Who Rules the Future?

As shipping enters an age of rapid technological change, class societies are reexamining their roles.

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Classification societies no longer serve solely as compliance inspectors at vessel delivery.

Evolving pressures demand they maintain oversight of innovation throughout a vessel's lifecycle. Owners want faster approvals for complex ships; shipyards are progressively innovating, and shifting regulations create ambiguous moving targets.

Meanwhile, technological advances outpace existing standards, pushing class societies to adapt faster than ever before.

"The role of a classification society has expanded considerably beyond its traditional foundations in survey, certification and rule-setting," explains Korean Register Chairman & CEO Yongsok Lee. "At KR, we see this as a transition from being primarily a technical gatekeeper to becoming a proactive technical partner across the full vessel lifecycle."

EMBEDDED COLLABORATORS

Class societies are becoming embedded collaborators, influencing vessel design from concept to operations and helping build frameworks for new technology while laying the groundwork for professionals entering a changed industry.

Ultimately, maritime is becoming an industry where rules cannot remain static.

Patrick Ryan, Senior Vice President & Chief Technology Officer at ABS, says the transformation is being driven by two major forces: the rise of fully digital shipbuilding environments and the growing importance of modeling and simulation: "What we're seeing now is a much broader approach to using that 3D asset, not only to produce blueprints but also to build, class and operate from it."

The innovation theme threads through a vessel's lifecycle. Class societies are moving deeper into digital environments, integrating rules directly into shipyard workflows and enabling designers to assess compliance in real time. AI-assisted structural analyses and automated engineering systems are already reducing design review timelines.

Meanwhile, digital twins and simulation tools are

becoming central to the approval process.

"Modeling and simulation have become foundational to class approval," Ryan explains. "Because these systems are digital in the first place, we can put the control systems and decision-making algorithms into a digital environment and test them there before we'd ever put a vessel out into the seaway."

AUTONOMOUS CHALLENGES

The industry's autonomy ambitions have accelerated dramatically over the past several years. Autonomous navigation systems, remote operation centers and AI-enabled monitoring systems are no longer theoretical concepts studied in research programs. They're being actively integrated into offshore vessels, survey craft, naval platforms and commercial shipping prototypes.

"We were proud to be the first class society to offer autonomous and remote-control notations," Ryan says, pointing to ABS's work with fully unmanned systems, including the classing of Saildrone's unmanned ocean-going platform.

KR has similarly expanded its work in autonomous systems through collaborative efforts, such as with Singapore's Defence Science and Technology Agency (DSTA), to develop verification and validation frameworks for AI-based observation systems used aboard unmanned surface vessels.

"Autonomous and remotely operated vessels require classification societies to rethink frameworks that have historically assumed a human crew as the primary decision-making authority onboard," KR explains.

Traditional class rules were built around deterministic systems. Steel structures, machinery arrangements and physical redundancies could be tested against known performance criteria. Autonomous systems introduce a fundamentally different challenge because AI-driven decision-making is probabilistic rather than predictable.

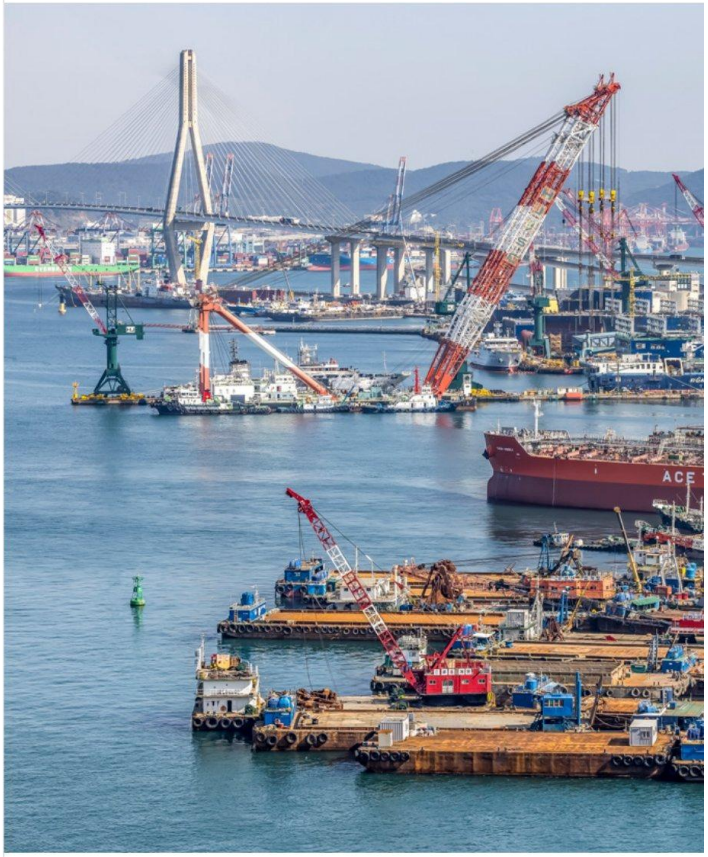
The question is no longer simply whether machinery will fail. Now, responsibility extends beyond hardware. It encompasses the correct interpretation of software-monitored conditions, how sensor-infused systems behave under degraded inputs and accountability for software-driven decisions.

As unmanned and remotely operated vessels move from pilot projects to commercial reality, frameworks must clarify culpability.

Responsibility now potentially extends beyond the vessel's master to include software developers. This emergence of automated decision-making means class must adapt, considering not only traditional physical assets but also accountability for how operational choices are managed in the virtual realm.

EXPANDED SECURITY PROTOCOLS

Cybersecurity has become equally critical.



Increasingly autonomous vessels and systems rely on constant communication between ship and shore, remote monitoring systems and progressively integrated digital ecosystems. As a result, class societies are being pushed into areas traditionally associated with software engineering and network architecture.

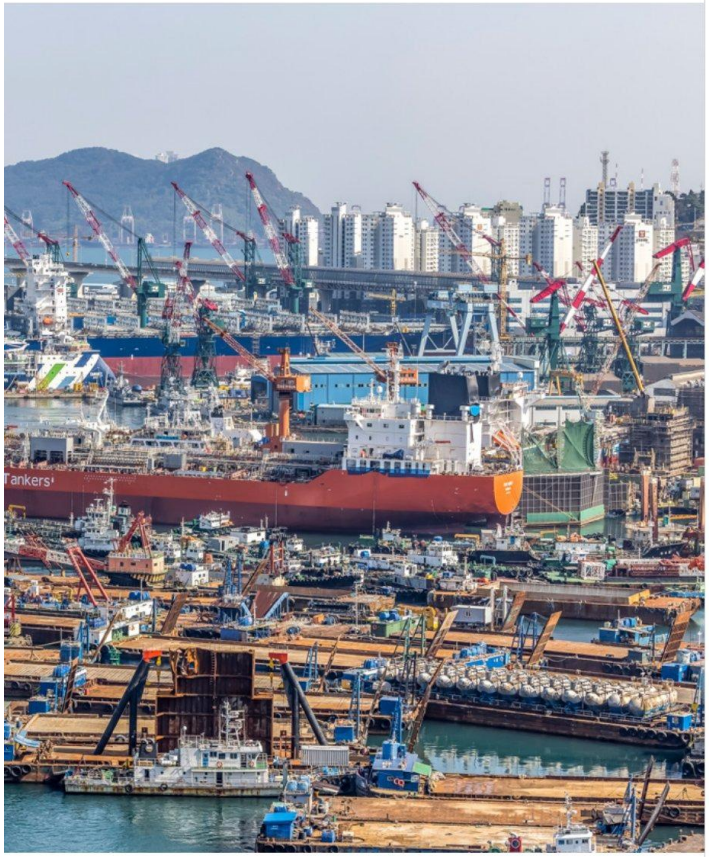
TK Sahu, Joint Managing Director at the Indian Register of Shipping (IRClass), noted that autonomous vessel frameworks now require assessment of "navigation and communication systems, situational awareness, network architecture, cyber resilience, data assurance and software assurance."

Class societies are simultaneously attempting to prevent regulatory fragmentation.

Even before the new era of AI and fast innovation, the existing framework and the processes behind it were frustratingly disjointed and incomplete while technology continued to advance, seemingly unchecked. KR warns that "fragmented national or regional standards would significantly complicate the commercial deployment of autonomous vessels."

Despite their struggle to keep pace, this places classification societies in a uniquely influential position.

Organizations such as the International Association of Class Societies (IACS) and the IMO's Maritime Autonomous Surface Ships (MASS) initiatives are gaining momentum and



global support. These efforts position class societies to serve as translators between innovation and regulation, helping ensure that technological advances can eventually scale into internationally accepted operational frameworks.

THE HUMAN IMPACT

The challenge is not limited to autonomy alone.

The broader shipbuilding industry is undergoing its own transformation, driven by decarbonization, robotics and workforce disruption. Shipyards are becoming more automated as AI-driven design optimization, robotic welding systems and digitally integrated production environments change how ships are constructed.

ABS believes robotics could become one of the most disruptive developments in shipbuilding over the next decade. "There's an opportunity for class to understand what those robots are doing, understand the safety implications and certify that," Ryan says.

The workforce implications are likewise substantial.

For decades, shipbuilding struggled with an image problem, being perceived as labor-intensive, physically demanding and technologically conservative. Today, classification societies argue that the opposite is increasingly true. "You're exposed to the latest technological advances," Ryan notes.

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The future shipbuilding workforce will require skills that are decidedly different from those provided by traditional maritime training. KR acknowledges that shipbuilding expertise will require expanded multidisciplinary integration between "software engineering, data science and systems integration with core naval architecture and marine engineering."

A MATTER OF BALANCE

That integration may ultimately become one of the industry's defining challenges now and in the decades to come. Automation can replicate processes and simulation can predict failures. But maritime operations still depend heavily on experiential knowledge.

"While you can automate a great deal and you can simulate it," explains ABS Executive Vice President Paul Karam, "you still need some of that experiential foundation. You can hear, smell and see things that give you a global sense of a vessel's condition. You still need some of those senses on board. We need to supplement what's being lost as the workforce transitions and meld the experienced and the digitally native together."

Classification societies have historically occupied a straightforward role in shipbuilding: Verify compliance and overall safety while providing technical assurance that a vessel was designed and built according to established rules.

Those fundamental paradigms have not changed. However, class societies are actively expanding beyond their traditional space in order to ensure the safe and scalable integration of digitally advanced ships. They continue to establish robust validation frameworks designed to evolve with the maritime industry while striking a balance between technological innovation and operational reality.

As ABS's Karam notes, "It's a continuous evolution, not a discontinuous one. And that's what innovation is: constant change, with the challenge of doing it safely."

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