

Editor's Corner

Clinical Engineering in the Age of Intelligent Systems

Why AI Literacy, Governance, and Ethical Competence Are No Longer Optional

We are living in the midst of a technological inflection point. For the first time in history, we possess computational systems capable of performing tasks that, in many domains, rival aspects of human cognitive performance. Artificial Intelligence is no longer experimental; it is embedded in diagnostics, imaging, predictive analytics, decision support, workflow optimization, and resource management across healthcare systems worldwide.

Yet precisely at this moment of unprecedented capability, the profession risks making one of two fundamental mistakes.

On one side are those who view AI as the solution to all systemic inefficiencies and clinical challenges. On the other are those who see it as an existential threat—an opaque force that may erode professional autonomy, accountability, or patient safety. As with most transformative technologies, the truth lies between these extremes.

Artificial Intelligence is neither savior nor destroyer. It is a collection of tools—powerful tools—that can enhance human resolutive capacity if, and only if, two essential conditions are met.

First, the human in the loop must possess the cognitive and professional maturity to properly interpret, validate, challenge, and contextualize AI-generated outputs. The role of the clinical engineer is not to passively deploy intelligent systems, but to critically assess them—understanding when to accept their conclusions, when to question them, and when to override them.

Second, the technology itself must be developed, trained, and deployed within a framework of context awareness,

accountability, traceability, and governance. AI systems do not operate in isolation. They depend on data quality, ontologies, interoperability standards, lifecycle management, cybersecurity safeguards, and ethical oversight. When components are assembled without structured integration—without guardrails, interoperability layers, or standards alignment—we do not create solutions. We amplify complexity and risk.

Healthcare systems are sociotechnical ecosystems. Introducing AI into these environments without governance does not simplify them; it can fragment them further.

Clinical engineers therefore face a critical transition. Historically, the profession has been the steward of medical devices, infrastructure, and safety systems. Today, we are becoming stewards of intelligent systems. This shift demands more than operational familiarity. It demands conceptual literacy.

We must understand not merely how to use AI tools, but why they function as they do.

- How are solutions generated?
- What data structures shape outputs?
- What forms of bias or drift may influence performance?
- Are errors random anomalies, or systemic consequences of training limitations?
- How do we ensure traceability and accountability?
- What governance structures activate when systems fail—and they will fail?

Without the ability to answer these questions, we risk surrendering professional agency to black-box systems we neither fully understand nor adequately supervise.

Technology can empower clinical engineering—or it can become a hindrance. The difference lies in literacy, governance, and intentional design.

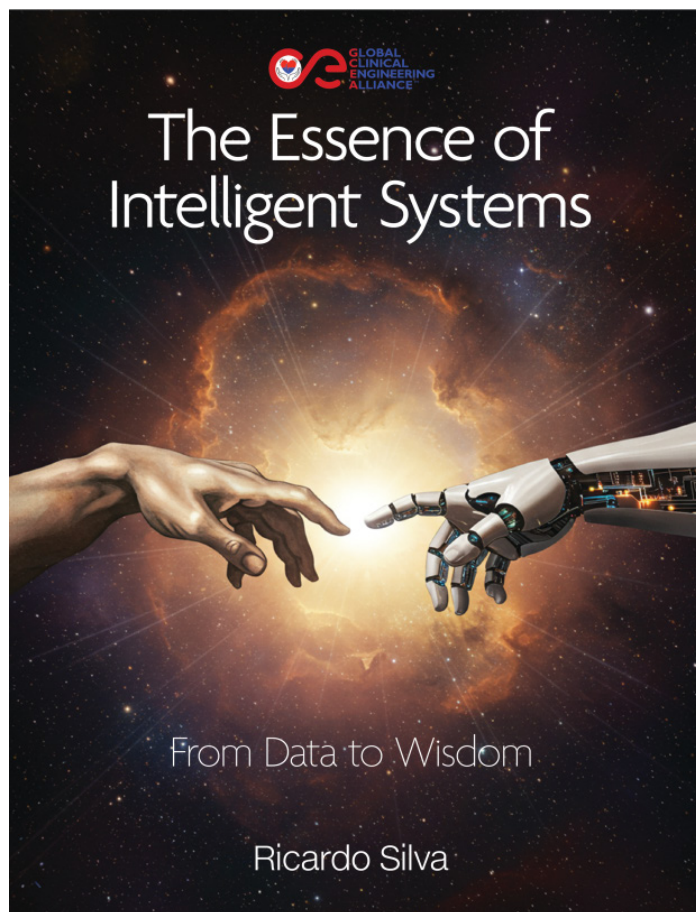
In *The Essence of Intelligent Systems*, I argue that intelligence—artificial or biological—must be understood as structured information operating within constraints. Without ethical boundaries, contextual awareness, and accountability mechanisms, intelligent systems become unstable. When integrated responsibly, however, they can extend human capability, improve decision quality, and strengthen healthcare delivery.

The future of clinical engineering will not be defined by how rapidly we adopt AI tools, but by how rigorously we govern them.

To support this transition, GCEA, through the Health Technology Foundation and its collaborators, is developing technical, academic, and educational initiatives designed to upskill clinical engineers for the age of intelligent systems. These efforts aim to cultivate not just technical competency, but ethical discernment and systems-level thinking.

The question before us is not whether AI will shape healthcare. It already does. The question is whether clinical engineers will shape how AI is governed, integrated, and held accountable.

If we rise to this responsibility, we will not be displaced by intelligent systems. We will become their architects.



Ricardo J. Silva

PhD, MBA, CCE

Award Committee Chair

Global Clinical Engineering Alliance

Copyright © 2026. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY): [Creative Commons - Attribution 4.0 International - CC BY 4.0](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.