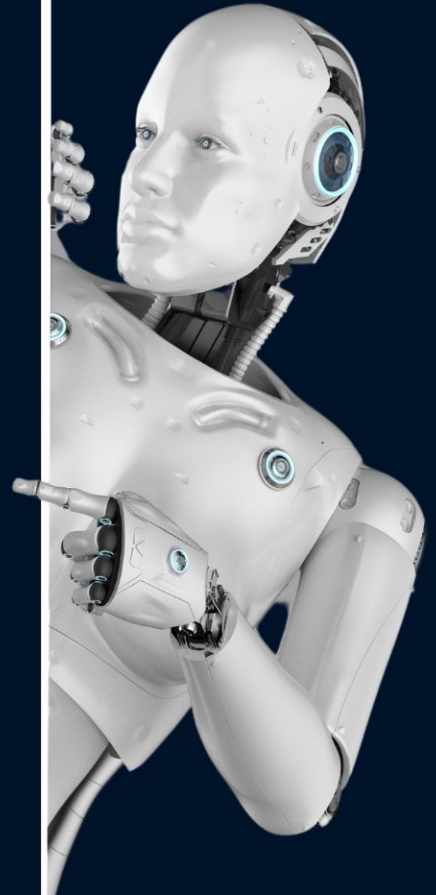


# How Autonomous Robots Will Change Every Industry

From manufacturing & warehouses to underwater navigation

**PRESCOUTER**



# Today's Agenda



## PreScouter Introduction

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Meet today's experts

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## Webinar topics

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- The importance of autonomy in your business
- Current and future use cases
- Catalysts and roadblocks for full autonomy
- Strategies and tips for developing a fully autonomous platform
- Case Study: The path to underwater autonomy

## Live Q&A with the experts

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## PreScouter intro



# Sofiane Boukhalfa

*Technical Director @ PreScouter*



*sboukhalfa@prescouter.com*

# PRESCOUTER

CUSTOM INTELLIGENCE FROM  
A GLOBAL NETWORK OF EXPERTS

 **EVONIK**  
KRAFT FÜR NEUES

 **Printpack**  
Preserving and Enhancing People's Lives

 **Sealed Air**

 **DUPONT**

 **lyondellbasell**

 **ALBEMARLE**

**AkzoNobel**

 **Sinclair**

 **BASF**  
We create chemistry

 **Diversey**

 **Dulux**

 **DART**



**P&G**

 **MOEN**

 **Dow**

 **RAYONIER**  
Advanced Materials

# Custom Intelligence, On Demand



## RESEARCH TIME IS LIMITED

- › PreScouter serves R&D, Product Development, and Corporate Development professionals from every major industry.

We operate as an extension of your in-house teams, helping you quickly get up to speed on what you need to know on a topic.



## INCREASE REACH & BANDWIDTH

- › PreScouter saves clients the time and pain of having to look for particular information, and does this at lower cost than using internal resources.

In effect, we eliminate the overhead of hiring, training and managing employees to perform research tasks.



## ENHANCE GLOBAL PERSPECTIVE

- › PreScouter saves clients the time and pain of having to look for particular information, and does this at lower cost than using internal resources.

In effect, we eliminate the overhead of hiring, training and managing employees to perform research tasks.

## FACTS:

Founded  
in 2010

Over **5,000+**  
**PROJECTS**

A truly global (and local)  
perspective, with **CLIENTS IN MORE  
THAN 50 COUNTRIES** around the  
world

Network of **10,000+ Global  
Experts and Analysts**



## DYNAMIC GLOBAL RESEARCH NETWORK

**10,000+** researchers, analysts, scientists, engineers, economists & subject matter experts



**10,000 AND  
GROWING**



**INDUSTRY  
EXPERTISE**



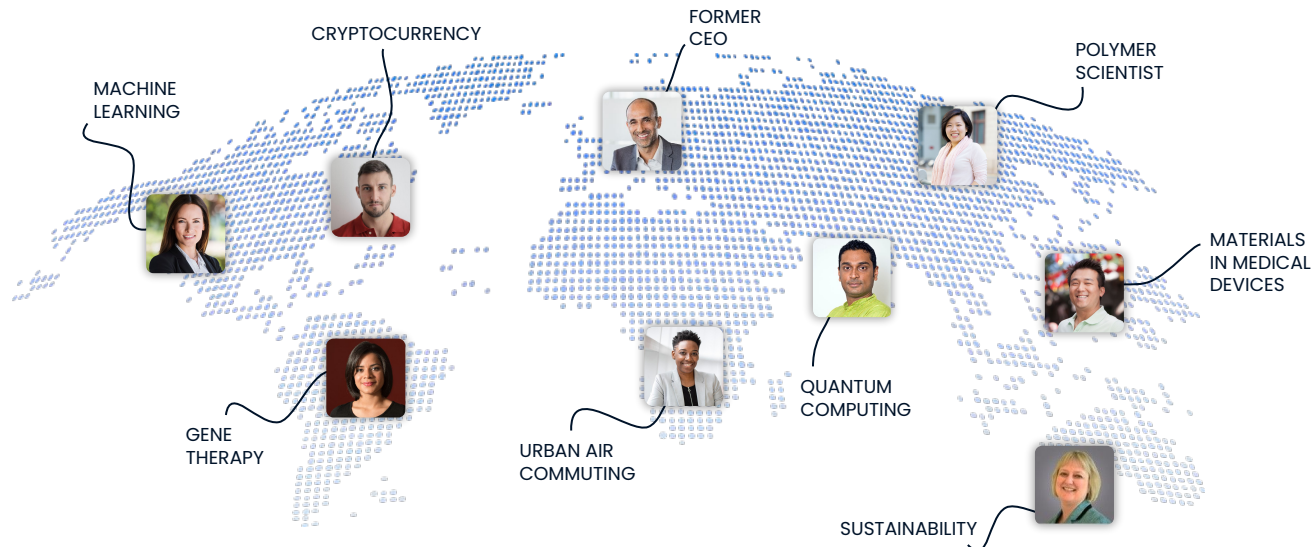
**GLOBAL  
PERSPECTIVE**



**UNBIASED**



**CONFIDENTIAL**



# Today's Speakers



**Sofiane Boukhalifa, PhD**

Technical Director,  
PreScouter



**Oren Gal, PhD**

Assistant Professor, University of  
Haifa, Swarms and AI Lab



**Marco Leonardi, PhD**

Performance Analysis Engineer,  
ARM

What does autonomy enable at a systems-level?

**A vision of the future for manufacturing,  
mining, and aerospace**



# The importance of autonomy in your business\*



## Cost- efficiency

~20% reduction in  
operating costs



## Optimized operations

~20% reduction in direct  
labor costs



## Improved ROI

ROI of 2-3 years

*Conservative estimates, projections for 2025 indicate benefits of up to [40%](#).*

## POLL #1

Is your company currently considering the implementation of autonomous technology?

☐

**YES**

☐

**NO**

☐

**NOT SURE**



What an  
autonomous  
system looks  
like in a  
**manufacturing**  
setting



**RAW MATERIAL DELIVERY**

Autonomous trucks and drones arrive, delivering your raw materials.



**INVENTORY & STORAGE MANAGEMENT**

As these materials arrive, imagine an orchestrated ballet of robotic arms and autonomous forklifts springing into action. They sort, categorize, and store each item with impeccable accuracy.



**PRODUCTION LINE**

Autonomous machines and robots work in harmony, from assembly to welding, from painting to inspection. Every step is precision-engineered and synchronized to the millisecond, ensuring flawless production flow.



# What an autonomous system looks like in a manufacturing setting



## QUALITY CONTROL & ASSURANCE

AI-powered inspection systems will detect the smallest of defects. AI continuously analyzes and learns, outpacing human capability to guarantee that every product meets your gold standard.



## PACKAGING & DISPATCH

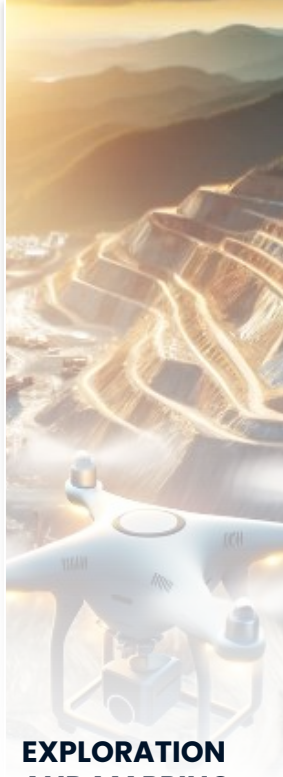
Ready products are whisked away to be packaged by robotic packers. Innovative dispatch systems next take over—calculating, coordinating, and choosing the most efficient routes for delivery, ensuring products reach their destinations swiftly and safely.



## END-TO-END INTEGRATION & MONITORING

Overseeing this all is a central AI control system. It monitors, analyzes, and directs each autonomous unit and process, making real-time adjustments to optimize the workflow, all while collecting data that feeds back into the system for continuous improvement.

# What an autonomous system looks like in a mining setting



## EXPLORATION AND MAPPING

An autonomous drone conducting aerial mapping and exploration.



## DRILLING AND BLASTING

An autonomous drilling rig performing precision operations.



## MATERIAL TRANSPORTATION

An autonomous haul truck transporting ore within the mine.



## MONITORING AND MAINTENANCE

A system monitoring mining equipment and infrastructure.



## SAFETY AND SURVEILLANCE

An autonomous surveillance drone monitoring safety in the mining area.



What an  
autonomous  
system looks  
like in an  
airplane  
manufacturing  
setting



**AUTONOMOUS  
LOGISTICS**

Autonomous platforms deliver raw goods and parts to and from an airplane manufacturing plant.



**INVENTORY  
MANAGEMENT**

Real-time inventory management to limit inventory costs while minimizing risks (interface direct with suppliers)



**PARTS  
PRODUCTION**

Robotic arms and machinery automating the production of airplane parts.



**QUALITY  
ASSURANCE**

Automated QA supplemented by virtualization for accelerated training and validation



**MAINTENANCE  
AUTOMATION**

Robots and drones maintaining infrastructure in an airplane manufacturing setting.

How can the latest advancements in autonomous technologies revolutionize industries and enhance productivity, efficiency, and safety?

## **The current autonomous platforms landscape**



# Raw material delivery

## AUTONOMOUS TRUCKS FOR FREIGHT DELIVERY BY AURORA AND BY VOLVO



### WHAT AUTONOMY ENABLES

- Transport of goods becomes 67% more efficient.
- The 3-day trip from California to Dallas takes an autonomous truck 1 day.
- 20 - 25% Fuel economy

## What's needed to unlock the next level of autonomy?

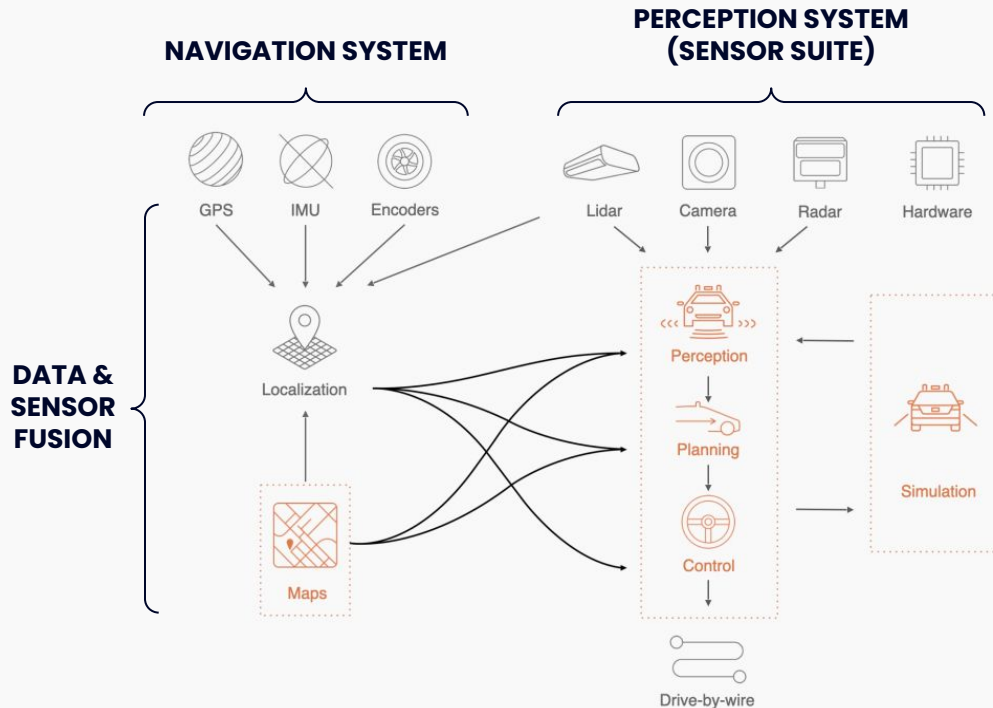
**AI Enhancements:** Improved algorithms for better decision-making in autonomy.

**Sensor Upgrades:** Boosted perception for safer, diverse environment navigation.

**Software Integration:** Streamlined logistics for efficient autonomous truck routing.

**Fault Management:** Enhanced system for autonomous issue detection and safe response.

## The technology behind autonomous vehicles

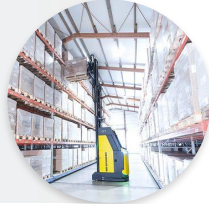


# Inventory and Storage Management

**Proteus by Amazon:**  
A collaborative warehouse robot



**SSI SCHAEFER:**  
Automated warehousing



**Stretch by Boston Dynamics:**  
Mobile robot



## WHAT AUTONOMY ENABLES

- Productivity increased between 25% to 40%[\[1\]](#).
- Saving on operational expenses by 20% to 40%.
- Using warehouse management systems has resulted in a 30% decrease in the typical order-picking time.
- Reduce error rates ~ 90%, leading to fewer returns, corrections, and customer complaints

# Production Line

## DIGIT by Agility Robotics A multitask humanoid robot

Digit is being tested by  
Amazon and GXO  
Logistics warehouses.



## WHAT AUTONOMY ENABLES

- Ability to perform a wide range of tasks, adapting to different workflows as required.
- Facilitates seamless integration into various operational environments.
- Handle tasks such as moving totes, palletizing packages, and estimating box volumes in warehouse settings.



# Quality Control and Assurance

Creaform  
MetraSCAN  
3D-R:  
Automated  
Quality  
Assurance



## WHAT AUTONOMY ENABLES

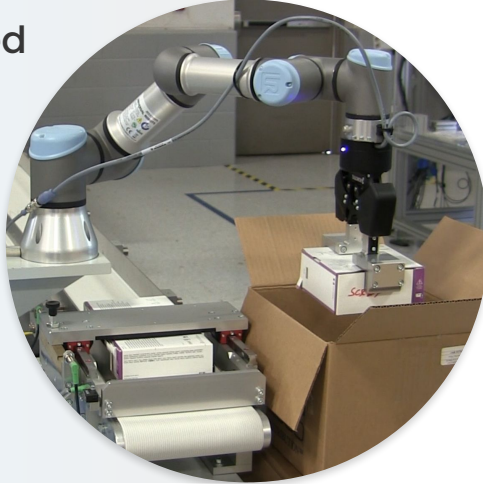
- Can generate 3 million measurements/sec, providing high-density scanning with 69 laser lines, and enabling the measurement of hundreds of parts per day,
- Offers high accuracy to 0.025 mm (0.0009 in), high resolution, and reliable acceptance tests based on ISO standards
- Suitable for a wide range of part geometries and sizes from 1.5 to 3 m (4.9 to 9.8 ft.)

# Packaging and Dispatch

## Flexible automated packaging by Lanco:

### Automated packaging system

Using Automated packaging systems, DCL Logistics halves labor costs. One cobot arm achieves the output of a five-person team's full shift in just 2 hours.



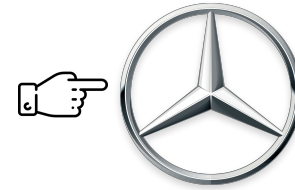
## WHAT AUTONOMY ENABLES

- Achieve up to 360 parts per minute with fixed cycle times for high volume, low mix assembly.
- Up to 1,100 parcels/hour.
- 3D scanning tech for fit to size packaging.
- Replaces up to 20 Manual stations.
- Reduces box volume up to 50%.



# Humanoid robots

To replace humans (staff shortages, physically demanding routine tasks)



Mercedes is trying these out in light of staff shortages



**OPTIMUS by Tesla:**  
A multitask humanoid robot



**Figure's speech to speech reasoning robot**



**Atlas by Boston Dynamics:**  
Whole-body mobility and bimanual manipulation



**Apollo by Apptronik:** A general purpose humanoid robot

**Employ multisensor simulations** to close the gap between virtual training and real-world application.

**Upgrade sensor technologies** for more accurate navigation and environmental understanding.

Integrate AI enhancements for **better problem-solving and safety** in autonomous operations.

**Improve sensor accuracy and AI interpretation** for real-time adjustments and obstacle navigation

**Collaboration** among Research Institutions, industry partners, engineering, and design experts adds complexity.

**Advance AI training** to improve systems' understanding and interaction with their surroundings.

Implement cutting-edge chips for **enhanced decision-making** in autonomous systems.

**Develop algorithms** that enable autonomous systems to operate independently and tackle complex tasks.

**What's needed to unlock the next level of autonomy?**



# **LIMITATIONS AND REQUIREMENTS**

*Recognizing the limits and needs for AI autonomy.*



# Limitations found during the development of Autonomous platforms



Lack of Data



Complexity



Cost



Time



Labeled vs  
unlabeled Data



Environmental  
heterogeneity



Different sensor  
requiring ML  
processing



Number of  
Stakeholders

## POLL #2

What do you see as the largest limitation for implementing autonomous techs your business?

- ☐ Cost
- ☐ Technical knowledge
- ☐ Lack of partners
- ☐ Having a clearly defined product fit



## Strategy for developing a fully autonomous platform

Leverage and augment existing platforms instead of starting from scratch to minimize investment and time required

This is a complex effort that will require a company or group of stakeholders with expertise in numerous technical areas, including:

- > navigation accuracy
- > sensor integration
- > electrical integration
- > AI and software integration
- > resolving mechanical issues

**Work** with **experts**, due to lack of data for training



Navigating data scarcity



Connectivity challenges



Architectural innovations



Rising industry interest

# **A Case Study: Underwater Autonomy Platforms**



To advance the **current best-performing state-of-the-art platforms** to a fully autonomous platform, according to our research



A minimum investment of

**\$100M**

may be required



# Autonomous underwater platforms are advancing with AI, but complete autonomy remains elusive.



# Two key gaps are addressing "noisy" data and boosting latencies **by 30X**.

## Navigating AI challenges in aquatic environments

- › Improve communication protocols,
- › Boost bandwidth,
- › Reduce latency < 10 ms (compared to 300-400 ms in autonomous cars),
- › Ensure signal robustness



## Bridging architectural and latency hurdles

High-level autonomous systems need to manage data with significant noise and uncertainty.

There's a pressing need to enhance system latencies by 30x.



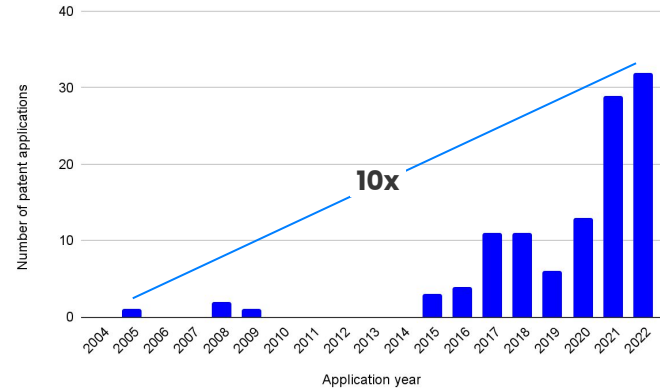
# Underwater platform autonomy is evolving, and these gaps are being addressed by leading players globally.

## 10x increase in patent applications for underwater autonomy/AI (2005-2022)

IP domain includes diverse applications:

- › Surveillance,
- › unmanned vehicles,
- › Advanced sensors.

Advancements in specialized chips and neural networks are key for achieving autonomy.

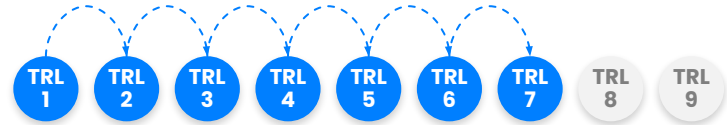


# Underwater platform autonomy is evolving, and these gaps are being addressed by leading players globally.

## Better performing autonomous architectures and edge computing are crucial

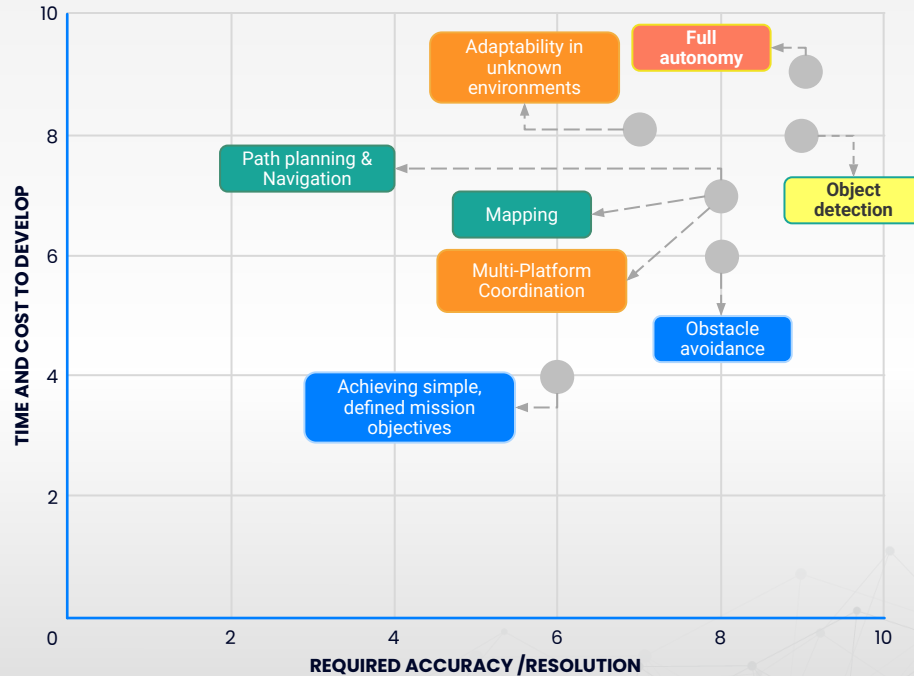
Achieving 1000 TOPS<sup>1</sup> for full autonomy necessitates 25 top-tier edge computing chips<sup>2</sup> in a unified architecture.

To achieve continuous autonomy, models need a minimum of 7 TRLs improvement.

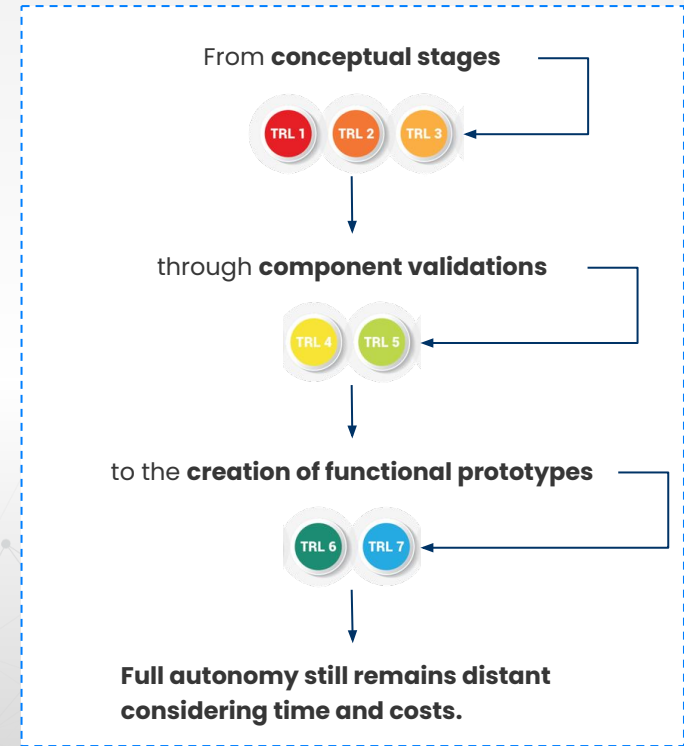


1. Trillions of operations per second – a key metric to measure chip performance; 2. Based on EdgeCortex Sakura1 performance, [Source](#); TRL = Technology readiness level according to Valencian Research Institute for Artificial Intelligence, [Source](#).

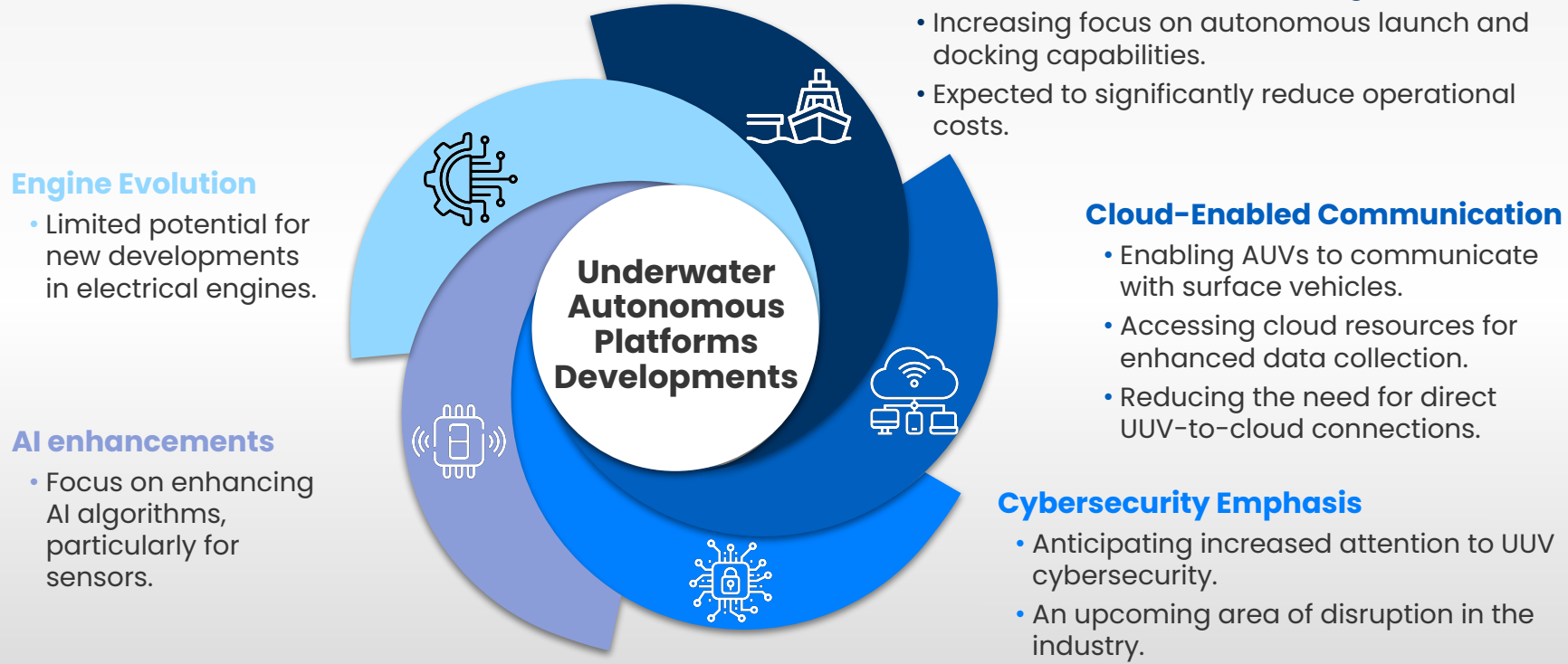
# Current state of the art in achieving underwater autonomy



**Figure.** Analysis of the elements required to achieve underwater autonomy based in their current state of the art, functionalities, cost, and technology readiness level (TRL).



# The path forward: the next 5 years



# Q&A Session



**Sofiane Boukhalifa, PhD**

Technical Director,  
PreScouter



**Oren Gal, PhD**

Assistant Professor, University of  
Haifa, Swarms and AI Lab



**Marco Leonardi, PhD**

Performance Analysis Engineer,  
ARM

NEXT MONTH'S WEBINAR

MASTERCLASS

# Generative AI Implementation: **A step-by-step guide**

June, 2024

Session 1: 12pm CET

Session 2: 10PT / 12pm CT / 1pm ET

**PRESCOUTER**



PreScouter leverages PhD-level analysts and industry experts to help our clients navigate strategic growth opportunities and resolve challenges with existing product lines in the context of compliance and regulatory considerations.



TECHNOLOGY  
LANDSCAPING



TRENDS  
MAPPING



TECHNOLOGY  
ROAD MAPPING



INTERVIEWING  
STARTUPS



IP  
LANDSCAPING



SUPPLIER  
OVERVIEWS



COMPETITIVE  
INTELLIGENCE



MARKET  
ANALYSIS



PARTNER  
OVERVIEWS



REGULATORY  
LANDSCAPE

MOMENTIVE

NETFLIX

PEPSICO



Kimberly-Clark

BAUSCH + LOMB



Carlex



ESTÉE  
LAUDER  
COMPANIES

lyondellbasell

Beckitt  
Berkshire

DUPONT



BASF  
We create chemistry

P&G

Whirlpool

EVONIK  
BUILT FOR REUS



BAE SYSTEMS  
INSPIRED WORK



500+

CLIENTS  
WORLDWIDE

VISA

TATE & LYLE

5,000+

RESEARCH REPORTS  
CREATED

Beiersdorf

Micron

150,000+

HOURS OF RESEARCH  
COMPLETED FOR CLIENTS



Energizer

THANK YOU FOR ATTENDING:

## How Autonomous Robots Will Change Every Industry

If you're interested to learn more about PreScouter feel free to contact [Ryan Moran](#) at [rmoran@prescouter.com](mailto:rmoran@prescouter.com).

PRESCOUTER