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CONVERGING KNOWLEDGE AND TECHNOLOGY FROM ATOMS, BITS AND NETS

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Abstract

The convergence of knowledge, technology and industrial applications is accelerating with broad implications on the future society. Unifying science based on the material unity of nature at the nanoscale provides a foundation for knowledge creation, innovation and technology integration. Converging technologies refers in this presentation to the integration of emerging and relatively traditional technologies at three interdependent scales: (a) First, convergence from material nanoscale of foundational transforming tools in nanotechnology, biotechnology, information technology and cognitive technologies ("Converging Technologies for Improving Human Performance", 2003, Springer); (b) Secondly, technology integration at human dimensions has been accelerated by developments in electronics, sensors, physical-virtual systems interactions, human-machine interfaces, brain research, robotics, emotional intelligence, group psychology and social networks; (c) Thirdly, technology integration for very large systems at Earth environmental scale is best characterized by complex behavior where the available transforming tools have only limited capabilities. Developments in system approach, mathematics and computation in conjunction with understanding materials and systems from the nanoscale allow understanding the natural world and scientific research as closely coupled complex, hierarchical systems. Such perspective underlines the needs to better integrate and correlate disciplines and research and education programs. Examples will be presented in each category.