

## NBIC: Convergence of Nano-Bio-Info-Cogno Concepts

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During past centuries, the human life has been changed for several times into the positive and negative directions. Several natural disasters and pandemic diseases in addition to dual industrial progresses with advantages and disadvantages and wars have always put serious effects on the quality of life and age duration for people of all other the world. Even in such current modern society, serious problems are managing the health issues and life styles of people such as Coronavirus pandemic.<sup>1-3</sup> Therefore, it seems that the science and engineering in their conventional mode and even their corresponding innovated technologies are not useful enough to save human life for feeling in normal mood. Based on such problems in both of health systems and other industrial issues, technologies based on Nano, Bio, Info, and Cogno have been innovated for improving the already available achievements in science and engineering to more applicable technology.<sup>4</sup> However, if they work individually, almost nothing will happen despite their unique pre-defined goal. Convergence is an idea for combining all four technological concepts of Nano, Bio, Info, and Cogno into a new concept of NBIC.<sup>5</sup> Indeed, mission and vision of NBIC has been defined regarding the needs of society not answered by conventional science and engineering up to now. There is actually no doubt about the huge progress in science and engineering; however, showing proposing a destination for such very

much and very fast progressive achievements could help NBIC to do its mission and vision very much better for the society. Indeed, the current Coronavirus pandemic showed the deficiency of our self-knowledge for providing needs of society and several others' knowledge should be combined together to save the human life at the moment! Nanotechnology is engineering of very small size of matters still working their jobs very well.<sup>6</sup> Biotechnology is mostly related to engineering of architecture of biological systems.<sup>7</sup> Information technology is engineering of huge amount of knowledge to access accurately and rapidly.<sup>8</sup> Cognitive technology is engineering of human brain to all sides of science, engineering and technology.<sup>9</sup> To this aim, several other complementary accessories have been arisen including artificial intelligence and machine learning. Hence, it seems that NBIC could work revolutionary in science and engineering leading them to more applicable technology to save human life or increase its quality and performance.<sup>10</sup> Herein, it is very much important how to improve ourselves to join the stream of NBIC innovation, which is very much important to design future. Besides available conventional science and engineering, NBIC could speed up novel technological innovations very much useful for societies without any doubt. So, this is the time to see what each of us could do for moving further NBIC.

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