R&D&I Strategic Plan

April 2025

www.rina.org

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PART 1:
INTRODUCTION

Our identity

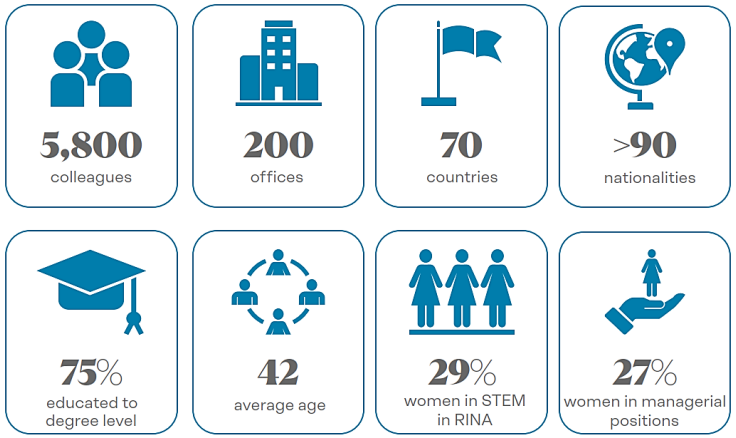
Committed to simplifying complexities with a focus on energy transition, ESG and digitalisation

Since its foundation in 1861, RINA, with its unwavering commitment to innovation, quality, and environmental responsibility, is not only a leader in its field but also a catalyst for progress. By integrating advanced digital tools, promoting sustainable practices, and driving technological advancements, the company ensures its clients are equipped to thrive in an increasingly complex and interconnected world.

At RINA, we collaborate with our clients to find innovative solutions to complex problems, leveraging our expertise to anticipate and tackle any challenges along the way.

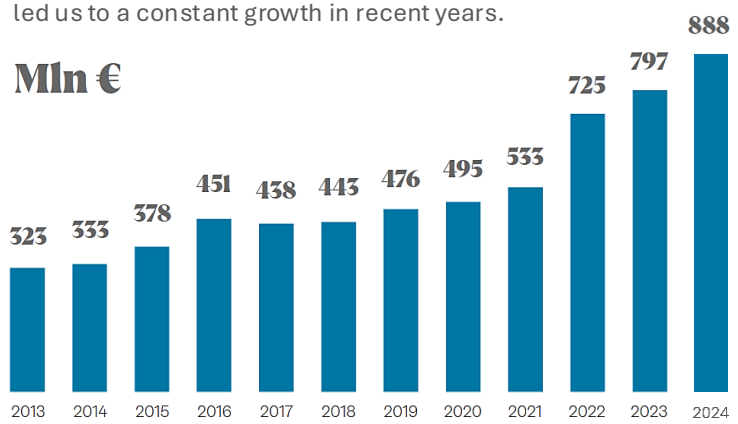
As a Global Leader in Certification, Consulting, and Engineering, founded in 1861 as Registro Italiano Navale, RINA has evolved into a global organisation delivering expertise across diverse industries. With operations in over 70 countries, 5,800 professionals, and annual revenues nearing €890 million in 2024, RINA is a trusted partner for businesses navigating the complexities of innovation, sustainability, and operational excellence. RINA's approach is rooted in blending tradition with cutting-edge solutions. Its broad range of services is tailored to meet the demands of clients in sectors critical to the world's future, including energy, mobility, infrastructure, and the marine industry. By combining in-depth technical knowledge with a commitment to sustainability, RINA supports businesses in achieving their goals while advancing global decarbonisation efforts.

Our people come from different cultures, countries, and backgrounds and, respecting and embracing these differences, makes us much stronger.



Whether in the maritime sector, urban transformation, or industrial innovation, RINA's expertise continues to pave the way for a smarter, greener, and more resilient future.

RINA's broad portfolio spans key sectors essential to the future of the global economy, including energy, marine, infrastructure, and mobility. By leveraging its multidisciplinary capabilities, the organisation delivers tailored services that ensure operational excellence, compliance with regulatory standards, and long-term sustainability. As a pioneer in decarbonisation and energy transition, RINA actively collaborates with clients to design and implement strategies that reduce emissions, enhance energy efficiency, and support the transition to renewable energy sources, which has led us to a constant growth in recent years.



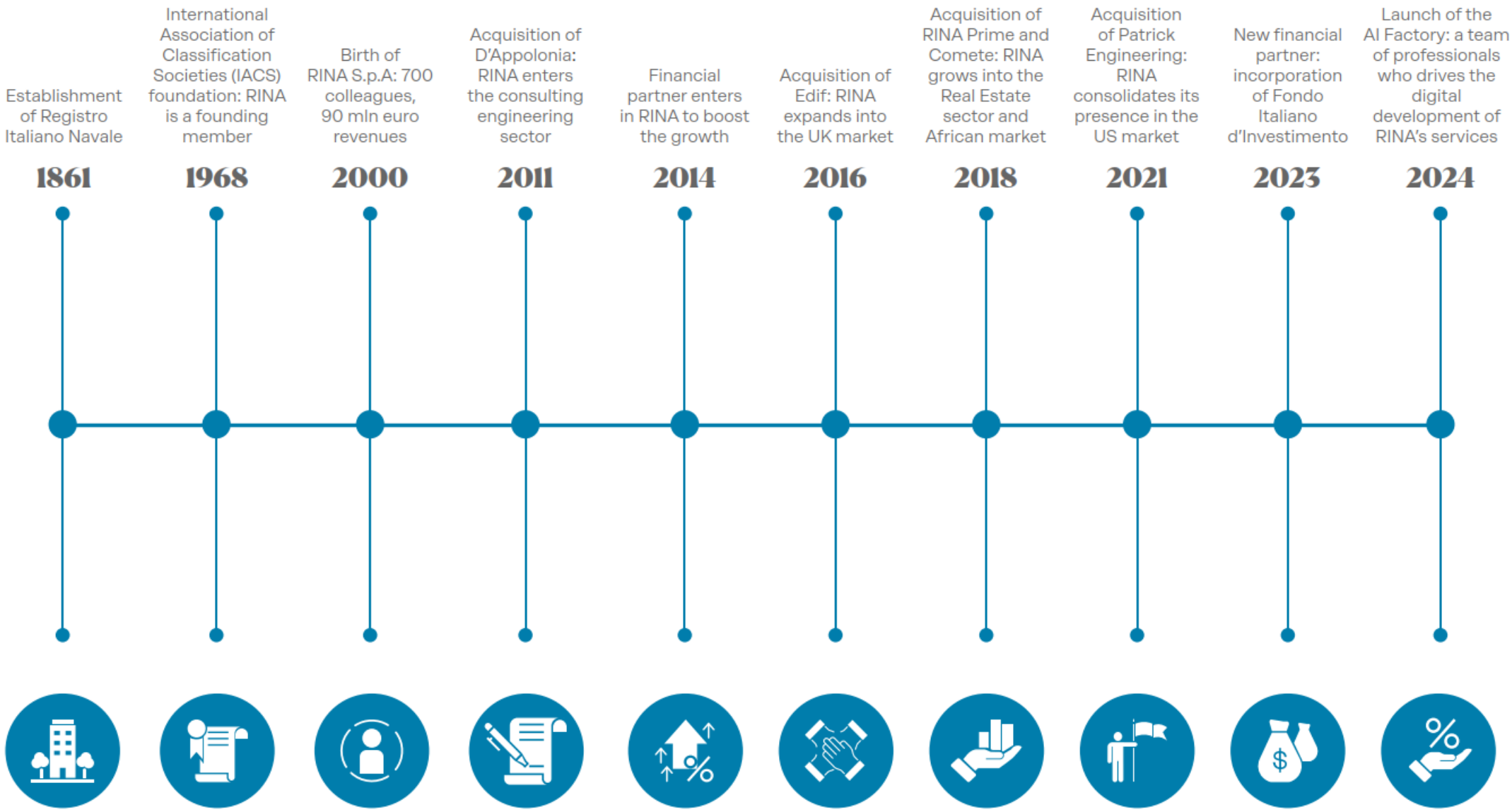
Our Purpose and our Way

Our company, our decisions, and our actions are all guided by our raison d'être: our purpose.

Everyone in RINA chooses to do what they do, because we believe in a shared goal: providing solutions that improve the wellbeing of the society and building sustainable values for future generations.

We accomplish this through our expertise, knowledge, and a highly capable team that delivers clear and innovative solutions to complex problems, ensuring the successful execution of even the most ambitious projects.

Our journey


Establishment of Registro Italiano Navale
1861
International Association of Classification Societies (IACS) foundation: RINA is a founding member
1968
Birth of RINA S.p.A: 700 colleagues, 90 mln euro revenues
2000
Acquisition of D'Appolonia: RINA enters the consulting engineering sector
2011
Financial partner enters in RINA to boost the growth
2014
Acquisition of Edif: RINA expands into the UK market
2016
Acquisition of RINA Prime and Comete: RINA grows into the Real Estate sector and African market
2018
Acquisition of Patrick Engineering: RINA consolidates its presence in the US market
2021
New financial partner: incorporation of Fondo Italiano d'Investimento
2023
Launch of the AI Factory: a team of professionals who drives the digital development of RINA's services
2024

Our business units

RINA has evolved from its origins as a cornerstone of marine classification into a globally diversified organisation, offering a wide range of specialised services. With a steadfast commitment to professionalism, innovation, and sustainability, RINA supports businesses across multiple sectors, including Energy, Marine, Infrastructure & Mobility, Certification, Industry, and Real Estate. By continuously broadening its expertise and embracing new technologies, RINA ensures its clients meet the evolving demands of global markets while adhering to the highest standards of quality, safety, and environmental responsibility.

Energy

Promoting energy solutions from oil & gas to renewables, taking care of sustainability and environmental impacts.

Marine

Classification, statutory, engineering, and value-added services for maritime industry's digital transition and decarbonisation.

Infrastructures and mobility

Supporting the path to the next generation of infrastructures and buildings by ensuring their safety and efficiency.

Certification

Solutions to support products, people and processes on their way to excellence.

Industry

Accelerating clients' success with technology-driven strategies and solutions.

Real Estate

Innovative value proposition of integrated services: RINA Prime Value Services is able to cover all the real estate lifecycle.

Our strategic streams

Ship classification has been the cornerstone of our business from its very beginning, propelling us to become one of the world's leading marine classification societies. Over time, we have progressively broadened the range of our services and diversified our operational sectors. RINA's extensive expertise, coupled with its commitment to continuous development and training, ensures the highest levels of professionalism and competence.

In the Marine, we champion a sustainable approach, with a strong commitment to energy saving, emissions reductions and optimisation of fuel consumption.

We support the sustainable growth of worldwide Energy operators in their quest to meet the increasing market demands in oil and gas, power generation (traditional, renewables and power grids) and environmental protection.

Our third-party Certification services provide an independent guarantee of compliance with associated regulatory standards, in order to support companies across all aspects of projects, operations, logistics and legislation.

We offer specialised and tailored services for the Transport & Infrastructure sector, aimed at optimising the value and potential of assets whilst complying with standards, controlling costs, ensuring quality and safety and respecting project timescales.

In the Industry sector, our dedicated team offers expert consultancy and technical support to help clients maintain a competitive edge. We deliver solutions in areas where materials, advanced technologies, and innovative approaches are critical to success.

Particular emphasis is placed on sectors like manufacturing, where we enhance production processes; steel and special alloys, where we provide specialised material assessments; and aerospace and defence, where we ensure compliance with rigorous performance and safety standards. Our client-centered approach ensures tailored strategies that meet unique business needs and challenges.

With regard to Inspection & Field, we support the management of our clients' assets or projects across various market segments, enabling them to achieve their performance goals while adhering to QHSE standards, deadlines, and all regulatory requirements.

Energy transition

RINA reaffirms its role as a partner, guiding companies through their energy transition by designing, supporting, and verifying the implementation of decarbonisation plans and initiatives, leveraging its extensive knowledge and the use of innovative technologies.

Integrated asset management

Leveraging its multidisciplinary competencies from extensive knowledge and experience in sectors like energy, infrastructure, shipping, and real estate, RINA is quickly becoming a benchmark for managing facilities, infrastructure, and operations.

Smart compliance

Thanks to its strong historical position, RINA leads the evolving Testing, Inspection & Certification (TIC) sector. The company pioneers new compliance strategies, addressing technological advances and navigating dynamic national and global regulations, including the latest in ESG and digital compliance.

Infrastructure & Urban transformation

Over the years, RINA has gained specialised skills through key roles in urban transformation projects in infrastructure, transportation, real estate, and building refurbishment. This cross-disciplinary expertise, both nationally and internationally, strengthens the Group's position in large-scale public tenders and private sector projects.

New economies

In recent years, sectors with advanced technical content and interdisciplinary challenges, like underwater, cybersecurity, aviation, and space, have grown significantly. RINA, known for providing specialised services in these areas, is now ideally positioned to lead and support the exponential growth of these value chains.

Our values

Our values are the reflection of who we are, the mirror of our actions, the image that guides and inspires us. They are what we see when we look at ourselves.

They represent the foundation of our identity as individuals and as an organisation, shaping the way we approach challenges, build relationships, and deliver solutions. They are what we see when we look at ourselves and what others see when they interact with us.

By living these values, we not only strengthen our organisation but also empower each of us to make a meaningful impact. Read more about our values below and discover what defines us as a company and as a community.

Integrity and Transparency

Integrity and transparency are the pillars of trust and reliability. For us, this means conducting our business with honesty, fairness, and impartiality, ensuring that every action we take is accountable and visible. By embracing these principles, we foster a culture of openness that strengthens relationships with our stakeholders.

Integrity means always doing the right thing, even when no one is watching, while transparency ensures that our processes and decisions are clear, ethical, and accessible to all.

Accountability and Results

Accountability and results reflect our commitment to excellence and our awareness of our role in the market. We hold ourselves responsible for the quality of our work and the outcomes we achieve. This means setting ambitious yet realistic goals and working collaboratively to exceed expectations.

Our focus is not only on delivering financial performance but also on creating value for our clients, teams, and society. We measure success by the tangible, positive impact we bring, ensuring that our work contributes to a sustainable and prosperous future.

Determination and flexibility

Determination and flexibility are the dual engines of progress. Determination drives us to overcome challenges and persist in reaching our goals, even when faced with obstacles.

Flexibility, on the other hand, allows us to adapt to new circumstances, embrace change, and seize opportunities. In a rapidly evolving world, these qualities enable us to stay ahead, leveraging innovative technologies, insights, and strategies to deliver solutions that make a difference.

Curiosity and competency

Curiosity and competency are the essence of our growth mindset. We are relentless in our pursuit of knowledge and committed to expanding our expertise.

Curiosity fuels our desire to explore new ideas, challenge conventional thinking, and innovate. Competency ensures that this curiosity is grounded in a strong foundation of skills, experience, and technical excellence.

Collaboration and trust

Trust is the foundation of collaboration, enabling us to align our efforts, share knowledge, and overcome challenges as a unified force. By fostering open communication and mutual respect, we create an environment where everyone feels empowered to contribute, innovate, and achieve our common goals. Together, we build a resilient and dynamic organisation, capable of driving positive change and delivering lasting impact.

Our vision and approach behind R&D&I

Innovation is a prime mover in RINA's evolution and is key to secure ongoing success. We practice research, development and innovation to build up our knowledge and to stay ahead of new trends thus being able to always offer top class innovative services to our clients.

Empowering growth through research, collaborative innovation and strategic partnerships

Innovation at the core of RINA's growth

Innovation drives RINA's growth and the growth of our clients. We leverage research and innovation to ensure we consistently deliver top-tier innovative services to our clients.

Our activities span across all sectors in which we operate, integrating multidisciplinary teams from various divisions into a dynamic and collaborative network.

Our approach emphasises open collaborative innovation, fostering strategic partnerships with academia, research centres, and industry peers across the market value chain to unlock new growth opportunities.

Collaborative development with Stakeholders

R&D&I projects are developed in collaboration with key stakeholders, including technology providers, pilot end users, public authorities, and representatives of the civil society.

R&D&I is collaboratively developed with all stakeholders through a process of co-design and co-development, ensuring that innovative solutions are tailored to meet shared objectives and real-world needs.

Leading in funded R&D&I initiatives

We are deeply engaged in funded research, development and innovation initiatives, resulting as one of the leading industrial participants in Horizon Europe, the EU's key research and innovation funding programme, and in the Research Fund for Coal and Steel, the key EU funding programme supporting research projects in the coal and steel sectors.

150+
Ongoing R&D&I projects

500.000+
Engineering Hours on R&D&I projects

2.000+
European partners

10
R&D&I Communities across all geographies

Our model behind R&D&I

RINA's R&D&I Communities: a strategic approach to Innovation and Collaboration

Built to foster cross-disciplinary collaboration and knowledge sharing within the company, with the objective to accelerate innovation anticipating future market needs, R&D&I Communities play a crucial role in addressing gaps in critical skills across various domains.

Our R&D&I Communities are structured but agile, cross-business unit and cross-practice working groups focused on strategic, multi-disciplinary domains. Open to all functions, technical disciplines and business units with relevant interests and expertise, these communities serve as collaborative hubs that interconnect existing facilities and resources to enhance efficiency and innovation. They foster a culture of openness and sharing, enabling experts from different sectors to come together, exchange ideas, and create impactful solutions to complex challenges.

By leveraging these communities, RINA ensures that the outcomes of our research, development and innovation efforts are not confined within individual units but are shared widely, maximizing their value and application across the organisation.

Our R&D&I Communities

To address the most pressing challenges and opportunities across industries and market sectors, we have established the following R&D&I Communities:

- **Energy Transition and Decarbonisation**: Focused on enabling the shift to low-carbon energy systems and sustainable practices.
- **Maritime and Blue Economy**: Driving innovation in the maritime sector and supporting sustainable marine resource management.
- **Advanced Industrial Technologies and Materials**: Promoting the development of cutting-edge technologies and advanced materials for a wide range of sectors.
- **Smart Cities and Communities**: Creating sustainable and inclusive urban environments through innovative solutions.
- **Sustainable Transport and Infrastructures**: Enhancing connectivity and sustainability in transport systems and infrastructure projects.
- **Asset Management, Safety and Resilience**: Ensuring the integrity, safety, and resilience of critical systems and infrastructures.
- **ESG, Sustainability, Resource-efficiency, and Circular Economy**: Advancing responsible practices that align with environmental, social, and governance (ESG) principles.
- **Water**: Innovating solutions for sustainable water management and quality improvement.
- **Future Aerospace, Defence and Security Applications and Technologies**: Addressing challenges in aerospace, defence, and security through advanced technologies.
- **Artificial Intelligence and Digitalisation**: Harnessing the power of AI and Digitalisation to drive operational efficiency and innovation.

A Strategy to break down Silos

The creation of these communities reflects RINA's strategic commitment to breaking down barriers between legal entities, business units and geographies.

By adopting a community-based approach, we are able to:

- Share Knowledge: facilitate the exchange of expertise and results from R&D&I projects across the company.
- Foster Collaboration: encourage teamwork and co-creation across disciplines and geographies.
- Maximise Impact: ensure that R&D&I outcomes benefit the entire organisation, enabling us to deliver even greater value to our clients and stakeholders.
- Enhance Efficiency: interconnect existing facilities and resources to create specialised hubs that streamline innovation and operational processes.

Driving a Collaborative Future

Our R&D&I Communities are more than just working groups, they are engines of innovation that unite our organisation and ensure that RINA remains at the forefront of emerging trends.

By working as a unified team across disciplines and sectors, we are not only addressing current challenges but also shaping the future of the industries and markets we serve.

Our R&D&I strategy

Shaping the Future through Innovation

Shaping the future through innovation is at the core of RINA's mission. As a knowledge-based company, RINA leverages its extensive expertise and multidisciplinary competencies to drive forward-thinking solutions across various sectors. This commitment to innovation is evident in the company's strategic initiatives and its role in guiding companies through transformative processes.

The concept of “open innovation” is particularly central to our strategy. It reflects our belief that innovation thrives through diverse perspectives and collaboration, connecting stakeholders from different sectors, from research to industry, and from investors to governmental organisations.

By designing, supporting, and verifying the implementation of solutions to complex multidisciplinary problems, RINA plays a crucial role in helping companies navigate the complexities of the transition to more sustainable practices in a magnitude of sectors. The company's extensive knowledge and use of innovative technologies make it a benchmark for managing facilities, infrastructure, and operations throughout the complexities of entire value chains.

RINA's commitment to innovation is also reflected in its participation in international projects and working groups aimed at bridging technical, technological, and regulatory gaps. The company has developed dedicated guidelines for the evaluation of innovative projects or new applications of existing technologies in unusual contexts.

Overall, RINA's strategic positioning as a knowledge company, combined with its commitment to innovation, ensures that it remains at the forefront of providing valuable solutions and services across various sectors. By continuously pushing the boundaries of what is possible, RINA is shaping the future through innovation.

A focused and Impact-driven approach

Looking ahead, this R&D&I strategy aims to position RINA as a leading provider of integrated innovative and sustainable solutions in each of the domains identified as the most strategic for our growth. By investing in groundbreaking research, fostering cross-disciplinary collaboration, and staying ahead of technological trends, RINA is committed to shaping a sustainable future for its clients and the communities it serves.

At the core of our R&D&I strategy lies a commitment to delivering long-term value and addressing global challenges through innovation.

Flexibility to Adapt and Evolve

Recognising the dynamic nature of global challenges, our R&D&I strategy is inherently flexible and adaptable. It is reviewed and updated annually to address changes in the energy landscape, market dynamics, and stakeholder expectations. This adaptability ensures that our strategy and underlying plans remain relevant and integrated with RINA's overall strategic and business objectives.

A Vision for Leadership in Innovation

By focusing on multidisciplinary collaboration and leveraging RINA’s global expertise, the strategy aims to not only meet the needs of today but also anticipate the demands of tomorrow. Through strategic investments, cutting-edge technologies, and sustainable practices, RINA aspires to become a global reference point for innovation, enabling transformative solutions that contribute to a more resilient, inclusive, and sustainable world.

PART 2:
OUR R&D&I STRATEGIC PLAN

R&D&I strategic domains

RINA's R&D&I strategy is thoroughly described within our R&D&I strategic domains, which comprehensively outlines our approach to address key global challenges and seize emerging opportunities.

The plan sets clear directions and objectives for the period 2025–2030 and beyond, ensuring that our efforts remain focused, impactful, and aligned with our long-term goals.

It is designed to be flexible and adaptable to the changing market landscape and the evolving needs and expectations of the stakeholders within each of the identified priority domains. To this end, it will be reviewed and updated annually, with the involvement of all relevant parties. The plan will also be periodically aligned and integrated with the company's overall strategic plan and business plan.

Our R&D&I strategic plan is intended to guide the company's R&D&I activities and investments for the next five years (2025-2030), with a long-term vision of becoming a leading provider of integrated innovative and sustainable solutions and of the related services in each of the fields of strategic relevance.

R&D&I strategic plan architecture

Anchored on 10 priority R&D&I domains, each reflected into a corresponding R&D&I Community as per our model behind R&D&I, the plan defines, for each R&D&I domain, specific directions as well as underlying objectives, each of which is associated with a set of dedicated actions oriented at reaching measurable outcomes and tangible impacts.

The R&D&I strategic plan also outlines our implementation needs against the level of our preparedness to achieve each of the identified objectives as well as the timelines, resources, partnerships, and types of investment needed to implement the plan effectively and efficiently.

The implementation needs against the level of our preparedness to achieve each of the identified objectives indicate whether R&D&I activities and investments need to be focused mainly on research/discovery, on development, or on scaling/ transfer/capacity build-up, which is obviously related to the allowable timeline to reach the objective, which in turn depends on the market situation and competitive landscape. The resources include the human, financial, and physical resources that need to be allocated and mobilised for reaching each of the defined objectives. The partnerships include indication of the external collaborations and networks that need to be established and maintained in order to operationalise our objectives.

Our priority R&D&I domains

By adopting a results-oriented approach, our R&D&I strategic plan identifies the following priority R&D&I domains:

- **Energy Transition and Decarbonisation**
- **Advanced Industrial Technologies and Materials**
- **Smart Cities and Communities**
- **Sustainable Transport and Infrastructures**
- **Asset Management, Safety and Resilience**
- **ESG, Sustainability, Resource-efficiency and Circular Economy**
- **Water**
- **Maritime and Blue Economy**
- **Future Aerospace, Defence and Security Applications and Technologies**
- **Artificial Intelligence and Digitalisation**

R&D&I strategic plan structure

Domains

Anchored on 10 priority R&D&I domains, each reflected into a corresponding R&D&I Community as per our model behind R&D&I

Directions

As a result, our R&D&I strategic plan identifies key R&D&I directions for each domain that align with the company's vision and mission

Objectives & Actions

Each strategic direction is broken down into specific objectives for a clear understanding of what actions and outcomes are targeted under each topic of interest.

Domains	Directions	Objectives & Actions
Energy Transition and Decarbonisation	**12 directions**: hydrogen, alternative energy, ammonia...	**48** specific R&D&I objectives with related actions
Advanced Industrial Technologies and Materials	**10 directions**: waste-to-X, recycling, smart materials...	**21** specific R&D&I objectives with related actions
Smart Cities and Communities	**4 directions**: smart building, urban renovation...	**12** specific R&D&I objectives with related actions
Sustainable Transport and Infrastructures	**7 directions**: safe and interconnected infrastructure...	**29** specific R&D&I objectives with related actions
Asset Management, Safety and Resilience	**3 directions**: smart inspection, safety monitoring...	**12** specific R&D&I objectives with related actions
ESG, Sustainability, Resource-efficiency and Circular Economy	**9 directions**: KPIs, climate change, human rights...	**21** specific R&D&I objectives with related actions
Water	**8 directions**: water scarcity, contaminants, cycles...	**24** specific R&D&I objectives with related actions
Maritime and Blue Economy	**8 directions**: decarbonisation, safety, circular economy...	**27** specific R&D&I objectives with related actions
Future Aerospace, Defence and Security Applications and Technologies	**5 directions**: defence, avionic, space, underwater...	**31** specific R&D&I objectives with related actions
Artificial Intelligence and Digitalisation	**6 directions**: asset integrity, predictive maintenance, AI...	**6** specific R&D&I objectives with related actions

Energy Transition and Decarbonisation

Introduction

The energy sector is undergoing a profound transformation, driven by the growing demand for energy, the increasing awareness of the environmental and social impacts of energy production and consumption, and the rapid development of new technologies and business models.

The global energy transition is characterised by a shift from fossil fuels to renewable energy sources, a diversification of energy vectors and fuels, a decentralisation and Digitalisation of energy systems, and a greater integration of energy sectors and markets.

These changes pose significant challenges and opportunities for the energy industry, as well as for the society and the environment. To address these challenges and opportunities, the energy industry needs to invest in R&D that can deliver innovative and sustainable energy solutions that are cost-effective, reliable, and safe.

Relying on its multidisciplinary skills and profound knowledge of the energy sector at large, RINA supports the shift towards low-carbon energy, energy efficiency and decarbonisation through a number of services spanning from certifications to inspections and surveys, and passing through consulting engineering, consulting on technologies, materials and processes, PMO & PMC, Engineering & Design, O&M Engineering, and Digital-enabled services.

Strategic implementation approach

Our R&D&I strategic implementation approach in the Energy Transition and Decarbonisation domain is based on a comprehensive analysis of the internal and external factors that affect the company's R&D&I performance and potential. The analysis includes:

- A review of the global and regional energy trends and policies, such as the Paris Agreement, the European Green Deal, the African Renewable Energy Initiative, and the Asian Development Bank's Strategy 2030.
- A scan of the current and future energy challenges and opportunities, such as the energy access and security, the climate change and environmental degradation, the energy efficiency and affordability, and the social acceptance and inclusion.
- An assessment of the company's capabilities and potentials, the R&D&I portfolio and pipeline, the R&D&I collaborations, and the R&D&I risks and uncertainties.

As a result, our R&D&I strategic plan identifies twelve key R&D&I directions that align with the company's vision and mission. These directions are:

Hydrogen and Hydrogen-related Technologies

Hydrogen is at the core of the energy transition as a versatile energy carrier and a promising solution for decarbonising hard-to-abate sectors such as industry, long distance transport, and power generation. The development of hydrogen-related technologies, including green hydrogen production through electrolysis or other technologies, hydrogen storage, transportation, and utilisation, is critical to establishing a sustainable hydrogen economy. RINA focuses on advancing the implementation of these technologies while ensuring safety, scalability, and cost-effectiveness to accelerate the adoption of hydrogen solutions globally.

Alternative Energy Vectors & Fuels other than Hydrogen

Beyond hydrogen, alternative energy vectors and fuels such as biofuels, and synthetic fuels offer additional pathways to reduce greenhouse gas emissions. These options are particularly relevant for applications where electrification is not feasible, such as aviation and maritime transport. RINA is actively involved in the development, certification, and deployment of these alternative fuels, ensuring their compatibility with existing infrastructure and compliance with environmental standards.

Ammonia and Ammonia-related Technologies

Ammonia, with its high energy density and existing infrastructure, represents a viable solution for reducing greenhouse gas emissions. RINA advances expertise in ammonia transport, storage, utilisation, and its application as a maritime fuel, while supporting large-scale ammonia cracking technologies. Through safety assessments and techno-economic evaluations, RINA promotes ammonia's scalable and sustainable integration into the energy transition.

Batteries & Storage Systems

Energy storage is a key enabler of renewable energy integration and grid stability. Advanced battery technologies, such as lithium-ion and solid-state batteries, along with other storage solutions like flow batteries and thermal storage, are critical to overcoming the intermittency challenges of renewables. RINA contributes to the development and testing of innovative storage systems, optimising their efficiency, safety, and lifecycle performance.

Flexible, Efficient, and Resilient Power Grids

The future of energy systems relies on power grids that are flexible, efficient, and resilient to disruptions. By integrating digital technologies, smart grids, and advanced energy management systems, RINA supports the design and implementation of grids that can handle dynamic energy flows, distributed generation, and diverse energy sources. These grids play a pivotal role in enabling energy transition and decarbonisation.

Energy Efficiency

Improving energy efficiency is one of the most cost-effective ways to reduce emissions and energy demand. From industrial processes to building systems and transport, energy efficiency measures contribute significantly to achieving climate goals. RINA focuses on developing and certifying solutions that enhance efficiency, optimise energy use, and reduce waste energy in various applications.

Carbon Capture, Utilisation, and Storage (CCUS)

CCUS technologies are essential for capturing and storing carbon dioxide (CO_2) emissions from industrial processes and power generation, as well as for reusing CO_2 in value-added products. RINA is actively engaged in the development and implementation of CCUS solutions encompassing the entire value chain, ensuring their scalability and alignment with regulatory and environmental standards.

Waste-to-X

Waste-to-X technologies convert waste materials into valuable products, such as energy, fuels, or chemicals, contributing to a circular economy. These solutions help reduce waste while creating sustainable energy sources. RINA supports the development of Waste-to-X processes, focusing on innovation, safety, and environmental performance.

Energy Sectors' Integration

Integrating energy sectors, such as electricity, heating, transport, and industry, is critical to achieving a holistic and efficient energy system. Sector coupling enables better utilisation of renewable energy, reduces reliance on fossil fuels, and creates synergies between technologies. RINA fosters the development of integrated solutions that optimise energy flows and maximise system efficiency.

Offshore Renewables and Ocean Energy Technologies (Wind, Solar, Wave, Tidal)

Offshore renewable and ocean energy technologies, including wind, solar, wave, and tidal energy, hold significant potential for expanding clean energy capacity. These technologies leverage the vast resources of oceans to generate sustainable power. RINA provides expertise in the design, assessment, and certification of offshore renewable projects, ensuring their performance, safety, and environmental compatibility.

Onshore Renewables

Onshore renewables, such as solar and wind energy, form the backbone of the energy transition. These technologies are crucial for decarbonising power generation and enabling the shift to clean energy systems. RINA supports the deployment and optimisation of onshore renewable energy projects, ensuring their efficiency, reliability, and compliance with international standards.

Nuclear

Nuclear energy remains a critical component of the energy mix, offering a reliable and low-carbon source of electricity. Advances in small modular reactors (SMRs) and next-generation nuclear technologies are key to enhancing safety, reducing costs, and minimising waste. RINA plays a role in the certification, risk assessment, and deployment of innovative nuclear solutions that support a sustainable energy future.

Advanced Industrial Technologies and Materials

Introduction

The field of advanced industrial technologies and materials is at the forefront of innovation, addressing critical challenges such as decarbonisation, resource efficiency, and the integration of cutting-edge production techniques. These advancements play a pivotal role in transforming traditional industries, enhancing operational effectiveness, and driving sustainable economic growth. This transformation is characterised by the adoption of innovative production methods, such as additive manufacturing, and the development of advanced materials that improve product performance and enable new applications. These efforts are supported by cross-cutting strategies that integrate modeling, design, testing, and life-cycle analysis to ensure the sustainability and effectiveness of industrial systems. These advancements provide immense opportunities for sectors such as manufacturing, energy, infrastructure, and beyond, while addressing the challenges of systemic decarbonisation and the transition toward circular and resource-efficient processes. Leveraging its multidisciplinary expertise, its laboratories, and a strong focus on innovation, RINA actively supports the development of advanced materials and industrial technologies. RINA delivers solutions that drive innovation and sustainability across multiple sectors.

Strategic implementation approach

Our R&D&I strategic implementation approach in the Advanced Industrial Technologies and Materials domain focuses on fostering sustainable industrial innovation. This includes:

- Supporting the development of systemic decarbonisation pathways for hard-to-abate industrial sectors, with a particularly strong focus on Steelmaking, ensuring alignment with global sustainability goals.
- Driving manufacturing processes toward decarbonisation through resource efficiency, recycling, circularity, and industrial symbiosis.
- Implementing innovative production techniques, such as additive manufacturing, and integrating them into standard industrial processes to optimise production and enhance efficiency.
- Developing and adopting cutting-edge technologies to improve operational effectiveness and enable new industrial capabilities.

As a result, our R&D&I strategic plan identifies ten key R&D directions that align with the company's vision and mission, as well as the global transformative trends in the manufacturing domain, driven by technological advancements and the need for greater adaptability and sustainability. These are:

Resource-efficiency, Recycling/Circularity, and Industrial Symbiosis in Industry

Improving resource efficiency and fostering recycling and circularity are critical steps toward reducing environmental impact and achieving sustainable industrial growth. By implementing circular economy principles, industries can minimise resource consumption, extend the lifecycle of materials, and reduce waste. RINA supports industries in optimising their processes, adopting innovative recycling technologies, and developing resource-efficient systems that drive economic and environmental benefits.

Waste-to-X Processes

Waste-to-X technologies represent a powerful solution to transform waste materials into valuable products, such as fuels, chemicals, or energy. These processes contribute to a circular economy by converting various waste streams—industrial, municipal, or agricultural—into alternative resources. Examples include waste-to-energy (WtE), waste-to-hydrogen, and waste-to-chemicals pathways. RINA focuses on advancing and optimising these processes to ensure environmental performance, scalability, and economic viability while addressing waste management challenges across industries.

Clean Steel and Solutions for Hard-to-Abate Industries

Hard-to-abate industries, such as steel, cement, and chemicals, face significant challenges in decarbonising their processes. The development of clean steel solutions, including green hydrogen-based steel production, carbon capture, and energy-efficient technologies, is essential for reducing emissions. RINA works alongside industry stakeholders to implement innovative strategies and technologies that facilitate decarbonisation pathways, ensuring cleaner, more sustainable production in energy-intensive sectors while maintaining competitiveness and operational reliability.

Digitalised Industrial/Manufacturing Processes, Automation, and Robotics

The digital transformation of industrial and manufacturing processes is revolutionising productivity, efficiency, and flexibility. By integrating automation, robotics, and digitalisation technologies such as IoT, AI, and digital twins, industries can optimise production, reduce downtime, and enhance operational control. RINA supports the adoption of smart manufacturing systems, providing expertise in digital solutions that improve real-time monitoring, predictive maintenance, and production quality across sectors.

Advanced Industrial Processes

Innovation in industrial processes is key to improving efficiency, performance, and sustainability. Advanced techniques, such as high-precision manufacturing, additive manufacturing, and advanced thermal processes, enable industries to produce high-quality products while reducing energy consumption and waste. RINA promotes the development and innovation of state-of-the-art industrial processes, ensuring they meet the highest standards of safety, reliability, and environmental compliance.

Smart/Advanced Materials, Composite Materials

Advanced materials and composites play a critical role in enabling new technologies and improving product performance. These materials offer superior properties, such as higher strength-to-weight ratios, corrosion resistance, and durability, making them ideal for applications across aerospace, automotive, energy, and infrastructure sectors. RINA works alongside producers on further developing these materials, supporting their integration into advanced manufacturing processes and ensuring their long-term performance and sustainability.

Advanced Materials for Energy Applications

The development of advanced materials is crucial for enhancing energy systems, including renewable energy technologies, energy storage, and grid infrastructure. RINA focuses on the innovation and deployment of advanced materials for batteries, fuel cells, solar panels, and energy transmission systems, enabling the transition to sustainable and resilient energy infrastructure.

Bio-based/Recycled Materials and Processes

Bio-based and recycled materials are essential for reducing reliance on finite resources and minimising environmental impact. Bio-based materials, derived from renewable biological sources, provide sustainable alternatives to traditional materials, while recycling processes extend the lifecycle of existing resources. RINA supports industries in adopting bio-based as well as recycled materials, developing innovative processes to ensure their scalability, performance, and compliance with sustainability standards.

Safe and Sustainable Coatings & Nanostructured Surfaces and related Deposition/Production Processes

Innovative coatings and nanostructured surfaces offer enhanced performance properties such as corrosion resistance, self-cleaning, and energy efficiency. Developing safe and sustainable coatings requires advanced deposition processes that minimise environmental impact. RINA focuses on advancing coating technologies and nanostructured surfaces, supporting industries in implementing solutions that optimise performance while meeting regulatory and environmental requirements.

Nuclear Waste Treatment

Nuclear energy is a key low-carbon solution, but effective treatment and management of nuclear waste are critical for its sustainability. Advanced technologies for nuclear waste treatment focus on minimising environmental risks, reducing waste volumes, and enhancing safety. RINA provides expertise in the development and deployment of innovative solutions for nuclear waste processing, containment, and storage, ensuring compliance with the highest safety and environmental standards.

Smart Cities and Communities

Introduction

The concept of smart cities represents a paradigm shift in urban development, emphasising sustainability, inclusivity, and resilience. This transformation is driven by the integration of multidisciplinary approaches to urban planning, advanced technologies, and community-centered strategies that address the complex challenges of modern urbanisation.

Smart cities focus on creating sustainable urban environments by combining innovative urban planning, energy-efficient infrastructure, smart mobility solutions, and circular resource management. These initiatives aim to enhance the quality of life for residents while addressing critical issues such as climate change, resource scarcity, and social inclusion.

RINA, leveraging its extensive planning capabilities and multidisciplinary expertise, plays a pivotal role in the transformation of urban spaces. Through an integrated approach that combines engineering, architecture, landscaping, and urban design, RINA delivers innovative solutions for sustainable urban requalification, mobility, and waste management fostering a more circular urban metabolism.

Strategic implementation approach

Our R&D&I strategic implementation approach in the Smart Cities and Communities domain is designed to drive sustainable urban innovation. This includes:

- Implementing effective urban renovation and regeneration strategies to create more sustainable, inclusive, and resilient urban environments.
- Contributing to the development of smart, green, and energy-efficient buildings and districts, including Positive Energy Buildings and Districts.
- Rethinking urban mobility by implementing smart solutions that enhance public transport, reduce traffic congestion, and promote alternative mobility options.
- Partnering with local authorities to develop and promote targeted sustainability initiatives that actively engage communities in the co-creation of urban solutions.
- Closing the loop of product lifecycles through the re-use and recycling of waste fractions, such as construction and demolition waste, fostering a circular economy approach in urban contexts.

Through these initiatives, RINA supports the transformation of cities into smart, sustainable, and people-centered communities, ensuring a better future for urban generations to come.

As a result, our R&D&I strategic plan identifies four key R&D directions that align with the company's vision and mission, as well as the trends shaping the future of design and urban life worldwide.

These directions are:

Smart, Green, and Energy-efficient Buildings and Districts (including Positive Energy Buildings and Districts)

Smart, green, and energy-efficient buildings and districts are at the heart of sustainable urban development. By integrating advanced technologies, energy-efficient systems, and innovative design principles, these buildings reduce energy consumption, minimise emissions, and improve occupant comfort. Positive Energy Buildings and Districts (PEDs) go a step further by producing more energy than they consume, utilising renewable energy sources and smart grid systems. RINA focuses on supporting the development of such infrastructures through sustainable materials, advanced energy management systems, and innovative engineering solutions to ensure the transformation of urban spaces into resilient and energy-positive environments.

Urban Renovation, Architectural Regeneration, Inclusiveness, and Climate Resilience of the Built Environment and of Public Spaces

Urban renovation and architectural regeneration are essential to revitalising cities, ensuring inclusiveness, and enhancing climate resilience. By upgrading existing infrastructure, improving the functionality of public spaces, and adopting climate-adaptive designs, cities can become more liveable, accessible, and sustainable. RINA promotes solutions that integrate nature-based approaches, smart infrastructure, and inclusive urban design to create environments that address climate challenges while fostering social equity. Ensuring that public spaces are resilient to extreme weather events and accessible to all is key to building thriving, future-proof communities.

Energy Communities

Energy communities represent a paradigm shift in how energy is generated, distributed, and consumed at the local level. These collaborative initiatives empower citizens, businesses, and local authorities to collectively produce and share renewable energy, enhancing energy independence, reducing costs, and lowering carbon emissions. By leveraging smart grids, digital tools, and decentralised energy systems, RINA supports the development of energy communities that enable more efficient energy use, promote renewable energy integration, and create social and economic benefits for local populations.

Smart Public Transport & Mobility

Smart public transport and mobility solutions are critical to reducing urban congestion, improving air quality, and enhancing accessibility. These solutions involve the integration of digital technologies, data-driven systems, and innovative infrastructure to optimise public transportation networks and promote sustainable mobility. RINA works on implementing smart mobility strategies that include real-time monitoring, intelligent traffic management, electrified transport fleets, and multi-modal transport systems. By prioritising efficiency, affordability, and environmental performance, RINA enables cities to provide safe, reliable, and sustainable mobility services that meet the needs of modern urban life.

Sustainable Transport and Infrastructures

Introduction

Sustainable transport and efficient infrastructures are critical to ensuring the well-being and mobility of people and goods while addressing global challenges such as climate change, urbanisation, and resource scarcity. By integrating innovation, safety, and sustainability, the transport and infrastructure sectors are redefining how people move, connect, and thrive in a rapidly evolving world.

This transformation emphasises the development of sustainable, safe, and interconnected systems across maritime, rail, and road transport. It also involves advancing urban mobility, fostering multi-modal logistics, and adopting sustainable construction practices that enhance infrastructure resilience and minimise environmental impact.

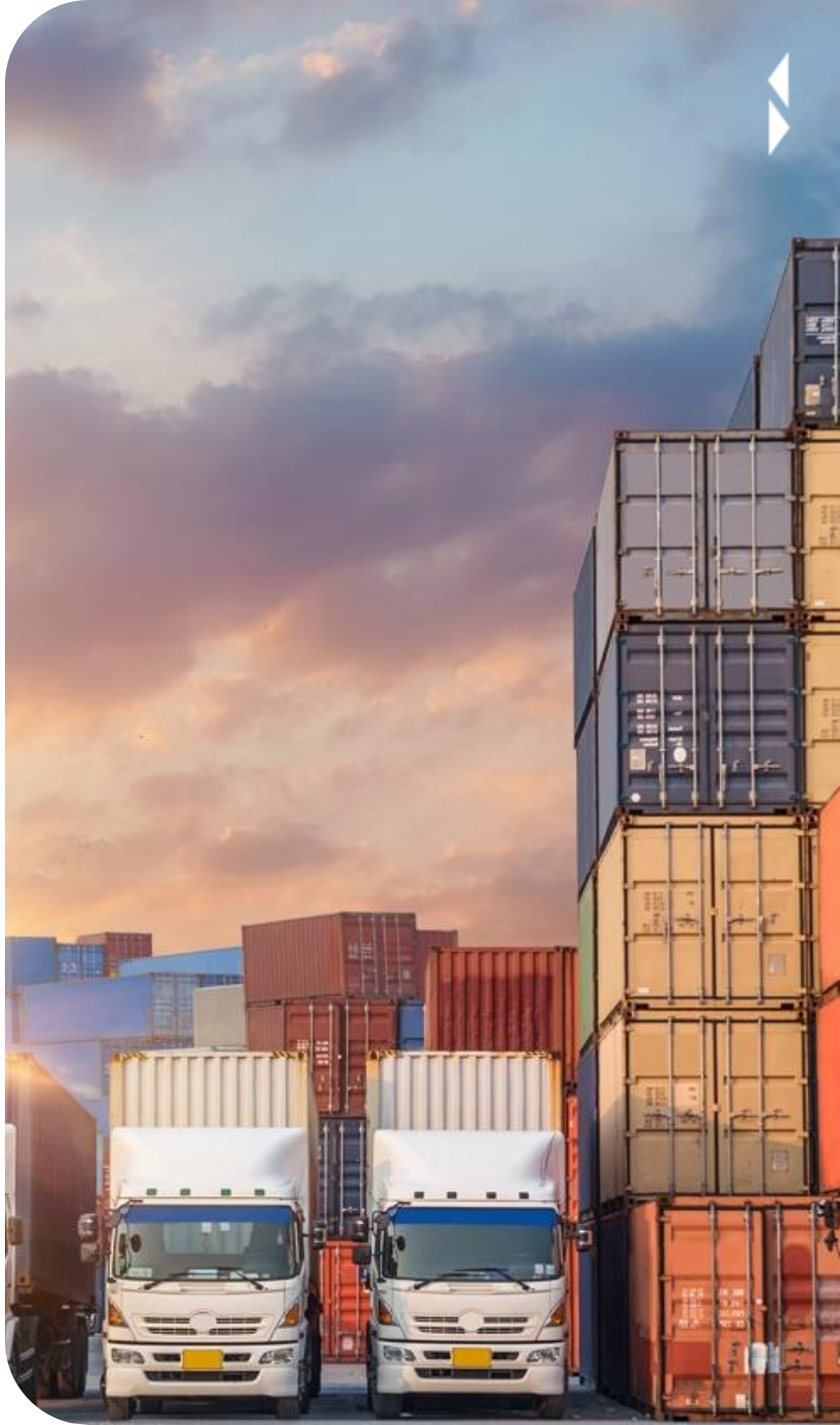
RINA, through its active participation in international research and innovation programs, brings cutting-edge solutions to its projects. With a focus on energy-efficient and secure infrastructures, innovative strategies for urban mobility, and digital solutions for control systems, RINA supports the creation of smarter and more sustainable transport and infrastructure networks.

Strategic implementation approach

Our R&D&I strategic implementation approach in the Sustainable Transport and Infrastructures domain focuses on delivering innovative, efficient, and resilient solutions. This includes:

- Contributing to the creation of sustainable, safe, and interconnected maritime, rail, and road transport systems and infrastructures, spanning the entire supply chain and asset lifecycle.
- Supporting the development of future metro and rail control systems, leveraging advanced digital technologies to enhance efficiency and safety.
- Developing collaborative and integrated multi-modal logistics and transport systems to improve connectivity and reduce environmental footprints.
- Advancing sustainable construction practices and implementing effective construction management methods to enhance the sustainability of infrastructure projects.
- Defining innovative strategies that foster sustainable urban mobility, promoting accessibility, efficiency, and reduced environmental impact.

Through these initiatives, RINA helps shape the future of transport and infrastructure, creating systems that are not only efficient and reliable but also environmentally and socially sustainable, ensuring long-term benefits for people and communities worldwide.



As a result, our R&D&I strategic plan identifies seven key R&D directions that align with the company's vision and mission, as well as the global trends in this domain.

These directions are:

Sustainable Construction and Construction Management

Sustainable construction and effective construction management are essential to delivering infrastructure projects that minimise environmental impact while ensuring long-term resilience and efficiency. By incorporating eco-friendly materials, energy-efficient designs, and circular economy principles, sustainable construction reduces emissions, waste, and resource consumption. Advanced digital tools such as Building Information Modelling (BIM) and real-time project monitoring systems optimise processes, improve resource allocation, and enhance overall project performance. RINA supports the implementation of sustainable construction practices, ensuring projects align with environmental goals while meeting the highest standards of safety and efficiency.

Sustainable, Safe, and Interconnected Maritime Transport and Infrastructure

Maritime transport remains a backbone of global trade, and its transformation toward sustainability, safety, and digital interconnection is critical for reducing emissions and improving efficiency. RINA works on enabling greener maritime solutions, such as clean propulsion systems, energy-efficient ports, and digital infrastructure to enhance vessel monitoring and management. By fostering interconnected maritime systems that integrate data-sharing, predictive maintenance, and smart technologies, RINA ensures that ports and fleets can operate safely, sustainably, and efficiently in a rapidly evolving global market.

Sustainable, Safe, and Interconnected Rail Transport and Infrastructure

Rail transport plays a vital role in enabling low-carbon mobility for both passengers and freight. Enhancing sustainability and safety requires the development of modernised, interconnected rail infrastructure, capable of integrating digital solutions and green technologies. RINA supports rail projects by implementing energy-efficient solutions, improving infrastructure resilience, and advancing automated safety systems that ensure optimal operations. By focusing on electrification, smart signalling systems, and digital connectivity, rail transport can become a cornerstone of sustainable, low-emission mobility networks.

Future Metro and Rail Control Systems Based on Digital Solutions

The future of metro and rail networks lies in advanced digital control systems that improve efficiency, safety, and capacity. Technologies such as automated train operation (ATO), predictive maintenance, and real-time traffic monitoring enable rail systems to reduce delays, optimise energy use, and increase passenger throughput. RINA supports the design and implementation of these digital solutions, helping operators transition to smart rail systems that deliver reliable, safe, and sustainable transport services in urban and intercity environments.

Sustainable, Safe, and Interconnected Automotive and Road Transport and Infrastructure

The automotive and road transport sectors are undergoing a significant transformation, driven by the need for sustainability, safety, and digital interconnection. Innovations such as electric vehicles (EVs), smart road infrastructure, and automated driving systems are paving the way for cleaner and more efficient mobility. RINA supports the development of integrated road networks that incorporate renewable-powered charging infrastructure, smart traffic management, and vehicle-to-infrastructure (V2I) communication technologies to enhance safety and operational efficiency while reducing environmental impact.

Collaborative and Integrated Multi-modal Logistics and Transport Systems

Integrated multi-modal logistics systems are key to ensuring the smooth, efficient, and sustainable movement of goods and people across different modes of transport—maritime, rail, road, and air. By fostering collaboration between stakeholders and adopting digital platforms for real-time monitoring and data exchange, multi-modal systems can minimise delays, optimise supply chains, and reduce emissions. RINA supports the development of smart logistics solutions that integrate transport networks, enabling businesses and cities to achieve greener, more resilient, and cost-effective supply chain management.

Connected, Cooperative, and Automated Mobility

Connected, cooperative, and automated mobility (CCAM) leverages advanced technologies such as Internet of Things (IoT), AI-driven automation, and vehicle-to-everything (V2X) communication to revolutionise transport systems. CCAM enhances safety, reduces congestion, and enables seamless mobility by integrating real-time data from vehicles, infrastructure, and users. RINA contributes to the design and implementation of smart mobility solutions, focusing on automated vehicle systems, cooperative infrastructure, and intelligent traffic management to create safer, cleaner, and more efficient urban and interurban transport networks.

Asset Management, Safety and Resilience

Introduction

The management, safety, and resilience of assets and infrastructures are critical to the reliability, security, and sustainability of modern systems. These factors are increasingly vital in a world where dynamic risks, environmental challenges, and the need for operational efficiency demand innovative approaches and technologies.

This transformation focuses on the adoption of advanced methods and tools for risk assessment, real-time monitoring, and predictive maintenance. It includes the integration of artificial intelligence (AI) and unmanned solutions to enhance the inspection, sensing, and management of critical assets, ensuring their safety, reliability, and resilience across sectors.

RINA, with its expertise in multi-disciplinary engineering and innovation, actively contributes to the evolution of asset management and resilience strategies. By leveraging cutting-edge technologies and AI-supported solutions, RINA delivers dynamic, data-driven approaches to asset integrity and risk management, ensuring the robustness of infrastructures throughout their lifecycle.

Strategic implementation approach

Our R&D&I strategic implementation approach in the Asset Management, Safety and Resilience domain emphasises the development of advanced solutions to address complex challenges. This includes:

- Developing comprehensive all-risk assessment approaches and tools to enhance the security and resilience of critical infrastructures across sectors.
- Implementing methods for dynamic risk monitoring based on real-time data collection, enabling proactive management and mitigation of threats.
- Innovating asset integrity management through real-time data analysis and AI-supported solutions, ensuring optimal asset performance and reliability.
- Advancing predictive maintenance solutions, leveraging AI to anticipate issues and reduce downtime.
- Driving the development of AI-supported smart inspection solutions for enhanced accuracy and efficiency in asset monitoring and assessment.
- Promoting the adoption of cutting-edge unmanned solutions for data acquisition, sensing, mapping, and inspection, enabling safer and more efficient operations.

Through these initiatives, RINA empowers industries to manage their assets with greater precision, ensuring safety, resilience, and sustainability in the face of evolving challenges and opportunities.

As a result, our R&D&I strategic plan identifies three key R&D directions that align with the company's vision and mission, as well as the global trends and technological advancements in this domain.

These directions are:

Smart Inspections and Advanced Methods for Asset Integrity Management

Ensuring the integrity and reliability of critical assets is essential to maintaining operational efficiency and safety across industries.

Smart inspection methods, powered by advanced technologies such as Artificial Intelligence (AI), drones, and robotics, enable faster, safer, and more accurate assessments of asset conditions.

Digital tools like digital twins and real-time data analytics further enhance asset integrity management (AIM) by predicting failures, minimizing downtime, and extending asset lifecycles.

RINA supports the deployment of these innovative inspection and monitoring methods, ensuring assets perform optimally while meeting stringent safety and environmental standards.

By embracing these advancements, industries can also optimise resource allocation and improve their operational sustainability.

Risk Assessment, Safety Monitoring, and Management

Risk assessment and safety monitoring are vital to identifying, evaluating, and mitigating hazards across complex systems and infrastructures.

By adopting dynamic, data-driven approaches and leveraging real-time monitoring tools, organisations can proactively manage risks and ensure compliance with safety regulations.

Advanced solutions, such as predictive risk models, AI-powered analytics, and IoT-based safety systems, allow for continuous tracking and intervention to prevent accidents and minimise disruptions.

RINA offers expertise in developing comprehensive risk management frameworks, enabling industries to operate safely while maintaining resilience and performance.

These frameworks also help organisations align with international standards and improve stakeholder confidence.

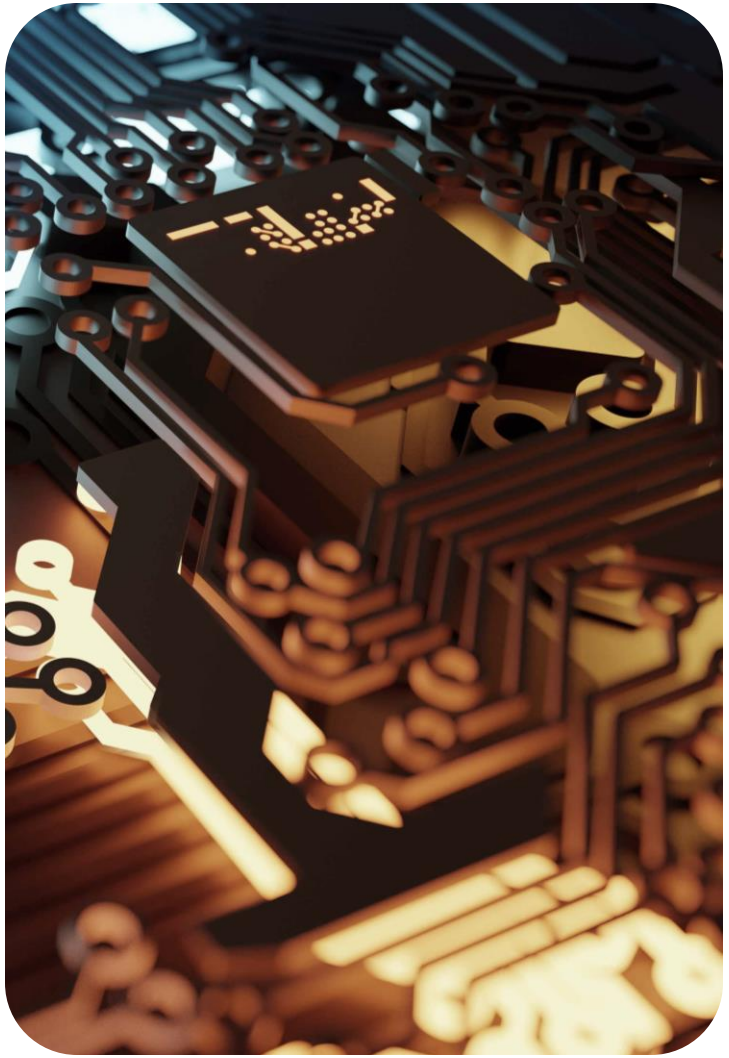
Critical Infrastructure Resilience

Critical infrastructure—including energy systems, transportation networks, and water supply—forms the backbone of modern society. Enhancing its resilience against physical, cyber, and environmental threats is crucial to ensuring stability and continuity.

By integrating all-risk assessment methodologies, real-time data collection, and predictive maintenance technologies, organisations can anticipate vulnerabilities, adapt to evolving risks, and recover quickly from disruptions.

RINA focuses on implementing resilient design strategies and advanced monitoring systems to strengthen infrastructure against natural disasters, cyberattacks, and operational failures, ensuring long-term sustainability and reliability.

These efforts also contribute to building trust and promoting collaboration among key stakeholders in infrastructure management.



ESG, Sustainability, Resource-efficiency and Circular Economy

Introduction

Environmental, Social, and Governance (ESG) considerations, combined with a focus on resource efficiency and circular economy principles, are transforming the way businesses and societies address sustainability. This paradigm shift emphasises responsible resource use, equitable social practices, and robust governance frameworks to build systems that are resilient, inclusive, and future-proof.

This transformation is characterised by the integration of comprehensive ESG metrics, the adoption of resource-efficient production models, and the implementation of circular economy practices. These initiatives aim to minimise waste, optimise material and energy use, and ensure sustainability across supply chains, while fostering social equity and human rights.

RINA, leveraging its multidisciplinary expertise, actively supports this transition by developing holistic methods to integrate ESG factors into decision-making processes. By delivering innovative solutions for sustainable production and resource optimisation, RINA empowers industries to create value while reducing environmental impact and promoting social inclusion.

Strategic implementation approach

Our R&D&I strategic implementation approach in the ESG, Sustainability, Resource-efficiency, and Circular Economy domain is designed to deliver impactful, sustainable solutions. This includes:

- Developing holistic methods to integrate environmental, social, and governance considerations into investment decisions, ensuring a balanced approach to sustainability.
- Determining comprehensive ESG metrics and KPIs that assess projects holistically, including critical perspectives on social vulnerability, gender equality, and human rights.
- Implementing solutions to optimise the use of materials, energy, and water in production processes, minimising waste and fostering responsible and transparent supply chains.
- Advancing sustainable production and consumption models that reduce waste and maximise the efficient use of resources, driving the adoption of circular economy practices.
- Supporting industries in embedding ESG principles across their operations, enhancing their long-term sustainability and alignment with global environmental and social goals.

Through these initiatives, RINA helps industries navigate the complex sustainability landscape, contributing to a more equitable and environmentally conscious global economy.

As a result, our R&D&I strategic plan identifies nine key R&D directions that align with the company's vision and mission, as well as the global and regional policies in this domain.

These directions are:

Sustainability KPIs

Sustainability Key Performance Indicators (KPIs) are essential tools for measuring and tracking the environmental, social, and governance (ESG) performance of organisations and projects. By establishing clear and actionable metrics, businesses can assess their progress toward sustainability goals, such as carbon reduction, resource efficiency, and social impact. RINA supports the development and implementation of robust ESG KPIs that enable organisations to monitor performance, identify areas for improvement, and communicate results transparently to stakeholders.

Sustainable Finance to Tackle Climate Change

Sustainable finance plays a critical role in accelerating the transition to a low-carbon economy by channelling investments into projects and technologies that address climate change. This includes green bonds, climate-aligned investments, and innovative financing mechanisms that support renewable energy, energy efficiency, and sustainable infrastructure. RINA contributes by aligning financial strategies with ESG principles, assessing the climate impact of projects, and ensuring compliance with frameworks.

Social Vulnerability, Gender Equality, and Human Rights

Achieving sustainability requires addressing social challenges such as inequality, human rights, and social vulnerability. Incorporating gender equality and human rights considerations into project planning and execution fosters inclusive and equitable development. RINA works to integrate social impact assessments into sustainability strategies, ensuring that projects promote fair labour practices, safeguard vulnerable communities, and support equal opportunities.

Sustainable Agriculture, Agro- & Bio-energy

Sustainable agriculture and agro-energy are critical to ensuring food security and reducing environmental impact. By adopting regenerative practices, resource-efficient technologies, and bio-energy solutions, industries can enhance agricultural productivity while minimising emissions and preserving ecosystems. RINA supports the development of innovative systems that integrate circular economy principles.

Nature-based Solutions (NBS)

Nature-based solutions (NBS) harness the power of natural ecosystems to address environmental challenges such as climate change, biodiversity loss, and water management. Solutions like reforestation, landscaping, green urban infrastructure, and wetland restoration provide cost-effective and sustainable benefits while enhancing ecosystem resilience. RINA promotes the design and implementation of NBS in urban and rural environments, supporting solutions that deliver environmental, social, and economic value.

Resource Efficiency and Circularity of Value Chains

Resource efficiency and circular value chains are central to reducing waste and optimising the use of materials across industries. By embracing circular economy principles, businesses can extend product lifecycles, minimise resource extraction, and reduce environmental impact. RINA works with organisations to redesign value chains, implement resource-efficient processes, and develop strategies for reuse, recycling, and remanufacturing.

Eco-design / Design for Disassembly

Eco-design focuses on creating products with sustainability in mind, ensuring minimal environmental impact throughout their lifecycle. By implementing design for disassembly (DfD) principles, products can be easily dismantled, reused, or recycled at the end of their life. RINA supports companies in integrating eco-design methodologies, Optimising material use, and developing products that align with circular economy goals while maintaining performance and quality.

Green and Social Certifications and Schemes

Green and social certifications play a key role in verifying the sustainability and social impact of products, projects, and organisations. Certifications such as LEED, BREEAM, and ISO 14001 ensure compliance with environmental standards, while social certifications address labour practices and community well-being. RINA provides expertise in achieving these certifications, providing assessments and guidance to enhance transparency, market competitiveness, and stakeholder trust.

Sustainable Supply Chain Management

Sustainable supply chain management involves integrating environmental, social, and governance (ESG) principles into procurement, logistics, and production processes. By promoting responsible sourcing, minimising emissions, and ensuring fair labour practices, organisations can create supply chains that are both ethical and resilient. RINA supports businesses in mapping supply chains, identifying risks, and implementing strategies to reduce environmental footprints and improve supply chain transparency.

Water

Introduction

Water is a fundamental resource for life, ecosystems, and economies. As global challenges such as climate change, pollution, and population growth intensify, the need for innovative and sustainable water management solutions has become more urgent than ever. Addressing these challenges requires cutting-edge technologies and strategies to ensure water quality, reduce environmental impacts, and optimise resource use.

This transformation emphasises the integration of advanced treatment methods, pollution control technologies, and real-time monitoring tools to enhance water quality and sustainability. These efforts support the minimisation of waste in recycling and treatment processes, ensuring efficient and responsible water management.

RINA, with its expertise in engineering and innovation, plays a pivotal role in driving sustainable water solutions. By leveraging advanced technologies and deploying tools for real-time quality monitoring, RINA helps ensure the environmental and operational sustainability of water projects across sectors.

Strategic implementation approach

Our R&D&I strategic implementation approach in the Water domain focuses on delivering impactful solutions that promote sustainability and efficiency. This includes:

- Creating innovative solutions aimed at minimizing the environmental impacts associated with water based economic activities, ensuring sustainable development.
- Integrating advanced technologies to effectively control and reduce water pollution, safeguarding ecosystems and communities.
- Implementing solutions designed to minimise waste generation during water recycling and treatment processes, enhancing circular water management.
- Adopting advanced treatment methods to lower contamination levels and improve overall water quality, ensuring safer and more reliable water resources.
- Deploying tools and technologies for real-time monitoring of water quality, enabling timely interventions and optimised water resource management.
- Contributing to design regulatory requirements to support water footprint and water efficiency metrics based policy makers decisions.

Through these initiatives, RINA supports industries and communities in addressing water-related challenges, ensuring access to clean, sustainable, and efficiently managed water resources for present and future generations.

As a result, our R&D&I strategic plan identifies eight key R&D directions that align with the company's vision and mission, as well as the global challenges in this field. These directions are:

Water Scarcity/Surplus in the Food/Water Nexus including Nature-Based Solutions

Balancing water availability within the Food/Water Nexus is critical to addressing global challenges of water scarcity and excess. Agriculture remains one of the largest consumers of water resources, making efficient water management essential for food security and sustainability. Nature-Based Solutions (NBS), such as wetland restoration, natural irrigation systems, and rainwater harvesting, play a key role in ensuring water availability while supporting ecosystems. RINA promotes innovative approaches that integrate NBS to optimise water use, mitigate scarcity, and address excess, ensuring resilience in the face of climate variability.

Removal of Contaminants in All Water Forms

Ensuring water quality requires the effective removal of contaminants from freshwater, wastewater, and industrial water sources. Advanced treatment technologies, including nanofiltration, adsorption systems, and chemical-free processes, are essential for removing pollutants such as heavy metals, microplastics, and emerging contaminants. RINA is committed to developing and deploying innovative treatment methods that improve water quality, protect public health, and safeguard aquatic ecosystems.

Soil and Nutrients/Water Cycles in the Food/Water Nexus including Biodiversity

The relationship between water, soil, and nutrients is fundamental to maintaining healthy ecosystems and sustainable agriculture. Water cycles regulate nutrients flow and soil quality, directly influencing biodiversity and food production. Sustainable water management practices, such as precision irrigation, nutrients recovery, and ecosystem preservation, help maintaining the natural balance of soil and water systems. RINA works on solutions that integrate biodiversity-enhancing practices, ensuring that water and nutrients cycles are optimised to support both agricultural productivity and environmental health.

Integration of Nature-Based Approaches and Biodiversity in Water Resource Management

The integration of Nature-Based Approaches (NBA) and biodiversity in water resource management provides cost effective, sustainable solutions to water-related challenges. Strategies such as forest preservation, riparian buffer zones, and green urban infrastructure help regulate water quality, reduce flooding, and support biodiversity. RINA supports the adoption of NBA by designing and implementing solutions that enhance water management while restoring ecosystems and creating long-term environmental resilience.

Industrial Process Water Recycling and Recovery of Valuable Resources, including Footprint Verification

Industries play a pivotal role in water sustainability by adopting processes that enable water recycling and the recovery of valuable resources, such as minerals and chemicals, from waste and industrial water. Implementing circular practices reduces water consumption, operational costs, and environmental footprint. RINA supports industries by developing technologies and frameworks that enhance resource recovery, optimise water reuse, and verify water footprint and efficiency to ensure compliance with accredited standards, as well as contribute to sustainability goals.

Safe, Sustainable, and Resilient Water Infrastructures

Resilient water infrastructures are essential for ensuring reliable water distribution and access to clean water and protecting communities as well from water-related risks. By combining smart design, innovative materials, and climate-adaptive solutions, modern water infrastructure can withstand challenges such as aging systems, increased demand due to population growth, and climate change. RINA provides expertise in developing safe, sustainable, and resilient infrastructures that ensure long-term performance and efficiency, addressing the needs of both urban and rural populations.

Water Security and Digitalisation of the Water Distribution Sector, including Digital Passport

The digitalisation of water distribution systems is transforming the sector by enhancing efficiency, transparency, and security. Smart water grids, real-time monitoring, and advanced analytics enable the optimisation of water supply, loss detection, and resource management. The introduction of digital passport for water assets ensures traceability and supports maintenance strategies. RINA works on integrating IoT, AI, and digital twins into water systems, enabling smarter, safer, and more sustainable water distribution while improving overall water security.

Decentralised Wastewater Treatment and Valuable Resources Recovery

Decentralised wastewater treatment systems offer flexible and cost-effective solutions for managing wastewater resources, particularly in remote or underserved areas. These systems not only can treat wastewater locally but also pave the way to enable the recovery of valuable resources, such as biogas, nutrients, and clean water at local level. By implementing modular technologies and circular principles, decentralised systems can reduce environmental impacts and support sustainable development. RINA supports the deployment of advanced decentralised treatment technologies that promote resource recovery, improve water reuse, and contribute to the new Urban Wastewater Treatment Directive compliance.

Maritime and Blue Economy

Introduction

The Maritime and Blue Economy sector is undergoing a transformative evolution, fueled by the increasing demand for sustainable development, the need to mitigate environmental impacts, and the rapid advancement of innovative technologies and practices. This transformation is characterised by a shift toward greener maritime activities, sustainable resource management, and the integration of digital and automation technologies. It encompasses a wide range of activities, including shipping, offshore energy generation, aquaculture, and marine ecosystem preservation, which collectively contribute to the health of our oceans and the global economy.

These changes present both significant challenges and unique opportunities for the maritime industry and broader society. Addressing them requires a commitment to innovation, the adoption of sustainable practices, and collaboration across disciplines to ensure economic growth aligns with environmental stewardship.

Leveraging its multidisciplinary expertise and deep understanding of the maritime domain, RINA also supports the sustainable development of the blue economy. Our services span certifications, inspections, engineering consulting, project management, technology evaluation, and digital solutions, fostering innovation and resilience in maritime operations.

Strategic implementation approach

Our R&D&I strategic implementation approach in the Maritime and Blue Economy domain is grounded in a holistic understanding of the global and regional trends, challenges, and opportunities that characterise the sector.

This includes:

- A review of international and regional policies and frameworks, such as the EU Blue Economy Strategy and global maritime decarbonisation initiatives.
- An analysis of current and emerging challenges, including climate change, biodiversity loss, maritime pollution, and the need for sustainable energy and resource use in marine environments.
- An assessment of RINA's capabilities and potential, including our R&D&I portfolio, our network of collaborations, and the risks and uncertainties associated with maritime innovation.

Through this approach, RINA reinforces its commitment to empowering the Maritime and Blue Economy sector to navigate a sustainable and prosperous future.

As a result, our R&D&I strategic plan identifies eight key R&D directions that align with the company's vision and mission, as well as with global trends and policies.

These directions are:

Zero-emission Vessels

The maritime sector is undergoing a transformative shift towards sustainability, with zero-emission vessels at the forefront of this evolution. These vessels rely on clean energy sources such as hydrogen, ammonia, battery-electric systems, and wind propulsion to eliminate greenhouse gas emissions. By integrating cutting-edge technologies and alternative fuels, zero-emission vessels reduce environmental impact and comply with stringent international regulations like the IMO's decarbonisation targets. RINA plays a pivotal role in supporting the development, certification, and deployment of these vessels, ensuring they are safe, efficient, and operationally viable.

Autonomous and Remotely Controlled Vessels

Autonomous and remotely controlled vessels represent the future of maritime transportation, enhancing operational efficiency, safety, and cost-effectiveness. These vessels leverage advanced technologies such as Artificial Intelligence (AI), sensors, and IoT to enable navigation with minimal human intervention. Remotely operated systems ensure real-time decision-making while reducing risks to crew members. RINA supports the design, testing, and validation of autonomous vessels, ensuring their seamless integration into global shipping fleets while prioritising safety, cybersecurity, and regulatory compliance.

Safety of Navigation (including Safety of Passengers)

Ensuring the safety of navigation and passengers is a core priority for the maritime sector. This involves developing advanced systems for real-time monitoring, collision avoidance, and weather forecasting to improve navigation reliability. For passenger safety, robust protocols, state-of-the-art life-saving equipment, and training programs are essential. RINA contributes by developing and certifying safety systems and processes that comply with international standards, enhancing maritime safety and resilience in an increasingly dynamic environment.

Digital Transformation Based on Cyber-resilient, Safety-enhancing, and Energy-efficient Solutions

Digital transformation is revolutionising the maritime industry, enabling smarter, safer, and more energy-efficient operations. Cyber-resilient solutions, digital twins, and AI-driven systems enhance vessel performance, optimise fuel consumption, and improve predictive capabilities. RINA supports shipowners and operators in adopting secure, data-driven technologies that strengthen cybersecurity, enhance operational safety, and reduce energy costs, ensuring a more resilient and sustainable maritime sector.

Ship Smart Inspections and Predictive Maintenance

The implementation of smart inspections and predictive maintenance is transforming ship management and asset integrity. By leveraging AI, IoT-enabled sensors, and real-time data analysis, shipowners can monitor vessel conditions, detect faults earlier, and predict maintenance needs, minimising downtime and costs. RINA provides expertise in developing and deploying these advanced inspection solutions, ensuring optimal vessel performance, safety, and regulatory compliance while extending asset lifecycles.

Offshore Multi-purpose Installations

Offshore multi-purpose installations integrate energy production, aquaculture, and other marine activities into a single platform, maximising the use of ocean space and resources. These installations combine renewable energy technologies like offshore wind and wave energy with sustainable practices, such as fish farming and environmental monitoring. RINA supports the design and implementation of these innovative systems, ensuring their safety, efficiency, and environmental compatibility while fostering a multi-use approach to offshore infrastructure.

Aquaculture Systems

Sustainable aquaculture systems are critical to meeting increasing global food demands while protecting marine ecosystems. Modern aquaculture incorporates advanced monitoring technologies, automated feeding systems, and waste management solutions to enhance productivity and reduce environmental impact. RINA collaborates with stakeholders to implement innovative and sustainable aquaculture practices that ensure food safety and quality, improve efficiency, and promote the preservation of marine environments health.

Maritime Circular Economy for Bio-based Sea Products

The maritime circular economy focuses on maximising the value of marine resources while minimising waste. Bio-based sea products, such as algae, seaweed, and marine biomass, offer sustainable alternatives for food, cosmetics, and bio-energy industries. By integrating circular practices, such as waste valorisation and closed-loop production systems, industries can reduce environmental footprint and create sustainable economic opportunities. RINA supports initiatives that advance bio-based production processes, ensuring they are efficient, sustainable, and aligned with global circular economy principles.

Future Aerospace, Defence and Security Applications and Technologies

Introduction

The Aerospace, Defence, and Security sectors are at the forefront of technological innovation, addressing some of the most pressing challenges in today's rapidly evolving global landscape. These fields require cutting-edge solutions to ensure security, resilience, and operational effectiveness in increasingly complex and interconnected environments.

This transformation focuses on leveraging space technologies, new defence systems, advanced AI systems, and cybersecurity approaches to enhance surveillance, situational awareness, and system reliability. It also emphasises the development of autonomous systems, human-machine interfaces, and underwater technologies to address diverse challenges across Defence, Aerospace, and Security applications. RINA, with its deep expertise in space&defence-enabled applications and advanced technologies, actively contributes to these sectors by delivering innovative solutions that address societal challenges. From GNSS-enabled applications for critical environments to advanced research on materials for defence and security of connected distributed systems, RINA is committed to driving innovation in Aerospace, Defence, and Security.

Strategic implementation approach

Our R&D&I strategic implementation approach in the Future Aerospace, Defence and Security Applications and Technologies domain emphasises innovation and resilience through the following initiatives:

- Developing advanced solutions for security and defence, including surveillance, behavioural analytics, situational awareness, and early warning systems.
- Engaging in cybersecurity, data management, and data protection by creating innovative tools and approaches to safeguard critical systems and infrastructures.
- Advancing next-generation human-machine interfaces (HMIs) and AI-enabled avionic systems to enhance control and automation in autonomous systems.
- Driving the development of underwater technologies and solutions for inspection, surveillance, and other applications critical to defence and infrastructure resilience.
- Conducting advanced research on innovative technologies for the space industry, including GNSS-enabled applications and protection solutions against signal interference and attacks.

Through these initiatives, RINA supports the aerospace, defence, and security sectors in addressing complex global challenges, shaping a future where resilience and innovation go hand in hand.

As a result, our R&D&I strategic plan identifies five key R&D directions that align with the company's vision and mission.

These directions are:

Defence

The Defence sector is evolving rapidly to address emerging threats and challenges, requiring advanced technologies and strategies to ensure operational effectiveness and resilience.

Innovations in surveillance systems, autonomous platforms, and collaborative connected systems are transforming defence capabilities, enabling rapid response and precision. RINA supports the development of cutting-edge solutions tailored to the needs of modern defence operations, focusing on system reliability, interoperability, and compliance with stringent safety and security standards.

Security, Cybersecurity, Data Management, and Data Protection

In an increasingly connected world, security and cybersecurity are paramount to protecting critical systems and sensitive information. Advanced data management and protection strategies safeguard infrastructure and ensure the integrity of communications, operations, and decision-making processes. RINA works on developing cyber-resilient systems, leveraging AI-driven threat detection, encryption technologies, and data analytics to enhance situational awareness and ensure robust defences against cyber threats.

Avionic

The Avionic sector is undergoing a transformation with the integration of next-generation human-machine interfaces (HMIs) and AI-enabled systems that enhance control and automation. Innovations in autonomous flight technologies, real-time data processing, and energy-efficient systems are shaping the future of Aviation as its standards and regulatory. RINA supports the design and certification of advanced avionic solutions, focusing on safety, reliability, and performance optimisation for both civilian and military applications.

Space

The Space domain plays a critical role in addressing societal challenges, from Earth Observation (EO) environmental monitoring to global communications and navigation. Emerging technologies such as small satellites, GNSS-enabled applications, and space-based sensors are expanding the capabilities of space systems. Additionally, the protection of space assets from physical and cyber threats is becoming increasingly important. RINA contributes to the development of innovative Space technologies, focusing on resilience, scalability, and sustainable practices to support exploration, data collection, and infrastructure in orbit.

Underwater

Underwater technologies are critical for applications ranging from civil defence and surveillance to infrastructure inspection and resource exploration. Innovations in unmanned underwater vehicles (UUVs), sensors, and communication systems enable real-time data acquisition and operations in challenging environments. RINA supports the development of underwater solutions, focusing on durability, precision, and compatibility with diverse operational needs. These technologies enhance capabilities in sectors such as maritime security, offshore energy, and environmental monitoring.

Artificial Intelligence and Digitalisation

Introduction

Artificial Intelligence (AI) and digitalisation are revolutionising industries by enabling smarter decision-making, automation, and enhanced operational efficiency. These technologies empower organisations to optimise processes, predict outcomes, and address challenges with unprecedented precision and speed.

With its deep expertise in AI and digital solutions, RINA actively supports this transformation by implementing and delivering cutting-edge tools and services aimed at enhancing efficiency, sustainability, and innovation across various sectors. From leveraging generative AI (GenAI) to creating digital twins, RINA provides robust solutions that enhance system performance and operational reliability.

Strategic implementation approach

Our R&D&I strategic implementation approach in the Artificial Intelligence and Digitalisation domain focuses on driving innovation and efficiency across all sectors in which we operate.

Accordingly, as one of our 10 priority R&D&I domains, we consider the Artificial Intelligence and Digitalisation domain as an enabler for a variety of applications defined as specific objectives of other priority R&D&I domains, to which the specific domain is transversal.

RINA's AI Factory

Triggered by the aim to evolve our services in relation to the emerging needs of our clients and the demand for ever new performing digital solutions, the company has made a thorough assessment of its internal capabilities in relation to the emerging demand for specialised services as well as the emerging trend for digital solutions and has thereby identified a number of domains in which to evolve its offering. As a key pillar of our strategic plan, our AI Factory has been designed to boost RINA's digital transformation by maximising existing services and processes while developing new innovative solutions, thus promoting the company's digital evolution through large-scale innovation. The creation of reusable and scalable AI components that can be integrated into different projects and services by RINA's AI Factory is a crucial aspect of our digital transformation strategy. These building blocks are foundational elements that support various AI-driven initiatives and projects within the various domains in which the company operates and intends to evolve its offering.

As a result, our R&D&I strategic plan identifies six key R&D&I directions that align with the company's vision and mission, as well as the global trends in Digitalisation.

These directions are:

Asset Integrity and Self-Monitoring

The integration of Artificial Intelligence (AI) and digital technologies has revolutionised asset integrity management, enabling real-time monitoring and self-diagnostic capabilities. Self-monitoring systems leverage IoT sensors, machine learning models, and data analytics to assess asset conditions continuously, predict potential failures, and optimise maintenance schedules. These technologies enhance operational reliability, minimise downtime, and reduce maintenance costs. RINA supports the development and implementation of advanced self-monitoring solutions, ensuring the safety, efficiency, and longevity of critical assets across industries.

Predictive Maintenance

Predictive maintenance harnesses AI and data-driven insights to anticipate equipment failures before they occur, significantly improving efficiency and reducing operational disruptions. By analysing data from connected devices and historical trends, AI-powered models predict wear-and-tear patterns and identify the optimal time for maintenance. This approach minimises unplanned downtime, extends equipment lifespan, and reduces maintenance costs. RINA specialises in designing and deploying predictive maintenance frameworks tailored to diverse industries, ensuring seamless integration and measurable performance improvements.

ESG-related Services

AI and digital tools are transforming Environmental, Social, and Governance (ESG) services by providing real-time data analysis, reporting, and compliance solutions. AI-powered platforms streamline the measurement of carbon footprints, resource efficiency, and social impact metrics, ensuring transparency and accuracy in ESG reporting. RINA offers tailored digital solutions to help organisations meet regulatory requirements, track sustainability goals, and communicate ESG achievements effectively to stakeholders.

GenAI-enabled Services

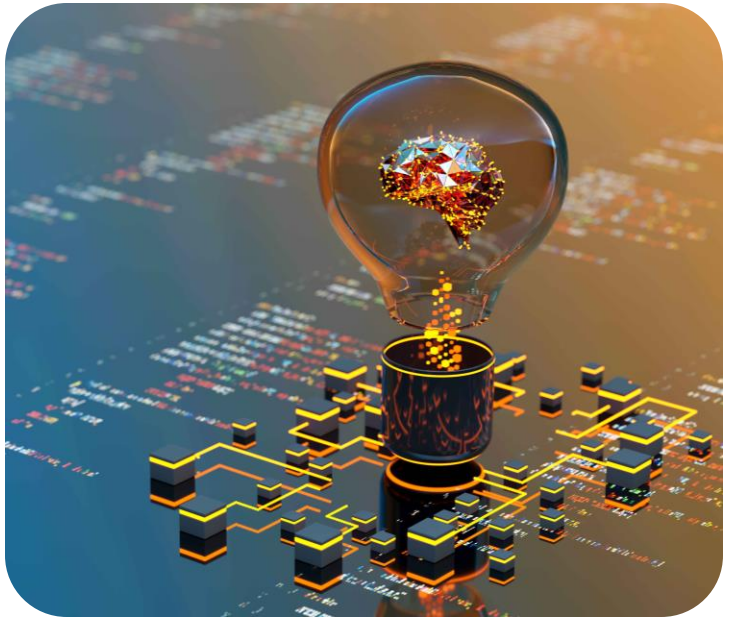
Generative AI (GenAI) is redefining innovation by enabling new forms of content creation, process optimisation, and decision support. From automating complex workflows to generating insights from unstructured data, GenAI enhances productivity and fosters innovation across various domains. RINA leverages GenAI to develop advanced services, such as automated reporting, customer interaction tools, and AI-driven decision models, enabling organisations to stay competitive and agile in a rapidly evolving digital landscape.

Health & Safety Self-assessment

Health and safety remain critical priorities in every sector, and digital self-assessment tools powered by AI offer a proactive approach to risk management. These tools enable organisations to evaluate compliance, monitor workplace conditions, and identify potential hazards in real time. AI-powered systems enhance accuracy, streamline reporting, and provide actionable insights to improve safety measures. RINA supports the adoption of Health & Safety self-assessment tools, ensuring a safer working environment while aligning with global safety standards.

Supply Chain Risk Monitoring

AI-driven supply chain risk monitoring solutions provide unparalleled visibility into complex global networks, enabling organisations to identify and mitigate potential disruptions. By analysing data from diverse sources, such as weather forecasts, geopolitical trends, and supplier performance, AI systems offer real-time insights into supply chain vulnerabilities. These tools enhance resilience, sustainability, and efficiency in logistics and procurement processes. RINA develops and deploys supply chain risk monitoring frameworks, helping organisations navigate uncertainties and maintain robust and adaptive supply chains.



R&D&I objectives and actions

At RINA, our R&D&I strategic plan defines clear objectives and targeted actions to address global challenges, foster innovation, and create value for our stakeholders. These objectives reflect our commitment to delivering impactful solutions while driving sustainable growth across industries.

Our R&D&I strategy is focused on 10 priority domains that will shape our activities and investments over the medium-term period 2025–2030 and lay the foundation for long-term leadership in delivering innovative and sustainable solutions.

To support these priorities, our strategy focuses on the following key actions:

- Defining Specific Goals and Outcomes: For each R&D&I domain, we have established clear objectives and expected outcomes. These guide our efforts and ensure measurable progress, whether it be technological advancements, sustainability improvements, or operational efficiencies' enhancement.
- Allocating Resources: We mobilise human, financial, and physical resources to drive innovation effectively. Our teams leverage state-of-the-art facilities, tools, and expertise to deliver impactful solutions.
- Building Strategic Partnerships: Collaboration is at the heart of our strategy. We work with industry partners, academic institutions, and research organisations to exchange knowledge, co-create solutions, and maximise the impact of our projects.
- Ensuring Governance and Oversight: We implement robust governance mechanisms, including processes for planning, monitoring, evaluating, and reporting R&D&I activities. This ensures accountability, transparency, and alignment with our broader business objectives.
- Embracing Adaptability: Recognising that innovation must evolve alongside technological, environmental, and market changes, our R&D&I strategic plan is designed to be reviewed and updated annually.

By combining a clear vision with focused actions, our R&D&I strategy empowers us to develop solutions that drive progress across key sectors, from energy transition and digitalisation to sustainability and advanced technologies.

These objectives and actions are not static; they evolve in step with the changing needs of our stakeholders and the global landscape.

By focusing on collaboration, adaptability, and excellence, RINA continues to position itself as a trusted leader in delivering solutions that drive progress and innovation across industries.

PART 3:
EXPECTED IMPACTS

Expected impact on business

Driving long-term value through collaborative R&D&I projects

At the core of our R&D&I strategy lies our commitment to delivering long-term value through our services. It is therefore core in our R&D&I strategy to participate in collaborative R&D&I projects in which we can enhance our service offerings by practicing innovative solutions hands-on together with our partners.

Starting from our R&D&I strategic plan, which sets our objectives in terms of new or enhanced service offerings, we develop and test our innovative solutions within collaborative R&D&I projects. R&D&I projects represent therefore for us the implementation environment as well as the test-beds for our innovative solutions to a variety of current as well as emerging challenges and business needs.

By gaining knowledge through these projects, we can develop and enhance our services, creating new offers that meet the evolving needs of our current or prospect clients. Additionally, these projects help us build strategic relationships with key players in relevant areas and, last but not least, increase our visibility as an innovation champion within a number of sectors.

Leading the way as an Innovation Champion

RINA has firmly established itself as an "innovation champion" through its long-standing active participation in numerous R&D&I projects and initiatives. The company's commitment to innovation is exemplified by its recognition on the Innovation Radar platform, which identifies high-potential innovations and innovators emerging from EU-funded projects. The company's strategic focus on leveraging internal expertise and fostering cross-business and cross-geography collaboration has positioned it as a knowledge-based organisation, driving innovation and excellence in all its endeavours. This approach not only accelerates employee professional growth but also enhances RINA's competitiveness in the market. By continuously pushing the boundaries of innovation, RINA remains at the forefront of industry advancements, ensuring its clients benefit from cutting-edge solutions and services.

Harnessing Key Exploitable Results from R&D&I projects

From the implementation of our innovative solutions in R&D&I projects, we derive our Key Exploitable Results. These represent the tangible outcomes of our R&D&I initiatives designed to address current and emerging challenges in various sectors. These results include innovative solutions, methodologies, and technologies that have been developed and tested within collaborative R&D&I projects. By leveraging these Key Exploitable Results, we can enhance our service offerings, improve our internal capabilities, and prepare for future market demands.

To harness the outcomes of our R&D&I initiatives and to drive them towards exploitation within the company's business, we have developed internal processes as well as tools. Starting from extensively mapping the Key Exploitable Results generated within our R&D&I projects, we address each of them towards the most suitable internal functions capable to add value on top of them in order to generate the expected impact on our business that we had envisaged within our R&D&I strategic plan at the very beginning of the journey.

Key Performance Indicators

R&D&I's Key Performance Indicators (KPIs) are essential metrics that help us measure the success and impact of our research, development, and innovation initiatives. These KPIs include the number of projects funded internally and externally, the number of publications stemming from R&D&I initiatives in relevant journals, and the number of conferences attended as speakers. Additionally, we track the number of technical deliverables produced by RINA, as well as the number of RINA users involved in R&D&I projects. Another critical KPI is the R&D&I engineering effort, which measures the hours available to our employees for developing knowledge, tools, networks, references, and solutions. We also monitor the use of R&D&I references in new opportunities proposals, such as new offers for clients and tender proposals. By evaluating these KPIs, we can ensure that our R&D&I activities align with our strategic goals and contribute to the overall growth and competitiveness of RINA.

Enablers for implementation

Multidisciplinarity and cross-sector integration

Multidisciplinarity is a key strength in our pathway toward innovation and growth. Counting more than 5,800 employees, our Human Capital embraces 500+ competencies organised into 9 practices and 73 underlying disciplines.

Thanks to our privileged multidisciplinary approach and our cross-sector view angle, we can address problems from diverse perspectives and by integrating diverse expertise, fostering collaboration, and leveraging interdisciplinary approaches. This allows us achieving comprehensive innovative solutions to complex problems spanning across entire supply chains.

Open Innovation Hubs

Open Innovation Hubs (OIHs) are a cornerstone of RINA's strategy to foster innovation and facilitate the transition of research ideas into tangible solutions. With existing hubs in Rome, Leatherhead, and Athens, and new hubs planned for Singapore, Abu Dhabi, Chicago, and Rio, these centres are strategically positioned to address local and global challenges.

Vision and Mission

The OIHs aim to establish collaborative environments where knowledge and expertise are shared to accelerate innovation. Their vision is to transform research into practical applications, supporting the transition towards a sustainable future. The mission focuses on empowering local organisations to enhance their innovation and technological growth, leveraging RINA's advanced tools, expertise, and competencies. These efforts are rooted in a commitment to fostering partnerships that drive long-term societal and economic benefits.

Key Features and Services

OIHs are designed to support innovation through four main components:

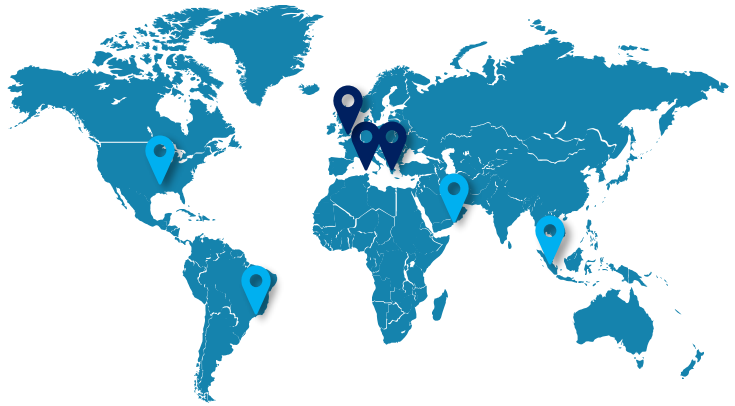
- **Training Academy**: Specialising in advanced technologies, including competence certification.
- **Testing Facility**: Addressing regional needs with a focus on technological validation and application.
- **Services to Local Ecosystem**: Offering consulting, engineering, certification, and decarbonisation advisory, alongside venture capital support.
- **Demo Centre**: Providing demonstration facilities for innovative technologies, including AI and regulatory frameworks.

Target Audience

The hubs target a diverse range of stakeholders, including key clients, small and medium-sized enterprises (SMEs), strategic partnerships, and venture capital ecosystems. This multifaceted approach ensures that OIHs act as catalysts for regional and sectoral innovation, while also contributing to global sustainability goals.

In summary, RINA's Open Innovation Hubs are a dynamic platform for innovation, bridging the gap between research and market application, and driving advancements across industries and regions.

Locations



Existing OIHs
- Rome
- Leatherhead
- Athens

New OIHs
- Singapore
- Abu Dhabi
- Chicago
- Rio de Janeiro

Resources

Our Human Capital

Counting more than 5,800 people in 70 countries, our Human Capital embraces 500+ competencies. These are organised into 9 practices and 73 disciplines and enable our 100+ services.

Our extended R&D&I model builds upon our competencies and is oriented at constantly upgrading them into new and innovative services in line with our identity of “business-to-society” company supporting customers in keeping up with changes and growing sustainably.

Our Communities

By leveraging the collective knowledge and expertise of passionate professionals, RINA's R&D&I communities tackle complex challenges and position the company at the forefront of key trends. These structured networks not only facilitate the exchange of ideas and insights but also enhance RINA's ability to develop innovative solutions and maintain its competitive edge in the market.

Our Geographies

With its workforce of 5,800 colleagues representing more than 90 nationalities, the company operates in over 70 countries. This extensive geographical reach allows RINA to leverage local knowledge and expertise, fostering innovation and excellence across various regions.

One of the key aspects of RINA's strength is its ability to enhance, share, and develop internal expertise, making company know-how accessible across all Business Units. This approach not only fosters innovation but also accelerates employee professional growth and increases competitiveness in the market. The company's new organisational model emphasises fast cross-business and cross-geography collaboration, enabling RINA to act as one cohesive entity.

Our Diversity, Equity, Inclusion & Belonging

In RINA, we promote a culture where people are encouraged to develop new ideas, empowering people by respecting and embracing what makes them different. This means celebrating our differences and placing a positive value on diversity in the workplace.

We are an international, digitally connected and multi-cultural company, where diversity, equity, inclusion and belonging are key drivers to employee engagement, productivity, innovation and growth.

RINA's DEI&B Strategic Plan underscores the importance of cultural differences stemming from its global presence. The plan promotes inclusion by embracing the peculiarities of each region and turning these into strengths. This commitment to diversity and inclusion further enhances RINA's ability to operate effectively across different geographies.

Our Laboratories

With over 30 state-of-the-art laboratories and pilot plants we are able to reproduce complete industrial cycles and, through a worldwide recognised know-how and expertise on steel and alloy production, application and use, particularly in sectors like steelmaking, energy, space, defence, transport & infrastructure, and marine, our experts can implement innovative solutions directly onsite where our engineers and technicians gain hands-on experience. All studies, simulations, processing, preparation of samples and mock-ups, and all test phases are carried out within our facilities allowing for a continuous and swift exchange of results among the various competence areas involved in the project phases. By keeping in touch with the production environment we are able to understand and quickly solve problems and to conceive, put forward and implement solutions to enhance our clients’ competitiveness.

Thanks to a comprehensive knowledge of materials and extensive laboratory capabilities ranging from nano- to full scale, our specialists can provide a broad range of material selection services for specific technological applications. We conduct testing to qualify materials, fit-for-purpose testing and new testing development to specific requirements for material or component performance, and provide experimental evidence of resistance to damage mechanisms, including those related to operation in very challenging environments and extreme loading conditions. Through onsite investigation and monitoring we help our clients identify operating envelopes for diverse industrial applications, addressing enhanced safety in real operating conditions and focusing on cost saving. Thanks to multidisciplinary teams and a deep knowledge of applications across all sectors, we create value for our clients by cross-fertilizing ideas between different markets.

Partnerships

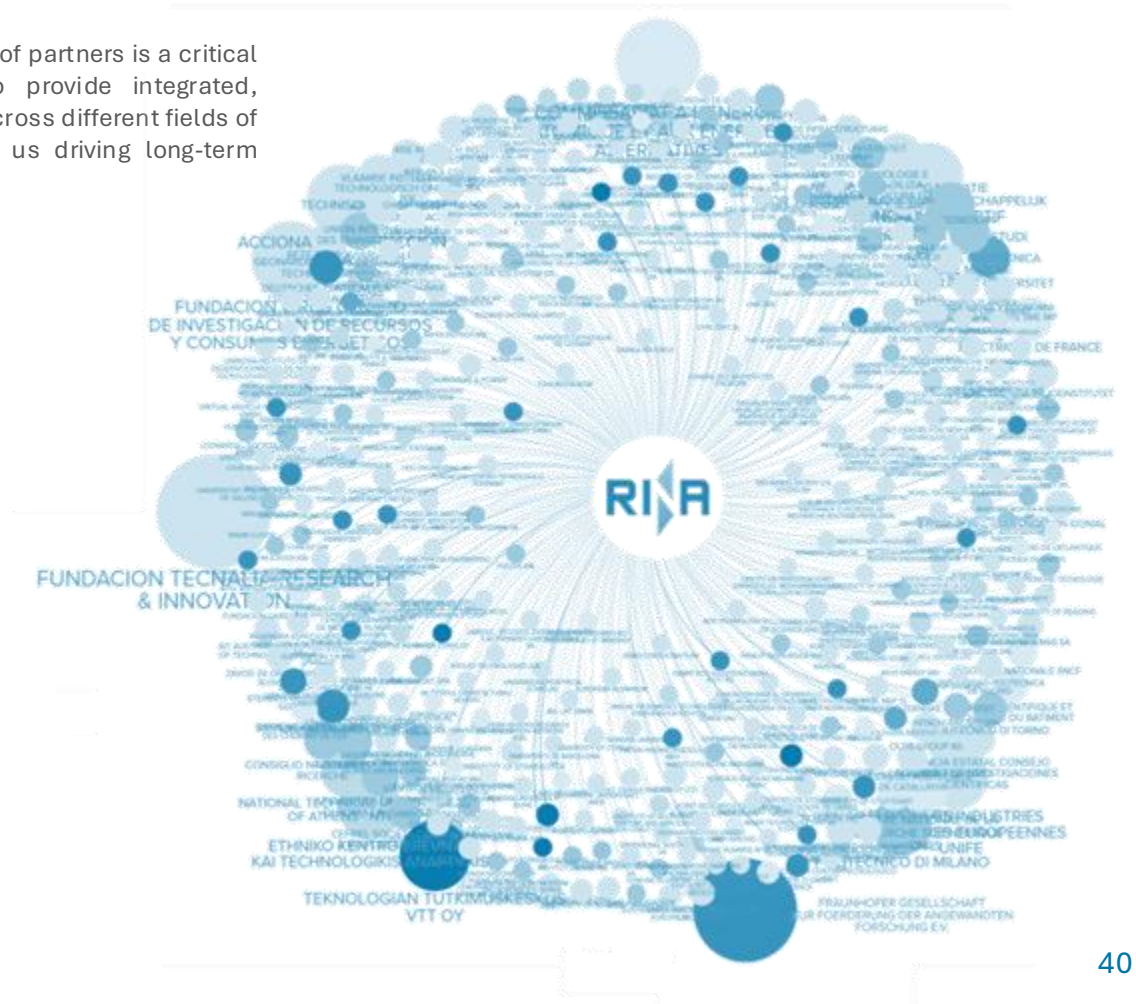
The value of our external R&D&I network

RINA's external R&D&I network is a robust and dynamic ecosystem that fosters collaboration and innovation across various sectors. This network includes partnerships with leading universities, research institutions, and industry players worldwide, enabling RINA to stay at the forefront of technological advancements and industry trends. By engaging with external partners, RINA can leverage a diverse range of expertise and resources, enhancing its ability to develop cutting-edge solutions and address complex challenges. These collaborations also facilitate knowledge exchange and the co-creation of innovative solutions, ensuring that RINA remains a leader in research, development, and innovation. Through this extensive network, RINA not only strengthens its service offerings but also builds strategic relationships that drive long-term business growth and sustainability.

RINA's external R&D&I network spans across multiple continents, allowing us to tap into a diverse range of expertise and resources, fostering innovation and collaboration on a global scale.

Through this network, we can also leverage the collective knowledge and expertise of our partners to drive long-term business growth and sustainability. By participating in collaborative projects, we gain valuable insights and experiences that inform our R&D&I strategy and help us deliver high-impact solutions to our clients.

Overall, RINA's external R&D&I network of partners is a critical asset that supports our mission to provide integrated, innovative, and sustainable solutions across different fields of strategic relevance, indirectly helping us driving long-term business growth and sustainability.



Governance mechanisms

RINA has implemented robust governance mechanisms to effectively manage its Research, Development, and Innovation (R&D&I) activities. These mechanisms include a comprehensive set of policies, procedures, and tools designed to plan, monitor, evaluate, and report on R&D&I activities and investments. The governance framework ensures that R&D&I initiatives are aligned with the company's overall strategic plan and business objectives, providing a structured approach to innovation management.

The governance mechanisms encompass the allocation and mobilisation of human, financial, and physical resources dedicated to R&D&I projects. This includes establishing and maintaining internal and external collaborations and networks that are crucial for the successful execution of R&D&I activities. Additionally, the governance framework is designed to be flexible and adaptable, allowing RINA to respond to the evolving needs and expectations of stakeholders and the changing energy landscape.

To ensure continuous improvement and relevance, the R&D&I strategic plan is reviewed and updated annually with the involvement of all relevant parties. This iterative process helps RINA stay at the forefront of technological advancements and industry trends, ensuring that its R&D&I efforts contribute to long-term business growth and sustainability. Overall, the governance mechanisms implemented by RINA provide a solid foundation for driving innovation and excellence in all its endeavours.

At the core of our governance mechanisms lies our R&D&I strategic plan, which underlies our 2030 Strategic Plan, is collaboratively developed within our R&D&I Communities, and sets our objectives in terms of new or enhanced service offerings, helping us to focalise our priorities, plan our R&D&I initiatives ahead, and define the best arrangements for each objective in terms of partnerships, type of investments needed, type of resources to be deployed.

Innovative ideas aligned with it are hence developed within our R&D&I projects' pipeline, allowing us to gain new knowledge, which we use to develop and enhance our services, creating new offers that meet the evolving needs of our clients.

The R&D&I projects are monitored throughout their life cycle and, once mature enough their outcomes are harnessed and assessed by the aid of the business functions inside the company, which address their most appropriate exploitation pathways.

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