittar man på dykdatorn** så att man inte går in i Deco om det inte är ett deco-dyk man gör då.

8.29 *Tycker du att informationen på dykdatorn är lätt att ta till sig?*

Ja för det mesta. Ibland känns det som att det **lite onödig information.** Egentligen behöver man inte vet just i själva fönstret hur varmt det är, ibland finns det lite andra värden man skulle vilja ha tydligare. Man lär ju sig en dator innan man börjar använda den men **inte alltid att den är så intuitiv så att den man bara försåt den direkt**. Ibland kan det vara lite missvisande sådär. Jag kan inte ge dig ett direkt specifikt exempel i och med att man har lärt sig hur sina datorer fungerar. **Viss information använder man ju knapp inte och viss information vill man ha lite större eller lite mer av.**

9.35 *Tror du att någon som har dykt ett par gånger bara lätt kan ta till sig informationen på datorerna?*

Lite grann iofs, det dom behöver. Både ja och nej. Det kan nog va svårt att få en viss information, när man är open water elev eftersom man har så mycket annat att tänka på. DÅ kan det nog vara lite svårt. Man säger att det **absolut viktigaste är dyktid och hur långt det är kvar tills Deco och har man en luft kompatibel dator så är det naturligt luftmängd som är kvar.** Det är inte alltid det är superenkelt att se med en gång, utan **det krävs lite tid att lära sig sin dator.**

10.45 *Vad är bästa men dina dykdatorerna. Funktioner eller utseende.*

Det m**an vill ha är tid och till deco**, och det är ganska så bra i Suunto måste jag säga. Om det är en **luft-kompatibel dator, som Suuntos cobra** som är luft integrerad som sitter på manometer slangen, Så är det **naturligtvis luftmängden, den är den absolut viktigaste.**

11.40 *Om man tänker på hur informationen visas, vad tycker är det bästa och sämsta med datorerna?*

Sämsta är att allting är ganska enformigt. Jag har ju en sån X-deep black en botten timer, men den är det ju en **OLED- skärm på och den har ju olika värden i olika färger, det är något man saknar på dykdatorer. Det skulle jag nog vilja ha, som är dåligt på dom befintliga datorerna.** Om man skulle kunna **utveckla det lite med möjligheten att se saker i olika färger istället för att stoppa in ännu mer lullull i dom.**

Det finns nog inget som är bra eller dåligt, man får lära sig. **Suunto datorerna är nog överlägset bäst av alla dykdatorer. Suunto Zoop är ju en sån helt fantastisk nybörjardator** med stora klara siffror men fortfarande är det om man jämför den me Xdeep så ändrar den färg när det blir dåligt med batteri och **när det händer vissa saker och man har uppstigning och nedstigning** så det finns ju sånna saker som man kan behöva när man lär sig. **Du ska ju inte gå snabbare än 18m i minuten men vad är det som säger det? Det finns inget som talar om för dig hur fort du går upp eller ner.**

14.15 *Varför tror du att dyksporten är så liten? Med regelbundna utövare*

Dels så är det **ganska dyr sport** om man ska ha sina egna dykprylar. Om man ska börja lira hockey eller fotboll så går man till stadium och köper sina prylar och sen hittar man en fotbollsplan och sen kör man. Du behöver ingen utbildning. **När du ska dyka kommer du liksom inte i vattnet utan utbildning och det är ganska meckigt att komma i**. D**et är många som tar det (Cert) på sina semestrar men sen när man kommer hem så blir det inte mer av det.**

15.40 *Hur tror du att man skulle kunna få folk att fortsätta med dykningen?*

I och med att den är **ganska dyr är det svårt vad jag har förstått det.** Men **det är otroligt många som har certifikat men inte utnyttjar det mer än en semester en vecka om året.** Jag har nog inget bra svar.

Mycket kommer tillbaka till att man inte bara kan dyka om man inte har utbildning. Nåbarheten till att få dyka på egen hand är ganska kostsam och lång. Folk är ju ganska lata…

17.40 *hur delar du med dig av dina dykupplevelser till vänner som inte är dykare eller familj?*

Det är svårt att förklara, om man ser en valhaj så måste man förklara vad det är och så. Dom förstår ju vad man håller på med i och med att man har hållit på så länge och man visar bilder. Men det är inte alltid så enkelt. Det är **roligare att prata med dom som dyker som man vet har varit på liknande platser.**

18.30 *Hur kommunicerar du med dom (dykarvänner)?*

Vi har lite dykgrupper på facebook där vi hänger. När man dyker så skapar **man ett ganska nära band till dom man dyker med**. Vissa tycker man bättre om att dyk med än andra. **Man vill kunna dyka på sitt eget sätt men ändå med någon ifall något händer.**

Man brukar lura in sina vänner att dyka också.

19.50

Man märker att om man lägger ut något som är sådär dykrelaterade så är det väldigt många även icke-dykare som ändå gillar och kommenterar det man har lagt ut.

21.00

Det **finns ju fantastiska platser att dyka på i Sverige**. Man skulle kunna dyka mycket mer hemma. Det är lite svår nått. Det är inte som utomlands där det ploppar upp dykcenter både här och där.
Tröskeln att kliva ombord är ganska hög om man inte är genuint intresserad av just dykning i Sverige.

22.00 *Tror du att dyksamhället i Sverige skulle kunna bli mycket bättre på att marknadsföra dykplatser?*

Ja det tror jag definitivt. Det finns ju ett par som har försökt. tex genom att **skapa en dykpark genom att kartlägga alla vrak och skriva historia kring det.**

22.54

Störst i Sverige på det är Dyk-leif på väderöarna.

Dive-team lysekil, flying divers

24.10 *vad stör du dig på mest i vattnet när det gäller din dykning?*
Nedskräpning stör mig. I Sverige är det mycket ölburkar och så från fiskare, drag och så tar man inte så stor notis med. Utomlands är det ren lathet och nedskräpning, i Egypten hittade vi massor med skräp, plastpåsar och till och med en hel svart sopsäck full med matrester och engångsmuggar.

26.00 *Vad är största hindret som får dig att inte åka ut och dyka?*
Väderförhållanden, om det är för kallt eller vind och vågor.

Tid, ett dyk är inte bara något du kommer på och 20min senare är man igång det är en längre process från att man bestämmer sig. Man kanske kan bestämma på en onsdag att på söndag dra vi ut och dyker på västkusten eller hemma liksom. Det är en startsträcka att hitta vart och med vem man ska dyka. Det finns inga naturliga platser som en fotbollsarena liksom.

27.40 *Använder du en dyklocka eller dator till vardags?*
Har en citizen dykklocka, det var det coolaste man kunde ha på 90-talet!
Sen har jag D4i som funkar som klocka och är väldigt smidig att ha på sig. Den använder man ibland till vardags men den är ju lite dyrare så man är lite försiktigt. I mitt jobb finns det **risk att man skadar den så jag har den inte så ofta.**

29.30
Jag vet att det har funnits försök där man har läst om dykdatorer som pratar med varandra, **som har haft kommunikations med varandra under vattnet och det är något som man saknar.** Ju mer man kan släppa dykningen och kan koncentrera sig på andra saker.

Misskommunikationen under vattnet är något som man märker är vanligt.

30.40
Det va nästan att var på gång att bli standard på dykcenter att om man dyker med dom så ska man ha på sig en tracking historia, så du kanske inte har så mycket nytta av den men din dykguide kan se vilka som är med. Han får informationen om vilka som dyker med honom. **Likaså om någon försvinner så kan dom ha en sån tracking historia för att hitta.**

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27 YEARS

- Vad är en typisk utomhusaktivitet för dig?

Det behöver inte vara någon fysisk aktivitet eller fokus på det, det handlar framförallt om **ett sätt att umgås**. Kvalitetstid. Om båda i förhållandet är stressade eller så tycker jag det ä**r väldigt rofyllt. Man känner sig harmonisk.**

Man **stoppar undan all teknisk utrustning** och liksom slappnar av på ett helt annat sätt.

Det är ju skillnad på att vara ute för att det är "gött" och för att nå resultat.

- Vilken typ av utrustning (teknisk) förhöjer upplevelsen av att vara utomhus?

Framförallt typ **klocka med barometer** och **höjdmeter**, det är ju väldigt **bra vid toppturer**. Som jag sa angående att det är skillnad på att röra på sig för att det är skönt och avslappande än med fokus på prestation så känner jag det att man **kanske behövde den där pulsklockan i början**, **men sen slutade man mer och mer att fokusera på den**. **Inte lika viktigt efter ett tag.** Nu känner jag att jag **känner min kropp så vä**l att jag inte känner att jag behöver lika mycket feedback.

Annars om man **bara är ute och "lufsar" så är det ju det att man vill helt enkelt veta var man är**.

- Vad gäller aktiviteter på havet, är viktigt då? Kärleken till havet?

Det är ju mycket **avkoppling**. Det är **frihet**, man vill ju bara styra ut mot horisonten. Vi **gillar ju när det inte är så mycket folk** för att kunna ta sig in på ställen som andra inte kan.

- Är du beroende av något på båten/havet?

Guideböcker med **platser av guldkorn**. Flygfoton över vikar och pärlor. **Utforska nya platse**r. **Ibland skissar vi egna kort** av vikar för att.

- Hur hittar ni nya platser?

Mycket snack mellan vänner och så, testa nya gränser. Men jag vet inte om vi pratar så mycket om det egentligen, **man vill ju kanske inte avslöja sig för mycket.**

- Fridykning?

Jag har ju problem med öronen så det får jag hålla mig borta från. Men de andra (vänner) sysslar ju med det. Det är **ju en trend helt klart, det och harpunering**.

Vissa gillar ju att pressa gränserna, hur djupt kan man gå. Det är inte vi så intresserade av. De kollar alla stats liksom, **de vill ju veta allt**. **För dem är det en sport, en farlig sport.**

Min kille Per tycker **mer att det handlar om att förbättra sin andningsförmåga** och så, l**ära känna sin kropp**. Mer om **sig själv och friheten**, inte lika mycket sport.

Sen är det ju mycket **koppling mellan yoga och fridykning**, **hitta sig själv** och lära känna sig själv för att veta sin gränser. Man har ju pratar om att mäta sin prestation i samband med yoga. I yoga pratar man om att "alla kan yoga".

- Vad gäller förorening i havet, är det ett problem tycker du?

Jo men absolut, framförallt vad gäller **typ små plaster som hittas överallt.** Det är ett problem. Per (hennes kille) fridyker mycket och tar upp typ musslor, där är man ju lite osäker på om de innehåller plast eller annan förorening.

Sen är det ju **det här med tång**! Jag tror verkligen man kommer i framtiden börja använda sig av och äta mycket mer tång, och **då vill man ju verkligen veta att det är bra grejer.**

- Vad är det största hindret för att komma ut? (land/hav)

Asså at**t fixa, packa och leta upp all utrustnin**g som ska med. **Leta efter prylarna och göra i ordning efteråt. Det ska vara enklare.**

- Har du själv svårt att motivera att hitta på något att göra?

Nej verkligen inte haha.. Men kanske att **man missar mycket nära i sin omgivning?** Det kanske hade varit bra att får mer info om.

- Angående tjänsten Movescount?

Det är riktigt **bra med sammanställningen,** var kan man liksom köra swimrun, skridskor och landsvägscykling? Sånt är bra. Jag är **inte så mycket för att berätta att jag sprungit 5 km**, men i den **sociala kontexten tycker jag det är bra.**

Sen kan det ju vara så att många inte berättar om sina "smultronställen", det kan ju vara lite lurigt. Jag tror många vill hålla vissa grejer för sig själva.

- Angående luftkvalité? Det pratas ju allt mer om det?

Det är något jag tänker på, helt klart. Ofta räcker det att jag känner att det luktar illa så blir man lite paranoid. Det hade varit **bra att få direkt feedback på där man befinner sig så kan man släppa den oron liksom**, om den är onödig. Och definitivt om det är direkt farligt.

- Gemensam nämnare i olika sporter? Vad är det man gillar med friluftsaktiviteter?

Det är så himla mycket frihet. Avslappningen och att **komma bort från det andra**. Sen handlar det också **om hälsa, man vill ju må bra**. Röra på sig och dagsljus. **Man tänker på enkla saker som att må bra, äta gott och få luft. När man kan fokusera på dem "enkla" behover känner man sig oftast lyckligare tycker jag.** Sen vill man ju också att ens familj och vänner ska må bra. Barn när man skaffar dem, ska kunna växa upp i sund miljö som man mår bra av.

Empatisk design, en produkt som ska känna av hur lycklig du är lite. Det tror jag bara kommer bli större framöver.

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25 YEARS

- Utomhusaktiviteter, vad brukar du göra och varför?

Det har väl alltid funnits där för mig, vi har alltid varit ute mycket med familjen och så. Rest mycket, mer upptäckande resor. Desto mer jag rest desto mer vill man upptäcka.

Sen har ju löpningen och hiking blivit allt viktigare för mig.

- Vad är det som är så skönt med att komma ut?

Friheten, att koppla av helt och hållet. Jag tycker så **mycket om skogen, tystnaden**. Det är en helt **annan grej att försöka ta sig fram genom naturen än på en färdig väg**. Man känner sig ett med skogen, man blir **uppslukad av stunden och naturen.**

- Har du med dig någon form av utrustning när du är ute och springer? Vilka funktioner är du ute efter?

Egentligen bara min GPS-klocka, ibland också telefon. Jag vil**l framförallt ha distans, karta/område, höjdskillnad är ganska kul, speciellt efteråt**. **Så lite som möjligt egentligen**, men några fundamentala funktioner typ.

- Vad vill du inte ha när du är ute?

Inga störande moment egentligen, framförallt **inga samtal** eller så från en telefon. Känner **inte heller att jag behöver puls, det känner jag att jag vet min kropp redan**. **Puls-info skulle nog till och med ta över upplevelsen för mycket** tror jag.

- Mäter du dina funktioner under aktiviteten eller efteråt?

Mer under tiden, så att man vet att man behöver typ springa lite längre, **för att slå sitt tidigare rekord typ**. **Vissa år har jag också fört statistik över min träning, det sker lite automatiskt med den klockan jag använder** (Garmin Forerunner, 5-6 år gammal).

- Movescount?

Vilken cool grej, vet kanske inte direkt hur jag skulle använda den. Möjligtvis är det **bra att veta på vilka sträckor som är schyssta att starta och sluta på**. **Löpning kan ju vara en ensamsport så via en sån här tjänst kanske man kunde få lite mer inspiration**.

- I resande, hiking, trekking, vad är det du letar efter i den typen av aktiviteter?

Där handlar det mycket **mer om att ta in omgivningen**. Att man är där själv i naturen, **att man har med sig endast det man behöver.** Man kanske har med sig kamera, telefon och så. **Man skulle vilja veta mer om sträcka, höjd och plats.**

Det handlar ju **mycket om att ta in naturen, friheten och avslappning.**

- Vad är det som lockar med aktiviteter på/i havet?

Jag paddlar **mycket kajak, det älskar jag**. Och lite motorbåt, men framförallt är de**t kajaken där man får fullständig frihet med havet. Man kan ta sig in i vikar och annat som man kanske inte gör med andra typer av båtar eller så.**

Stillhet, tysthet. Man kan **komma sjukt nära djur** som man kanske inte annars kan. När jag är ute och paddlar **kajak har jag typ inget med mi**g, minimalt med grejer. Kanske lite mer grejer om man behöver köra övernattning såklart.

- Du jobbar delvis i sportbutik och handskas med sportklockor i olika former, vad hade du letat efter i en klocka riktad mot friluftsliv?

Framförallt mycket bättre GPS, det ska bara funka. Idag är jag missnöjd med den. Sen **designen, något lättare och smidigare**. Jag hade absolut **kunnat tänka mig att ha en klocka på mig hela dagen om jag kände att den passade rent estetiskt** också.

Displayen eller informationen ska bara ge tydlig och relevant info. Det **kanske man kan ställa in personligen**. Man vill **bara ha det nödvändigaste**, **inte massvis med siffror eller information**. I **vilken ordning saker ska komma - typ trycker jag en gång kommer detta och två gånger detta - osv. Vattentäthet också**, man ska inte behöva vara orolig för väder eller så.

- Är det roligt att använda funktionen via datorn sen efter passen?

Njaa, den **tjänsten som har jag idag till min klocka är rätt plain**, svartvit liksom.

- Dykning, var har du gjort det och vad har du för upplevelser där?

Jag har problem med öronen så jag får inte dyka, men snorklat har jag gjort mycket. Har gjort det mycket i vårt sommarställe i norge, där är **det så klart vatten**. **Det är ju lite en annan värld liksom när man kommer under ytan**. Jag tycker det är **sjukt kul med arter och natur i allmänhet** också.

- Vad är det som avskräcker med vattenaktiviteter?

När det typ immar igen och **man är på platser man inte känner till**. **Man vill veta hur det ser ut.**

- Vad är det största hindret för dig att ta dig ut (land, hiking etc.)?

Lokalsinnet, jag har inget vidare lokalsinne. **Jag vill ha riktigt bra kunskap om hur det ser ut och var jag befinner mig**. **Dåligt väder kan ju också avskräcka,** där vet man inte riktigt hur man hade reagerat eller agerat i den typen av kontext.

Om jag skulle ge mig ut någonstans **där jag inte känner till platsen ser jag till att informera mig innan om omgivningen.**

- Är miljömässiga aspekter (land/vatten) något som oroar dig?

Ja det skulle jag säga.

- Hur tror du man kan få fler intresserade av miljön?

Om man gör det **enklare och mer tillgängligt**. **Så att fler får upp ögonen för det och känner att de kan bidra med något**.

APPENDIX IV - BRAINSTORMING IDEAS

Interaction

- Color code information for quick understanding/access
- Create a periphery color around mask to signal diver and surrounding divers of the status. Green=all good, red=danger/action required
- Give directions using different body parts. Used in order to find buddy. Vibration in right hand notifies diver that buddy is in that direction.
- Use vibration on different body parts to signal different things. i.e. Left arm = ascent speed
- Show that information is available in the mask using a light diode
- Bracelet or similar contacts to invoke attention.
- Use light signals on dive watch/computer to signal safety concerns, like depth or No-deco
- Use vibration as communication form between diver and dive computer (think text vs email vibration in a phone) learn the different signals
- Use only vibration as means of communication (connected to above)
- Set the dive plan on the surface and only alert if a deviation occurs during the dive.
- Integrate the computer functions in regulator or mouthpiece in order to minimize the task load for divers. Reduce the amount of equipment.
- Only receive information about a certain activity. During descent show only depth, during dive show only dive time, during ascent show only speed and stops.
- Use bars or other form of information displays to indicate data and information for the diver.
- Simple band that lights up in different colors depending on the depth/danger? Going from green to red to symbolize “OK” to “Danger”
- A very simple bar showing for example “remaining time”. Cingular bar going around the watchface (see images in moodboard/behance).
- Materials that change colors depending on depth/pressure/time (bestäms av användare innan dyk?)
- Necklace/bracelet with temperature characteristics. Gets hot or cold depending on the situation and what information that needs to be signaled to user.
- Smells/tastes under water? (wild card).
- Information via sounds, i.e. when reaching a certain depth (that’s decided on beforehand).
- Projecting information in front of user, which can be helpful for both the user and his/hers diving buddies. (communication between divers)
- LED-lights that can be a part of existing equipment like the mask, wetsuit or fins. Lights up depending on the situation and can therefore signal and interact with user/other users.
- Should be able to work in context with other gear (from other brands?)
- “Two-face-watch” that has different watch faces depending on if it is being used in water or on land/everyday use? Switch when needed to.
- Can be part of the current clothing/equipment, like a glove, fin or wetsuit. Integrated in those pieces. Smart textiles?
- A ring that changes colors depending on situation/danger? Vibrations?
- No text or digits at all. Information could be displayed through any kind of wearable or goggles/mask instead.
- Set all parameters before dive, no physical interaction during dive. Or visual interaction either?
- Haptic signals, vibrations and similar. Connected to warnings/alerts/acute danger.

- Should the user be able to change the interface depending on personal preference or should it be decided from the start? Open source or closed environment? (Apple philosophy?)

Communication

- Projecting information visually in from of diver. Communicating to several other diving buddies at once. How does visual projection work under water?
- Writing/drawing somehow? Apples “Digital touch”? Being able to send simple messages, emoji, directions, reactions, fish, feelings?
- Super simple communication, only getting option of clicking/pressing a green/red buttons?
- Visual information on the back/tube? Easy for others to see what is happening with your buddy. Still have to solve how to communicate that information back to the other user?
- Sonar?
- Sending out visual signals when in danger? Flare-gun except underwater?
- Messages/alerts gets sent automatically when a person is in danger/reaching limit. Not up to user to do it manually.
- Siri/AI to communicate with and to help with the communication of more complex messages to others? Needs voice in the mask?
- MORSE-code communication? Press/click/hold on a device to send these kinds of messages? Simple messages primarily.
- Communicating through colors (colors can’t be misinterpreted??) - green is good, red is danger. (Color Blindness an issue?). Keep it simple.
- Vibrations like the ones of sms/mail/notice that people are used to and know what they mean.
- Sounds/music that reminds people of a certain theme/reaction. Inception??
- If in danger, the colors around the diver lights up and sends an automatic message to others around.
- Tastes and smells under water?? (wild card)
- Automatic or manual form of communication? Manual can mean people have to think about it, automatic can be more safe and reliable?
- Decide on what needs to be communicated before going in the water. Set/decided sentences for that specific occasion (meaning not unnecessary functions that you don’t use)
- Scan environment, sonar/ekolod
- Locate my buddy system where you display a direction and distance to your buddy on the dive computer
- Switch the display to a dive buddy’s to check their information. Mostly for instructors to monitor/calm students
- open source “texting”. Give suggestions of the most used words (like texting on a phone) and add words on the surface that could be useful in that particular dive
- Use finger signals up, down, right, left. Similar to that of blind people using phones.
- Increase the light/ flash the light, on your dive buddys computer to locate him/her
- Use vibration to attract attention from your buddy. Control the vibration signal at your buddy's computer/device
- Control your buddy's device. Sound, vibration, light
- Show other your willingness to communicate with light signals. Green=ok to communicate, Red= i would not like to be disturbed from my experience
- Proximity warning. If distance is more than 10m between two dive buddies indicate that (sound, vibration, etc). Can also be used to navigate underwater (descent line, boat etc)
- Verify information, how can information be verified. Repeat it back.

Functions

- Visually attractive way of showing depth, bottom time and time.
- Giving feedback/alerts about interesting places in the area. (Maybe before the dive so that it does not interfere with the experience?)
- Somehow eliminating the need of attending other gear and equipment? Collecting all interactions through this device.
- Stats/data over your "career" as a diver. Saving important features of the diving experience. Depth, time, number of places, seen things etc…
- Connecting service in iPhone/smartphone/PC/Mac to take the experience further. More functionality in this service and not in the product itself. Focus on experience when diving, looking at data later.
- Somehow educating the user to learn more about the fundamentals of diving and how the body reacts to this environment.
- Open source for other developers to produce more functions/apps? Or closed environment where you can control the user experience?
- Environmental focus, pH-measure, other qualities of water/ocean? Collecting data for environment focus and usage. Passive function, not overrule main function.
- "Capturing the moment" → photographs, videos, sounds, smells etc.
- Service that allows user to connect with each other, finding new people around you with the same hobby/interest should increase the amount of time diving. "Tinder Diving"
- Bodily functions → blood pressure, heartrate, unusual activity in the body, level of "calmness"?
- Tag "Area of interest" when discovering an interesting location (marking the spot somehow??)
- Limit the amount of functions as much as possible. Less is more, quality over quantity.
- Barometer → having the ability to check current weather/climate warnings. Storms, higher water level, rough seas etc.
- "Movescount"-service, except more focused on diving and the ocean. Really nice design that could replace "dykarna.nu" as a the new platform to interact via.
- Adaptability from previous dives, tell the users how they can improve their diving.
- Location of boat, line of descent/ascent/other vessels. Radar?
- Measure visibility underwater, reference points could be device and BCD or regulator.
- Make vibration band and device separable for use with wetsuit/drysuit. But also connected for "on-skin use" in warmer waters
- Tag experiences to increase the experience and memorize the dive. Tag key points like fish, wrecks, corals etc,
- Track currents and their directions so that navigating and directions are made clearer and you are aware of your movements
- Download locations and POI
- Create a network of divers to communicate and check each other in regards to safety.
- Buddy watch. Share a watch so that one is responsible for keeping track of data and the other can focus in the experience.
- Have one master computer that keeps track of the other users. Useful for instructors, and more experienced people diving with inexperienced people. That way the students can focus on the experience and only be alerted (maybe vibration/haptic) if there is something that needs attention.
- Base calculations on fitness levels (preset on first use, age, fitness level etc)
- Backup computer in bracelet to ensure safety

Area of use

- Modularity, have a watch for everyday use and one for diving - keep elements such as bracelet.
- Can it function as something different on land? plug it into the car or a computer
- Modular like google project ARA, add functions like gps, freediving, light, pulse, dive etc
- Plug in a dive computer into an ordinary smart watch to add the functionality.
- Add a magnifying lens for when diving
- Lower the threshold for everyday use by making the style more sporty. Or go the other direction and make the dive watch just a little more “stylish”
- Add a screen or increase the screen size.
- The dive functions in the bracelet and then add a “normal” watch for when not diving. Or vice versa
- Add a diving case to add a more rugged/durable look.
- Is luxury connected to being fragile? Cheap/durable or luxury/fragile? Different ways or connected?
- Customization in order to satisfy the different opinions on appearance and aesthetics? Bands, watchfaces, other things.
- Connecting diving to freediving and other water activities. Kayaking, swimming, triathlon?
- Is it adaptable to different areas of usage and can change? One when using “on land” and another when diving?
- Offer different sizes depending on fit and preferences. Some like it big, others small, maybe there is no “one size fits all”.
- Connecting device to other platforms/services. iOS, Mac, PC and other systems. Maybe that’s enough of “other areas of usage”?
- Modularity → you are buying the experience of the product (Rolls Royce model), not the product itself. Maybe a model of service/subscription for additional devices/accessories for other areas of usage.
- Playing on the identity of diving in the appearance, how does that affect the usage of other areas?
- Sapphire glass for a display? Ruggedness in many areas.
- Materials that can resist being used in various types of environments.
- Building blocks (modules) like LEGO and Pandora. You can add certain bits and piece when needed to. Pandora-bracelet.
- Continue on the same functionality and values diving (simplicity, experience) and apply that to functions in other areas of usage also.
- Interchangeable bands for the same main body.
- Setting a limit in diving depth on the specification of the products, thus also limiting what the device should be able to handle, which also makes the product a bit sleeker and more nimble. (maximum 18 m?)
- Analog vs digital. It becomes “completely analog” when using in other areas than diving.
- Interface changes automatically between environments → Urban = calls, schedule, texts… Diving = time, depth, etc., Driving = focus on the driving, not interfering with that, Airplane/flying = airplane mode etc.

Diving Culture

- Limit the product to certain specifications, depth, time, to counteract the performance driven nature

- Launch a contest on experiences not performance for example: Seen fish, most dives, most included friends etc
- Make specific editions tropical vs cold
- Make editions based in age or gender. Change the size, the material or the color for example
- Market the product as invisible. I.e market the experience you will be part of rather than the product. Similar to GoPro
- How would a product for women look?
- Make communities about experiences rather than technical matters to shift focus.
- How to change forums and sites about GAS (gear acquisition syndrome) to instead focus about the experience. (9to5mac, Fujirumors, Fotosidan, dykarna.nu)
- Make users fundamentally understand the ocean in itself and the environment they are about to enter. Make it interesting to think about this new world and how to behave safely. (Tänker lavinföreläsningar och hur populärt det är).
- Push the fact that anyone could dive, regardless of gender and/or age.
- Sell the IDENTITY.
- Move away from the hard, black, performance and over to soft, ocean, colors instead.
- Sell the product closer to customer (typ Naturkompaniet).
- Highlight what aspects that you can't find in other places than the diving spots in your local area. Make diving at home something cool and different.
- Change the incentives. Not level of diving skills, "tec40" or hours under water, but rather the number of different places you have been to/seen, what fish or underwater nature you have seen and experienced. Think Pokémon → gotta catch `em all.
- Market the experience of diving in this product. Move away from technicalities and performance.
- Make the notion of the sport "younger". Attract a younger generation.
- Minimize the competition in diving and push the good aspects of the community instead. Can you do something really positive with diving clubs/membership?
- Make it accessible for everyone. It should be sold/available in all environments close to water → like "beachstands" and shops that sell snorkel things, surf gear and similar.

APPENDIX V - MORPHOLOGICAL MATRIX

IDEA 1 - BAND	
Interaction	
I1	• Color code information for quick understanding/access
I2	• Simple band that lights up in different colors depending on the depth/danger? Going from green to red to symbolize “OK” to “Danger”
I3	• A very simple bar showing for example “remaining time”. Cingular bar going around the watchface (see images in moodboard/behance).
Communication	
C1	• Messages/alerts gets sent automatically when a person is in danger/reaching limit. Not up to user to do it manually.
C2	• Vibrations like the ones of sms/mail/notice that people are used to and know what they mean.
C3	• If in danger, the colors around the diver lights up and sends an automatic message to others around.
C4	• Proximity warning. If distance is more than 10m between two dive buddies indicate that (sound, vibration, etc). Can also be used to navigate underwater (descent line, boat etc)
Functions	
F1	• Stats/data over your “career” as a diver. Saving important features of the diving experience. Depth, time, number of places, seen things etc…
F2	• Bodily functions → blood pressure, heartrate, unusual activity in the body, level of “calmness”?
F3	• Limit the amount of functions as much as possible. Less is more, quality over quantity.
F4	• Make vibration band and device separable for use with wetsuit/drysuit. But also connected for “on-skin use” in warmer waters
F5	• Backup computer in bracelet to ensure safety

Area of use	
A1	• Offer different sizes depending on fit and preferences. Some like it big, others small, maybe there is no “one size fits all”.
A2	• Building blocks (modules) like LEGO and Pandora. You can add certain bits and piece when needed to. Pandora-bracelet.
A3	• Interchangeable bands for the same main body.
Diving Culture	
D1	• How would a product for women look?
D2	• How to change forums and sites about GAS (gear acquisition syndrome) to instead focus about the experience. (9to5mac, Fujirumors, Fotosidan, dykarna.nu)
D3	• Move away from the hard, black, performance and over to soft, ocean, colors instead.
D4	• Make it accessible for everyone. It should be sold/available in all environments close to water → like “beachstands” and shops that sell snorkel things, surf gear and similar.
IDEA 2 - MASK	
Interaction	
I1	• Create a periphery color around mask to signal diver and surrounding divers of the status. Green=all good, red=danger/action required
I2	• Show that information is available in the mask using a light diode
I3	• LED-lights that can be a part of existing equipment like the mask, wetsuit or fins. Lights up depending on the situation and can therefore signal and interact with user/other users.
I4	• No text or digits at all. Information could be displayed through any kind of wearable or goggles/mask instead.
Communication	
C1	• Projecting information visually in from of diver. Communicating to several other diving buddies at once. How does visual projection work under water?
C2	• Visual information on the back/tube? Easy for others to see what is happening with your buddy. Still have to solve how to communicate that information back to the

	other user?
C3	• Siri/AI to communicate with and to help with the communication of more complex messages to others? Needs voice in the mask?
C4	• Show other your willingness to communicate with light signals. Green=ok to communicate, Red= i would not like to be disturbed from my experience
Function	
F1	• Somehow eliminating the need of attending other gear and equipment? Collecting all interactions through this device.
F2	• Connecting service in iPhone/smartphone/PC/Mac to take the experience further. More functionality in this service and not in the product itself. Focus on experience when diving, looking at data later.
F3	• "Capturing the moment" → photographs, videos, sounds, smells etc.
F4	• Measure visibility underwater, reference points could be device and BCD or regulator.
Area of use	
A1	• Add a magnifying lens for when diving
A2	• Connecting diving to freediving and other water activities. Kayaking, swimming, triathlon?
A3	• Connecting device to other platforms/services. iOS, Mac, PC and other systems. Maybe that's enough of "other areas of usage"?
A4	• Playing on the identity of diving in the appearance, how does that affect the usage of other areas?
Diving Culture	
D1	• Make specific editions tropical vs cold
D2	• Market the product as invisible. I.e market the experience you will be part of rather than the product. Similar to GoPro
D3	• Change the incentives. Not level of diving skills, "tec40" or hours under water, but rather the number of different places you have been to/seen, what fish or underwater nature you have seen and experienced. Think Pokémon → gotta catch `em all.

IDEA 3 - TWOFACE WATCH

Interaction	
I1	• Only receive information about a certain activity. During descent show only depth, during dive show only dive time, during ascent show only speed and stops.
I2	• Use bars or other form of information displays to indicate data and information for the diver.
I3	• “Two-face-watch” that has different watch faces depending on if it is being used in water or on land/everyday use? Switch when needed to.
I4	• Should the user be able to change the interface depending on personal preference or should it be decided from the start? Open source or closed environment? (Apple philosophy?)
Communication	
C1	• Writing/drawing somehow? Apples “Digital touch”? Being able to send simple messages, emoji, directions, reactions, fish, feelings?
C2	• Super simple communication, only getting option of clicking/pressing a green/red buttons?
C3	• Locate my buddy system where you display a direction and distance to your buddy on the dive computer
C4	• Use finger signals up, down, right, left. Similar to that of blind people using phones.
Functions	
F1	• Visually attractive way of showing depth, bottom time and time.
F2	• Open source for other developers to produce more functions/apps? Or closed environment where you can control the user experience?
F3	• “Movescount”-service, except more focused on diving and the ocean. Really nice design that could replace “dykarna.nu” as a the new platform to interact via.
F4	• Buddy watch. Share a watch so that one is responsible for keeping track of data and the other can focus in the experience.
Area of use	
A1	• Modularity, have a watch for everyday use and one for diving - keep elements such as bracelet.

A2	• Lower the threshold for everyday use by making the style more sporty. Or go the other direction and make the dive watch just a little more “stylish”
A3	• Add a diving case to add a more rugged/durable look.
A4	• Customization in order to satisfy the different opinions on appearance and aesthetics? Bands, watchfaces, other things.
A5	• Sapphire glass for a display? Ruggedness in many areas.
A6	• Setting a limit in diving depth on the specification of the products, thus also limiting what the device should be able to handle, which also makes the product a bit sleeker and more nimble. (maximum 18 m?)
A7	• Interface changes automatically between environments → Urban = calls, schedule, texts… Diving = time, depth, etc., Driving = focus on the driving, not interfering with that, Airplane/flying = airplane mode etc.
Diving Culture	
D1	• Limit the product to certain specifications, depth, time, to counteract the performance driven nature
D2	• Sell the IDENTITY.
D3	• Sell the product closer to customer (typ Naturkompaniet).
D4	• Make the notion of the sport “younger”. Attract a younger generation.
IDEA 4 - GLOVE/FIN	
Interaction	
I1	• Give directions using different body parts. Used in order to find buddy. Vibration in right hand notifies diver that buddy is in that direction.
I2	• Use vibration on different body parts to signal different things. i.e. Left arm = ascent speed
I3	• Set the dive plan on the surface and only alert if a deviation occurs during the dive.
I4	• Can be part of the current clothing/equipment, like a glove, fin or wetsuit. Integrated in those pieces. Smart textiles?
Communication	

C1	• Automatic or manual form of communication? Manual can mean people have to think about it, automatic can be more safe and reliable?
C2	• Decide on what needs to be communicated before going in the water. Set/decided sentences for that specific occasion (meaning not unnecessary functions that you don't use)
C3	• Use vibration to attract attention from your buddy. Control the vibration signal at your buddy's computer/device
Functions	
F1	• Somehow educating the user to learn more about the fundamentals of diving and how the body reacts to this environment.
F2	• Environmental focus, pH-measure, other qualities of water/ocean? Collecting data for environment focus and usage. Passive function, not overrule main function.
F3	• Adaptability from previous dives, tell the users how they can improve their diving.
F4	• Location of boat, line of descent/ascent/other vessels. Radar?
F5	• Track currents and their directions so that navigating and directions are made clearer and you are aware of your movements
Area of use	
A1	• Modular like google project ARA, add functions like gps, freediving, light, pulse, dive etc
A2	• Is it adaptable to different areas of usage and can change? One when using "on land" and another when diving?
A3	• Materials that can resist being used in various types of environments.
A4	• Continue on the same functionality and values diving (simplicity, experience) and apply that to functions in other areas of usage also.
Diving Culture	
D1	• Make editions based in age or gender. Change the size, the material or the color for example
D2	• Make users fundamentally understand the ocean in itself and the environment they are about to enter. Make it interesting to think about this new world and how to behave safely. (Tänker lavinföreläsningar och hur populärt det är).
D3	• Make the notion of the sport "younger". Attract a younger generation.

IDEA 5 - RING

Interaction	
I1	• Use light signals on dive watch/computer to signal safety concerns, like depth or No-deco
I2	• Materials that change colors depending on depth/pressure/time (bestäms av användare innan dyk?)
I3	• A ring that changes colors depending on situation/danger? Vibrations?
Communication	
C1	• Communicating through colors (colors can't be misinterpreted??) - green is good, red is danger. (Color Blindness an issue?). Keep it simple.
C2	• Increase the light/ flash the light, on your dive buddys computer to locate him/her
C3	• Control your buddy's device. Sound, vibration, light
Functions	
F1	• Tag "Area of interest" when discovering an interesting location (marking the spot somehow??)
F2	• Create a network of divers to communicate and check each other in regards to safety.
F3	• Have one master computer that keeps track of the other users. Useful for instructors, and more experienced people diving with inexperienced people. That way the students can focus on the experience and only be alerted (maybe vibration/haptic) if there is something that needs attention.
F4	• Base calculations on fitness levels (preset on first use, age, fitness level etc)
Area of use	
A1	• Can it function as something different on land? plug it into the car or a computer
A2	• Is luxury connected to being fragile? Cheap/durable or luxury/fragile? Different ways or connected?
A3	• Continue on the same functionality and values diving (simplicity, experience) and apply that to functions in other areas of usage also.

Diving Culture	
D1	• Launch a contest on experiences not performance for example: Seen fish, most dives, most included friends etc
D2	• How would a product for women look?
D3	• Market the experience of diving in this product. Move away from technicalities and performance.

APPENDIX VI- EVALUATION TRANSCRIPTS

App

Riptide

- Its really simple
- But you would still have the analog gauge for air pressure and depth to look at if i need to know more?
- You should have double everything because you shouldn't trust technology
- It doesn't tell me anything in a way but its good that it can remind you that you should be checking them every now and again. So if you have a vibration in your arm then you will remember, "oh shit i should be checking"
- Now you usually check with you dive buddy how much air they have and now you can't check that
- Personally i would want more information, but this can be like a training tool, that you give beginners to remind them to create a habit to check the safety levels
- If you constantly get vibrations telling you to check this or this then
- (would you feel safe?) probably, if i have the analog gauge as well then yes. Alone with just this…. not sure
- If those tiny boxes also would give me a number inside them then i would feel more safe
- I get that the color thing gives me information, but i would like to know more. But like the ascending speed, i don't care how many meter/second i go up sp there it is enough to see the color. But depth and time is something i would want to see more
- It's really simple so i'm not sure if it could replace a dive computer but as a learning tool. For instructor when you have a group of 4 at the same time under water and you are teaching them individually and the others are waiting that will give them a reminder to check this or that.
- It's not enough to know when you have to get up (air pressure) but sometimes you have to go around something and come back, then you need to know like steps in the middle to see if you can make it back

Cascade

- In some case you would never go up or down, for example a beach dive or a slope so there is no big difference so how good would it be to distinguish that? because then you don't have the different phases at all.
- i see the difficulty of doing this in real life because measuring the pressure changes is not always enough. Unless you have one button that switches it from one mode to the other
- The app is really nice and intuitive but sometimes you are in a place where you cannot charge your phone or want to have your phone so why not have both, so you can also use the buttons if you want. The phone would be better but just to account for all situations
- (would you wear ouside of diving) If it looks night why not, I think looks is a key driver to whether or not you would wear it. I mean people who wear running watches for example wear them outside of sports as well.
- I like that you get the numerical information, the first one (riptide) showed more with one glance but i like the numbers
- Maybe you could have a bar thing on the side showing if you go to fast.

Pandora

- I think it would be a slight learning curve to know what it means (position module)
- First time you would be like what the hell did the bars mean again.
- the round shape seems unergonomic you could do the same with the design of the previous one (cascade). I think that would be better looking.
- I think it is in a way over complicated. That it could be easier to just follow three numbers than following coloured bars going up and down
- It's not directly intuitive in what it means
- But you could take parts from this into the other one (cascade) and have the yellow and blue marks showing the depth
- The case is kind of irrelevant for the actual use, it's like a power bank basically.
- Its cool but it can be sold separately

Environment

- Maybe cool for expert user who dive everyday (collect env. information)
- A corporate sustainability is important
- This is such a performance item that you buy maybe one/10 years so i think the performance part is more important than the sustainability

Communicte

- Signaling your buddy would be good. Just to get attention
- Maybe it will help safety for instructors.
- There is a risk you will annoy the hell out of your dive buddy

Community

- I wouldn't share my experiences
- You need to be a repeated diver for it to make sense not just dive once a year

Favourite

- My favourite would be cascade with part from everyone
- Cascade is more versatile
- Would be willing to pay less than for a suunto zoop
-

Advanced open water

Riptide

- Spontant är det kul att veta vilket djup jag är på
- När man hittar en rolig grej på 13m djup så kan man inte prata om det innan. Men om man skulle kunna märka en grej under vattnet hade det varit bra. så kan man se det efter dyket. För det är sånt man diskuterar efter dyket
- Första gången hade det varit svår för man lär sig så mycket siffror utantill.
- Om det händer något som gör att jag måste omvärdera sin plan så kan jag inte veta hur mycket man ligger över.

- Den tillåter inte att man avviker från planen vilket i grunden är bra.
- Den stöttar “korrekt dykning” (enl plan) vilket är bra
- Bra för folk på dykskola, för din lärare att planera dyke.
- Man vill att den formar sig mer runt armen för haptisk feedback ska funka
- Känns som den sitter lite löst
- Skulle inte ha på den utanför dykning

Cascade

- Det bidrar till förståelse om man åker upp och ner i boyancy att man ser djup.
- Så länge funkar bra, är att den byter automatisk något bra.
- Gult och rött är starka signaler. Om man börjar få en gul signal som börjar blinka så andas man ännu fortare.
- Pulserar grön kanske är en bra indikation
- Ligger runt armen bra
- Känner sig säker. Nästan så att klockan vet mer än jag, vilket är bra, jag behöver inte ha koll på gränsvärden.
- Ofta tittar man lite snabbt, ser jag då att den är grön i periferin så är det nice
- Jag vill ha ljud sist på skalan. Om jag går till rött då vill jag ha ljud, inte annars

Pandora

- Gillar positionsmodule. Jag kanske inte veta exakt men kanske ett hum
- Inte använda röda färger på ställen ma inte behöver, det är en stress faktor att “shit jag är på röd”
- Känner sig säker så länge man ser att den uppdateras
- Känns pillig att ta loss från banden. Speciellt ute på en båt så att man inte tappar dom. Efter dyket kan du vara lite kall om händerna och då blir det ännus svårare.
- Man vill inte pilla så mycket, nu är det utrustning du ska rengöra och fixa, Man vill inte addera moment till det

Jämförelse

- Gillar Cascade bättre, för den ger mig mer exakt information i det tillfället jag behöver.
- Gillar positionsmodul i pandora. Jag är på rätt nivå. Men annars känns den komplicerat med allt annat.
- Cascade verkar allt funka.
- Formspråket i stoplight känns billigt, och den känns obekväm

Environment

- Känner inte att det bidrar men har inget emot det
- Om den skulle vara dyrare kommer jag inte köpa det
- Jag hade varit gladare om den var tillverkad på ett miljövänligt sätt, med miljövänliga komponenter än funktioner som gör mig medveten

Communication

- Vill ha en funktion som påkallar uppmärksamhet om man är en bit bort. Man drömmer sig bort lätt och då är det svårt att följa sin guide
- Många gånger pekar man på något men man vet inte vad dom vill att man tittar på. Kunna kommunicera: korall, fisk, stor, liten

Community

- Jag vet att jag aldrig kommer komma upp i den mängden (gamification samla fiskar etc..) så inte för mig men jag tror många hade uppskattat det
- Folk gillar achievements, jag har dykt här, jag har sett det här etc.

Stoplight

- Skulle passa turistdykare som inte vill veta något annat än det
- Jag hade spontant tyckt det va kul om man bara ska ut och grönsaksdyka för då ska man inte tänka på något annat
- Jag är uppfostrad till att veta tid och djup, för man får ut så pass mycket information genom att titta på dom parametrarna
- Kan en del av tabellerna i huvudet så då kan man ha det som referens och dubbel check för att veta om datorn visar rätt
- När man hittar något så vill man kunna delge att den här arten fanns på det här djupet
- Räcker med heltal i djup
- Känns bra att man inte ska interagera med datorn
- Om man råkar ställa in någon parameter fel så går det inte ändra under dyket eller dubbelkolla det
- Tycker det borde finnas en dubbelcheck/verifikation innan man hoppar i så att man är säker på att man har ställt in rätt parametrar
- Om man ska dyka i svenska vatten behöver man något som justerar armbandet
- Om man har en stor dräkt kan den försvinna i ett av vecken

Cascade

- Om man inte gör ett baljdyk (ner - samma djup - upp) så är man frågande till vad den visar, man kan gå ner till botten, gå upp 5m, gå ner 5m etc. Så att det inte blir att man hamnar i fel zon på klockan fast man inte vill.
- Tycket det är lite kul (att ha devicen på land). Det var ju väldigt populärt för att ha dykdator. Tror att det kan va säljande
- Tycket det är bra med olika färger, man ska bli stressad om den är på rött för då har ju något hänt.
- Vill ha vibration först, ljud kan vara svårt att uppfatta under vattnet med huvor och annat. Skulle den bara lysa är jag inte säker på att jag skulle uppfatta den.
- Men börjar man närma sig en safe zone så kanske den ska vibrera lite grann och sen kanske börja blinka med gult, och sen börja bli lite mer aggressiv om man går över.

Pandora

- Gillar att man får ett hum om djupet och det är lättare att förstå hur man rör sig
- Det kan vara bra om man är nära att nå sitt mål om man vill hitta något speciellt (positions modul)
- Man kanske kan lägga in extra ringar (referenser om man ska ha decostop eller hitta något)
- Det känns avigt att inte ha koll på allting exakt
- Finns inget som gör att man känner sig otrygg, men kontrollfreaket i mig vill veta mer
- Här får jag tillräckligt för att göra ett avslappnat dyk, till skillnad från stoplight
- Saknar tidsangivelsen, man tappar lätt tiden när man dyker och man navigerar mycket på djup och tid. Hur långt man simmar. Navigationen blir lättare om man får bättre referenser kring tid och djup
- Bra att ha halfway points som man kan navigera efter

Environment

- Mer intresserad av att den tas fram på ett miljövänlig sätt
- I tiden med produkter som tas fram på miljövänligt sätt och riktar man sig till personer (dykare) som ser mycket plast som slängs i havet så kan det vara en bra säljpunkt

Communication

- Gillar tanken med en funktion som påkallar en annan dykares uppmärksamhet
- Tror inte det är bra för nya dykare, dom kommer snarare att "oj nu händer något konstigt på armen" och dom ska alltid titta på instruktören och vara på en armlängds avstånd, så om den börjar påkalla uppmärksamhet för nya dykstudenter så tror jag inte det är en bra idé

Community

- Förslag på tävling: buoyancy tävling
- Vill även ha tävlingar som visar på att man dyker korrekt, har sett många dykare som står på botten och bara är ett dammoln, så kan man uppmuntra till skicklighet som dykare (inte performance).
- Hade loggningen gått automatisk så hade man loggat alla dyk, och att man hade fått se det lite snyggare hade det varit kul.
- Att man kanske kan lägga till söktaggar, typ att det här dyket hade mycket djurliv eller fina fiskar så kan man sortera ut sina dyk.
- Man kan visa och dela sina dyk

Jämförelse

- Hade valt pandora både med säkerhet och overall.
- Hade varit orolig att cascade inte visar rätt saker
- Om man hade varit ute och lekt hade stoplighten det kanske varit kul men inget jag hade lagt pengar på

Riptide/Stoplight:

- Spontant tycker jag det är en väldigt bra idé med vibrationer, inte så mycket ljud. Jag är i princip döv med så mycket man har på sig och över huvudet. Vibrationer beror ju också såklart hur mycket man har på sig när man dyker. Jag vet inte, men om man dyker på sommaren eller utomlands så är det jättebra.
- (hade du känt dig säker) Ja jag tror ändå det. Visst, till en början hade det varit lite ovant och en liten tröskel, eftersom man är så van vid att se tiden och djupet. Jag är väl kanske lite av ett kontrollfreak som vill se saker så. Man kan ju tabellerna rätt bra i huvudet och man försöker ofta stämma av det dykdatorn säger om det är rimligt liksom.
- Jag liter kanske inte hundra på min vanliga dykdator, jag har varit med om att jag slagit om till fel säkerhetsläge av misstag och det var ju inte bra.
- Jag gillar att kunna tänka igenom det lite själv, men å andra sidan här (riptide) så sätter jag ju gränserna ju själv innan och mer behöver jag ju egentligen inte veta.
- (fanns det några begränsningar med konceptet) Det är väl kanske det med "sista-minuten-ändringar" som kanske skulle kunna vara svårt. Att man bestämmer innan och hoppar i en liten gummibåt och lämnar allt som inte ska bli blött (typ telefon) på samma ställe, och om

då dykplatsen inte är så bra och man ändrar sig, att man kanske inte kan göra dem ändringarna då för att telefonen är på annat ställe. Men det är ju verkligen inget olösligt problem.

- (känns det bra att mata in information och parametrar innan dyket i telefonen) Ja men det tycker jag, när man gör lite mer avancerade och djupare dyk annars så har man ju ofta en app som man matar in information i och som man sedan skriver ned någonstans, fast här kommer det ju in direkt i "datorn" istället. Stopptider, gasbyten och så.
- (är informationen tillräcklig?) Ja jo det tycker jag nog faktiskt. När jag dyker och håller mig inom direkt uppstigningsgränserna så händer det ju ibland att jag improviserar lite och kanske stannar lite längre där eller avviker från planen för att jag kan. Här kanske jag skulle vara begränsad att inte göra det, vilket kanske egentligen är bra liksom, att man håller sig inom gränserna. Den säger ju till mig vad jag faktiskt borde göra. Alltså med det här konceptet blir det rött och på så vis med odiskutabelt, det blir inte så mycket tolkning som med en vanlig dykdator, vilket är rätt bra.

Cascade:

- Om man får feedback att man kommer till ett visst djup eller så är ju bra. Jag hade en dator som pep till då men det hörde jag ju aldrig egentligen, men i det här fallet har man ju bättre förutsättningar att lyckas (men ljus och vibration).
- Jag gillar att man faktiskt får siffror på djupet, och att man kanske får färg indikationer på det och i kombination med att det faktiskt påpekar att man är lite djupt och att man borde gå upp lite. Jag har en dator idag som faktiskt ger en lite liknande funktion, då jag till exempel ligger i safety stopp och råker stiga upp till typ 5,9 m så lyser den upp i helrött och verkligen säger åt mig att jag inte ska vara där. Det tycker jag är bra. Då vet man direkt vad det är den inte tycker om, om det handlar om djup i det här fallet.
- Jag gillar att man bara får information om det man faktiskt behöver. För det jag koller på i regel när jag dyker är egentligen bara tid kvar till direktuppstigningen och hur djupt jag är. Sen själva dyktiden, ja visst det händer väl att den är viktig ibland, men det är oftast inte det jag tänker på under själva dyket utan det är tid kvar till uppstigning som är intressant.
- (känns det som om du får tillräcklig information) Ja det tycker jag, det känns bra och ungefär den informationen jag brukar få. Möjligtvis också lite tydligare.
- Jag gillar också att man bestämmer innan vad man ska dyka (tid och djup) så man håller sig till det.
- (vad tycker du om formen) Den ser jäkligt snygg ut, väldigt slimmad. Det är en typisk grej att jag brukar plocka på mig klocka och kompass först och sen ska man krypa i remstället och då blir det jäkligt jobbigt när det är stort och bulkigt. Så desto mer slimmat desto bättre.

Pandora:

- Första intrycket är att jag tycker den är väldigt snygg och så tydligt som man behöver det egentligen.
- Spontant känner jag att jag kommer att ligga och försöka räkna om den stapeln (djupmodulen) till meter, men det kanske bara är jag. Men samtidigt visar det väldigt tydligt vad man behöver veta.
- Jag hade velat testa det och faktiskt köra igenom ett dyk med det (konceptet).
- (ser du några svårigheter med det?) Kommer dem lysa hela tiden? Jag har inte riktigt bestämt mig om jag vill att den ska lysa hela tiden eller inte. Man vill ju att den ska lysa när man tittar på den men inte när man vill titta på annat.
- (vad tycker du om iden med att modulerna placeras i caset och sen för över informationen till telefon?) Det tycker jag är väldigt bra, just liksom att man får all data i efterhand och att

man kan räkna lite på det i efterhand (luftförbrukning, medeldjup och så) är ju viktigt om man vill göra flera dyk tätt inpå varandra. Det använder jag mig jättemycket av, så man vet var man brukar ligga. Jag brukar också föra statistik om hur ansträngande dyket var. Samtidigt som det gäller oftast mer avancerade dyk, rör man sig innanför säkerhetszonerna och direktuppstigning är det ju aldrig något problem.
- (hade du kunnat tänka dig att ha på dig devicet utanför dykning?) Ja det tror jag nog.

Environment:

-)Hade en miljö-bit påverkat din inställning till produkten?) Ja det hade det, om man att det är faktiskt något som gör nytta. Det är naturligtvis svårt att svara på innan man vet exakt vad det är, men kanske inte en övervägande egenskap att välja den här produkten över en anna.

Communication:

- Jag tror att jag gillar det, att man hade en funktion för att "buzza" någon. Har dykt med fotografer förut och om de fastnar vid något ställe och man simmar vidare i 1 minut så är man borta liksom. Man märker inte det.
- Egentligen ska det inte behövas, man ska alltid vad uppmärksam tycker jag. Men oftast kan det hända att man glider ifrån det.

Community:

- (hade ett community, kanske med någon form av gamification, höjt upplevelsen) Det låter som en bra idé tycker jag.
- (är det något du hade engagerat dig i?) Ja det hade jag nog faktiskt. Idag när jag kopplar in dykdatorn till datorn har jag ett program som heter Subsurface som jag använder. Det är för att få någon form av digitalt loggande av mitt dyk, eftersom det är något man kräver om man ska gå en viss kurs kanske.
- Jag har tittat en del online över något bra community och verktyg men inte riktigt hittat något bra sådär. Subsurface är nog det bästa jag hittat. Men primärt delar jag inte med mig av informationen utan att det ligger mest på min dator.
- Det hade jag gärna velat ha.

Overall om Concepten:

- (Vilken är den säkraste om du fick välja av koncepten?) Svårt, men den sista tror jag, Pandora. Mest på känsla, nä men det är väldigt tydligt var jag är i förhållande till var jag borde vara. Det känns inte som att det är öppet för tolkning på något sätt, det känns inte som om man kan missuppfatta det på något sätt, även om man kollar snabbt. Det första (riptide) känns det lite som att man skulle kunna blanda ihop vilken det är som lyser rött, även om det iochförsig inte borde spela någon roll. Möjligtvis om man går för fort uppåt såklart, då ska man ju sakta ner…
- (om du fick välja en favorit?) I så fall är det nog mitten, Cascade, mycket för att den är snygg. Och den skriver ut siffrorna, vilket jag någonstans tycker är rätt skönt och något jag är van vid. Det är nog därför jag tycker rätt mycket om den.

APPENDIX VII - FOCUS GROUP EVALUATION NOTES

ALLMÄNT UNDER PRESENTATION

- Om man räknar fel på djup och det intressanta egentligen verkar vara några meter upp eller ner, vad gör man då?
- Det hade varit gött om man inte behövt göra upp en plan överhuvudtaget, bara hoppa i och sen varnar något om man gör något tokigt.
- (Riptide) Man skulle vilja ha att den här gröna ringen tickar ned, för då vet man hur mycket man har kvar lite.
- (Cascade) Det kan vara svårt att veta om man stiger eller sjunker under ett safety stop, det syns inte direkt i det interfacet som vi har idag. Referenspunkt liksom.
- (Cascade) Förslag om att i interfacet så kan ett djup vara markerat lite extra och att man då veta att man ska röra sig innanför den zonen. Och så räknar det ned.
- (Cascade) Bra att även andra dykare omkring ser att en färg lyser, så att de också blir medvetna om det.
- (Cascade) Man kanske kan ha en egen "ringsignal" på ljud-notification.
- En del frågor kring hur (Cascade) byter lägen automatiskt, hur fungerar det egentligen.
- Frågor på vad vi vill visa i exploration phase (Cascade)
- (Pandora) Varför är modulerna runda? Kan vara problematiskt om det vrider sig under dyket. Finns det en fram- och baksida?
- Frågor om den här referenspunkten igen på om man stiger eller sjunker under ett safety stop.

SAFETY (PLUS BLANDAT)

- Spontant tyckte någon att (Cascade) är den säkraste, för att man får mer information.
- Man är lite rädd att man skulle kunna riva av banden, om det är ett sånt "mag-lock".
- Lite osäkert att man (Stoplight, och kanske andra också) inte vet riktigt hur långt man har kvar till rätt djup kanske, eller till ytan, om något lyser gult eller rött. Man vet bara att man är lite fel ute.
- Vad händer om man verkligen hamnar utanför safe zone och allt bara blinkar rött, kan kännas lite meningslöst då?
- Man vill veta hur mycket man har "pushat" en limit.
- Man gillar ändå tanken med Riptide. Enkelt.
- Man vill att devicet ska lagra informationen om dyket så att man kan se det efteråt.
- Någon vill ha en fridykarmodul (Pandora).
- Skulle man kunna ha en kombination av Riptide och Pandora? Man gillar kombinationen av Riptide och modulen för Ascent/Descent i Pandora. Då får man lite feedback om hur man rör sig också i djup under tiden. Det är lite samma "stil" på Riptide och Pandora.
- Kan man glömma av att sätta på modulerna innan dyk?
- Frågor på hur ofta man ligger nära gränserna, alltså hur ofta kommer det lysa gult och/eller rött typ.

- Man kan bli osäker på om devicenet funkar typ, om man alltid rör sig innanför gränserna. Indikation på att allt fungerar vore bra?
- Skulle man kunna ha en GPS-grej som beräknar hur långt du färdats, hur djupt du gått, och hur långt kvar du har på dyket? Kanske att gult/orange kickar in på det läget, halvvägs?
- Kan man bli irriterad om typ något lyser gult/orange och så går man upp man så lyser det grönt sen igen? Att man liksom har mer tid kvar på dyket egentligen?
- Suunto-löparklocka, att typ devicenet pekar på ursprungsplatsen (kanske kopplat till Pandora-caset) så att man vet var man ska.

ANVÄNDARVÄNLIGHET

- Riptide känns sponta som att det inte går att göra fel. Allt är statiskt liksom.
- Cascade känns som att man behöver vara lite mer med, när den byter läge osv.
- Pandora känns lite mer "tolkningsbar", lite mer ungefär. Kanske behöver lite mer hjärnkapacitet,
- Vem som helst förstår Riptide.
- Cascade känns "onödigt komplex för att ändå vara så simpel". Man skulle kunna få in mer här och få ut mer av den. Man skulle vilja pilla på den, dra på den.
- Man kan inte styra över vilket läge man befinner sig i (Cascade). Är det bra eller dåligt egentligen? Vad är nybörjarvänligt, och vad är expertanvändarvänligt?
- Man skulle kunna få ut mer information i Cascade liksom, mer än de andra koncepten.
- Kan man få reda på, feedback, optimal rate att stiga?
- Om man ska symboler istället för text (Riptide) måste de vara solklara. Om kollar snabbt så kanske man uppfattar en symbol tydligare.
- Finns det utrymme att man missar VAD som lyser rött på Riptide?
- Ska man kunna trycka på Riptide, kanske att de projicerar ut mer information om man trycket på en av knapparna?
- (Pandora) Skulle man kunna få sin djuphistorik presenterad som någon form av normalkurva eller referens? Så man vet om man rör sig utanför den, ute på "uncharted territories"
- Hur kan man skapa ett ökat värde i devicet när allt är bra (idle)?

BÄRA UTANFÖR DYKNING

- Det är typ helt jämnt med vad gruppen skulle kunna ha på sig.
- Som Riptide är nu är den helt meningslös på land. Man behöver något mervärde där.
- Riptide borde ha möjlighet att samla information.
- Koppla till andra vattensporter.

PRIS

- Våra koncept kanske måste marknadsföra att mer siffror inte ska resultera i högre kostnad.
- Det känns som att man måste ha dykt en del för att fatta varför våra koncept är bra/prisvärda.
- Måste vara smart i sin marknadsföring.

- Nya dykare blir så inlärda med detaljer och siffror och beräkningar, det kan vara ett problem om vi riktar in oss på ett rekreationssegment.
- Koncepten kanske blir mer attraktiva för expertdykare för att de är så medvetna om att de kanske vill slippa en teknisk overload.

Overall

- Hela approachen, visionen känns rätt. Som att man dyker med en instruktör som bara ger en det absolut väsentligaste för att ha en bra upplevelse. Rätt tänk med andra ord. Det är kanske bara det man vill veta.
- Alla koncept känns verkligen nytänkande.
- Om det kommer från ett bra och välkänt dykmärke borde det innebära att det är bra.
- En del kommentarer om man verkligen vill blir stressad under dyk, eller alltså om man blir det av saker blinkar rött? Balans mellan awareness och fara?
- Innan man dyker så går det igenom ett läge som testar devicet och visar att allt funkar bra. Som ett "lysrör".
- Kan vara intressant med en bättre och roligare plattform för utbildning, typ som blir interaktivt och roligare att använda än att gå en PADI-kurs bara.
- Skulle man kunna göra så att det här devicet blir en snackis, en pryl som man är lite stolt över typ. Som en transceiver i skidsammanhang?
- Det kan var nice om den liksom har nästan en meningslös funktion som gör att man tar på sig den och har med sig den ändå på många sammanhang.

APPENDIX VIII - DIVE STORE TRANSCRIPT

RIPTIDE

- Spontant går det inte att planera framåt i dyket.
- Skitbra grej som ett tillbehör till min primära dykdator
- "Total time to surface" (mer avancerade info) är något han hade velat ha (shearwater).
- "+5"-funktionen som säger att om du befinner dig på det här djupet en liten stund till är det fortfarande grönt. Det är en ikon jag hade velat ha!
- Det här är en suverän grej att titta på först, och sen kanske behöver kolla på sin mer avancerade dator.
- Primärdator, primärdisplay! (bra, kopplat med kommentaren ovanför)
- (hon) Spontan reaktion från var först "nej jag vill ha mer" men sen när man inser vad den gör och hur den fungerar så kan jag inte komma på något mer egentligen jag behöver veta. Möjligen någon angivelse på tid eller djup. Eller mörkgrön, ljusgrön. Lite framförhållning, om man vill ha det liksom
- För 80% av våra dykare hade detta varit guld, hur nice som helst.
- Det är en utveckling det åt det hållet som det är påväg. Den ger info om du är innanför parametrarna.
- Ju mindre kunskap man har desto mindre kan man göra "on the fly", och majoriteten av rekreationsdykarna dyker ca 10 ggr om året och då hade en sån här funkat.
- Problemet kommer om något oförutsett händer, (hon infaller) fast för majoriteten av våra dykare innebär det sällan att man behöver gå djupare och då hade det här funkat.
- Jag skulle ge den en "+5" funktion. (flera kommentarer om detta)
- Jag gillar nog tanken på det första (riptide) mer, för där är något att man har något på armen, kanske riptiden då, och så kan man ta fram den mer avancerade datorn om man verkligen behöver det. I andra dykkulturer som i USA hänger den oftast där nere längs sidan liksom och då kan man ha den undan och bara förlita sig på Riptide mestadels av tiden.

CASCADE

- Idén att dela upp det (lägena) är väl jättebra (för en OW dykare hade den visserligen visat uppochner hela tiden).
- (hon) jag tvivlar på att den skulle kunna veta vilken information man skulle vilja ha i stunden, att den växlar rätt.
- (hon) Jag hade förmodligen fått stanna för att se vilken läge den är i , och varit lite otålig i det tror jag.
- Är det så få saker man vill veta så kanske man ändå kunde fått plats med det på en och samma skärm?
- (han igen) ett device som bara visar så lite data, är för mig nog bara ett extra device. Ju mer jag tänker på detta nu inser jag hur mycket data jag faktiskt använder för att fundera på vad kan vi göra om något händer typ. Djup, tid, hur mycket luft min kamrat har, hur mycket

jag har, medeldjup och allt, det är sånt som sker i bakhuvudet. Det stör inte mig, jag behöver mer info.

- (hur tänker ni på att den påkallar info genom ljud, ljus eller liknande?) Ljud fungerar väldigt sällan då man har huva på sig, vibrationer fungerar inte så bra på torrdräkt. Och ljus fungerar kanske inte så bra på OW dykare för man har armarna lite längre ut på sidorna. Dyker man på varmvattendykning så (upp till 3 mm) fungerar vibrationsbiten utan problem.Annars vibration i munstycket.
- Det är det här med att få mer information för att kunna planera mer framåt. Ju mer tekniskt jag dyker desto mindre kollar jag egentligen på datorn, medans om jag dyker mer "grönsaksdykning" gör man mycket mer och vill därför kolla oftare på datorn också. Man har mer utrymme på grönsaksdyk, man kan variera lite mer och därför tycker jag att det första konceptet hade räckt i de flesta fall, då kanske i kombination med en mer avancerad dator. (RIPTIDE)
- Det här med att man ska ställa in paramtetrar innan dyk tycker jag är en jättebra grej.
- Här på Cascade har jag svårare att hitta en bra användningsområde, lite för lite information för att jag ska kunna motivera det.

PANDORA

- Spontant hade jag velat kanske att hela devicet ändrade färg med uppstigningshastighet.
- asså jag vill ha alla grejerna kombinerat, då är jag nöjd! haha…
- (hon) alltså jag gillar siffror.
- Det beror vad maxdjupet är, om det påverkar hur man tolkar referensmodulen.
- Det hade varit kul att se hur det funkar i praktiken.
- Dykaree kommer inte alltid ihåg sina dykplaner, även om man bestämmer det på sin telefon och det kan vara svårt att avgöra om det var det senaste dyken eller om man har uppdaterat till det nya dyket liksom. Ofta göra man flera dyk på rad och hur kan man verifiera att man ställt in utefter nya data och rätt dyk?
- Ofta planerar man ju ett dyk utefter att något befinner sig på ett visst djup, men sen kanske inte det riktigt alltid stämmer och man behöver gå ett par meter djupare exempelvis än vad man hade tänkt, och då stämmer ju plötsligt inget på devicet. Vad händer då liksom?
- Jag gillar den hur den visar djup och tid.
- Jag tror att den skulle behöva visa vilken bottendjup man har eller aktuellt djup.
- Det skulle behöva stå vilket djup jag har matat in, att det står typ 30 vid det blåa sträcket. Sen hur man visar det, om det är tre prickar eller siffror spelar mindre roll.
- Man kommer ändra dykparametrar mellan dyk och att kunna verifiera om man uppdaterat parametrarna är viktigt. Flera dyk på en dag, man kanske har glömt att ställa om den. Vad dök man senast liksom, är det nya värden nu?
- Återigen, här har man all aktuell info man behöver på armen, där har ni kommit en bra bit på vägen. Man behöver inte ha så mycket info framför sig, men jag tror fortfarande att man kanske behöver ha något mer att kolla på i speciella situationer. Lite den mänskliga faktorn.

ENVIRONMENT

- Det hade nog varit en bra grej, men kanske inte betalat mer för det.
- Det måste fungera minst lika bra fortfarande, det är nummer ett.
- Däremot tror jag att det stämmer att det "strengthens brand", att det kan bli en snackis liksom.
- Man kanske får reda på mer om märket på det här sättet.

COMMUNICATION

- Jag tror på en "kalla-på-uppmärksamhets-signal", det kan vara en bra grej.
- Det är tillräckligt svårt i dagsläget att få en grupp dykare köpa samma dykdator och utrustning så att de får samma värden under dyket eller förståelse varför det kan vara bra att ha likadana grejer.
- Finns ett tyskt företag som gör ett sånt "buddy-call" verktyg.
- Man ska inte ha mer funktionalitet i kommunikation än att "jag vill att du tittar på mig".
- Inte försöka göra avancerade saker som morse, det handlar om enkla signaler för uppmärksamhet.
- En enkel idé gillar jag. Intressant hur ni skulle lösa det utan knappar dock?
- Jag tror det definitivt att det är en grym grej till nya dykare, även i säljsyfte tänker jag nu, att man kan säga till en grupp att "aa men om ni har dem här så kan ni bara trycka där så får han en liten notifikation om han skulle simmat bort från gruppen där". Det är ju bättre än att behöva simma ikapp en person i motströms.

COMMUNITY

- Det är ganska få dykare som dyker varje månad, det här inte som löpning där man gör det flera gånger i veckan, så det behöver vara något man upprätthåller.
- Det finns en risk att man går in och uppdaterar sin profil när man varit utomlands och rest/dykt, för att sedan släppa det i ett år tills nästa tillfälle liksom.
- Däremot att ha ett ställe där man kan ladda upp sina loggar online, och kanske även få badges när man har dykt si och så länge eller liknande. Första 30 h utan för snabb uppstigning eller så, det finns ju grejer att hitta på.
- Jag önskar att folk var villiga att dela med sig av sin erfarenhet mer.
- Jag gör ca 50 dyk per år och kanske loggar hälften av dem, men det har att göra med att jag är yrkesdykare också.
- (tycker du att det finns en bra plattform att dela med sig av dykupplevelser idag?) Nej, Padi försökte och misslyckades. Det är värt att försöka, jag hoppas att någon gör det. Scubaverse försökte väl också.
- Ja, vi hade behövt detta i marknadsföring för sporten.
- Det kan nog inte kosta pengar, man skulle kunna ta betalt för att använda vissa funktioner på plattformen.
- Man ska lätt kunna logga sina dykloggar, det måste vara enkelt. (Padiverse?)
- Det måste vara universellt för många olika dykdatorer och märken så att det växer.

OVERALL

- Ska jag rangordna så säger jag Pandora, Riptide och Cascade, i den ordningen. Men Riptide och Pandora ligger väldigt nära varandra. Pandora ger ju mig faktiskt också en beskrivning av var jag befinner mig i dyket, och det ger mig med.
- Om man kombinerar Riptide med en annan enhet, som man kan plocka fram utifall att, så tycker jag att det är klockrent.
- Det här är väl långt ifrån det som jag kikar på och använder idag, det känns nytänkande. Vissa saker har liksom kommit långt idag, Men är det bättre?
- För dem som man brukar kalla för "Resort diver" som alltid dyker med en instruktör och för upplevelsen, så är Riptide perfekt. För att om man tappar bort guiden vet man fortfarande att man kan gå upp om allt är grönt för att det är ändå någon annan som har planerat mitt dyk åt mig.
- Ur dykresort-perspektiv, om man hyr ut grejer, så är det perfekt att bara kunna dela ut Riptide och säga ni fyra följer med den guiden och följer de parametrar som är satta. Om det fortfarande är grönt är allt okej liksom, sen har ändå alla dykare sin egna logg att titta på i efterhand. Tittar vi på den gruppen av dykare hade Riptide varit en riktigt bra enhet till folk som gör typ 10 dyk på sina resor till Thailand. Dem är inte tillräckligt duktiga för att göra egna initiativ och tänka om under ett dyk ändå, och då är det perfekt. Dem följer ändå en guide som tänker och gör det andra åt dem, och har utbildningen och en större dator.
- Riptide som "barn" åt en större dator "mamma". Gruppen dyker med en guide och om något blinkar gult kan de vända sig till guiden som har en mer detaljerad vy på sin dator men också en större förståelse. Åt det hållet tror jag.