

Oceans of opportunities

MARIN STRATEGY PLAN 2026 - 2029

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Preface

MARIN represents almost 100 years of independent maritime research. We are proud to add to this legacy with our team of highly motivated colleagues and a dedicated network in the public and private sector.

We live in turbulent times, with multiple transitions moving forward. Energy transition, digitalisation, climate change and geopolitical developments that are more complex than we have seen in the last decades. With this new strategy, we choose to embrace the dynamics that come with these transitions. We cooperate and navigate with the maritime sector as circumstances change. We aim to be more agile, by developing our team. More resilient, by selecting our integrated activities carefully.

At the same time, we remain focused on our mission: the sustainable, safe, and secure use of the oceans for a thriving maritime sector. We believe that using our oceans responsibly is the way forward to truly support society. With clean transport. With secure and clean energy. By securing territorial safety, trade routes and infrastructure at sea. And with safe operations, protecting human life, nature, and economic value.

Driven by that vision we will help our clients to innovate and to be competitive and we will assist policymakers with the right knowledge to support and guide the transitions. Because with the right focus there are oceans of opportunities for MARIN and the maritime sector.

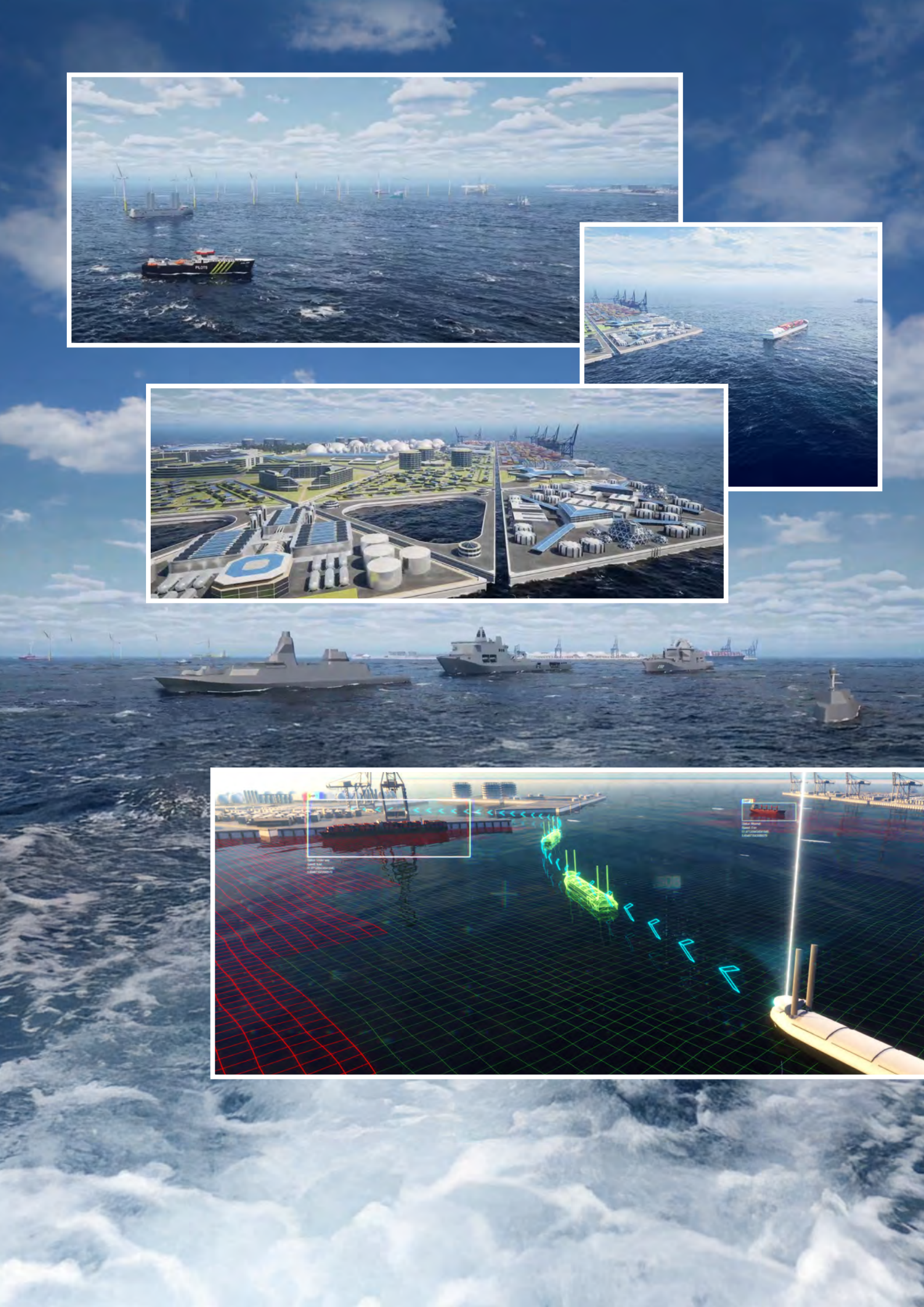
Let's explore!

Olaf Waals and Hannes Bogaert

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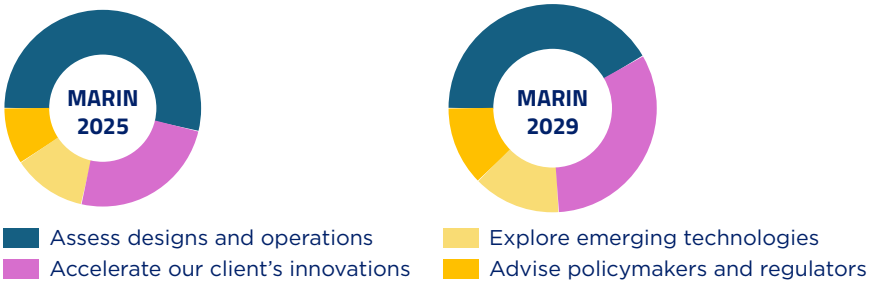
Summary

For nearly a century, MARIN has been a beacon of knowledge and innovation in the maritime world, driven by a highly motivated team with a mission: *We are committed to the sustainable, safe, and secure use of the oceans*[1] *for a thriving maritime sector.*

Our vision is that by our 100th anniversary in 2032, we have *accelerated the maritime energy transition,* integrating sustainable energy production with zero-emission shipping. By then, *we have prevented accidents* at sea, in ports, and on inland waters. We will see new practical applications of *infrastructure* that are *efficient and climate resilient*. Through strong collaboration, we will have contributed to an *effective naval security* that protects borders, trade, and vital infrastructure. And the *maritime sector will have adopted new technologies* such as *digital and artificial intelligence* to operate efficiently.

To navigate that future we made four strategic choices:

- *We create impact across the entire maritime sector by engaging broadly across five markets.* We are committed to achieving our vision with the maritime industry and governments across the entire spectrum of the maritime markets. We want our knowledge development and services for these markets to play a direct and meaningful role in realizing our vision.
- *We create impact from concept to operation of ships and marine structures by broadly deploying our expertise across four roles:* assessing design and operations, accelerating client's innovations, exploring emerging technologies and advising policymakers and regulators. We will make a stronger commitment to advice policymakers and regulators. Above all, we will help our clients much more with their innovations. This will enable us to expand to the concept and operational phase which is essential to create impact, realise our vision and increase our resilience. This is how we evolve our roles:



1 When we use the word 'oceans' we want to be concise, but are implicitly referring to every other relevant (inland) body of water, like seas, rivers, canals, etc.

- *We build a unique position by linking our strengths in our networks, knowledge base and research methods.* We are a leading organisation, driven by strong sector engagement, national and international collaboration, and recognised expertise. We pioneer AI applications in the maritime domain, conduct advanced measurements in model basins and at sea, and perform cutting-edge simulations and use high-fidelity simulators. By combining our strengths, we create unique value that is difficult to copy by others. This unique value enables our clients to experience and evaluate their designs, operations and/or policies before they are actually implemented. This allows them to optimise and innovate their solutions with our support, at MARIN, at our clients' offices or onboard.



- *We create coherence and efficiency in our operations: generic where possible, specific where needed.* We emphasise strongly on synergy across our operations to achieve the broad impact we aim for. We focus on synergy in our services across markets, in our research methods and R&D and in our internal collaboration, where we work from a common base that allows us to operate with agility across the organisation. This means a clear focus on shared priorities and common interests.

To guide the implementation of our strategic choices, we have used the Objective, Goals, Strategies and Metrics (OGSM) model. We first translated the strategic choices into a clear objective for the strategic period 2026–2029: *To create maximum and unique impact across the maritime sector by operating coherent and efficient.*

We then translated this objective for our organisation into measurable goals. We defined one for each area of our value chain: services, research, tools, people, and finances.



1. We create impact with new services from concept to operation, with 70% of our clients helped from concept to operation. We implement this by developing roadmaps for three client-accessible services per role, assigning senior project managers to clients and building long-term cooperations.

2. We integrate and advance our research methods, with 80% of new projects integrated in our internal MARIN wide library of digital models and data sets. We implement this by automating model testing and improve data processes, strengthening our knowledge and tools with generic foundation and building alliances to focus on our own core activities.

3. We prioritise within our tools and buildings and secure funding, so that the backlog of overdue maintenance and sustainability improvements no longer increases after four years. We implement this by rationalising tools and buildings, securing government funding and reinvesting new services revenues in reducing our ecological footprint.

4. We cooperate as one agile team, combining leadership, entrepreneurship, excellent knowledge and diverse perspectives whereby an additional 25% of MARIN is skilled to work on other roles or disciplines. We implement this by sustaining a social and safe working environment and investing in leadership, development and agility.

5. We control and cover our cost, creating room for new services with an annual overall financial result of 4.2% of our turnover and a performance-based incentive (RAM – Resultaat Afhankelijke Maatregel) of 8.33% of our gross salaries. We implement this by improving cost control and project steering, ensuring cost covering tariffs in public contracts and obtaining a structural increase in our annual institute subsidy. This increase is essential to remain sufficiently equipped to perform our task as a TO2 institute of developing and applying knowledge to address societal challenges and empowering the innovative strength and competitive position of the Netherlands.



The strategy team at the kick-off in the Maritiem Museum Rotterdam, January 2025.

1. Introduction

Developing the new MARIN strategic plan for 2026–2029 has been an exciting endeavour, as MARIN is about to add an important chapter to its impressive history. Consequently, the new board of directors initiated the process with specific aspirations for the outcome. The plan needed to clearly articulate our values and our unique position for the future. It had to address the tensions we experience and how we manage them. It should include realistic goals, strategies, and metrics, ensuring we remain agile. Moreover, the plan must inspire and connect, both within MARIN and the maritime sector.

Thus, the management team and a broad representation of MARIN volunteers set to work. We conducted a thorough analysis of our environment, learned lessons from our past, and evaluated our present. We engaged in candid discussions about our motivations, both as MARIN team members and as an organisation. From there, we explored several directions towards a unique MARIN proposition for the future. We evaluated and refined these paths into one final strategic direction and developed our strategic plan accordingly. Throughout our journey, key players in the maritime sector, including members of our advisory board, colleague institutes, technology companies, and strategic thinkers, challenged our thinking and inspired us.

In Chapter 2, we summarise what we learned from our history, recent evaluations, and tensions analysis. In Chapter 3, we present three scenarios in global developments and identify and weigh the drivers that impact MARIN. Next, in Chapter 4 we will present our mission and vision, followed by our strategic choices in Chapter 5. We conclude in Chapter 6 with a finance and risk analysis. The appendices provide more details on several chapters and present the contour of our market activities and research agenda.


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2. Lessons learned and perceived tensions

To define our mission and vision, we took a good look at ourselves. What can we learn from our past? How are we doing now? And what tensions do we experience that we need to resolve to respond to what is happening around us? Below we briefly present the most important answers to these questions and refer to the appendices for the underlying information.

Lessons learned

We studied the history of MARIN and concluded that our story is a dynamic one, with ups and downs, but above all with a lot of drive from all MARIN employees, generation after generation. Below we present our takeaways, for more information on our history and our cooperation with the sector and governments, see Appendices A and B.

- MARIN must remain an independent research institute.
- MARIN is an important bridge between public and private sectors to tackle societal challenges and strengthen the innovation and competitive position of the maritime sector.
- We are a leading organisation thanks to our commitment to the sector through various networks and our drive for collaboration both nationally and internationally.
- From the beginning, success factors have included direct interaction with customers, international orientation, fast delivery times, supporting scientific research, and effective financial management.
- MARIN has successfully ridden the waves of new enabling technologies, from model testing to computing and simulation, and is now embarking on the latest: digitisation and artificial intelligence.
- We realised we take on four different roles for the maritime sector that are driven by different personal motivations and skillsets. Our success depends on an integrated application of these four roles. See the picture on the next page.

1. We are committed to **assessing designs and operations**. We believe ships, marine structures and operations improve when environmental and financial risks are identified and mitigated. We are driven by high standards and factual correctness.

2. We are committed to **accelerating client's innovations**. We believe that we give maritime companies a real competitive edge and improve ships and marine structures when we explore alternative design concepts or operational practices with our clients.

4. We are committed to **advising policymakers and regulators**. We believe that regulations are the primary driver of change in the maritime sector. Our motivation is to support the regulatory framework with our independent scientific research and expertise.

3. We are committed to **exploring emerging technologies** ahead of market demands. We believe that new technologies push the boundaries of what the maritime sector can achieve. Our drive is to learn everything about new technologies and consider their maritime applications.

TopTier Joint Industry Project

The TopTier project brought together scientists and experts from across the maritime industry to improve safety at sea and reduce the loss of containers overboard. Together we identified the main reason for container losses, developed tools and training to help ocean carriers and seafarers prevent incidents, as well as recommendations to the IMO. This illustrates the four roles combined in one project.



Assessing: Incident reviews, simulations and seakeeping model tests showed vessel sensitivity to synchronous and parametric rolling. Scientific testing, simulations and modelling of containers and lashings gave realistic data on their strength and how they behave in a stack under stress. Surveys, data collection and workshops showed deviations between actual stowage and plans. This work provided the solid basis of the project.



Explore emerging technologies: Training and tools for crew & staff were created to prevent parametric rolling. Furthermore, a parametric roll experiment on the simulator illustrated the need for operational guidance if parametric roll is to be avoided by the seafarer.



Accelerating innovations: By showcasing the potential added value of an operational guidance concept and providing the technical understanding, we anticipate accelerating the development of products to enhance safety.

Empower policymaking: Regulatory improvements are proposed to IMO (amongst others with an action paper to CCC-10). The factual and physics based work and the cooperation with experts from across the industry empower the policymakers to enhance safety.



The assessment provided the bases of all activities. The impact on avoiding container loss at sea was made in the exploration, accelerating and empowering role.

Early 2024 we started evaluating our present in preparation of the EMTO-evaluation but also driven by the fact that we are active in the maritime world with important and urgent issues, but at the same time not being able to achieve our financial targets sufficiently. We conducted a self-evaluation that included a MARIN-wide SWOT analysis and a reflection on our research programmes. We also conducted an employee survey and were interviewed by the EMTO commission (Appendix C).



Key takeaways

- Our quality is widely endorsed nationally and internationally. Uphold these standards while ensuring we do not exceed the quality necessary for achieving our customers' goals.
- Focus our research agenda to reduce fragmentation.
- Keep our dedication to the sector strong by actively contributing to various networks.
- Increase our use of metrics to help us track progress and make data-driven decisions.
- Continue the direction of our 'Drijfveerkracht' plan: entrepreneurship for a better market position; targeted knowledge and technology development; timely maintenance and sustainability; MARIN-team: strong and in motion; and financially agile in volatile markets.
- Collaborate with the government to increase the institute subsidy. This will help us to maintain our impact and quality and prevent the closure of facilities that are of national strategic importance.

Perceived tensions

Based on these various analyses, we then identified underlying tensions that we experience. These tensions involve high-level choices about our mission, vision, and competitive positioning:

- How do we relate to other players in the maritime sector who are taking different paths in the transition to clean, smart, and safe shipping and sustainable use of the seas?
- How can we be impactful and resilient across the maritime sector and make our research portfolio not too broad?
- How can we balance research that anticipates market trends with research that addresses current market needs?
- How can we maintain our crucial role in the design phase of ships and marine structures while becoming more involved in the concept and operational phases?
- How can we do classified work for defence and apply the learning to civilian applications?
- How can we differentiate quality levels while upholding our reputation for high quality?
- How can the next wave of enabling technologies (digital and artificial intelligence) strengthen our current key methods: model testing, computing, simulation, and onboard measurements?
- How can we integrate versatile skills in our specialised skilled work environment?
- How can we be efficient in our operation and foster exploratory ventures?



3. Navigating an unpredictable world



On the path to our future, we must navigate an unpredictable world that can change rapidly at any moment[1]. Referring to the special report 'Scenarios of Evolving Global Order' by the Centre for International Governance Innovation [1], the global order is under strain, due to a complex interplay of several trends:

- Advanced and emerging economies face demographic challenges due to declining birth rates.
- Global debt is at unprecedented levels and asymmetrically distributed.
- Climate change impacts are growing, putting ecosystems at risk.
- Rapidly developing technologies like AI present both promise and danger.
- Conflicts between democracies and authoritarian regimes, including regional and proxy wars.
- Socioeconomic inequalities persist, driving social tension and unrest.
- Migration pressures increase due to political, economic, social, and environmental challenges.
- The multilateral systems designed to maintain a stable global order are waning.

The report outlines five scenarios for an evolving global order. These scenarios are not mutually exclusive and can evolve simultaneously. Based on this, we have defined three scenarios of evolving world order with which we will work. Each has a different impact on the maritime sector and our work and living environment. Each scenario is plausible, and current realities show signals for each of the scenarios.

1 For a complete overview of the sources we consulted for our external analysis, see Appendix D.

1. Highly interconnected global economies



The existing global system may reform or be replaced, but the world economy will remain highly interconnected. If major power relations remain stable, the current systems largely continue. Reforms will primarily focus on economic institutions, with security reforms being unlikely. These economic reforms could be led by the United States of America and G7 nations or by a coalition of middle power states. If a growing number of emerging and advanced economies seek a fundamental overhaul of international institutions and norms, the global system could be replaced. This could be driven by BRICS+ nations or a broad coalition of states frustrated by the dysfunction of institutions like the United Nations Security Council. Multipolarity, sovereignty, and non-interference would be key principles of the new order. Trade and development financing would be crucial to kick-start the new system, along with new military cooperation.

2. Security and economic blocks



The existing global system fragments into blocs based on shared interests to be protected. These can be economically motivated or religion or value-based blocs. As a results of continuous rivalries and trade wars, new blocks are formed to safeguard their economies and ensure access to energy and materials. If the collective security interests of current major powers diminish, block formation can also occur with new alliances. The new alliances strive to strengthen their defence to provide collective security. Demographic shifts, environmental challenges, technological advancements may accelerate the formation of blocks to protect interests. The blocks may operate in largely independent spheres, though cooperation on specific issues remains possible.

3. Competing nations



The existing global system scatters. Cooperative mechanisms within nations and at the international level to mitigate conflicts collapse. Current regional tensions cannot be stopped and escalate further, with a risk of global conflict. Alternatively, conflicts may not escalate, but stagnating economies, declining socio-economic conditions, and a technological arms race (AI and automation) erode overall cooperation. Many countries choose to protect their own interests and impose restrictions on others. Current value chains disintegrate and international trade shrinks.

Impact

To understand the impact of these three scenarios on us, we identified the drivers that would significantly influence our markets[2] , our

2 In previous strategy periods, we had nine market groups. We combined several markets because they share stakeholders and drivers. Additional information can be found in Chapter 5.1.

technology, government policies and human capital, see the table below. We indicate the probability of a positive effect from these drivers per scenario. We use (•) for a low probability and (•••) for a high probability. The more dots a scenario has, the more opportunities it presents for us.

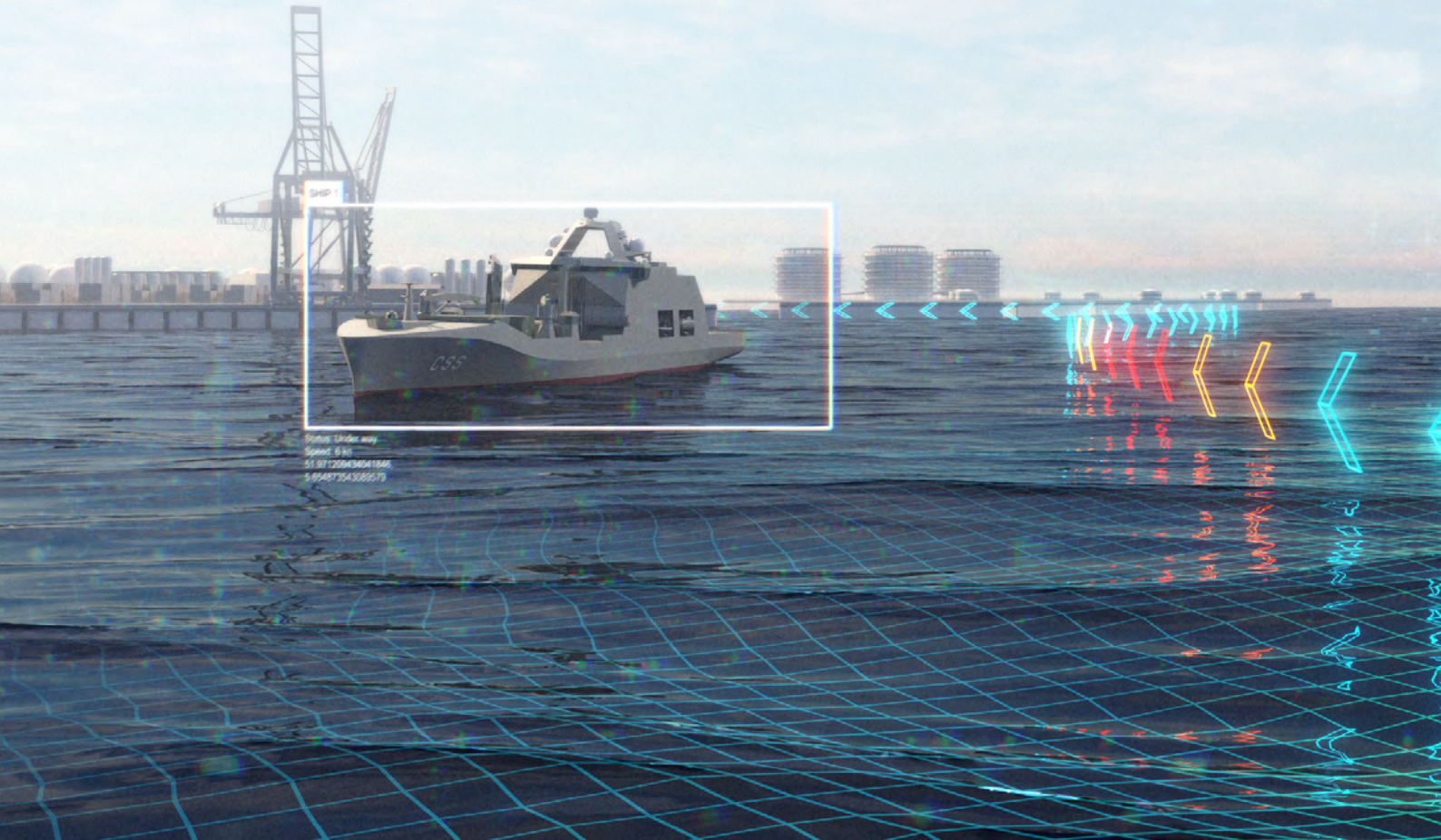
Drivers			External scenarios		
			Highly inter-connected global economies 	Security and economic blocks 	Competing nations 
Our markets	**Transport and Shipping**	International trade is thriving due to stable geopolitics	•••	••	•
		International regulators push for sustainability	•••	••	•
		Level playing field for shipyards worldwide	•••	••	•
	Passengers and Yachting	Consumer confidence, encouraging spending on leisure	•••	••	•
		See Transport and Shipping for sustainability and level playing field	•••	••	•
	Defence	Political commitment to invest in navy: need for short cycle innovations	•	•••	••
		Strong and large alliances	••	•••	•
	Offshore energy and Blue growth	Political focus on autonomy for energy and materials	•	••	•••
		Financial stability and low interest rates drive investments in the market	•••	•	•
	Marine infrastructure and Spatial planning	Trade volumes stimulate investments in ports, terminals and waterways	•••	••	•
		Public-private investments to increase resilience to climate change impacts	••	•	•
Technology	Access to technological breakthroughs on AI and ultra high-speed computing		••	••	•
	Drive from the market to accelerate innovation		••	••	•
Government policies	Policies to strengthen innovation capacity, strategic autonomy and competitiveness for the maritime sector		•	••	•••
	Public investments in strategic research and facilities		•	••	•
Human capital	Appealing maritime sector, offering relevant and challenging work		••	••	•
	Access to international talents		•••	••	•

Weighing opportunities

Transport and Shipping / Passengers and Yachting

In the Transport and Shipping market, as well as in the Passengers and Yachting market, our opportunities are highest in the highly interconnected global economies scenario. We can operate worldwide, there is a strong demand, and there is a drive for decarbonisation. There are also opportunities in the security and economic blocks scenario. We can expect an increased demand for new types of ships as global trade routes change.

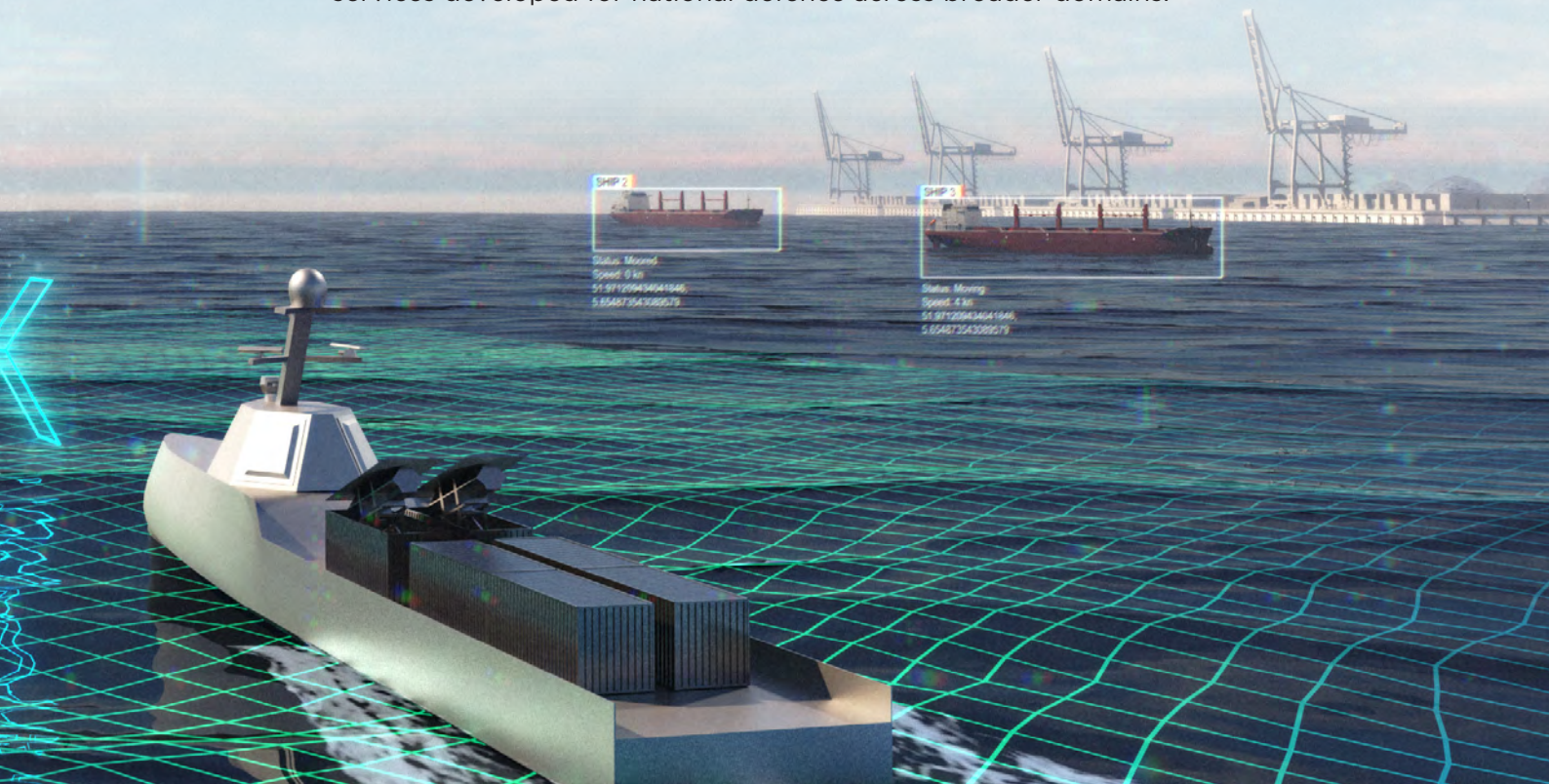
We increase our resilience by focusing more on direct services for owners, charterers, and operators. This has two effects. Firstly, if the world moves away from a highly interconnected global economy, our services for shipyards worldwide will be under pressure. By focusing more on owners, charterers, and operators, we can continue to be of added value for ship designs regardless of where the ship is built. Secondly, we currently play a crucial role at one moment in the ship's life, namely during the design and acceptance at the shipyard. By focusing more on owners, charterers, and operators, we enhance the moments when we add value throughout the ship's life, from early concepts to operation. This increases our opportunities in all scenarios. While we broaden our services, we can maintain our agility and stay focused by collaborating with partners in the execution. The energy transition is in both markets a major topic as well as the shortage of labour. This drives innovation.



Defence

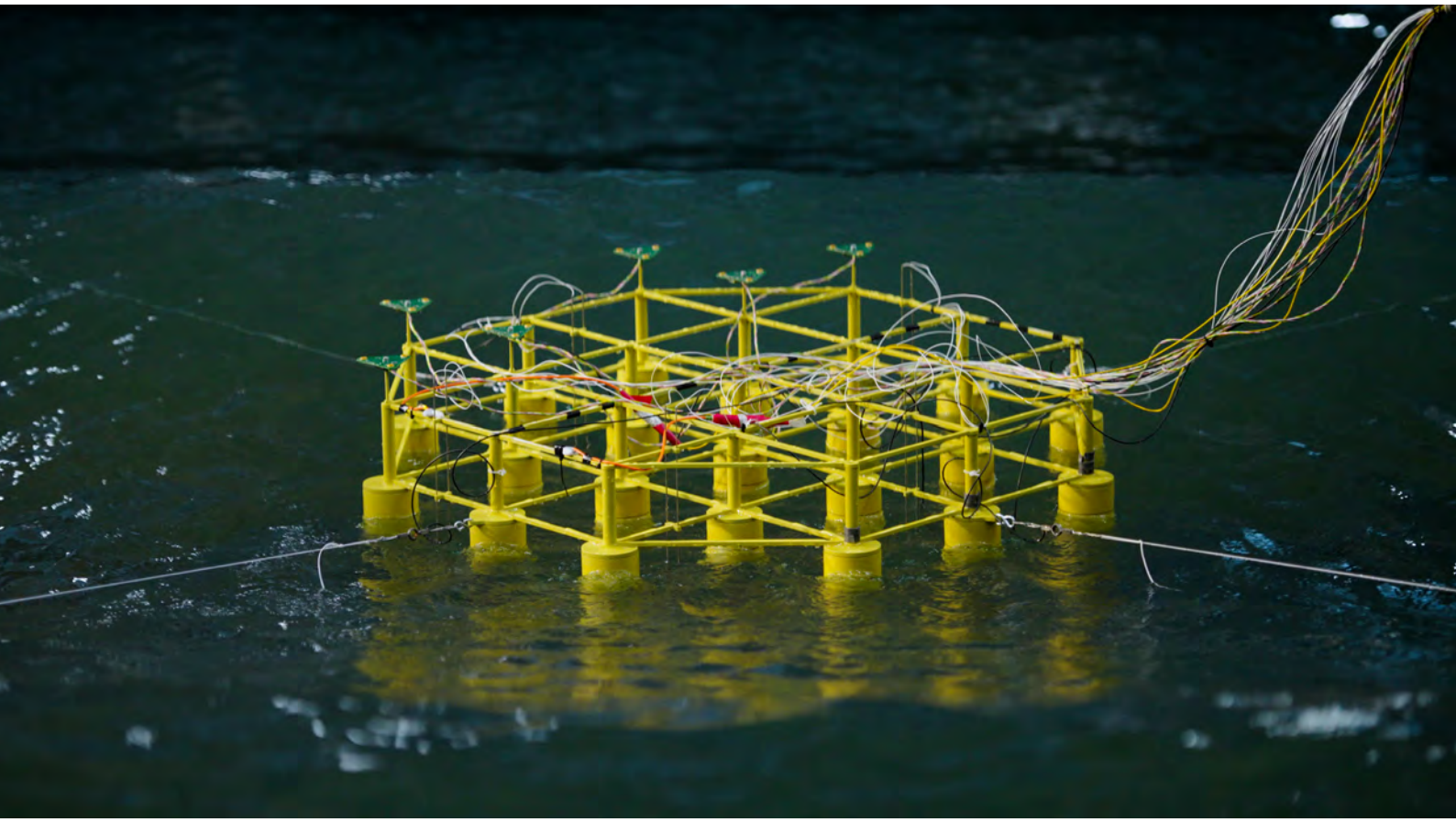
In the evolving geopolitical landscape shaped by security and economic blocks scenario, the demand for advanced defence services is expected to rise significantly. For the Netherlands and its allies, this scenario underscores the urgent need to strengthen naval capabilities, with a strong emphasis on strategic autonomy and technological innovation, ensuring operational effectiveness and readiness under constraints such as scarcity of energy, materials, and labour. In this context, MARIN plays a vital role. By contributing from early concept development through to operational deployment, MARIN adds value across the full lifecycle of naval innovation. However, this scenario also presents risks. Potential realignments within international alliances could lead to a redistribution of responsibilities. We will act proactively to continue our leadership in innovation for Europe in close cooperation with other knowledge institutes. We will prioritise our activities depending on the actual needs of our navy stakeholders.

The recently published Dutch Defence Strategy for Industry and Innovation (D-SII) [18] calls on knowledge institutions to accelerate the scaling of innovations and to act as a bridge between industry, academia, and government. This includes the rapid development, testing, and refinement of promising technologies, as well as the creation of collaborative hubs and test facilities. As a strategic partner of the Ministry of Defence - alongside TNO and NLR - MARIN is recognised for its contributions to knowledge development, technical expertise, policy support, and innovative solutions. Nationally, we have made significant strides in embracing these new roles. By expanding our network and collaborating closely with partners, we ensure agility and responsiveness. To enhance our resilience, it is essential to leverage the knowledge and services developed for national defence across broader domains.



Offshore energy and Blue growth

In the Offshore energy and Blue growth market, our opportunities are significant in the highly interconnected global economy scenario, especially when there is financial stability. The chance for government investments is greater in the security and economic blocks and competing nations scenarios to ensure self-sufficiency. This creates opportunities for us to support offshore operations. However, in this scenario, supply and demand could be partially aligned between alliances through land-based production, although transportation between continents would still be necessary at sea.



In this market, we already have strong collaborations with owners and operators. We assist them for specific designs and operations, as well as addressing pre-competitive themes related to safety and efficiency through joint industry projects. We can increase our resilience by further enhancing the moments when we add value throughout the life of offshore structures. This starts with greater support for concept design and with a larger focus on support in operations. We also expect increasing pressure in this market to design, build, and operate efficiently in every scenario.

Marine infrastructure and Spatial planning

In the Marine infrastructure and Spatial planning market, our opportunities are highest in the highly interconnected global economies scenario because more investments are made in infrastructure. However, there are also opportunities in other scenarios. We can expect that issues arising from climate change will be addressed when they threaten the supply security. This leads to a demand for climate adaptive infrastructure. Moreover, there will be increased need for resilient infrastructure to reduce consequences of sabotage.

We can increase our resilience by enhancing the moments when we add value throughout the life of ports, terminals, and waterways. This includes supporting governments in formulating regulations that ensure shipping safety, and more support in operations for users of ports, terminals and waterways.

Technology

We can enhance our opportunities with the right technology to perform our work. The competing nations scenario poses the greatest risk in this regard. The technology that directly affects our field of work in The National Technology Strategy [19], is 'Artificial intelligence and data science'. AI is called a system technology. It changes the way of working, learning and creating, enables other innovations that are easily scalable, can contribute to higher labour productivity and thus has a major impact on society and on earning capacity.

The National Technology Strategy indicates that Europe can differentiate itself by focusing on decentralised sharing of data and AI models, rather than remaining dependent on large international players using a central model. AI and data science are strongly related to other key enabling technologies belonging to the digital and information technologies cluster: cybersecurity technologies, software and computing technologies, digital connectivity technologies and digital twinning and immersive technologies. For successful AI applications, access to structured and preferably clean datasets is essential. These datasets should cover a broad range of operational conditions and include human decisions. Additionally, simulation environments and synthetic data for training AI, along with collaboration between domain experts and data scientists, are crucial for making AI successful.

Government policies

Government policies to strengthen innovation capacity, strategic autonomy and competitiveness for the maritime sector enhance our opportunities. These policies are most extensive in the competing nations scenario, but they are also substantial in the security and economic blocks scenario.

The Netherlands is ahead with the Maritime Sector Agenda [16] and the Maritime Master Plan [17]. The Rijksregiebureau Maritieme Maakindustrie has been formed within the ministry of Economic Affairs. Multiple ministerial departments are cooperating to strategically develop the sector together with the industry stakeholders such as KVNR, NML and NMT/IRO. We are actively involved with the development of the new innovation policy that is coordinated by the ministry of Infrastructure and Water Management.

We are also connected to the industry policy that is coordinated by the ministry of Economic Affairs. We have a strong link with the Mnistry of Defence for the fleet replacement. We have also an ambition to increase our connection with the Ministry of Agriculture, Fisheries, Food Security and Nature regarding blue growth developments.



Mario Draghi addressed the critical role of industrial policy in revitalizing Europe's economic landscape [15]. Three pivotal areas for action have been identified to reignite sustainable growth: closing the innovation gap, decarbonisation and competitiveness and enhancing security and reducing dependencies. There is also

a call on the European Commission to develop a new strategy that supports the European maritime industry. The call is made as the maritime industry is vital for the EU's strategic interests and in the digital and green transition.

Government investments in our research and research facilities are essential for us. Reinforcement seems most likely in the security and economic blocks scenario. Investments are needed for our core tasks as an institute: to develop, apply, and disseminate knowledge to solve societal issues, support governments, and strengthen the innovation capacity and competitive position of the Netherlands.

Human capital

Finally, our people are essential to creating all the above opportunities, regardless of the scenarios. It is important that the maritime sector and MARIN remain appealing. This helps retain our people at MARIN and attract new employees from various disciplines both within the Netherlands and internationally. Relevant and challenging work to attract international talent is crucial in this regard, and we expect that this will be particularly pressured in the competing nations scenario. Accessibility to international talent is also crucial. The competing nations scenario poses the highest risk here.

Key takeaways

- Accelerate innovation for the design and operation of ships and marine structures, because there is a need for it in all markets and all scenarios.
- Shift our focus to end users to make the step towards the concept and operational phase of ships and marine structures.
- Create synergy in our services and R&D across the markets. This ensures that strong markets can support other markets under challenging conditions to maximise market potential. It also allows for better redistribution of work within MARIN during market fluctuations.
- Collaborate with partners to create focus for ourselves.
- Leverage AI and data science to enhance our opportunities and combine our research methods: numerical simulations, model testing, simulators and onboard measurements.
- Make sure MARIN remains an attractive employer.


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4. Our mission and vision

To navigate the changes in the world and our current state, we have set a new strategic direction. MARIN continues to be the independent knowledge institute with a strong focus on the future of the maritime sector. Like the other TO2 institutions MARIN has three main tasks: developing, applying, and disseminating knowledge to solve societal questions and support government tasks and policy; empowering the innovative strength and competitive position of the Netherlands; and managing strategic research facilities that are unique in the Netherlands and internationally.

In our new strategy, we are building on our previous strategy and under the same motto 'Better ships, Blue oceans'. But because the world now looks different and MARIN itself is also changing, we are sharpening the formulation of our mission and vision.

This is what we stand for, our mission:

MARIN is committed to the sustainable, safe and secure use of the oceans for a thriving maritime sector.

The heartbeat of our previous mission, 'MARIN stands for clean, smart and safe shipping and sustainable use of the seas,' resonates in this new mission. However, MARIN also stands for maritime security, and we now emphasise this in our mission. Furthermore, we believe that ‘sustainable’, ‘safe’ and ‘secure’ use of the oceans are necessary conditions for the maritime sector to thrive. But also vice versa, a thriving maritime sector is needed to achieve sustainable, safe and secure use of the oceans. Note that when we use the word ‘oceans’ we want to be concise, but are implicitly referring to every other relevant (inland) body of water, like seas, rivers, canals, etc.

Sustainable refers to the ability to maintain or improve certain processes or states over the long term. In the context of environmental science and policy, it means meeting the needs of the present without compromising the ability of future generations to meet their own needs. This involves balancing economic, social, and environmental factors to ensure a healthy planet and society for the future. It relates both to the mitigation of and the adaptation to the effects of climate change.

Safe refers to the condition of being protected from or unlikely to cause danger, risk, or injury. It involves implementing measures and practices to prevent accidents and minimise risks that can lead to physical, economic and ecological harm. It is about creating an environment where people can operate without fear.

Secure refers to the state of being free from danger or threat from intentional actions. It involves protecting individuals, organisations, assets and territories against deliberate threats or attacks, such as armed conflict, sabotage, espionage, piracy or cyber-attacks. Security measures are aimed at preventing unauthorised access, damage, or harm.

Sustainable Development Goals

Our mission supports several of the United Nations' Sustainable Development Goals (SDGs), i.e. Zero Hunger (SDG2), Good health and well-being (SDG3), Affordable and clean energy (SDG7), Decent work and economic growth (SDG8), Industry, innovation and infrastructure (SDG9), Responsible consumption and production (SDG12), Climate action (SDG13), Life below water (SDG14) and Peace, justice and strong institutions (SDG16).

The fulfilment of the SDGs is under increased pressure due to large-scale geopolitical shifts and uncertainty. Therefore, the balance between these goals might shift in the years to come. For example, the balance between clean energy and energy security might further change, which means offshore oil and gas extraction may still be necessary. *We believe that we should not disengage during such moments of shifting balance.* We should ensure safe energy security, maintain open communication, and navigate towards renewable energy. The same applies to other conflicting SDGs. Moreover, we realise more than ever that maintaining security at sea and the ability to utilise maritime routes for transportation and communication are prerequisites for achieving the SDGs.

And this is what we aim for, our vision:

By 2032, we have achieved the following with and within the maritime sector:

- *An integrated maritime energy transition,* with innovations for sustainable energy production and fuel logistics, and zero-emission shipping.



- *A maritime system that prevents accidents,* with innovations to increase the safety of shipping and offshore work while maintaining efficiency, including decision support and autonomous shipping.



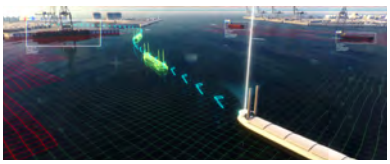
- *A marine infrastructure that is efficient and climate resilient,* with efficient shipping on waterways and innovations for floating port industry and housing.



- *An effective naval security,* with rapid-cycle innovations to ensure territorial safety, protect trade routes, and safeguard vital infrastructure at sea.



- *A maritime sector that rides the next technology wave,* with data driven digital and artificial intelligence innovations to design and operate efficiently.



The essence of our previous vision 'free, safe and clean seas with zero-emission ships, solutions for sustainable energy and food at sea, safe ships for the crew, cargo and environment, smart digital ships and an innovative infrastructure' echoes in our vision for 2032. These five bullets replace and integrate several of the nine perspectives of our 2022-2025 strategy plan. This brings more focus in the organisation with new ambition.

With 'an integrated maritime energy transition', we emphasise the importance of a holistic approach to the energy transition: without sustainable fuel production and fuel logistics, a sustainable ship will not get far. We will actively work on this integration with the sector to avoid the pitfall of perfecting one aspect while neglecting another.

All five bullets are fuelled by innovation to design, build, and operate efficiently, given the scarcity of energy, materials, and labour. We believe that we should aim to improve the performance of our customers' ships and maritime structures significantly. To be clear, this is not about our own innovations we would market, but about our contribution to our customer's innovations in contract research and the innovations we jointly develop with the sector in our JIP's.

Our visions are closely aligned and directly contribute to the strategic objectives of both the Netherlands and the European Union. These objectives are reflected in series of key frameworks. They include the Draghi Report on the Future of European Competitiveness [15], and the current and future innovation and industrial policies in the Netherlands, focusing on safe, circular, and zero-emission shipping, sustainable blue economy, accessible waterways and ports, and maritime safety, fisheries, food and energy. They also include the Sector Agenda for the Maritime Industry [16], the Maritime Master Plan [17], the Safety at Sea programme, the Kennisplan Zee, the Defence Strategy for Industry and Innovation [18] and the National Technology Strategy [19].




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5. Our strategic choices and their implementation

At the core of this strategic plan is our search to find the right balance between our scope to create impact and be unique versus feasibility. To this end, we have made the following four strategic choices:

- We create impact across the entire maritime sector by engaging broadly across five markets.
- We create impact from concept to operation of ships and marine structures by broadly deploying our expertise across four roles.
- We build a unique position by linking our strengths in our networks, knowledge base and research methods.
- We create coherence and efficiency in our operations: generic where possible, specific where needed.

We first further describe our strategic choices, after which we will explain how we will implement them using the OGSM-model.

5.1 Strategic choices

Impact across the entire maritime sector by engaging across five markets

We are committed to achieving our vision with the maritime industry and governments across the entire spectrum of the maritime markets. That is why we are actively involved in five important market segments: Transport and Shipping, Passengers and Yachting, Defence, Offshore energy and Blue growth, and Marine infrastructure and Spatial planning. We want our knowledge development and services for these markets to play a direct and meaningful role in realizing our vision. In all five markets we are working together to drive the maritime energy transition, prevent accidents and accelerate the digitalisation of the sector:

Vision for 2032	MARIN market groups				
	Transport and Shipping	Passengers and Yachting	Defence	Offshore energy and Blue growth[1]	Marine infrastruc-ture and Spatial planning
An integrated maritime energy transition	✓	✓	✓	✓	✓
A maritime system that prevents accidents	✓	✓	✓	✓	✓
A marine infrastructure that is efficient and climate resilient	✓			✓	✓
An effective naval security			✓		
A maritime sector that rides the next technology wave	✓	✓	✓	✓	✓

Overview of MARIN market groups contributing to each 2032 vision.

[1] *Blue growth includes the development of sustainably cultivated marine life, such as seaweed and fish farming, as well as floating ports and cities. We also contribute to nature conservation, for example by removing plastics from the oceans.*

We also need this breadth across the markets to remain resilient and to be able to switch between markets if some market conditions fluctuate.

In previous strategy periods, we had nine market groups. We chose not to exit any market but to consolidate them for greater focus and efficiency. We no longer consider Marine systems as a separate market. It is now integrated into every other market. Additionally, we have combined Oil & Gas, Renewables, Life at Sea into the market segment Offshore energy and Blue growth, as they typically involve the same stakeholders. Furthermore, we no longer view Authorities and Regulators as a separate market. Instead, it is one of our four roles that we apply across all market segments. We will align MARIN's organisaton with this.

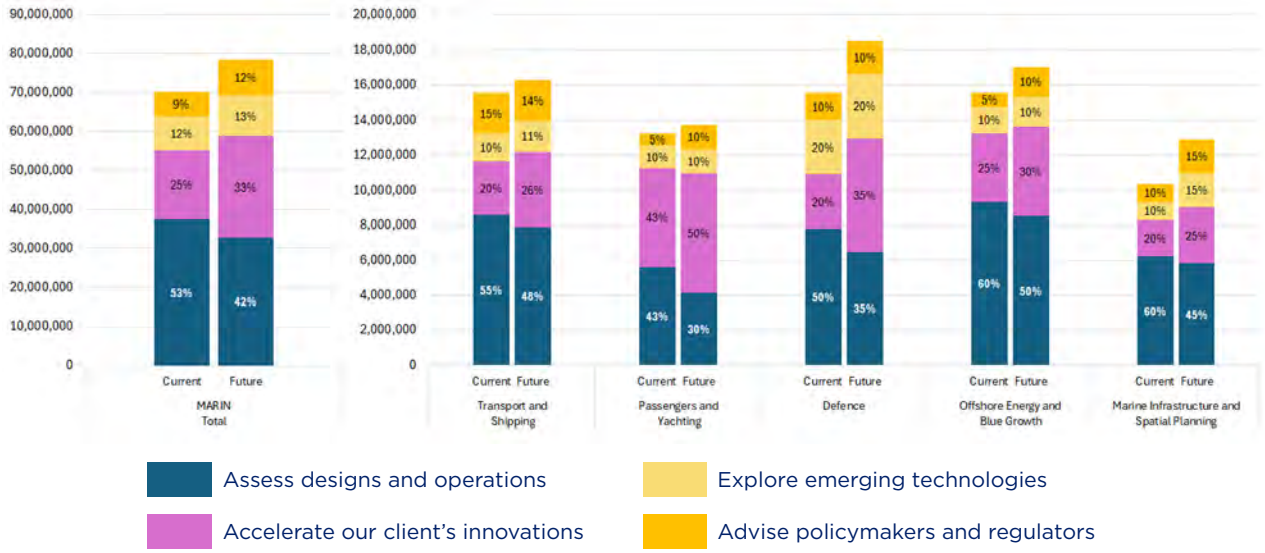
Our activities within each market, as well as our close collaboration with the governments, companies, other knowledge institutes, universities and universities of applied science are further detailed in Appendix E. Our efforts span various networks and drive collaboration both nationally and internationally. Our efforts bridge the public and private sectors. As a leading institute in Europe, we play a key role in strengthening the European maritime industry through intensive cooperation and strategic partnerships. We do this as part of the Dutch maritime sector.

Impact from concept to operation by deploying our expertise across four roles

We are also going to help our clients in more areas than we are used to. In practice, we still focus strongly on design. But there are also many opportunities for MARIN to help clients in the phase before, the concept phase, and in the phase after, the operation. We are convinced that these phases offer significant potential for impact and are essential to realising our vision. Moreover, we are also increasing our resilience as we extract more from the markets.

So, we will keep doing what we do best, like evaluating designs and operations. We will continue to explore new technologies ahead of the market, and we will make a stronger commitment to advise policymakers and regulators. Above all, we will help our clients much more with their innovations. Working with them to develop alternatives in the concept phase and during operations. From small, consistent improvements to radically new approaches. We see a need for it in all markets and in all scenarios (see Chapter 3).

We further describe our activities per role in each market in Appendix E. We have moreover made the development in our roles explicit by defining the revenue target per market and role for 2029. We used the drivers (see Chapter 3) per market, combined with technology, government policies, and human capital drivers to define the turnover. We based the turnover on the scenario 'Security and Economic Blocks' as perceived the most likely to happen.



We aim for sustainable growth, targeting an annual growth rate of 3.0% over the next four years. Our actual growth will be larger in order to account for inflation. The growth will primarily come from an increase in contract research and comes with a healthy profit margin. It results from increased added value for our four roles, expanding our role in accelerating client innovations and advising policymakers and regulators, and efficient cost management.

Unique position by linking our strengths in our networks, knowledge base and research methods

We are a leading organisation thanks to our commitment to the sector through various networks and our drive for collaboration both nationally and internationally. Our knowledge is widely endorsed and we have taken a leading role in applying AI within the maritime domain. We conduct state-of-the-art measurement in model basins and onboard ships and marine structures. We perform cutting-edge simulations and use high-fidelity simulators and immersive environments to include human factors.

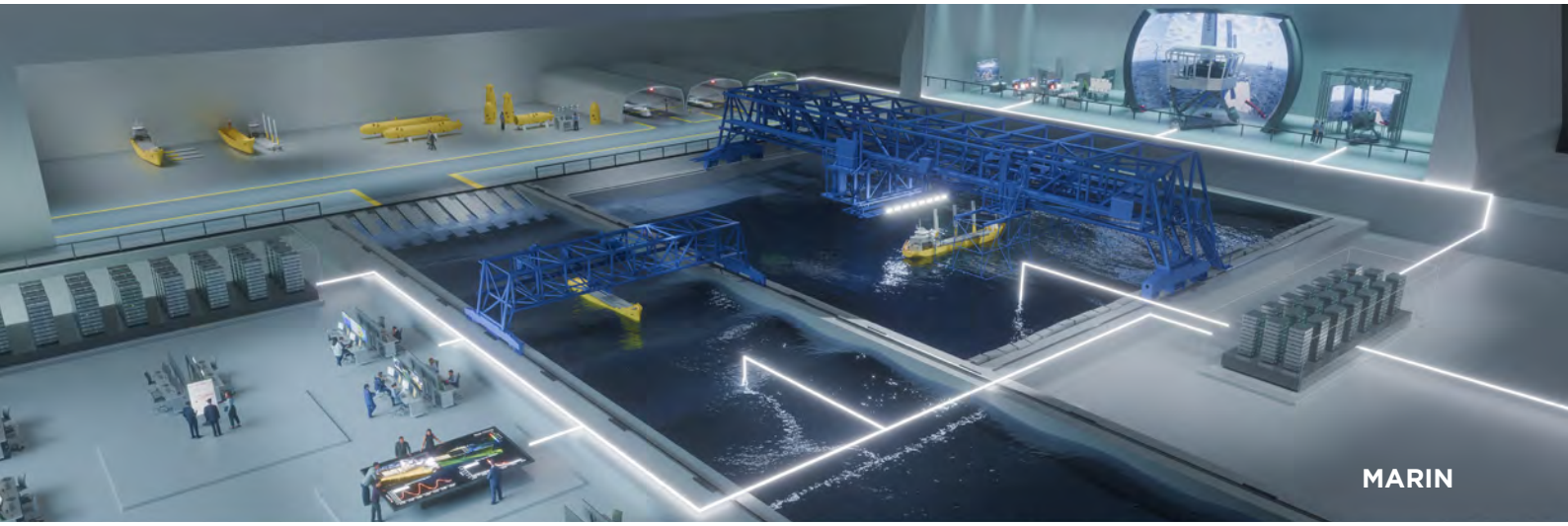
By combining our strengths we create unique value that is difficult to copy by others. This unique value enables our clients to achieve greater success in their activities. Our clients can experience and evaluate their designs, operations and/or policies before they are actually implemented. This allows them to optimise and innovate their solutions with our support. We aim to provide this experience at MARIN, at our clients' offices or onboard.

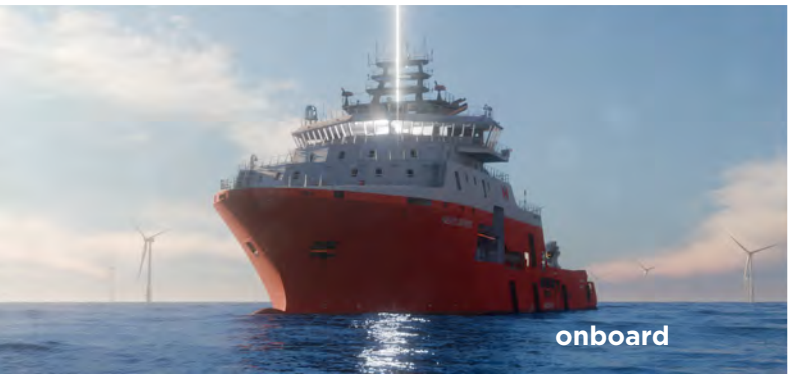
At MARIN, we support our clients through in-depth evaluations. We will also ensure that we can help them with rapid experimentation of innovative design concepts and operational approaches. We will use fast numerical tools and exploratory testing in our basins to explore the ideas during the day. Overnight, we will seamlessly shift to automated testing, to collect high-quality data to train numerical models. The next day, we will bring the alternative designs or practices to life using the numerical models on our simulators and fine-tune the designs or practices in co-creation with the future operators.

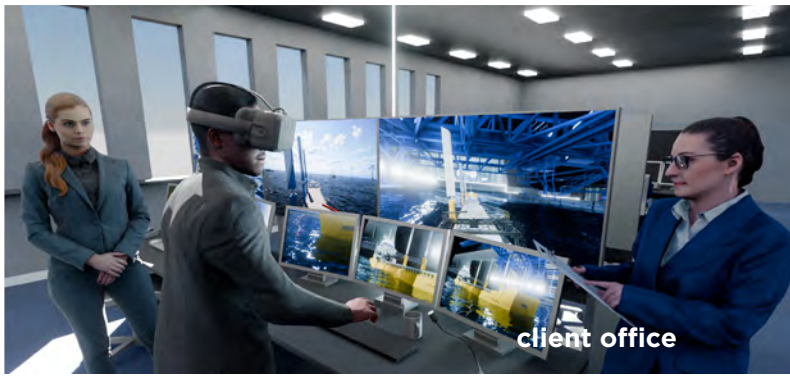
At our clients' offices, we will help our clients to explore alternative operational practices or concepts for hulls, propulsors, and power systems. We ensure that these align with their specific operational profiles. We help them to collect and analyse operational data, providing valuable insights into actual vessel usage, onboard decision-making, and how environmental conditions and vessel behaviour impact performance. We optimise for power, cavitation,

manoeuvring and seakeeping requirements. We will use our cutting-edge physics and data driven tools. Clients as well can make use of these tools. They can also step into a dynamic simulation environment that uses our advanced library of hydrodynamic, power, propulsion, and energy systems models and data. Together we will achieve concepts or practices that are a significant leap forward in energy efficiency, operational performance and safety.

Onboard, we support clients in collecting operational insights and we will help clients to explore new concepts in operation that enhance the performance of their ships and marine structures. We will link real-time measurements with our dynamic simulation environments to create a hybrid physical and virtual setting in which we can jointly explore and evaluate ideas. This integrated environment will connect the vessel, the client's office, and MARIN, enabling collaborative simulation and interaction across all locations.







Coherence and efficiency in our operations: generic where possible, specific where needed

In addition to the broad scope we pursue in the market, in our roles, and in linking our strengths to create impact and uniqueness, we are more aware than ever that this is only possible if we choose coherence and efficiency in how we operate.

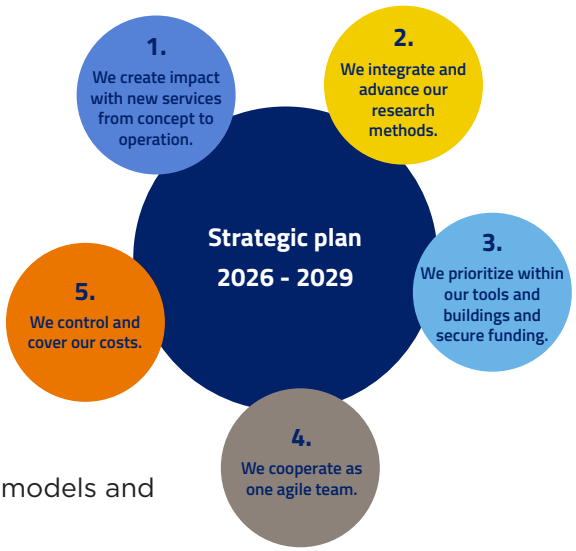
This calls for a strong focus on synergy across our operation. We chose for generic where possible, specific where needed. We focus on synergy in our services across markets with shared marketing, offering, analysing and reporting modules that can be reused and adapted to different sectors. We focus on synergy in our research methods and R&D, so that we create a robust base from which we can develop market-specific capabilities. We focus on synergy in our internal collaboration, where we work from a common base that allows us to operate with agility across the organisation. This means a clear focus on shared priorities and common interests.

5.2 Implementing our strategic choices

To guide the implementation of our strategic choices, we have used the Objective, Goals, Strategies and Metrics (OGSM) model. We first translated the strategic choices into a clear objective for the strategic period 2026–2029:

To create maximum and unique impact across the maritime sector by operating coherent and efficient.

We then translated this objective for our organisation into concrete, measurable goals. We defined one for each area of our value chain: services, research, tools, people, and finances. These were also the five focus areas of our 2025 annual plan, Drijfveerkracht. With our strategic plan 2026-2029, we have now defined updated goals for each of these areas, and the corresponding annual implementation plans.



The goals by 2029 are:

1. *We create impact with new services from concept to operation,* with 70% of our clients helped from concept to operation.
2. *We integrate and advance our research methods,* with 80% of new projects integrated in our internal MARIN wide library of digital models and data sets.
3. *We prioritise within our tools and buildings and secure funding,* so that the backlog of overdue maintenance and sustainability improvements no longer increase after four years.
4. *We cooperate as one agile team,* combining leadership, entrepreneurship, excellent knowledge and diverse perspectives whereby an additional 25% of MARIN is skilled to work on other roles or disciplines.
5. *We control and cover our cost,* creating room for new services with an annual overall financial result of 4.2% of our turnover and a performance-based incentive (RAM – Resultaat Afhankelijke Maatregel) of 8.33% of our gross salaries.

Next, we have identified strategies to guide and focus our efforts in achieving these goals, along with corresponding metrics. The resulting OGSM (Objectives, Goals, Strategies, and Metrics) is presented in Appendix F. Below, we outline the key elements.

We create impact with new services from concept to operation

We aim to help 70% of our clients from concept to operation. The five market groups within MARIN will develop a *market roadmap* to implement this goal, in close collaboration with the maritime sector. Part of each roadmap will be a quantitative analysis of that market and an assessment of MARIN's competition and services.

Additionally, the roadmaps will present propositions and a marketing approach for three client-accessible services for each of MARIN's four roles: assessing designs and operations, accelerating client innovations, exploring emerging technologies, and advising policymakers and regulators. The three services per role differ in their level of detail and complexity, allowing us to better tailor our support to the specific needs of each client.

The market roadmaps will be linked to the RD&I agenda and they will give focus to new initiatives for cooperation projects. We will leverage our existing strengths while advancing new knowledge and technologies. We will combine our daytime services at MARIN's premises with digital services that clients can access remotely, in their offices or onboard.

To strengthen client relationships, senior project managers will act as dedicated points of contact for specific clients. This will help build long-term cooperations based on shared roadmaps. We will also shift our focus more toward end users - such as ship owners, charterers, and operators - to better support the concept and operational phases of ships and marine structures.

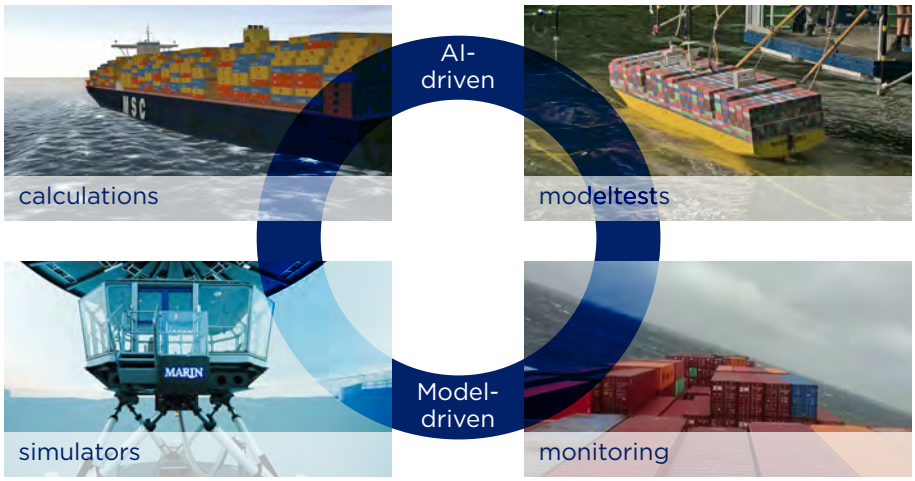
We are committed to long-term collaboration between governments, companies, and knowledge institutions to drive innovation. MARIN leads five national and international networks that promote innovation and cooperation in the maritime sector: the BlueForum, the Vessel Operator Forum, the Floating Energy Research Forum, Cooperative Research Ships, and Cooperative Research Navies. These networks contribute to the sustainable, safe, and secure use of the oceans, while also enhancing the competitiveness of the sector.



We will work closely with the maritime sector, other TO2 institutes, universities, and universities of applied science to harness the unique strengths of each partner. We will focus our developments in cooperative projects on Technology Readiness Levels (TRL) 4 to 7, validating technologies in the lab up to demonstrating system prototypes in operational environments. Particularly in our role of accelerating our clients' innovations and exploring emerging technologies, we will strengthen collaboration with SMEs. Collaboration with universities of applied sciences will support SMEs in this effort.

We integrate and advance our research methods

We aim to integrate our research methods across MARIN to deliver faster, more effective, and more distinctive services. Our goal is for 80% of new projects to be integrated into a MARIN-wide library of digital models and datasets. This integration includes calculations, hydrodynamic and power system model testing, simulators and onboard measurements, as well as all supporting software and digital infrastructure. We do this for MARIN's four roles: assessing designs and operations, accelerating client innovations, exploring emerging technologies, and advising policymakers and regulators.



We will implement this goal through a MARIN-wide research, development, and implementation (RD&I) agenda. This marks a new approach. Our RD&I agenda expands the current R&D focus by including the critical steps needed for implementation. It broadens our scope beyond knowledge and technology development to also encompass improvements in our basins, simulator centre, digital services, and infrastructure. Additionally, we are committed to ending the fragmentation of our efforts over time. In the past, we worked on many R&D projects simultaneously, each making small progress annually. We will concentrate our development in larger blocks each year. This means prioritizing projects annually so they

can have a greater impact. We have developed the structure of the RD&I agenda, and its governance. This is outlined in Appendix G.

A key part of our transformation is the automation of model testing. We will automate repetitive tasks and invest in our measurement technicians to take up the challenge. Thanks to their continuous work, we will maximise the 24 hours in a day to obtain unique, high-quality datasets and to *intensify our interaction with the clients in our facilities during daytime.* Furthermore, in our projects, we currently conduct only those experiments or simulations necessary to address our customer's immediate questions. This approach results in a limited dataset and biases the data towards specific conditions. Through automatic model testing and maximizing the use of our high-performance cluster, we will enhance and expand the testing programmes for our customers. We will also meticulously create digital models and datasets, independent of customer projects and owned by MARIN, with our numerical simulations and model tests. The result will be a MARIN-wide modular library. The library will be a real asset to successfully implement AI in the maritime sector. Clients can also add their own data through a secure private data space, ensuring their digital sovereignty.

We will thereto improve and automate the entire process - from data generation to updating models in the library. New digital technologies, including artificial intelligence, will help us take major steps forward. Our model tests will produce robust, structured datasets that can be used to train high-quality numerical models. These models will be enriched with onboard data - whether from MARIN or client vessels - and made operational in simulators at MARIN, in client offices, or onboard ships. This enables clients to explore and evaluate alternatives throughout both the concept and operational phases. We will also introduce data and model stewardship as a crucial role in ensuring the quality, integrity and security of the library.

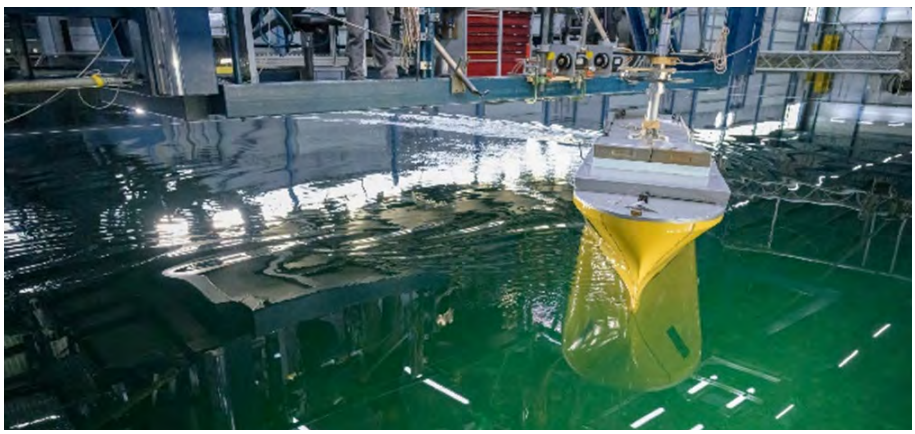


We will moreover strengthen the applicability of our knowledge and tools for all four roles by building on a robust, generic foundation. Our RD&I agenda will be centred around these roles, with a focus on synergy across new services and markets. By combining our strengths, we ensure that designs, technologies, practices, and policies can be experienced and validated before implementation - maximizing their success in real-world operations. We will thereto develop approaches for rapid prototyping and human-centred design of ships and operations. Through this RD&I agenda, we will also drive our digital transformation, enabling the transition toward MARIN-as-a-Service.

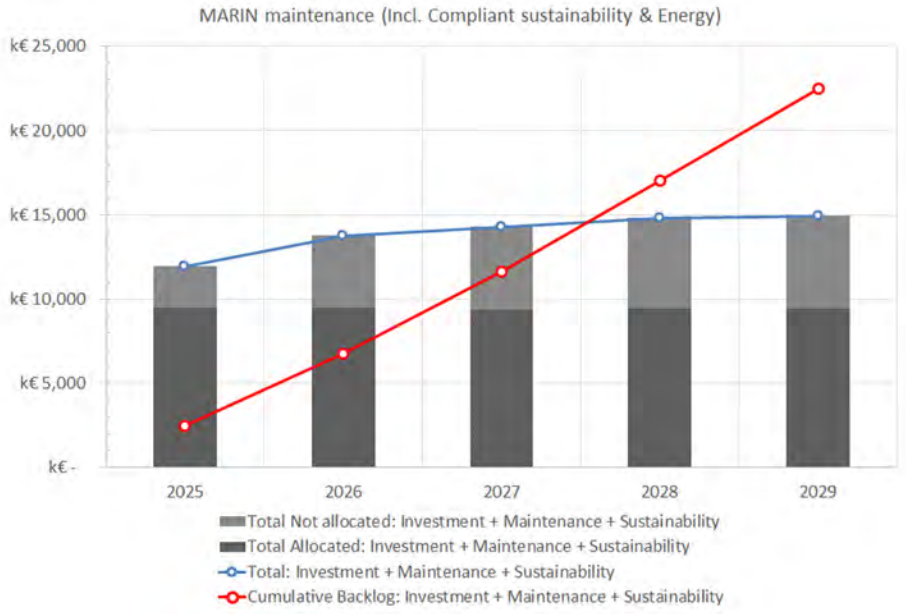
To stay focused on our core activities, we will build alliances on a non-exclusive basis with partners that have complementary knowledge and tools. We will connect our tools, simulation environments and onboard data acquisition systems with design and operational tool providers, as well as onboard system suppliers. While we collaborate broadly, we remain independent and scientifically objective.

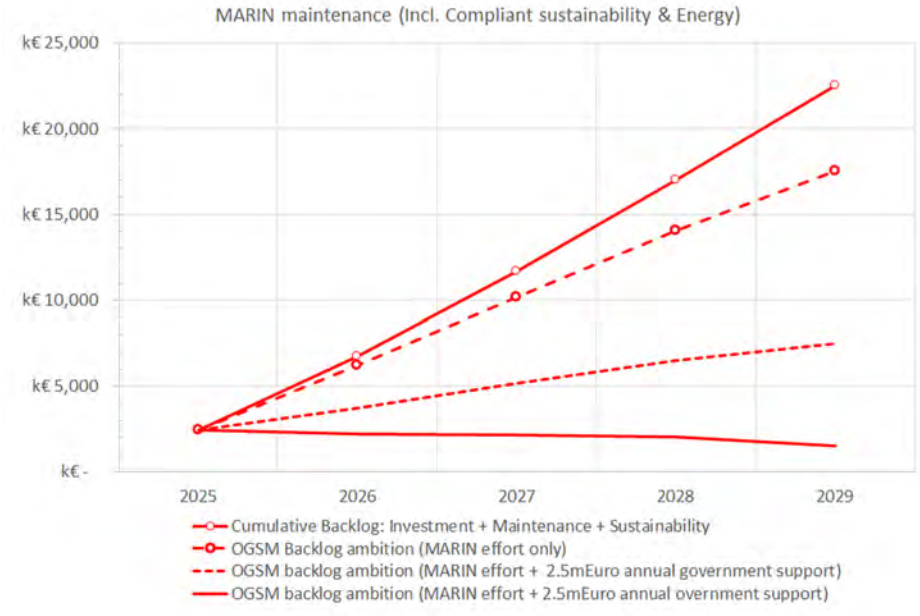
We prioritise within our tools and buildings and secure funding

Our goal is to ensure that the backlog of overdue maintenance and sustainability improvements no longer increases after four years. We will implement this goal based on our l*ong-term maintenance and sustainability plan,* along with actions outlined in the RD&I agenda. We use 'tools' as a collective term that includes our research methods with our numerical calculation tools, model basins, simulators, onboard test facilities, corresponding software and digital infrastructure. We face a significant challenge in maintaining our tools and buildings, let alone renewing them or reducing the ecological footprint of our buildings and operations.



A substantial maintenance backlog has built up over time. As an initial overview, we have mapped the required investments for maintaining our tools and buildings in Wageningen and Ede over the coming strategic period. This overview only presents the out-of-pocket costs, no labour costs for MARIN employees are included. As a result of the backlog, there is an average required investment of €12-15 million per year for the period 2025–2029. In the budget of 2025, we were unable to budget €2.5 million of this amount (light grey in the bar plot below), This annual backlog increases to €4.3 million in 2029, leading to a cumulative backlog of €22 million by 2029 (red line). This would result in a severe reduction in the reliability of our operations and therefore a change in policy in needed.

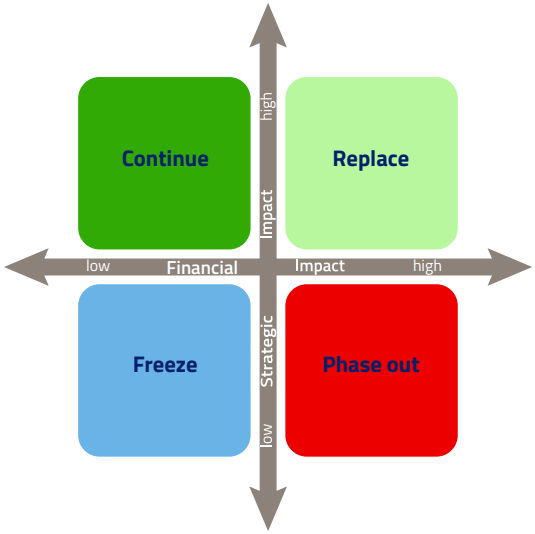




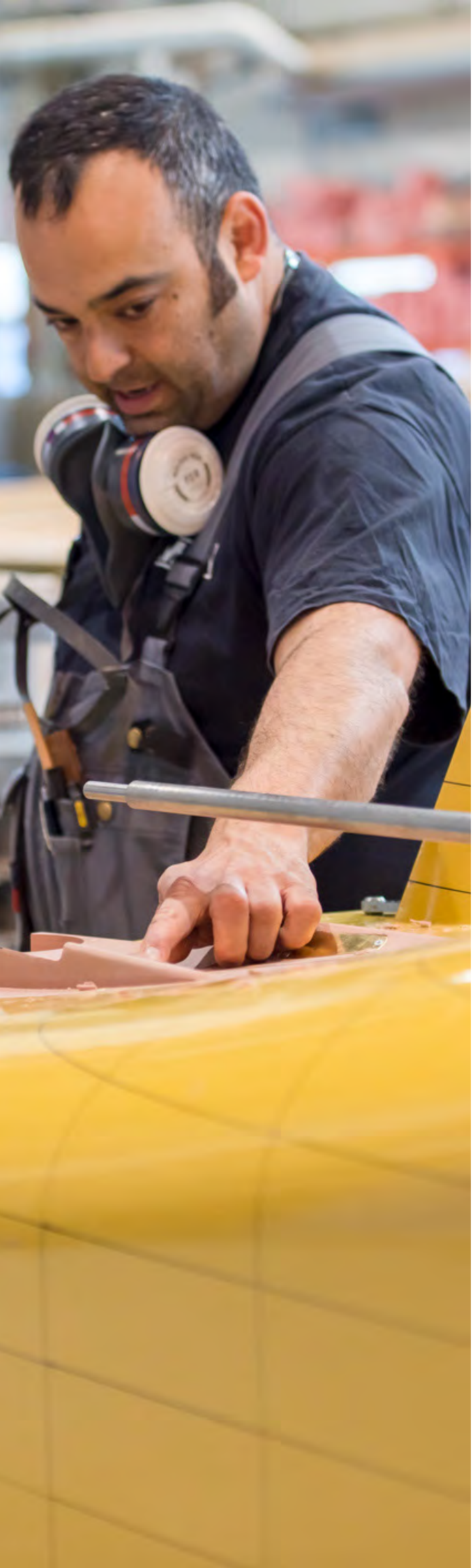
To prevent the backlog from growing to this amount in 2029, we will evaluate all tools and buildings on a fixed cycle, taking into account their strategic importance and financial impact. Based on these evaluations, we will make clear decisions - whether to continue, freeze, replace, or phase out specific assets - in close cooperation with our stakeholders. Wherever possible, we will integrate overlapping tools to reduce maintenance costs, aiming for annual savings of €1.5 million compared to 2025. The plot below on the left shows the impact of this saving also taking into account €2.5 and €4.0 million per year additional funding from our government. It shows that only the €4.0 million scenario results in a stable situation.

We will continue our dialogue with our government stakeholders to obtain funding for the maintenance and development of MARIN's vital research and testing facilities. Our goal is to ensure an annual operational subsidy of €4.0 million to remain sufficiently equipped to perform our three main tasks as TO2 institute, and in particular maintaining our strategic research facilities. Currently, the costs of maintaining and sustaining these facilities must be covered entirely through our operational income. MARIN already fully allocates its institute subsidy to maintaining the essential knowledge base and supporting public-private partnerships. It is important to note that direct public funding for this knowledge base is relatively low compared to other TO2 institutes. As a result, there is no room to redirect these funds toward the upkeep of our tools, such as model test facilities, or the development of supporting methods and processes like complex data analysis.

The EMTO-commission has advised MARIN and the government to engage in discussions on this matter. We are following up on this recommendation. We are grateful to the involved ministries and remain committed to preserving the Netherlands' strategic research infrastructure.







In addition, we will generate additional financial results through new services and research methods (see Goals 1 and 2), and reinvest these gains in reducing our ecological footprint. We aim to increase these additional annual financial results to €1.0 million by 2029, equivalent to 1–2% of turnover.

We cooperate as one agile team

We combine leadership, excellent knowledge and diverse perspectives in an inspiring work environment. We choose to be versatile and agile in expertise and competencies so that we can more easily switch between MARIN's four roles and across teams. Our aim is for 25% more colleagues to be equipped to work across different roles or disciplines. In our Human Relations agenda we will develop the roadmap to achieve that goal.

We will continue to invest in each other and sustain a safe learning culture, where feedback, coaching and making mistakes are part of the learning process. We focus on this because, in a social and safe environment, we can successfully bring together our four roles and deliver the best quality to the maritime sector. Our commitment to inclusivity - being open-minded and valuing different perspectives – strengthens collaboration. We will continue to invest in internal connection and expand our Diversity & Inclusion plan, focusing on awareness, equal opportunities and inclusivity. We are committed to equal pay for equal contributions and actively monitor and address any diversity-related gaps in salary or promotion.

We will further align personal development with our strategic goals. Strategic personnel planning helps us identify the knowledge and skills we need, giving our people direction and confidence in their growth. Building competencies keeps MARIN an inspiring place to work. We will focus on leadership, entrepreneurship, commercial, and digital skills.

We will provide leadership training and coaching for management, team leaders, market and RD&I coordinators, and project managers. We also stimulate entrepreneurial thinking from all MARIN colleagues - because MARIN thrives when we create value together. This mindset is essential for taking commercial initiatives and implementing our R&D into the market. We will also further develop management skills which are crucial for those coordinating the projects in a way that team members can work efficiently and effectively.

We will also strengthen our roles through so-called T-profiles: professionals who combine deep expertise with strong communication skills and the ability to bridge disciplines. They help translate client needs into clear objectives and research questions, guiding innovation processes. In addition, we will train colleagues to advise government organisations, understand regulatory frameworks, and communicate in ways that support public decision-making. This includes translating our findings into insights that policymakers can understand and apply.



To support agility, we will improve collaboration between teams, making it easier to form multi-disciplinary project teams. Agility means more than switching tasks - it requires confidence to take initiative, supported by training and supervision. This approach helps colleagues learn new skills and ways of working, ultimately creating a more flexible and responsive organisation.

We encourage learning across and beyond departments, offering employees opportunities to grow in line with their ambitions. As we invest in multiskilling, we may also adapt our salary structure to recognise newly acquired and maintained skills and experience.

We control and cover our cost

We get further control over our expenditures and ensure that our costs are appropriately covered, creating room to invest in new services. Our financial goal is to achieve an annual overall result of 4.2% of our turnover and to remain an attractive employer by offering competitive salaries, supported by a performance-based incentive RAM (*Resultaat Afhankelijke Maatregel*) of 8.33% of our gross salaries. In our monitoring and reporting plan, we will develop the roadmap to implement that goal.

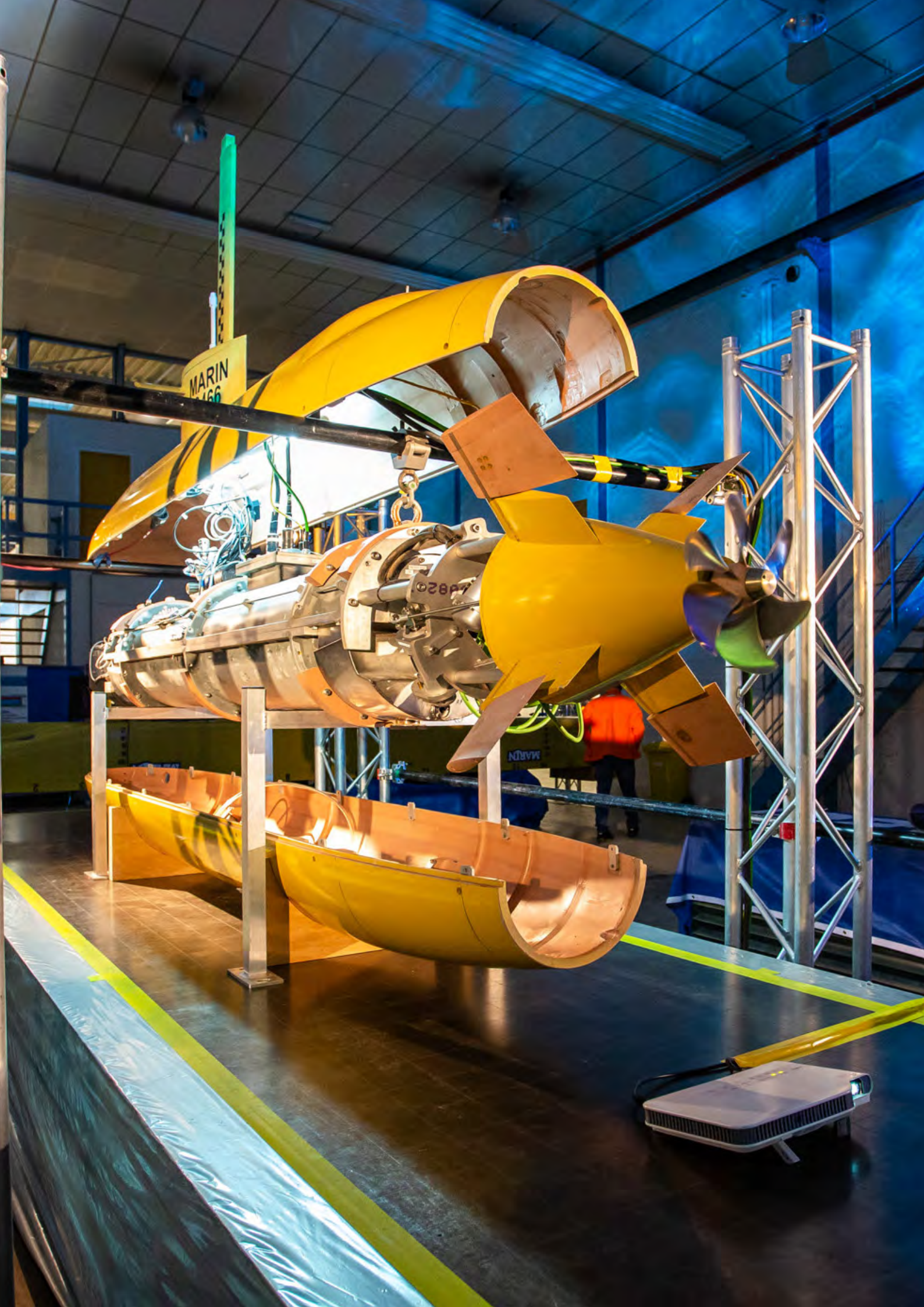


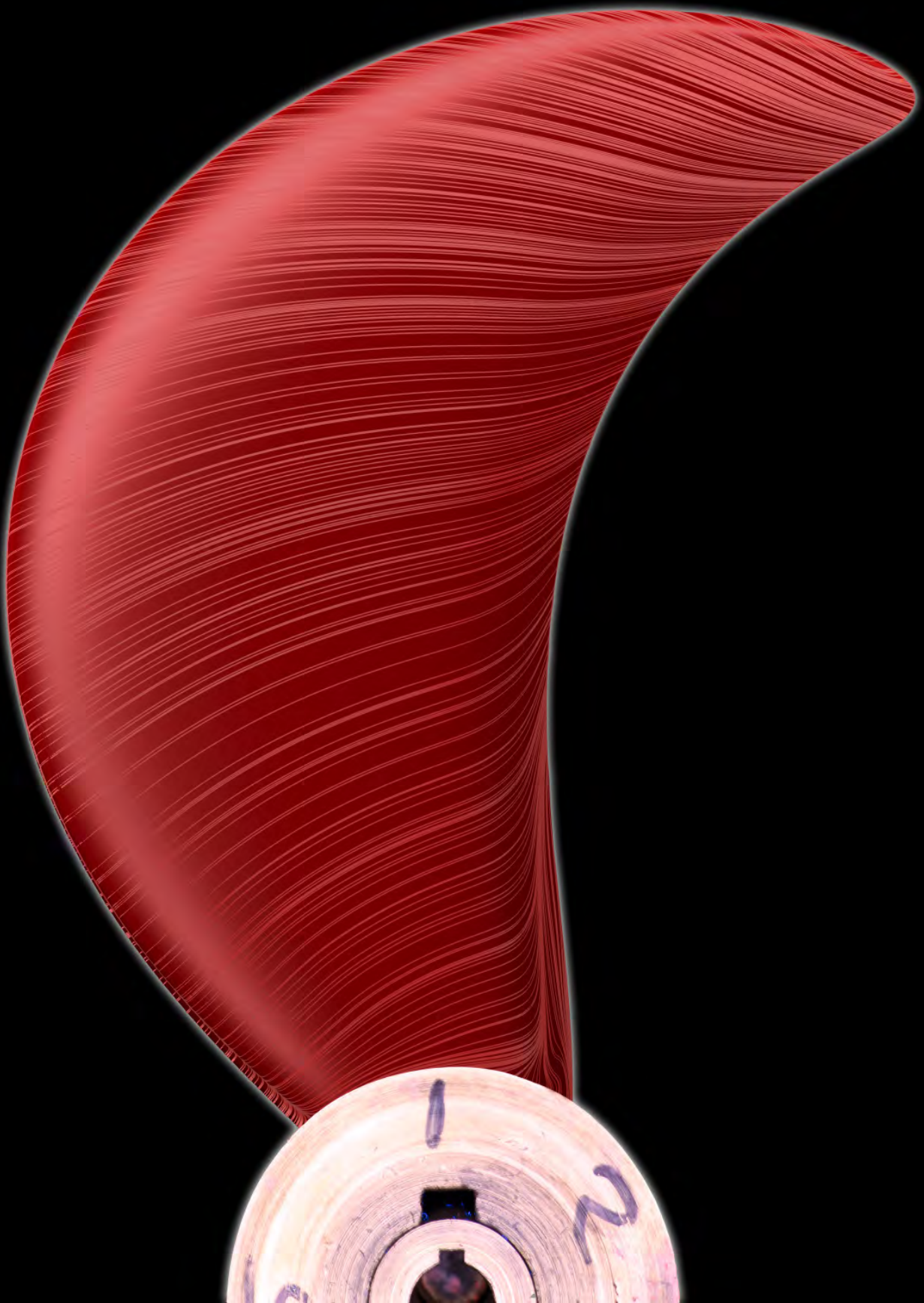
We will further improve insight and control over the cost coverage of contract research, cooperative projects, and internal initiatives. We will steer project scope based on the desired quality and available budget. Our target is for 90% of contract research projects to generate a positive financial result, and for 100% of cooperative projects to be fully cost covered.

We will continue our dialogue with government clients to ensure that we can apply fully cost covering tariffs in all our public contracts. This includes fair and transparent compensation for security measures required in Defence-related assignments, as well as for the investment in secure workspaces and buildings at MARIN. The demand for these secure facilities is increasing, driven by the needs of the Netherlands Ministry of Defence and allied partners, and meeting this demand requires substantial investment.

Additionally, we want to ensure that currently unfunded advisory and support activities provided to government bodies are properly recognised and financially supported.

In line with the EMTO-commission's conclusions and its first recommendation to the government, we will also maintain structured dialogue with our government stakeholders to obtain structural increase in our annual institute subsidy. With this increase we want to maintain our knowledge base and strengthen public-private cooperation. This is essential to remain sufficiently equipped to perform our first task as TO2 institute of developing and applying knowledge to address societal challenges as well as our second task to empower the innovative strength and competitive position of the Netherlands. Subsidies in for example EU programs are not cost-covering, requiring MARIN to contribute its own funds through matching. As a result, MARIN has become more selective in responding to collaboration invitations under subsidy calls, as the available matching funds are insufficient. Furthermore, there are currently no resources available to support an EU desk within MARIN, which limits our ability to engage effectively with European funding opportunities and increase our impact. Our aim is to achieve a structural increase of €2.0 million in the annual institute subsidy compared to 2025 to remain sufficiently equipped to perform our first two tasks as a TO2 institute.


MARIN



6. Finance and risk analysis

As a public-private and not-for-profit institute, our financing is based on a mix of funding sources. Notably, 66% of our current turnover comes from market and cooperation projects. This proportion is traditionally high compared to other national and international research institutes. This chapter describes our financial aim in the markets as well as an urgent call to our government to support our mission, strategic facilities and to cover our actual rates.

Recommendations of the EMTO-commission

The EMTO-commission made recommendations to both MARIN and the government. MARIN's follow up to the commission's recommendations is outlined in this strategic plan summarised in Appendix C3. This can only be successfully achieved if the recommendations to the government are also implemented. As stated in the EMTO report:

1. The commission is of the opinion that only a substantial increase in the institute subsidy will enable MARIN to remain sufficiently equipped and positioned to continue performing its three main tasks in the future. MARIN plays a central and pioneering role in developments in the maritime sector. It makes great (time) efforts for this, which the committee believes, partly in comparison with the other TO2 institutions, is insufficiently recognised through the level of the institute's subsidy. This is too low to finance the maintenance of its own facilities, as is the case with the other TO2 institutes.

2. The commission proposes aligning the institute subsidy with the planned activities to strengthen the knowledge base of MARIN as agreed and described in the four-yearly Technology Plan and supplemented with a separately earmarked contribution for MARIN's maintenance of the facilities (such as NLR's) which have been agreed to be of strategic value to the Netherlands and should be retained as such, regardless of their utilisation rate. The latter also requires joint action.

3. Allow MARIN to apply cost covering tariffs in government contracts to the extent that these costs are not already covered through other government contributions.

To successfully achieve our strategy, these recommendations to the government imply:

- A structural increase of €2.0 million in the annual institute subsidy compared to 2025 to remain sufficiently equipped to develop and apply knowledge to address societal challenges and empower the innovative strength and competitive position of the Netherlands (first two main task as TO2 institute).
- A structural increase of €4.0 million in the annual institute subsidy compared to 2025 to maintain our strategic facilities (third main task as TO2 institute).
- Use of cost covering tariffs in our services to governments.

In summary, the total requested additional funding based on the EMTO recommendation is therefore €6 million in annual institute subsidy and using realistic cost covering tariffs. These amounts were calculated without inflation, based on cost in 2025. MARIN will keep the same high ratio for valorisation of our knowledge (66% market cooperation of total turnover) and the requested €6 million is 23% of the total effort to achieve our strategic goals. This is further explained below.

Profit and loss projection

Our strategy focuses on achieving our vision with the maritime industry and governments across the entire spectrum of the maritime markets, with innovations for industry and increasing our role in supporting policymakers. We therefore foresee a similar balance between market services (66%) compared to subsidised activities (34%) by 2029. Our portfolio has been further developed to deliver unique value by connecting and leveraging our core strengths. Our subsidised activities also include an expanded role for our Ministries of Defence, I&W and LVVN with an additional turnover of €2. 0 million. At the same time we anticipate a reduction in the infrastructure (FTO) subsidies for new facilities.

We project a modest growth of 3.0 % annually, resulting in a total turnover of €79.0 million in 2029, including additional institute subsidy which is partly to support out-of-pocket cost for maintenance. We can therefore achieve this by a 2.0% increase in personnel size. This increase will be 50% by external workers to be able to focus on our core competences in MARIN and to remain flexible in our operations. Part of the additional added value is resulting from new services, such as automatic model testing, data-based conceptual design support, crew centred ship design on our simulators and exploration of new concepts in operation onboard. This results in a slightly higher financial result of 4.2%.

This total result is traditionally generated by market activities. As we need this result for further investments in our institute, we will discuss with our government stakeholders to include the same percentages in the rates for government assignments. At the same time we will reduce our maintenance cost by €1.5 million, to close the gap as described in the previous chapter. MARIN will also increase the total depreciation to €6.0 million in 2029 to account for the costs related to the required investments.

	2025		2029		Remarks
Market and cooperation projects	46.5	66%	52.5	66%	% as part of total turnover
Institute subsidy (ARD + Matching Fund)	8.0		8.0		
+ Additional institute subsidy to maintain our knowledge base and strengthen public-private cooperation			2.0		Recommendation 1 to government from EMTO-commission to remain sufficiently equipped for task 1 and 2 as TO2 institute
+ Additional institute subsidy to maintain strategic facilities			4.0		Recommendation 2 to government from EMTO-commission to remain sufficiently equipped for task 3 as TO2 institute
Programme subsidy	7.5		7.5		
+Additional programme subsidy of Ministry of Defence, I&W, LVVN			2.0		Including coverage for costs for defence security measures, workspaces and buildings and cost covering rates, as per EMTO recommendation 3 to government
Infrastructure subsidy	7.0		2.0		FTO-projects related to development of facilities
Other subsidies	1.3		1.0		
Total invoiced turnover	**70.3**		**79.0**	**3.0%**	**%annual growth rate**
FTE (full time, incl. externals)	*430*		*465*	*2.0%*	*%annual growth rate*
MARIN personnel cost	48.0		51.8		Including RAM of 8.33% of our gross salaries in 2029
External personnel cost	0.5		2.4		50% of new personnel will be externals, outsourcing 5% of our operation
Direct project cost	6.3		6.3		Balance between general cost increase and reduced material cost on FTO projects
Other operational cost	9.0		8.5		Reduction of maintenance cost (-€1.5M), increased general cost supplies and energy (+€1.0M)
Depreciation	3.1		6.0		Higher due to own investments in buildings and reducing ecological footprint of buildings
Endowment facilities	0.7		0.7		
Total cost	67.6		75.7		
Net result	2.7	3.8%	3.3	4.2%	% net result as part of turnover, to be reinvested in our sustainability

Amounts in € million, without inflation correction.

Costs to achieve the goals

Underlying our profit and loss projection is an assessment of the costs required to realise our key objective: create maximum and unique impact across the maritime sector by operating coherent and efficient. For each goal and its corresponding strategies, we have estimated the number of internal hours, the out-of-pocket costs and the necessary investments for the strategic period 2026-2029. In addition, our external funded knowledge development and our market services directly contribute to the realisation of our vision.

Goal with strategies (see Appendix F)	Total cost 2026 - 2029				Additional requested institute subsidy
	Internal hours	Out-of-pocket	Invest-ments	Total	
1. We create impact with new services from concept to operation (majority of the costs related to our networks)	10.7	0.7	0.0	11.4	**8.0 (2.0 per year)**
2. We integrate and advance our research methods	17.1	1.5	1.0	19.6	**-**
3. We prioritise within our tools and buildings and secure funding	3.8	19.0	38.0	60.8	**16.0 (4.0 per year)**
4. We cooperate as one agile team	8.4	1.8	0.0	10.2	-
5. We control and cover costs	2.8	0.3	0.0	3.1	-
Total 2026-2029 (4 years)	42.8	23.3	39.0	105.2	**24.0**
Total per year	**10.7**	**5.8**	**9.8**	**26.3**	**6.0 (23% of total)**

Amounts in € million, without inflation correction.

Internal hours

We present the required internal hours in euros. We apply a target in which 60% of our available working hours are externally funded, leaving 40% as internal hours. The total annual internal hours needed to implement the strategy (€10.7 million) represent 36% of the total available internal hours. This indicates that our ambition is challenging, yet achievable, as a significant portion of our internal hours are essential for our daily operation. The estimation provides focus to our internal hours, and we will organise this collectively within MARIN.

Out-of-pocket cost

The annual out-of-pocket costs represent 69% of our 'Other operational cost' (€8.5 million in 2029). We consider this manageable with sharp cost control measures in place.

Investments

The total required investment is €9.8 million annually, leading to €39 million over 4 years. This investment is mainly related to the maintenance of our facilities and buildings. The total cost for our tools and buildings is €63.6 million. Here we will request €4 million annually to our government to reduce the investments for MARIN from €9.8 to €5.8 million. This would also be in line with the depreciation in the previous table, leading to a sustainable financial model.

Risk analysis and mitigation

Besides 'Oceans of opportunities', MARIN is also facing risks. We have indicated the most important risks and related mitigation measures in the table below.

Description	Impact	Type	Consequence	Mitigation
No support from government for maintaining strategic facilities	+++	Financial	Severe operational issues	Close strategic facilities
No need for our new services in the market	+++	Financial	Pressure on financial result	Boost existing services to increase turnover. Reduce growth ambition
No increased need for support by ministries of Defence, I&W and LVVN or willingness to cover actual costs	++	Financial	Pressure on financial result	Reduce growth ambition
FTO subsidies are stopped	+++	Financial/ Strategic	Missing opportunities to develop strategic impact and renew facilities	Find alternative funding in EU. Reduce growth ambition
No financial capability for own investment in buildings and maintenance	+++	Financial/ Strategic	Severe operational issues and not able to reach our sustainability goals	Close strategic facilities and related buildings
Not successful in hiring new talent	++	Personnel/ Strategic	Missing opportunity to develop agile team	Reduce growth ambition and automate activities
Not successful in setting up leadership programmes	+++	Personnel/ Strategic	No commonly developed leadership approach to bring focus in the organisation.	Individual and limited leadership development
Not successful in 'generic where possible' strategy	++	Operational/ Strategic	We lose focus and spend too much time maintaining too many tools, software and facilities	Forced to reduce our scoping for the sector
Not successful in controlling costs on projects and out-of-pocket costs	+++	Operational/ Strategic	Financial loss	Reduce investments and limit complex projects


ABATO Motoren

Appendices


MARIN

Appendix A. MARIN's journey

Our foundation was established in 1929 by the maritime sector and the Dutch government. It was found to benefit from research by means of model tests to improve resistance, propulsion and steering behaviour of ships. This is a result of a period at the beginning of the 20th century in which shipping and shipbuilding in the Netherlands grew and there was support for scientific research in shipping. There also was a drive for nationalisation and self-sufficiency. Other countries were also investing in towing tanks.







The Netherlands Ship Model Basin was officially opened in 1932. It was the fruit of the vision and hard work of our founders. We realise that if it had not succeeded then, it would have been a significant setback to start model testing in the Netherlands after the Second World War. Our founders created a time advantage over our global competitors. The key points of the policy were: direct interaction with customers, international orientation, fast delivery time, supporting scientific research, and financial management of liquidity.

We continued to build during the growth period of 1947-1973. It was a time when Japan became a market leader in shipbuilding, and ships started sailing faster and getting larger. New ship types and forebodies emerged and offshore operations were on the rise. We expanded and deepened our research in various areas, including resistance and propulsion, steering and manoeuvring, vibrations and noise, behaviour and loads in seaways, behaviour in restricted waters, offshore operations (such as anchoring, dynamic positioning and installation). During this period, we developed several new facilities, some ahead of market demands others directly catered to market's needs. It was also a period of increasing support for computing, human-machine interaction, resulting in a calculation centre and manoeuvring simulator.






The period from 1973 to 2000 was one of survival. Global shipbuilding production drastically declined. This led to the downfall of large shipyards in Europe and the rise of South Korea around 1980. The demand for large tankers collapsed. The demand in the offshore market fluctuated but with further specialisation in advanced objects. For MARIN, it was a time marked by decreasing revenues and annual operational deficits, largely due to the costs of the vacuum tank. The erosion of equity, lack of replacement and renewal of facilities, increased failures and outages, and missed opportunities led to major reorganisations. This deeply affected our colleagues. Government intervention was present but often too late and insufficient in financial support.

Two investigations by government committees took place one at the beginning of this period (1978) and one more at the end (1994). These committees consistently concluded that while actions were necessary, MARIN was crucial and relevant for the maritime sector. The question was never about our importance but rather how we operated. In 1994, the committee advised MARIN to strengthen its external networks and professionalise its research inquiries. They recommended the government to provide financial support for the replacement of the seakeeping tank and wave current tank, upgrading the vacuum tank and for MARIN's independent research.





And so, from 2000 onward, we made a fresh start. With government support, we did not simply replace the model basins, but we established the unique Seakeeping and Manoeuvring Basin and Offshore Basin. This provided us a real competitive edge. We also developed our own computational infrastructure (High Performance Computing). This accelerated our numerical computation capabilities. We professionalised our organisation in line with the current needs. We strengthened our integration within the industry and knowledge networks. We were once again supporting the maritime sector and governments with contract research. 60-70% of our annual revenue came from work for the maritime industry. We revived our strong culture of cooperation and sharing, initiating multiple international knowledge networks.

From 2016 onward, we worked on the next transition. On the one hand, we wanted to further develop our strength as a leading hydrodynamic and nautical research partner and service provider for the international maritime sector. On the other hand, we wanted to expand our broader role for the maritime sector, government and society based on a clear mission that connects social, economic and technological challenges. This resulted in the strategy plan 2018-2021 'Better Ships, Blue Oceans' and the succeeding 2022-2025 plan 'Beyond the horizon'. Our mission became:

MARIN stands for clean, smart and safe shipping and sustainable use of the seas. *We do this in our capacity as an independent knowledge partner for the maritime sector, government and society. We offer integral solutions, from concept development and design to operation. In developing, applying and sharing our expertise we stimulate innovation and global cooperation. Our strength lies in the expertise and dedication of our employees.*

Our vision of the future became: free, safe and clean seas. We wanted to achieve with the sector seas with zero-emission ships, solutions for sustainable energy and food at sea, safe ships for the crew, cargo and environment, smart digital ships and an innovative infrastructure.



Based on this strategy, we made ships and marine structures cleaner and safer. We focused on an integrated and multidisciplinary approach to problem-solving, from concept to operation. We conducted high-quality research that effectively addressed societal challenges. We leveraged the government contributions to knowledge development and public-private partnerships. They accounted for 10-15% of our annual revenue. We strengthened our role for the government and international regulators to serve the public domain. We added expertise on artificial intelligence and human factors. We invested in knowledge and capabilities to assess reduced emission powertrain with Zero Emission Lab. And we realised our Seven Oceans Simulation centre: a completely new state of the art simulation centre for better ship design and safer operations.

Appendix B. Knowledge partner

Cooperation with the national and international maritime sector

MARIN is a dynamic force in the national and international maritime sector. We lead and cooperate within numerous Joint Industry Projects and networks. In the Netherlands, this starts with Nederland Maritiem Land, involving all Dutch maritime branches and central companies. We are particularly active in the Innovation Council, directly connected to Top Consortium for Knowledge and Innovation Maritime, to accelerate innovations and strengthen collaboration.

To stimulate fundamental maritime research, MARIN collaborates with TU Delft, NLDA, TNO, and major market players within the Maritime Knowledge Centre (MKC). At Delft University, MARIN is deeply involved in joint scientific work, funding a professor chair, and guiding master and PhD students. Our collaboration with Twente University is robust, especially in the exciting field of multi-phase fluid dynamics. We also maintain a close partnership with Groningen University, focusing on Computational Fluid Dynamics. Additionally, MARIN teamed up with the Netherlands eScience Centre to advance data science research in maritime studies.

Internationally, MARIN has been leading the Cooperative Research Ships (CRS) for over 55 years, bringing together shipyards, suppliers, shipowners, navies, classification societies, and research institutes. We also collaborate with international navies through the Cooperative Research Navies. MARIN spearheads various Joint Industry Projects, organizing networks like the Floating Energy Research Forum, BlueForum, and the Vessel Operator Forum. These forums facilitate sharing experiences, promoting sustainable practices, and discussing new technologies. This drives innovation and collaboration in the maritime sector.





MARIN has been a key player in organizing the maritime sector at the European level. For four years, we chaired the Waterborne Technology Platform, uniting ship owners, shipyards, equipment suppliers, class societies, and research institutes. This platform aims to shape the European research agenda in Horizon Europe and secure funding for maritime, inland, and blue-growth research. Together, we have established a co-programming partnership with the European Commission on zero-emission shipping, running until 2030. In 2019, MARIN joined the European Sustainable Shipping Forum. The European Commission created this to discuss the latest innovations and regulations and provide input for IMO discussions.

MARIN is also involved in the International Towing Tank Conference and the International Ship Structures Conference. Academically, we have established close collaborations with Instituto Superior Técnico in Lisbon, the University of Leeds, the University of Southampton, and Chalmers University.

Knowledge partner of Ministry of Infrastructure and Water Management

In 2022, MARIN sent the white paper 'Heading for shipping safety' to the Ministry of Infrastructure & Water Management and Rijkswaterstaat. Serious shipping accidents on our busy waterways and the North Sea pose major risks to crew, passengers, the environment and the economy. With larger ships, more shipping movements, and wind farm constructions, shipping safety is under increasing pressure. This situation demands national and international action to raise maritime safety levels.

MARIN proposed strengthening cooperation with the ministry to enhance maritime safety. As an independent knowledge partner, MARIN can support the government's proactive, risk-based approach with its unique facilities and expertise. A targeted long-term knowledge agenda is essential for this collaboration. The ministry has decided to fund a multi-year research program with MARIN, starting in 2024, to address these safety challenges. Additionally, MARIN works on nautical tool development, the Green Deal and sustainable shipping programs with TNO.

Knowledge partner of Ministry of Defence

Our research for the Ministry of Defence focuses on developing and maintaining naval platforms that deliver maximum operational effectiveness. We aim to ensure these platforms remain relevant throughout their operational lifetime with consideration of safety and sustainability. The ministry involves MARIN intensively in general knowledge and innovation, such as in the Kennisnetwerk Zee Network and the Dutch Naval Design. MARIN's expertise is crucial

for the Defence Industrial Strategy, ensuring the Netherlands has a stable base of knowledge, technology and industrial capacity to protect its vital and allied interests.

Currently, MARIN is deeply involved in all renewal programmes of the Royal Netherlands Navy. These programmes include the mine countermeasures vessels, submarines and the replacement of fast raiding interception and special forces crafts. They also cover the replacement of M-frigates, air defence and command frigates, and the amphibious toolbox. A key area of focus is the introduction and integration of uncrewed systems in mixed crewed-uncrewed operations. This includes efforts to reduce crew sizes on large navy vessels, considering aspects as safe navigation, collision avoidance, situational awareness and safe launch and recovery of assets. MARIN plays a central role in addressing these complex challenges.

Increased defence budgets have allowed the Ministry of Defence to invest in strengthening the knowledge base at the knowledge institutes (TNO, NLR and MARIN) since 2023. While our focus was primarily on hydrodynamics, recent years have seen a shift towards simulation techniques, AI-based advisory systems, uncrewed systems, and risk-bearing exploratory research, such as developing the modular Autonomous Underwater Vehicles and hydrofoils.



Knowledge partner Ministry of Agriculture, Fisheries, Food Security and Nature

In 2024 the Ministry of Agriculture, Fisheries, Food Security and Nature published a vision: ‘Food from the sea and large waters’. In this document a sustainable future is envisioned for traditional fisheries and other forms of food production at sea. MARIN plays an important role in the safety and sustainability of these producers. Firstly, research is done into the stability of fishing vessels and reducing the emissions of the vessels. Other offshore food producing is still in its infancy, MARIN knowledge on offshore structures and operations is essential for a successful future for these industries.

Cooperation in the TO2-federation

Within the TO2-federation, MARIN collaborates closely with the other Applied Research Organisations (TO2) in the Netherlands, including Deltares, NLR, TNO, and WUR. The TO2 institutions have three main tasks: developing, applying, and disseminating knowledge to solve societal questions and support government tasks and policy; empowering the innovative strength and competitive position of the Netherlands; and managing strategic research facilities that are often unique in the Netherlands and internationally.

Every four years, a committee evaluates the five TO2 institutions based on the protocol for the evaluation and monitoring of applied research organisations (EMTO). The overarching evaluation committee TO2 (Committee Gielen) was positive about the quality, impact and vitality of the TO2 institutions in its final report of April 2025: *"The TO2 institutes play a leading role in the field of innovation and all TO2 institutes are regarded by the stakeholders (in their field) nationally and internationally as authoritative and leading institutes. The limited available financial resources for the knowledge base and research facilities pose a number of challenges for the institutes, but despite this, the TO2 institutes fulfil an important, central role in the Dutch knowledge ecosystem, whereby they generally fulfil their main tasks in a good manner."*

We have strengthened our cooperation on a number of themes and topics, including: The North Sea, Digital collaboration (Digilab TK, DigiShape), Energy transition (Zero Emission Lab and Maritime Masterplan) and Defence. More specifically, our collaboration per institute focuses on the following themes:

- TNO: emission-free sailing, autonomous sailing, underwater noise, sustainable energy at sea, marine infrastructures, digitalisation, data science and human factors.
- Deltares: ports and waterways, marine infrastructures, floating construction, energy from water, environmental conditions, digitalisation, data science and Computational Fluid Dynamics.
- Wageningen University & Research (WUR): impact on ecology, fisheries, seaweed cultivation and digitalisation.
- NLR: aerodynamics, Computational Fluid Dynamics, human factors, simulation and virtual reality, and digitalisation.

The committee Gielen also asks for attention to bottlenecks regarding, for example, government financing of the knowledge base and large research facilities, accessibility for SMEs, cooperation with universities of applied sciences, among other things, to lower the threshold for knowledge exchange with SMEs.

Appendix C. Recommendations of EMTO-commission

1. Follow up on recommendations from the previous evaluation (2016–2019)

We summarise the recommendations made to MARIN and the Dutch government by previous EMTO-commission, along with the commission's 2024 assessment of how these recommendations have been followed up.

The previous EMTO-commission made the following recommendations to MARIN:

1. Continue to focus on maritime development and application of new Key Enabling Technologies (KETs) and seek collaboration with other specialised parties including universities or institutes (possibly outside the TO2 domain). Consider whether this requires employees with different competencies and how they can be recruited or trained and employed effectively in today's hydrodynamics-dominated environment. In this same context, consider appointing an Advisory Council that is also composed of future-oriented representatives from sectors that are increasingly relevant to (the mission of) MARIN, such as alternative energy, food and data services.

   According to the commission, this recommendation has been followed up well. MARIN's strategy places a strong focus on new technologies such as zero-emission drivelines, Virtual Reality and data science. In addition, MARIN also focuses on Human Factor aspects in ship operations. MARIN has also hired staff for data science applications, zero-emission technology, Virtual Reality and Human Factors and has strengthened cooperation in these areas, for example with TNO in the field of zero-emission technologies and Human Factors. Furthermore, new members have been appointed to the Advisory Board. Finally, MARIN has increased the representation of other TO2 institutes (TNO, Deltares, NLR) in subjects where joint research is being conducted.

2. Working more with social goals makes the relationship with the government all the more important. This requires MARIN to translate the research into policy questions from the government and from the government to a greater demand for - and financing of - policy research and the associated long-term research agenda.

According to the commission, this recommendation has been followed up well. MARIN's work for the government has increased, in particular for the Ministry of Defence (e.g. unmanned systems, crew-centred ship design, fleet development). For the Ministry of Infrastructure and Water Management, MARIN conducted research into container loss at sea and preventing collisions between ships and wind turbines. This resulted in funding for safety-related research in 2024. Discussions on funding research into inland shipping and sustainable sailing (as a follow up to the Green Deal) are still ongoing. In addition, MARIN worked with the Ministry of Agriculture, Fisheries, Food Security and Nature on a small scale. In general, the relationship with the government has become more structural and this has been reflected in an increase in funding from departments.

3. Social relevance will also be confirmed if MARIN remains at the centre of new developments and initiatives in the maritime sector at national and international level. It is expected that data science will play a more prominent role in the future. MARIN will have to develop a policy that will give it a central role here too due to its independent position (for example as an '(inter)national maritime database' for storing and processing operational data from ships) that supports further development of data-driven research and that can lead to a strong advisory position towards the market and government.

   According to the commission, this recommendation has been followed up well by MARIN. One of the pillars of MARIN's vision is to become a world leader in maritime AI applications, with the sea as a digital lab. MARIN has expanded its staff of researchers in this field, both in research and in application. In various pilot projects, MARIN works closely with the sector to explore the possibilities of AI in the maritime sector. Examples include MARIN's work on federated data sharing in the CRS (Cooperative Research Ships) and the internationally recognised AI Sail project. In addition, MARIN is in discussions with the maritime industry to set up a data platform within the Maritime Masterplan (Joint Maritime Digital Platform). MARIN has good relations with ship owners who are prepared to share their data. However, a bottleneck is that the willingness of the maritime sector to share data is still limited because companies often consider their data to be competition sensitive. For Defence, too, not all data can be shared from a security perspective.

4. It is desirable for MARIN to translate its academic quality towards stakeholders into KPIs, so that MARIN's scientific output clearly shows how and to what extent the results of fundamental

research are included in its own research portfolio. This is especially true for the new areas. The KPIs can be based on traditional scientometric indicators (publications, references, etc.) but can also have a broader approach. Also consider classifying all research according to the global Social Development Goals (SDGs).

This recommendation has not been followed up according to the commission. MARIN has not given priority to KPIs and has not formulated explicit KPIs. Data on publications, conferences, projects are mentioned in MARIN documents but are not explicitly formulated as KPIs and there does not seem to be any management. In the opinion of the current evaluation commission, KPIs can help to achieve goals, without unnecessarily high administrative burden. This is also important for managing one's own organisation if, for example, choices have to be made.

5. Investigate whether project-based collaboration with other TO2 institutes can be further intensified, especially in the field of new KETs and social themes. Look for substantive collaboration (for example within the Maritime Masterplan) and investigate whether this collaboration can be a structural part of the strategy.

   According to the commission, this recommendation has been followed up well by MARIN. Further collaborations have been set up with other TO2 institutes for new themes, such as data science, human factors and zero-emission technologies. An intensive collaboration has been established with TNO, for example in the projects MENENS and SH2IPDRIVE (R&D scheme for the Mobility sectors: RDM) and the Maritime Masterplan. An intensive collaboration has been established with NLR and TNO in Defence programmes relating to unmanned systems (KnowOne) and Human Factors (XR in Motion, MOMMIT). This has further improved the collaboration with other TO2 institutes.

6. Despite good progress on external communication, further intensification of communication to all stakeholders remains of great importance to adequately serve MARIN's overall goals and to underline the social relevance of the institute.

   According to the commission, this recommendation has been largely followed. MARIN has improved its communication to the maritime sector and the general public by being more active on social media and towards the press. This resulted, for example, in presence on national TV and newspapers related to MARIN's work on container loss (MSC Zoe) and collision prevention between ships and wind turbines (Julietta D) with the initiative 'Maritime

crash barriers'. MARIN's work on a floating mega-island was part of the children's programme 'het Klokhuis' and MARIN invites school classes (Technasia) to test their own designs for floating wind turbines and mega-islands. Communication about this receives a lot of international attention. MARIN's contributions to social media such as LinkedIn are widely appreciated and shared. However, although MARIN is recognised and acknowledged worldwide for its leading position, it should make its social impact even more clearly measurable.

7. As part of the EMTO evaluation, a basic benchmark was done between MARIN on the one hand and the fellow institutes SINTEF Ocean and HSVA on the other. This benchmark and recent changes at SINTEF Ocean provide reason to analyse in more detail how this Norwegian institute is organised and how its relationship with (and financing by) science, government, and industry is shaped. It could help MARIN to further develop its strategy.

   This recommendation has been well followed up according to the commission. As part of its strategy review, MARIN reviewed SINTEF's strategy and plans for new facilities. MARIN concluded that the position of SINTEF Ocean is very different from that of MARIN with its link to the University of Trondheim, part of a larger SINTEF organisation and with significant government funding of over €600 million for new facilities. In addition, SINTEF Ocean is very focused on the national market and less international than MARIN. Finally, MARIN notes that the new facilities are very similar to MARIN's Offshore Basin and Seakeeping & Manoeuvring Basin built 25 years ago, only slightly larger. This is also acknowledged by several Norwegian academics. MARIN concluded that it was important to follow its own strategy within the Dutch and international frameworks.

The previous EMTO-commission also made the following recommendations to the Dutch government:

1. MARIN would benefit from a clear long-term maritime research agenda from the government with associated financing. This is easier at the Ministry of Defence than at the Ministry of Infrastructure and Water Management (I&W). More intensive support from the government (I&W) for providing advice by MARIN in the context of IMO regulations could also strengthen the position of the institute in the shipping safety domain.

   In the opinion of the commission, this recommendation has been followed up well. The relationship with the ministries has become

more structural. The budget from the Ministry of Defence has doubled and MARIN has recently also received program subsidy from I&W. Collaboration with the Ministry of Agriculture, Fisheries, Food Security and Nature has taken place in several projects.

2. Over the evaluation period, the government contribution has grown to the minimum ('guiding lower limit') of approximately 15% of MARIN's turnover. This contribution is hardly sufficient to maintain the knowledge base for government and the maritime sector at the necessary level, combined with contributing to social themes. This contribution must also be partly used in the coming years to finance large facilities, such as the new Simulator Centre. Finally, the government contribution is proportionately lower than that of institutes for comparable sectors. The committee therefore recommends additional strengthening of the government contribution so that MARIN can responsibly implement the good long-term plans.

   In the opinion of the commission, this recommendation has not been followed. The institute subsidy has increased by 4% in the period 2020-2023 (+ €0.3 million), mainly as a result of inflation corrections. The current evaluation commission is of the opinion that only with a substantial increase in the institute subsidy can MARIN remain sufficiently equipped and positioned to maintain its current role in society in the future.

3. The MARIN EMTO commission is surprised that TO2 institutes such as MARIN have had to invest in their own computer facilities because the rates of computer facilities such as SURFsara are high. With the ever-increasing need for greater computing capacity in these times of digitalisation, the commission recommends finding a joint solution and financing that will effectively benefit MARIN, its fellow TO2 institutes and all clients.

   According to the commission, this recommendation has been followed up well. The joint FTO application for the financing of the TO2 Digilab Applied Knowledge has been approved very recently. This should result in a joint federal, digital infrastructure with which the TO2 institutes can share and use each other's data and models.

2. Conclusions and recommendations from the current evaluation (2020–2023)

The EMTO-commission drew the following conclusions about the quality and the impact of our research and the vitality of MARIN:

Criterion	Score 1-4	Description
Quality	4	MARIN has further expanded its social mission and has invested considerably in facilities, some of which are also unique in the world. The quality of MARIN's research is comparable to the previous evaluation period. **This quality is widely endorsed by (inter)national stakeholders** and there are no signs of quality deterioration. The committee does note that MARIN has taken on relatively many new subjects that required additional investments in both more manpower and more facilities. This entails a potential risk and therefore MARIN must **be much more selective in this regard in the future.** MARIN may also make sharper choices regarding the continuation of certain research themes. This will benefit MARIN's financial position.
Impact	4	The social and economic **impact of MARIN is very good. MARIN has been fulfilling an extremely important role in various (international) forums** for years with gusto, which is confirmed by participating parties. In doing so, these parties even question whether these meaningful networks would be viable without MARIN's active role. However, on the basis of the documents provided alone, this impact cannot be fully endorsed. MARIN could therefore **make the impact of its activities more visible,** including its central role in stimulating innovations and establishing connections between parties.
Vitality	3	Although MARIN's turnover has increased, MARIN's **financial position is under pressure** from cost increases due to various external factors and declining facility hours. The structural **institute subsidy** from the Ministry of Economic Affairs has hardly increased, despite the previous committee's recommendation to do so, while according to the current committee an **increase is necessary to maintain both the knowledge base and the maintenance of facilities.** This requires MARIN to improve its financial administration and project management (e.g. better accountability) and to develop a multi-year financial perspective, with MARIN also paying attention to its facilities strategy. Organisationally, there is a need for more organisation-wide policy, the connection between business units can be strengthened and attention needs to be paid to a number of HR-related matters. With the new **annual plan 'Drijfveerkracht',** the committee concluded that the above observations have already been **recognised by MARIN itself and measures for improvement have become part of this plan.** This gives the committee confidence that MARIN is moving in the right direction to be well equipped for the future.

Recommendations of EMTO-commission for MARIN

The Commission made the following recommendations for MARIN:

1. Limit yourself in initiating new research topics when this requires new investments in both more manpower and more facilities.

2. Give more explicit priority to the future potential market value of the knowledge developed within the research portfolio in order to shift the balance between 'for the market out' and 'for the market' more in favour of that for the market. In doing so, MARIN should be careful not to make the research portfolio too broad, leading to fragmentation.

3. Make the impact MARIN has as a whole, but also by component or facility, more 'measurable'. This will not only make it easier to illustrate and defend MARIN's importance even better but also make it easier to make and communicate future strategic choices even better substantiated. MARIN could do this - in addition to the current case studies - by developing a set of output and outcome indicators that are close to MARIN's core activities. In addition, network analyses can also contribute to understanding (developments in) MARIN's role in the knowledge landscape. Also, the way strategic goals are formulated and determining the extent to which they are subsequently realised deserves more attention.

4. Bring more differentiation in the level of quality (including accuracy) of results or advice delivered. Not all clients demand the high quality that MARIN is used to delivering. This increases the possibility of achieving more assignments in a shorter time to cover costs.

5. Give extra attention to formulating and enforcing more uniform and organisation-wide policies. At the moment, for instance, there is still too much freedom around working from home and being present in the office. For instance, it is stated that employees should be at least 50% in the office, but this standard is not observed by all departments. The way of budgeting or invoicing for assignments also differs by department; there is still too much of an 'island culture'.

6. Keep working on resilience and flexibility in employability of individuals and the organisation. Times of change bring uncertainties. This is particularly true when considering downsizing or stopping activities. The role of managers is essential in guiding employees. It is recommended to continue to focus on leadership skills, but also on retraining and upskilling

technical staff to be deployed at multiple facilities (inside and outside MARIN). In presenting the 2025 annual plan to the committee during the site visit, the new management demonstrated that it has already recognised its importance. It is recommended that a strategy will be developed for the coming period detailing these changes over time with associated implications for both staff and facilities.

7. Develop a multi-year financial perspective, focusing on MARIN's long-term earning capacity and taking into account various future scenarios.

Recommendations of EMTO-commission for the government

1. The committee is of the opinion that only a substantial increase in the institute subsidy will enable MARIN to remain sufficiently equipped and positioned to continue performing its three main tasks in the future. MARIN plays a central and pioneering role in developments in the maritime sector. It makes great (time) efforts for this, which the committee believes, partly in comparison with the other TO2 institutions, is insufficiently recognised through the level of the institute's subsidy. This is too low to finance the maintenance of its own facilities, as is the case with the other TO2 institutes.

2. The committee proposes aligning the institute subsidy with the planned activities to strengthen the knowledge base of MARIN as agreed and described in the four-yearly Technology Plan and supplemented with a separately earmarked contribution for MARIN's maintenance of the facilities (such as NLR's) which have been agreed to be of strategic value to the Netherlands and should be retained as such, regardless of their utilisation rate. The latter also requires joint action.

3. Allow MARIN to apply cost covering tariffs in government contracts to the extent that these costs are not already covered through other government contributions.

4. Investigate to what extent there are advantages for MARIN and the government to consider MARIN's activities on maritime safety as a statutory task.

Recommendations of EMTO-commission for the government and MARIN

Partly in view of the fact that MARIN has indicated for 2025 that it will 'freeze' or discontinue a number of facilities with too low occupancy, it becomes extra important from the point of view of our national strategic autonomy to determine which facilities

should remain available and thus operational for research in the Netherlands at all times. MARIN cannot and should not decide this alone. It would be unfortunate if MARIN now decides to 'freeze' the Inland Waterway Tank while IenW is considering the possibility of conducting more research at MARIN in the field of inland navigation in the future. It is therefore proposed that MARIN should make these decisions together with stakeholders. In that context, there are opportunities to also involve the Maritime Manufacturing Industry Sector Agenda in this. On the other hand, consideration could also be given at European level to, for example, positioning MARIN in the Draghi context as an essential research infrastructure for Europe's strategic autonomy.

3. Follow up on recommendations from the current evaluation (2020–2023)

Next, we summarize our key choices and approaches outlined in our strategy plan 2026–2029 to follow up on the recommendations made by the EMTO commission. We note that to be successful in achieving these, we would also need the required funding as described in Chapter 5.

1. Limit yourself in initiating new research topics when this requires new investments.

   We have followed up on the recommendation of the commission by not initiating new research topics. With our new strategy, we choose to integrate and advance our current research methods. Within these research areas, we will work closely with the maritime sector, other TO2 institutes, universities, and universities of applied science to stay focused and harness the unique strengths of each partner. We will focus our developments in cooperative projects on Technology Readiness Levels (TRL) 4 to 7, validating technologies in the lab up to demonstrating system prototypes in operational environments. (see section 5.2 and Appendix G).

2. Give more explicit priority to the future potential market value of the knowledge developed within the research portfolio. MARIN should be careful not to make the research portfolio too broad, leading to fragmentation.

   We will follow up on the recommendation of the commission by developing market roadmaps, in close collaboration with the maritime sector. The roadmaps will present propositions and a marketing approach for three client-accessible services for each of MARIN's four roles: assessing designs and operations, accele-

rating client innovations, exploring emerging technologies, and advising policymakers and regulators (see section 5.2).

The market roadmaps will be linked to the RD&I agenda and they will give focus to new initiatives for cooperation projects. We will strengthen the applicability of our knowledge and tools for all four roles by building on a robust, generic foundation. Our RD&I agenda will be centred around these roles, with a focus on synergy across new services and markets. By combining our strengths, we ensure that designs, technologies, practices, and policies can be experienced and validated before implementation - maximizing their success in real-world operations (see Appendix G).

3. Make the impact MARIN has as a whole more 'measurable'. MARIN could do this - in addition to the current case studies - by developing a set of output and outcome indicators that are close to MARIN's core activities. Also, the way strategic goals are formulated and determining the extent to which they are subsequently realised deserves more attention.

   We have followed-up on the recommendation of the commission. To guide the implementation of our strategic choices, we have used the Objective, Goals, Strategies and Metrics (OGSM) model in our strategy plan 2026 – 2029. Each goal is connected to one key performance indicator that we will monitor (see section 5.2 and Appendix F).

4. Bring more differentiation in the level of quality (including accuracy) of results or advice delivered.

   We have followed up on the recommendation of the commission by developing services and tooling with different levels of detail and complexity (see section 5.2), allowing us to better tailor our support to the specific needs of each client.

5. Give extra attention to formulating and enforcing more uniform and organisation-wide policies.

   We have followed up on the recommendation of the commission by our strategic choice for coherence and efficiency in how we operate (see section 5.1). This calls for a strong focus on synergy across our operation. We focus on synergy in our services across the markets, in our research methods and R&D and in our internal collaboration, where we work from a common base that allows us to operate with agility across the organization. We will strengthen the leadership at MARIN to focus on shared priorities and common interests, see also our following-up on recommendation 6.

6. Keep working on resilience and flexibility in employability of individuals and the organisation. Times of change bring uncertainties. This is particularly true when considering downsizing or stopping activities. The role of managers is essential in guiding employees. It is recommended to continue to focus on leadership skills, but also on retraining and upskilling technical staff to be deployed at multiple facilities (inside and outside MARIN).

   In our strategic plan 2026 – 2029, we have refined and expanded the goals set out in the five focus areas of our 2025 annual plan, Drijfveerkracht. We have followed-up on the recommendation of the commission by the updated goal for the focus area 'people'. The new goal is: We cooperate as one agile team, combining leadership, entrepreneurship, excellent knowledge and diverse perspectives whereby an additional 25% of MARIN is skilled to work on other roles or disciplines (see section 5.2).
   To achieve this, we are committed to sustaining a social and safe working environment, with an open-minded and inclusive culture. We are strengthening leadership and competencies across MARIN's four key roles by investing in learning and development and proactive personnel planning. Additionally, we are enhancing collaboration across the organization to enable the formation of multi-disciplinary project teams with greater ease and flexibility.

7. Develop a multi-year financial perspective, focusing on MARIN's long-term earning capacity and taking into account various future scenarios.

   We have followed-up on the recommendation of the commission by defining three scenarios of evolving world order in this strategy plan (see chapter 3). We have weighed our opportunities in these scenarios, leading to our strategic choices to create maximum and unique impact across the maritime sector. Next, we have formulated a multi-year financial perspective, based on the scenario' Security and Economic blocks' as perceived the most likely to happen (see section 5.1 and chapter 6). We have estimated for each goal in our strategic plan the number of internal hours, the out-of-pocket costs and the necessary investments. We have thereby mapped the required investment for maintaining our tools and buildings over the coming strategic period. The multi-year perspective depends both on our market growth and on the additional institute subsidy. Finally, we also have performed a risk analysis and defined related mitigation measures (see chapter 6).

Appendix D. Consulted sources for external analysis

Summary

We have consulted a range of studies to develop a comprehensive understanding of our broader environment. These include studies on geopolitical conflicts [1,2], power politics in an interregnum [3], geopolitical decoupling [4], and America's shifting approaches to Europe [5]. We also reviewed studies on the protection of national vital interests and the key role of the Dutch maritime industry [6], digitalisation for the European waterborne sector [7], technology trends that might disrupt business models [8] and the safe sharing and smart use of data [9]. We also examined studies that address the safety of shipping [10], the global energy transition [11], renewable power generation and the EU ocean and fisheries package [12]. Finally, we considered studies that cover the maritime decarbonisation [13,14], including the Fit for 55' policy package, the FuelEU maritime regulation and the EU Emissions Trading System and the roadmap for fuel transition in maritime shipping. These studies have helped us in developing a detailed picture of our high-level surroundings.

Further, we have explicitly adopted guiding frameworks and strategic plans from the Netherlands and Europe as our foundation. These include the Draghi report on The future of European competitiveness [15], the Sector Agenda for the Maritime Industry [16], the Maritime Master Plan [17], the Defence Strategy for Industry and Innovation [18] and the National Technology Strategy [19]. Additionally, our discussions with key players in the maritime sector, including members of our advisory board, colleague institutes, technology companies and strategic thinkers, have been very valuable.

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[8] Top Strategic Technology Trends, Gartner, 2024

[9] TNO's view of 2030: Digital privacy and security for everyone, 2024

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[11] Energy Transition Outlook 2024 – A global and regional forecast to 2025, DNV, 2024

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[14] Brandstoftransitie Zeevaart, RVO, Juni 2024

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[16] No guts, no Hollands Glorie! Sectoragenda Maritieme maakindustrie, 2023

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[18] Defensie Strategie voor Industrie en Innovatie, Ministerie van Defensie en Ministerie van Economische Zaken 2025

[19] De Nationale Technologiestrategie, Bouwstenen voor strategisch technologiebeleid, Ministerie van Economische Zaken, 2024

Appendix E. Five market groups

1. Transport and Shipping

The maritime transport and shipping industry is a cornerstone of global trade, moving about 90% of the world's goods. It is a highly competitive sector with a few major global players and a wide range of stakeholders involved in short-sea and inland shipping. Large shipping companies - often family- or state-owned - make quick decisions and demand fast, reliable support. Our independent, trusted advice helps them validate assumptions and make informed choices. As a long-standing authority, MARIN has evolved from trial assessments to design optimisation, which now accounts for about 75% of our projects.

Since the late 1980s, we have increasingly focused on optimizing hulls and propulsion systems, even recently adding power systems and energy carriers, while also helping resolve performance issues on existing vessels. We also offer advanced simulation services for pilot and crew training, especially in congested areas and ports, and soon with emerging technologies like wind propulsion and alternative energy systems. Our latest developments enhance in-service operations and provide onboard decision support. Deepening our collaboration with shipowners and operators will strengthen our influence on decisions, technologies, and operations across the sector.

An unprecedented era of technological exploration is underway. The major topics in this market are the energy transition, the transformation of trade and trade routes, and technological transition. These shifts demand and require agile and forward-thinking responses. We continue to develop ourselves to help our clients navigate and lead through this evolving landscape.

Emerging technologies require owners and operators to understand potential risks and opportunities better. Early-stage requirements may not align with future operations. Sustainable, lower-density energy carriers may necessitate changes in vessel design or operational profiles. Access to large amounts of operational data is driving optimisation at both design and operational stages. New designs and operations must therefore involve a wider range of stakeholders, including ship owners, infrastructure providers, operators, crew, and shippers concerned about the environmental impact of their goods.

MARIN already engages with communities like Cooperative Research Ships, Vessel Operator Forum, Blue Forum, and the European Sustainable Shipping Forum. We will expand these networks to include energy suppliers (e.g. Bebeka energy cooperative), shipowners' associations, shippers (e.g. AUTF, BICEPS), merchant marine academies, and relevant authorities.



Being successful in our services requires quick reaction times for assessment and exploration, as well as a holistic approach. We will improve the efficiency of our numerical tools, experimental processes, and their analysis. Moreover, we will interconnect several tools to simulate complete operations, including hydrodynamics, power, energy supply, logistics, and economic aspects. Finally, we will create hybrid frameworks that mix simulations with experiments, potentially involving interactions between separate experimental facilities. For example, we will link the engine and power control of a free-sailing model in our facilities with the virtual zero-emission lab. We will also explore external connections, such as using the dynamic response of a battery at a TNO-operated site within our Zero Emission Lab at MARIN, or incorporating an economic model developed and operated at the Maersk McKinney Moller Center into our scenario simulations.

Assessing designs and operations

Performance verification of designs will remain necessary at some point of the project, and we play a key role thanks to our independent status. Supporting and optimising the operations (on-board) has an increasing interest as it is the quickest way to obtain results on short term. Competition is fierce on this type of



evaluations, and we will need to further improve our efficiency to reduce the costs, while maintaining our credibility in the accuracy of work. Using the current operations to characterise the operational profile is essential. Assessing how these operations are conducted and how decision support systems are performing is also crucial. Together, these factors play a key role in successfully supporting the sector to improve its performance. The amount of information is so vast that new AI-supported algorithms will be necessary.

Accelerate our client's innovations

This is a domain which has a large potential to grow as more stakeholders will be involved at concept and requirements level. Knowledge of current operations is key in defining the room available for exploration, while low-fidelity and scenario simulation tools will allow performing the exploration itself. We focus on the following aspects to deploy and accelerate such activity:

- Understand the context, user need and transforming this into (technical) requirements.
- Provide accessible information to raise awareness of alternative solutions.
- Embed exploration within frameworks that reflect the full future operational chain.
- Engage stakeholders through fast, interactive workshops.
- Create virtual twins accompanying the current operations to demonstrate the benefit of an alternative concept.

We will further expand the Maritime AI Innovation Lab to accelerate AI developments for our clients in this and other markets. The Maritime AI Innovation Lab was founded by us as part of the Innovation Labs of the AI Coalition for the Netherlands. The lab started in 2025, and we will extend its services to national and international clients.

Explore emerging technologies

While part of the industry will focus on proven technologies due to risks, another part will invest in emerging technologies to achieve success. Our exploration of new technologies will match market needs and ambitions, anticipating them as much as possible. This is how our RD&I agenda is structured.

Advice policymakers and regulators

Transport and Shipping is one of the sectors most covered by current regulations, focusing mainly on emission reduction (greenhouse gases, pollution, underwater radiated noise, etc.) and safety standards. We are already part of most of the groups dealing with these subjects at national, European, and international levels. However, this activity is relatively scattered among a few individuals who cannot dedicate enough time to explore all possibilities in terms of support towards policymakers. We will consolidate our efforts, extend our capacity to better understand the needs of various organisations, including ministries, the European Commission, the European Maritime Safety Agency, ISO, ITTC, and the International Maritime Organisation.

2. Passengers and Yachting

We have strong connections with major shipyards for cruise ships, ferries and yachts, design offices, and associations as the Super Yacht Builders Association, ICOMIA, Cruise Lines International Association and Interferry.

About 40% of model testing for cruise vessels is done at MARIN, with occasional tests at Potsdam (20%), Vienna (8%) and HSVA (4%). Europe dominates the global cruise shipbuilding sector, constructing approximately 97% of the fleet. Italy leads with 52.6%, followed by Germany, France, Finland, and China. Despite market uncertainties, the global cruise industry expects a 10% rise in passengers by 2028. Major cruise builders are fully booked until 2030.



Italy leads the yachting industry with a 54% market share in yachts over 24m, followed by the Netherlands at 15-17%, and Germany and Turkey at 8% each. The industry is expected to grow with more High Net Worth Individuals (HNWIs) in the next 5 years.

The world ferry fleet is projected to grow steadily over the next decade, driven by demand for efficient transportation, emission limitations, urbanisation, and population growth. European shipbuilders dominate with a 60% market share, followed by Asia at 35%, with China, South Korea, and Japan as major builders. The Philippines and Turkey are strong regional players.



The major topics in this market are the energy transition, underwater noise emissions, operational efficiency, and technological transition with concerns about cybersecurity. We continue to evolve to help our clients maintain their competitive edge in the face of these challenges. In the 'Security and Economic Blocks' scenario our customer base will be smaller but still substantial, as the main players in the cruise, ferry and yacht industry are within the EU. With a shift to the concept and operational phase we will get more out of this challenging market.

We are committed to continuing our cooperation with clients in the Cooperative Research Ships and initiating joint industry projects. The main challenge is the high competitiveness in these sectors, making cooperation difficult. Large shipyards have internal R&D departments which are more sensitive to MARIN's call for cooperation, but smaller shipyards do not have internal capacity nor expertise. Therefore, involving representative associations like SYBAss, CLIA, and Interferry is crucial to move the sector collectively forward. New collaboration methods are needed where MARIN conducts research for associates through the main association and provides consultation.

We support universities and higher education by allowing training periods, BSc & MSc thesis at MARIN, support PhD projects, visits and workshops. We disseminate our knowledge through papers, publications and lessons as guest lecturers in mainly European Schools and Universities. With our ZEL and SOSc facilities we contribute to the education of the maritime professionals of the future.

We will integrate partially overlapping tools like multiple seakeeping software. We also bring further Model Based System Engineering techniques in use to clearly define the relationships among design requirements, environmental criteria and the human factor. We therefore specialise further in human centred designs. This methodology will also enable MARIN to connect the simulation environments and tools to design and operational tool providers, as well as onboard system providers. This integration will not be limited to MARIN fields of expertise but will be extended to relevant fields like aerodynamics, noise and vibrations. We will continue our non-exclusive cooperation with wind tunnel institutes, laboratories and other research institutes to provide the most complete and knowledgeable possible answers to our customers.

Assessing designs and operations

To create a unique impact in the passenger and yachting sector, MARIN will continue to independently assess the designs and technical solutions offered by the market. We create interconnections among designers, system integrators and operators to go beyond the acceptance tests of the ships. Our results are presented in an understandable and useful way to reduce the risks of our clients' projects. We also become a preferred provider of hydrodynamic and operational training.

Accelerate our client's innovations

We accelerate our clients' concept exploration phase with increasing levels of fidelity as the design matures. We help our clients up to the point of integration in operation and support in upscaling to production. To achieve this, we will streamline internal workflows and reinforce the digital frameworks XMF. We help our clients transition from digital modelling to digital twinning in which humans and operations are central. Our unique combinations of knowledge, tools and infrastructures allow us to let our clients experience their vessels before they are built and explore new concepts in operation onboard. This accelerates the developments and increase awareness and confidence.

Explore emerging technologies

By exploring new technologies and techniques, we will be able to speed up the energy transition towards more sustainable solutions. Additionally, we will support safer ship operations with more autonomy. Decision support, including those based on AI, will help compensate for the lack of qualified crew in the future.

Advice policymakers and regulators

We also expand our advisory role towards policymakers and regulatory institutions. We leverage our independence, knowledge and understanding of the market's challenges. We continue our active participation to the International Organisation for Standardisation (ISO) via de Nederlands Normalisatie-instituut (NEN), ITTC, and IMO working group.

3. Defence

Our aim is to support the defence sector of the Netherlands and allied partners to realise the necessary military-maritime operational capability for a credible defence. Effective, safe and efficient naval operations must be conducted with assets that remain relevant throughout their entire life cycle. Even under complex and changing operational conditions.



By actively sharing our expertise with the defence industry, we accelerate innovation and help turn capability ambitions into reality. We act as a strategic bridge between defence and industry, translating operational needs into clear innovation targets. In doing so, we help the defence sector become more effective and the industry more competitive and profitable. We work and cooperate internationally to bring our knowledge and to learn and broaden our expertise, contributing to the strategic position of MARIN and the broader defence sector.

Over the past few years MARIN has been transforming itself to better address the needs in the naval domain. We established a dedicated Defence department to better align with the defence market. Historically, we have excelled in assessing designs and operations, such as defining, evaluating, and optimizing naval vessels during design and operational stages. With increased funding from the Ministry of Defence, we have expanded into new areas like energy technology, low and uncrewed naval operations, and advanced simulations. Additionally, we have started to accelerate client innovations. The new Dutch Defence Strategy for Industry and Innovation (D-SII) [18], published in April 2025, requires MARIN to further develop in these new areas and to link up with other knowledge institutions, academia and industry.

Cooperation is a key factor in maintaining our strategic knowledge position in the Defence market and ensures we bring relevance to the broader defence industry. We work closely with the Ministry of Defence and our colleague institutions NLR and TNO to ensure that we optimally contribute and complement each other. Where possible we exchange personnel or work together in joint programmes. We contribute actively to the national and European industry defence ecosystems, such as Dutch Naval Design, Northern Naval Capability Cooperation and EDF programs. We work with NATO and the Cooperative Research Navies is chaired by MARIN. We build strong alliances to focus our own core activities.

Within MARIN we aim to share our knowledge and methods between the various groups and departments. For defence work we do this by actively involving other departments based on their expertise and by furnishing joint secure working locations where colleagues from inside and outside MARIN can work together. We exchange knowledge between military and civil domains including joint methodologies and tools, without sharing confidential data.



Assessing designs and operations

Besides assessing and optimizing the hydrodynamic performance and interactions of maritime assets, we apply our knowledge to enable effective, safe and sustained operations with smaller crew sizes. This is combined with independently navigating uncrewed systems. We use advanced numerical and testing capabilities for rapid design evaluations and improvements in realistic operational conditions. We also use advanced and immersive simulations to assess new operational concepts and human performance in military-maritime operations. We go on board and perform in-depth assessments of maritime operations.

Accelerate our client's innovations

The D-SII [18] calls for knowledge institutions to actively support scaling up of new innovations to production. This is achieved by setting up ecosystems of private companies, start-ups and academia. This includes rapid development, testing and improvement cycles of promising innovations, as well as the establishment of cooperation locations and test facilities. We take an active role in setting up these ecosystems such as for uncrewed underwater and surface vehicles. We also support ultra-short cyclic innovation, rapid operational testing and improving within these ecosystems. Early involvement in concept design helps to create more impact and implement innovations. There is a clear need to rapidly build up our expertise to foster innovation in the defence sector to scale up production and integration of new solutions in the operation.

Explore emerging technologies

We keep developing our lower TRL knowledge to keep our edge with innovations and new technology. Also, this role is essential in current times of accelerating defence developments. We maintain a knowledge base in our foundation. This includes hydrodynamics, signatures, naval operations, human factors and energy systems. We build on this foundation with emerging technologies, such as autonomy, AI and data science. We collaborate MARIN-wide and with the broader sector on AI, aligning with the Maritime AI Innovation Lab to leverage AI for decision-support and automation in the naval domain.

Advice policymakers and regulators

We have an advisory role towards policymakers within the Ministry of Defence and allied partners, which encompasses three main areas. First, we advise on emerging technologies and their potential applications within the naval domain. Second, we provide guidance on developing policies to strengthen the Netherlands Defence Technological Industrial Base and the broader knowledge landscape,

while also stimulating national and international cooperation. Third, in collaboration with TNO and NLR, we assist the Ministry of Defence in developing knowledge and technology roadmaps. This advisory role is expected to further consolidate in the coming years.

4. Offshore energy and Blue growth

We help the sector build resilient offshore infrastructures, ensuring safe access to affordable, reliable energy and food from the sea. The challenges are high as the demand for energy and food increases. We drive innovation to enhance the safety, sustainability, and efficiency of the operations. We play a crucial role in the concepts, design and operations of moored platforms and wind turbines at sea. This constitutes the bulk of our activities. We conduct model tests, numerical simulations, and training of the crew for ship-to-ship operations, offshore installations, and crew transfer offshore. We measure on-board to provide insights into structural integrity.

Our close cooperation with stakeholders allows us to deeply understand their needs. We collaborate with clients to develop solutions that address both technical aspects (Technical Readiness Level) and human factors (Adoption Readiness Level), enabling us to tackle challenges comprehensively and provide effective solutions. This approach allows us to offer clear and concrete advice on selecting and utilizing offshore structures for specific operations in a safe, efficient, and sustainable manner.



Our four roles in the Offshore energy and Blue growth market are highly interconnected. Our primary role in assessing design and operations on projects remains the cornerstone of our work. This expertise and our extensive client network are built on these projects, allowing us to gain deep insights into industry challenges and client needs. From these insights, we can proactively address client problems by accelerating the exploration of new concepts,

leveraging our expertise and understanding of asset operations. Some issues cannot be fully resolved with existing technologies. We bridge this technological gap to application. Some challenges require not only technical solutions but also adoption by the industry and society. We can bridge the gap by advising on policy formulation, collaborating with partners who bring complementary expertise.

The changes in our roles that we want to realise are largely driven by the shift from a global economy to more fragmented or competitive national blocks. As a result, new policies are being developed to promote strategic autonomy and resilience in energy and food sectors, both in the Netherlands and worldwide. While this creates new opportunities, it also increases competition as new facilities are established globally and there is a greater emphasis on local content. We are committed to further develop ourselves.

We are enhancing our presence in the FER Week network, a key global platform for the energy sector. We remain active in the GROW sector and the CoP Noordzee Community. To help clients extract value from shared knowledge, we are building a digital twin community, sharing knowledge and integrated technology/software, and providing training on related topics (co-simulations, AI, data engineering, synchronisation of models, human factors). We connect this community to our Maritime AI Innovation Lab that was founded in 2025.

We build strong cooperations with our colleagues from TNO, DELTARES, WUR and NLR, to execute the first cooperation project with DigiLab. In this project, we integrate models from various disciplines - ecology, environment, soil properties, aerodynamics, hydrodynamics, and economics - from different institutes to deliver comprehensive solutions to our clients. We are also bringing back master's students to MARIN, recognizing their value in exploring new ventures and preparing them as future clients or colleagues.

We will ensure that we use a uniform template for time-domain numerical models and data. This is the key to smooth integration of our research methods. We reduce the number of tools used at MARIN, partly by integrating capabilities of niche codes into larger existing software rather than fragmenting capabilities into multiple software. We are automating model tests, analyses, and calibration of numerical models.

At Blue Labs, we have upgraded our basins to create state-of-the-art facilities for the floating solar and bottom fixed and floating offshore wind markets. This enhancement ensures we have the

world's best wave basin in these markets. While value was traditionally conveyed through reports, it will now also be embedded in software, models, and data we provide to clients. We develop a comprehensive MARIN-wide library of modular digital twin assets. This library offers ready-to-use models and accessible data. We initiate the database with stock models, conducting tests and numerical simulations independently of client projects, to create a unique and structured dataset.

The digital twin distinguishes itself by focusing on nautical aspects and using a unified digital platform that integrates data, simulation models, and AI algorithms efficiently. It employs a consistent calculation core for various applications, making it suitable for model testing, desktop calculations, simulator simulations, and on-board anomaly detection and decision support. Featuring multi-fidelity levels validated by model test or full-scale data, it can be used at any time during the asset lifecycle, at any desk, and on any deck.



Assessing designs and operations

Our expertise in assessing design and operations has been particularly strong. This includes production platforms, offshore installation vessels, offshore wind turbines, and offshore floating solar panels. We assess at MARIN as well as on board through inspections onboard and monitoring campaigns. However, increased competition in this market has put pressure on this role. We want to hold up this role and we will therefore leverage our unique combination of top-tier technology and expertise to deliver superior quality at competitive prices. We are standardizing and automating various integrated MARIN activities, beyond just model tests. This includes streamlining the entire process, from automatic model testing or measurements onboard to analysis and calibration of numerical models.

Accelerate our client's innovations

We enhance our role in supporting our clients with their innovations and becoming true partners in solving problems and reducing risks. We deepen our understanding of how clients use their assets in operation and improve our capabilities and tools to support them. We then bring back knowledge from these operations to inform future designs or operations. We will build, grow, and share digital twins of assets using generic components and open data, model test data, and operational data. These digital twins enhance our clients' competitiveness in the maritime sector by enabling faster, cheaper, safer, and more sustainable project execution while optimizing asset lifetimes.

Explore emerging technologies

We anticipate that our role in studying new key technologies will remain constant, as it is essential for maintaining our competitive edge and exploring new markets. For example, we explore and share with the industry how AI can be used to detect anomalies and predict maintenance on board or support the crew and onshore teams during operations.

Advice policymakers and regulators

We actively participate in network events promoted by the Ministry of LVVN, such as the Community of Practice (CoP) Noordzee. Additionally, we provide advisory services to the Ministry of I&W on energy and blue growth infrastructure. To effectively fulfil this role, we enhance MARIN's profile and develop the necessary competencies. This involves a deep understanding of market needs and the ability to comprehend the interests of various stakeholders, allowing us to propose comprehensive solutions accordingly.

5. Marine infrastructure and Spatial planning

We support companies, agencies and governments in making better decisions on increasingly more complex marine infrastructural and spatial planning topics. We consider economic, safety, environmental and security perspectives.

We advise throughout the entire process of developing, planning, and operating marine infrastructure. We examine how existing vessels will operate in these environments from nautical, human factors and process design perspectives. Naturally, we also include future vessels which are either remotely operated or autonomous, and/or use different types of sustainable propulsion systems.

On a larger scale, we assist with infrastructure projects such as wind farms and large port developments, which are often planned and developed in already congested areas. While focusing on the

shipping perspective, we aim to maintain safety and security. With many interdependencies and multi-use scenarios, decision-making becomes more complex. We are dedicated to further developing ourselves to assist our clients in this.

Cooperation with other TO2 institutes and civil engineering firms is crucial for maintaining our strategic knowledge position. It ensures we bring relevance to the broader maritime industry through synergy and combined efforts, while remaining agile and efficient by preventing duplication of effort. Where possible, we strive to exchange personnel.



We actively contribute to national and international organisations such as IALA, IMO, and PIANC. We aim to make our safety models and simulation software available for use by other parties and integrate our simulator centre (SOSc) into a wider network for multidomain simulations.

Within MARIN we aim to share our knowledge and methods between the various groups and departments. For marine infrastructure and spatial planning work we do this by actively involving other departments based on their expertise and market focus. We aim to make our safety modelling and calculation tools accessible to a broader group of external users. While maintaining custodianship to ensure quality, we will also encourage development through user feedback and input for future enhancements.

Assessing designs and operations

Besides assessing and optimizing the safety of operations and interactions between maritime assets, humans, and the environment, we apply our knowledge to enable effective, safe, and sustained operations. These operations involve fewer crew members and uncrewed systems, which can be either remotely operated or autonomous. We use advanced numerical models to assess safety of operations in the widest sense. We use advanced and immersive simulations to assess new operational concepts and human performance in increasingly complex environments.

Accelerate our client's innovations

We strive to a achieve a shift in design methodology to designing ships, installations, equipment and processes from a human centred design perspective. We accelerate our client's innovations though the use of advanced simulation methods as early as possible in the design process. To that end we further explore the possibilities that extended reality and motion simulation may offer. To speed up the innovation process further we aim to speed up our internal process. This involves translating data and parameters from our calculations and model tests into parameters that can be used for (real time) simulations.

Explore emerging technologies

We further develop our mathematical safety modelling and aim to incorporate other 'safety' perspectives such as environmental and animal safety. The integration of data science and AI will enable us to address increasingly complex future questions, which involve multiple interdependencies with other fields. Additionally, advanced immersive simulation technologies will assist us in visualizing and demonstrating our research results. This allows clients to experience the impact of their choices or policies before they are implemented in practice.

Advice policymakers and regulators

We support both the civil engineering and maritime sector actively with strengthening national and international cooperation on research, development and innovation, by setting up and contributing to industry ecosystems and assisting with technology road mapping. We perform market scans and combine the information to identify trends with our mathematical, operational and human factor expertise to provide valuable insights and suggestions for knowledge development for policymakers.

MARIN has an independent advisory role towards policymakers within the Netherlands Ministry of Infrastructure and Water Management. This role is complex however as it often involves many stakeholders, public debate or involvement of parliament. We are building up our capacity and expertise in crucial areas different from our traditional field of expertise. These areas include regulatory frameworks and dealing with complex multi-stakeholder environments. This will help us gain a good understanding of the problems and foster mutual understanding to maintain strong cooperation with our clients. Together with for instance TNO and Deltares, MARIN is helping the Ministry of Infrastructure and Water Management to develop knowledge- and technology roadmaps to be able to address future questions.


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Appendix F. Our OGSM

Objective	
Create maximum and unique impact across the maritime sector by operating coherent and efficient.	
Goals (by 2029)	**Strategies**
1. We create impact with new services from concept to operation, with 70% of our clients helped from concept to operation.	Develop roadmaps for three client-accessible services per role. Each aligned with a different level of detail, from concept to operation. Onboard clients and manage the RD&I-agenda.
	Senior project managers become the dedicated points of contact for specific clients, and collaborate based on shared roadmaps. Shift our focus to end users.
	Create long-term cooperations between governments, companies and knowledge institutions to drive innovation.
2. We integrate and advance our research methods, with 80% of new projects integrated in our internal MARIN wide library of digital models and data sets.	Improve process from data generation to obtaining an updated model in the library. And automate model testing for 24/7 top-quality data.
	Strengthen our knowledge and tools for our four roles with a robust, generic foundation and drive digital transformation to enable MARIN-as-a-Service.
	Build alliances to focus on our own core activities on a non-exclusive basis
3. We prioritise within our tools and buildings and secure funding, so that the backlog of overdue maintenance and sustainability improvements no longer increasing after four years.	Make clear choices on our tools and buildings (stop, freeze, continue or replace). Integrate partly overlapping tools to reduce maintenance costs.
	Continue structured dialogue with government stakeholders to obtain funding for the maintenance and development of MARIN's vital research and testing facilities.
	Generate additional financial results through new services and research methods (see Goals 1 and 2) and reinvest them in reducing our ecological footprint.
4. We cooperate as one agile team, combining leadership, entrepreneurship, excellent knowledge and diverse perspectives whereby an additional 25% of MARIN is skilled to work on other roles or disciplines.	Sustain a social and safe working environment, with an open-minded culture.
	Strengthen leadership and competencies across MARIN's four roles by investing in learning and development and proactive personnel planning. Improve the organisation between teams in MARIN to more easily form multi-disciplinary project teams.
5. We control and cover our cost, creating room for new services with an annual overall financial result of 4.2% of our turnover and a performance-based incentive (RAM – Resultaat Afhankelijke Maatregel) of 8.33% of our gross salaries.	Improve insight and control over the cost-coverage of contract research, cooperative projects, and internal initiatives. Steer project scope based on the desired quality and available budget.
	Ensure cost covering tariffs in public contracts and ensure that currently unfunded advisory and support activities for governments are properly recognised and financially covered.
	Maintain a structured dialogue with government stakeholders to obtain additional financing to maintain our knowledge base and strengthen public private cooperation.

Metrics
• New services are adopted within one year by our existing clients.
• 85% of our clients have a MARIN senior project manager as their point of contact. • Annual increase of 5% in the number of owners, charterers, and operators for which we accelerate their innovations.
• Five national and international networks under our leadership.
• Process speed from data to model increased by 30% compared to 2025. • Automatic model testing for zero speed in waves implemented by 2026, and with wind and current by 2027. Automatic captive model testing in DT and DWB by 2026, and in SMB by 2028.
• 70% of RD&I agenda is MARIN generic by 2028, 20% market specific and 10% pilot projects.
• 5% of our operations outsourced by 2029 to enhance focus and agility.
• Annual cost savings of €1.5 million achieved compared to 2025. • Number of non-integrated software reduced by 50% by 2029.
• Annual exploitation subsidy (as part of institute subsidy) of €2.5 million ensured.
• Growing additional annual financial results achieved compared to 2025, increasing to €1.0 million by 2029, equivalent to 1–2% of turnover.
• Overall satisfaction score in employee survey at least 8.1 and inclusivity scores increased by 0.2.
• 100% of MARIN is actively involved in personal competency and/or knowledge development. • Annually, every leader spends 1-2 days in leadership. training on average. • 5 to 10 MARIN colleagues by 2027 that can lead a multi-disciplinary innovation process and 8 to 10 colleagues trained to advise government organisations.
• 90% of our contract research producing a positive financial result. 100% of our cooperative projects are fully cost covered. • Tool-related income covers 90% of the costs to maintain the quality of the tool by 2027.
• 100% of government projects with full cost-coverage, including appropriate compensation for security measures required in Defence-related assignments.
• Structural increase of €2.0 million in the annual institute subsidy achieved compared to 2025 to remain sufficiently equipped to perform our first and second task as a TO2 institute.

Appendix G. RD&I agenda

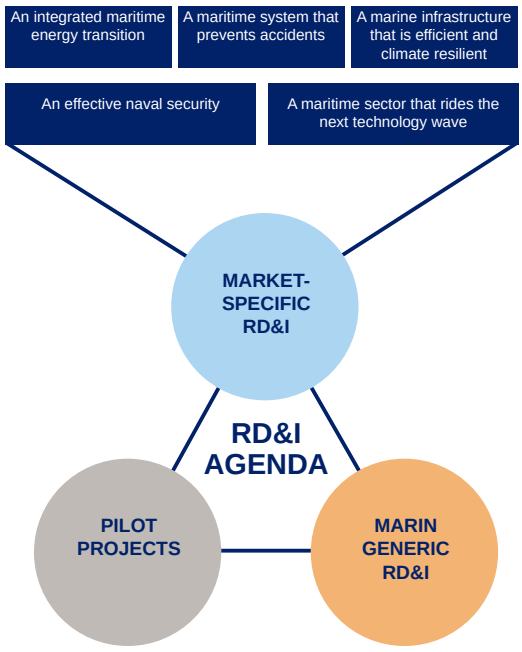
We will work with an integrated Research, Development, and Implementation (RD&I) agenda to advance our knowledge and technology. The RD&I serves to realise our vision for the maritime sector: an integrated maritime energy transition, a maritime system that prevents accidents, a maritime infrastructure that is efficient and climate resilient, an effective naval security, and a maritime sector that rides the next technology wave. within the maritime sector:

A new approach

The RD&I agenda will replace the Technology Plan, and the annual R&D Implementation Plans that previously guided our strategy. It not only replaces these plans but also expands upon them. The RD&I agenda encompasses knowledge and technology developments, as well as process improvements and developments in our basins, simulator centre, and digital services and infrastructure.

We believe these developments are interconnected and should be aligned as much as possible. We are shifting from planning developments based on funding schemes to focusing on the coherence of all our work towards new services for our markets. The RD&I agenda targets short, medium, and long-term developments, combining market pull and technology push. The market roadmaps provide input to our RD&I agenda. The agenda will be aligned biannually with the market roadmaps.

An important change in our approach to realizing our RD&I agenda is the focus we bring to execution. In many projects, we fragmented our efforts over time. We worked on many projects simultaneously, each making small progress annually. We will now be doing things differently. We will concentrate our development in larger blocks each year. This means prioritizing projects annually so they can have a greater impact.



Synergy across the markets

As with our services, we focus on synergy across the markets for our RD&I: generic where possible, market-specific where necessary. We want to emphasise that only when generic is truly not possible, we adopt a market-specific approach. We recognise that market-specific research will occur. Therefore, our RD&I agenda consists of a MARIN generic RD&I component and a market-specific RD&I component. It also includes a pilot projects component to explicitly give space to exploratory ventures while keeping our overall development streamlined.

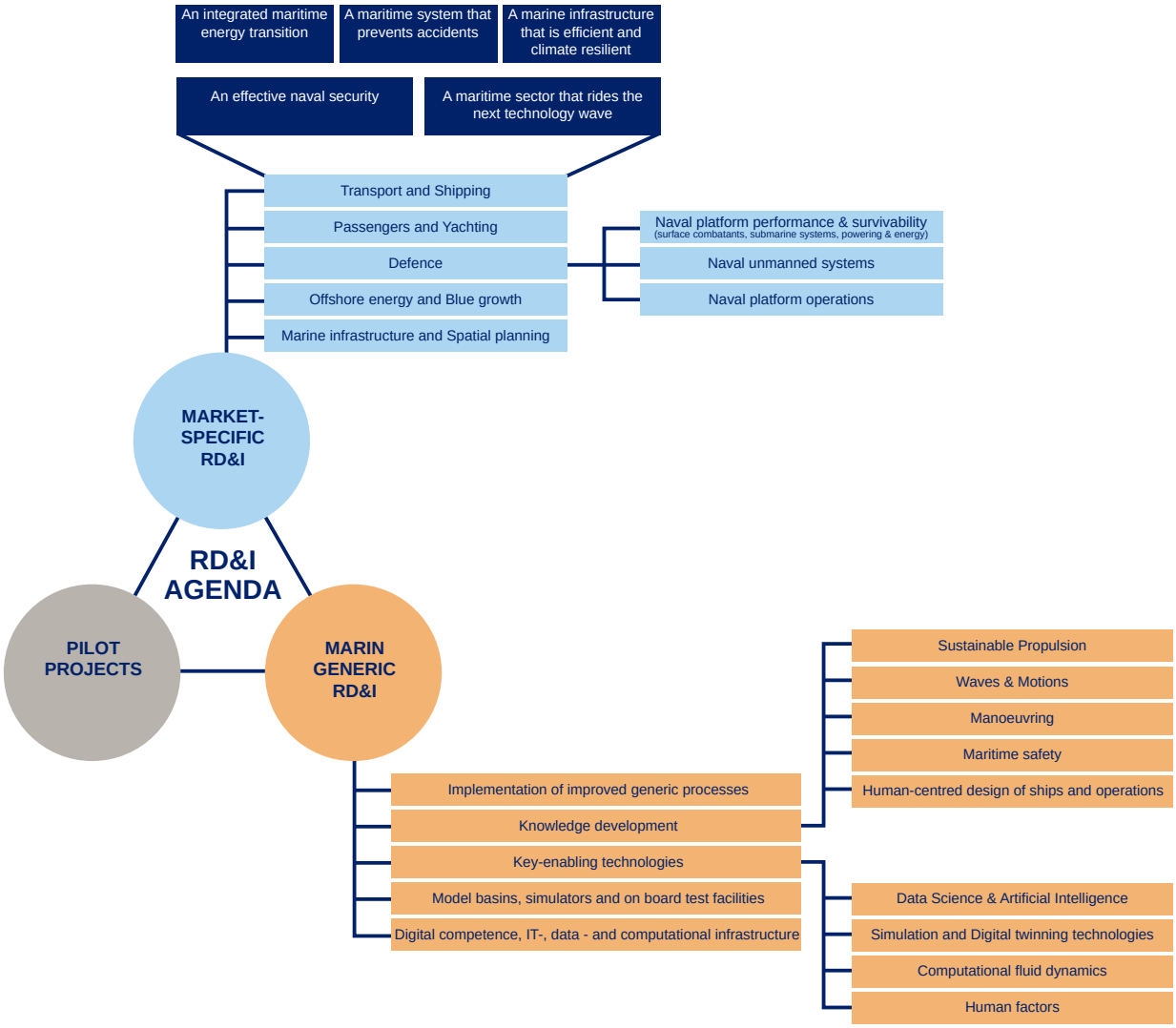
We are committed to the cooperation with the Ministry of Infrastructure and Water Management and the Ministry of Defence. Research for these ministries is an integral part of the RD&I agenda, and is aligned with the he Safety at Sea programme and the Kennisplan Zee, respectively. Where needed, this research is part of the market-specific RD&I. However, as much as possible, it is part of the MARIN generic RD&I. This will require our attention when writing proposals, including those for Defence. However, this is the core of our synergy and essential to avoid compartmentalisation.

The RD&I agenda plays a crucial role to advance our four roles with new services and to integrate our research methods. We have not created separate programmes for each role. We made these roles a focus point of every programme in the RD&I agenda. With special attention to the roles, we aim to enhance accelerating clients' innovations and advising policymakers and regulators.

We are committed to our cooperation with the sector and governments (see also Appendix B.) We will work closely with the maritime industry, governments, other TO2 institutes, universities and universities of applied science. Through our public-private partnerships we develop knowledge and tools hand in hand with the sector. Examples are our Joint Industry Projects (JIPs), EU projects, and our Cooperative Research Ships and Cooperative Research Navies networks. We aim to collaborate with dedicated universities on more fundamental research through PhD studies and Master thesis projects, keeping our focus on TRL 4-7.

Contours of the RD&I agenda

In this appendix we further present the contours of the RD&I agenda. We present the different programmes but not the specific developments. We also explain the corresponding funding schemes and governance. As a follow up to the strategic plan, we will draw-up the RD&I agenda with the corresponding developments and budget allocations.



1. Market-specific RD&I

The market-specific component of the RD&I agenda includes a programme for each market. It encompasses research, development or implementation that is not generic to multiple markets. For example, consider a research project on a topic specific to Defence. We want to emphasise that this does not mean that the entire research project is market specific. Such a project can still include

developments that are valuable to other markets or contribute financially to future generic developments by paying for the use of our generic foundation. The market-specific RD&I can range from fundamental research to very specific implementation in services. It can be external or internally funded.

2. MARIN generic RD&I

The MARIN generic RD&I is organised into several programmes. There is one programme for the implementation of improved generic processes as the backbone. There are five programmes for knowledge development and four for key-enabling technologies. There is also one programme for our model basins, simulators and on-board test facilities. Finally, there is one programme for digital competence, IT, data, and computational infrastructure.

Implementation of improved generic processes

The backbone of the MARIN generic RD&I is the programme 'Implementation of improved generic processes'. Each of the other programmes is actively involved in this backbone to realise together generic implementations. It also focusses on improving and automating the workflow around our research methods. The programme also manages our MARIN-wide modular library with data and models. We introduce data and model stewardship. It is a crucial role to govern the quality, integrity, and security of our library.

Knowledge development

Each knowledge development programme covers fundamental research, tool development, and implementation in efficient processes. Implementation is done in collaboration with the 'Implementation of improved generic processes' programme or market-specific programmes. The knowledge development programmes use the latest technologies from key-enabling technologies and advancements in facilities and measurement techniques, supported by IT infrastructure for large computations and data availability.

The *Sustainable Propulsion* programme focuses on all steps needed to reach zero-emission shipping. Starting with hull and propeller designs, it extends to innovative propulsion methods like wind propulsion and includes modelling the propulsion train and its interaction with the propeller. It also covers the modelling of ship powering in digital twins. This programme combines past research on Zero emission shipping and Resistance & Propulsion.

The *Waves & Motions p*rogramme studies the behaviour of ships and structures in waves, combining seakeeping and offshore hydrody-

namics and structural response. It includes the hydrodynamic safety aspects of individual ships and the modelling of seakeeping in digital twins. It is extended by the relevant hydrodynamical parts of the past research programmes on Blue growth and Safe operations & Human factors. Aspects of these past programmes that were market-specific will be included in the relevant market-specific RD&I.

The *Manoeuvring* programme focuses on ship behaviour during manoeuvres and offshore structures in current or during dynamic positioning. It includes the hydrodynamic safety aspects of individual ships and the modelling of manoeuvring of ships in digital twins. It takes on board the relevant hydrodynamical research of the past Safe operations & Human factors programme, and of the Autonomy & Decision support programme (control and modelling of manoeuvring in digital twinning).

These three maritime research programmes will develop exploration tools for design and operation. They will do this by utilising data science and artificial intelligence techniques based on the ample data generated in our basins.

The programme *Maritime safety* is focussing on the safety of operations in multi-vessel situations or in nautical traffic. Safety science is an important part of this. It incorporates part of the past research programme on Safe operations & Human factors. A significant part of the research will be performed within the programme subsidy of the Ministry of Infrastructure & Water management within the programme of Safety at the North Sea.

The programme *Human-centred design of ships and operations* integrates technical aspects (Technology Readiness Level), human factors (Adoption Readiness Level) and operational considerations. It provides workable solutions for the design or innovation process for ships, marine structures, operations, onboard automation and decision support systems, including those based on artificial intelligence. The programme adopts a human-centred design approach, which is a proven methodology for problems with complex user interactions and advanced technologies. The iterative process facilitates multidisciplinary collaboration and early involvement of end users. The programme takes on board the relevant aspects of the past Autonomy & Decision support programme. It will use the work of the key-enabling programmes and the digital twins developed by the maritime programmes.

Key-enabling technologies

We consider four key-enabling technologies programmes:

The *Data science & Artificial intelligence* programme focusses on the adaptation of artificial intelligence and data science techniques to maritime use cases. The application of the algorithms is foreseen in the knowledge development programmes. We believe that combining our domain knowledge with data science and artificial intelligence is key. To create our own data sets, we will use the free time of our basins as well as numerical simulations. Data science will be used to determine what additional measurements or simulations are required to enhance our algorithms and datasets. A significant part of the research programme will be dedicated to onboarding new technologies emerging in this rapidly developing research field.

The *Simulation and Digital twinning technologies* programme will enhance our capabilities in the simulation of multiple objects in all environments. The simulation technologies consist of a simulation framework (XMF), simulation models, and visualisation and user interaction. The techniques are used throughout MARIN in the simulators, in desktop studies and in the basins. A coupling with our CFD code and finite element packages exists to stimulate the reuse of models and technologies. New developments are foreseen in the field of co-simulation to facilitate the interaction with simulation models from third parties or customers. And additional work is needed to further improve our capabilities in virtual and augmented reality since technological development in these fields are fast moving. Also, the capability for digital twinning is addressed here, by integration data science and AI into our simulation framework.

The *Computational fluid dynamics* programme develops the core of CFD software to simulate the flow around a ship, propeller or offshore structure. The software has been developed for many years now and is used in market and research projects alike. Key enhancements that are necessary are the speed up of the code for time-dependent simulations in waves, and of cavitation, bubbles and related noise.

The *Human factors* programme deals with measuring and analysing the human performance on board or in simulator studies. This is a basic technology needed for the improvement of safety of operations, the efficacy of simulator trainings, and the development of human centred designs.

Model basins, simulators and on-board test facilities

Our basins, equipped with all necessary measurement tools, simulators, and onboard measurement equipment, are a cornerstone of MARIN. We are developing a dedicated programme to enhance these facilities.

A key focus is achieving automatic model testing. Our basins currently operate with one manned shift per basin, and occasionally double manned shifts during periods of high demand. This leaves many hours without operation and hence without data generation. In our projects, we often conduct only those experiments necessary to address our customer's immediate questions. However, this approach results in a limited dataset and biases the data towards specific conditions. We will change our operations and therefore our basins need to operate automatically or remotely for a large class of experiments. In customer projects, we will start to generate the data we need for our own research and use part of this data to answer the questions of our customers.

We will further develop our facilities through governmental funding. Examples are the ongoing BlueLabs developments, which enhances the wind generation in the Offshore Basin, and the testing of wind-assisted ships in the Seakeeping and Manoeuvring Basin. Another ongoing development is SeaLab, where we strengthen our onboard facilities with the sea as digital lab.

We want to improve our Depressurised Wave Basin for measurement of noise radiated from cavitating propellers or from offshore installations. Finally, we anticipate that we will upgrade our Concept Basin and our Shallow Water Basin to be well suited for all kinds of concept testing. Developments at the Zero Emission Lab will be driven by opportunities of external project funding.

Digital competences, IT-, data- and computational infrastructure

We continue our digital transformation. In addition to strengthening our digital competencies as part of our human relations plan, we are focusing on the following main initiatives.

Digital collaboration and workplace: Ensuring accessible digital resources for internal and external collaboration without compromising security and sovereignty. We aim to share, provide, and access data, models, and digital services. An approach is federated data sharing whereby data and models stay at their source, with access and use controlled by their owner. This approach is crucial for maintaining sovereignty, for our clients and ourselves, and ensures the trusts needed to collaborate on data and models. Our on-premises infrastructure remains a key foundation. The upgrade

of our computational infrastructure (High Performance Computing) and the improvement of our research data management are important developments. We complement our on-premises infrastructure with strategically chosen MARIN-managed cloud solutions and collaboration environments like DigiLab TK and JMDP.

Data, models and knowledge: Streamlining our digital process to transform data into knowledge is strategically important. Key components include data collection, storage, organisation, sharing, and preservation. Effective use of research data is vital for our internal processes and external services. Therefore, we continue to invest in AI applications for these areas. This supports the stewardship in the MARIN generic RD&I.

Security, business continuity and compliance: Information security in accordance with risk levels, privacy, and compliance are essential to our digital transformation. Risk management is the foundation of all our decisions, including those related to digital developments and dependencies.

We are improving Identity & Access Management by implementing a robust system. We are enhancing Zero Trust and Defence in Depth by integrating security principles for layered protection. We are also establishing procedures and technologies for the safe deletion of personal data to implement the Right to Forget. Additionally, we aim to be ISO27001 compliant by the end of 2026.

3. Pilot projects

The pilot projects component of our RD&I agenda is introduced to accelerate exploratory ventures while keeping our overall developments streamlined. The pilot projects are projects of relatively short duration to demonstrate an idea or technology. After the demonstration, we decide whether to continue development within one of our other components of the RD&I agenda (MARIN generic RD&I or Market-specific RD&I). Explorative projects may be related to the latest knowledge in academia, or to the latest IT or measurement technology for example. Also, good ideas to develop new services or improve processes outside of the scope of our market roadmaps may be awarded.

4. Funding schemes

The RD&I agenda is funded from various sources. Not all parts are funded by government subsidies to comply with state aid regulations.

MARIN receives subsidies through the Subsidieregeling Instituten Toegepast Onderzoek (SITO). Within this SITO, we use the following subsidies for our research:

- Institute subsidy is used for our basic research in knowledge development and key-enabling technology programmes. Furthermore, part of this subsidy is used to co-finance MARIN participation in public-private partnerships.

- Programme subsidy is dedicated to programmes planned in collaboration with Dutch ministries. Currently, we have programmes with the Ministry of Infrastructure and Water management and Ministry of Defence. The subsidy is used in market-specific and MARIN generic RD&I programmes.

- Infrastructure subsidy is used for developing new or upgrading existing facilities, such as the Sealab and BlueLabs projects. This subsidy is also used to improve our digital facilities through DigiLab TK.

- Exploitation subsidy (as part of institute subsidy) is a new kind of funding for MARIN, under consideration by the government. If granted, we will use it to address the much-needed maintenance of our facilities.

Another important source of funding are public-private partnerships (PPS), in which often contributions from industry are complemented by project subsidies such as provided through NWO, RVO, MIND, FRONT and the EU (including EDF). These subsidies can be used in any of our programmes, depending on the specific details of the regulation underlying the subsidy. This may vary from project to project and will be managed with the help of our Legal and Compliance team. We supplement external funding with our own investments and allocate hours for maintenance costs (MC) and development (DC) costs.

5. Governance

With the RD&I agenda, we have consolidated various developments. We have integrated programmes and connected separate or incidental developments. We have also aligned the civil and navy programmes. Additionally, we have ensured direct links to our new market roadmaps. We manage the market roadmaps and the RD&I agenda with:

- Five market coordinators.
- Five coordinators of knowledge development.
- Four coordinators of key-enabling technologies.
- One coordinator of model basins, simulators and on-board test facilities.
- One coordinator of digital competence, IT- data- and computational infrastructure.
- One coordinator of implementation of improved generic processes.
- RD&I agenda coordinator (R&D manager).

The market coordinators are responsible for the market roadmaps and market-specific RD&I programmes, including market-specific implementation. They coordinate this with each other and other RD&I coordinators and actively work in the programme Implementation of improved generic processes. The coordinators within the MARIN generic RD&I are responsible for the research, the development and as well as the implementation. They coordinate this with each other and all other coordinators. They actively work in the programme Implementation of improved generic processes. The RD&I agenda coordinator is responsible for the overall management and the coordination of the pilot projects.

In addition to regular, bilateral coordination, we foresee that all coordinators of roadmaps and programmes come together biannually. These meetings will align with the timing of the annual planning and reporting to the Advisory and Supervisory Boards. A full day will be dedicated to discussing all plans and progress. For more short-term needs in the market roadmaps, we foresee quarterly meetings between the market coordinators and the coordinator of Implementation of improved generic processes.

We recognize that coordinating a programme from fundamental research to practical implementation can be challenging. To better support the coordinators, we will - where this is not yet the case - expand the sounding boards to include the internal users of the knowledge within MARIN.



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