Meta-ergonomics:
A Concept whose time has come
A Framework for People-Technology-Ecosystem Integration

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Human ingenuity has resulted in complex technological systems whose accidents rival in their effects natural disasters; sometimes with even higher death tolls and greater environmental damage. A common characteristic of these systems is that sizable amounts of potentially hazardous materials are concentrated in sites under centralized human control. The effects of catastrophic breakdowns of these complex systems, created by anthropogenic or natural causes, pose serious threats and long-lasting health and environmental consequences for the local public, the country and possibly the entire region. An integrative framework is proposed which is inspired by Hendrick’s pioneering work in Macroergonomics (“Macroergonomics: A concept whose time has come”, 1986) and based on Rasmussen’s multifaceted model for risk management. This meta-ergonomics paradigm is utilized for systematic analysis of interaction, design of interoperability, and integration of decisions of major actors – people, technology and ecosystem. These actions can affect safety and sustainability of the focused industries during routine and non-routine operations. This multi-layered framework, which has been applied to the Persian Gulf, offers a viable and vital approach to design and operation of large-scale complex systems wherever the nexus of water, energy and food sources are concerned. This framework can also be used to identify and address potential roles and contributions of human factors to the U.S. National Academy of Engineering Grand Challenges for Engineering, which is “the first engineering vision for the planet that mandates global perspective”; as well as the United Nations Sustainable Development Goals.