Preface

The late Prof. Yoh'ichi Tohkura envisioned an information era in which information is used to achieve harmony for cultivating human and social potential, and proposed the idea of human-harmonized information technology. The vision was so fascinating that the Japan Science and Technology Agency (JST) decided to launch a EUR 40 million JST-CREST research area in FY2009 to substantiate a basic core of his grand idea in 8 years. Participated in by 17 research teams, the project has been actively working on building the human-harmonized information technology for significantly activating the inner power of individuals and the society for evolving creative life, and not just trying to passively follow their intentions. Although it was a profound sorrow that Prof. Tohkura passed away in December 2013 after intensively fostering the project in its infancy, the project kept growing after that tragedy and started to bear fruit.

This book is the first of two volumes that describe the major outcomes obtained from the JST-CREST research area on the creation of human-harmonized information technology for a convivial society, as delineated above. The challenge I tackled to assemble this book centered on uncovering not just hidden trails but also trunk highways, the untold philosophy, to restore the strategy of technical development toward a convivial society. To put it another way, I wanted to redraw a big picture that would tell why we need to develop a new technology for transforming the ongoing technical society into a convivial society, and moreover, exactly what difference and contribution we have been attempting to bring about by our human-harmonized information technology.

After nearly a couple of years of discussions, we have found that the idea of the human and social potential beautifully explains everything. Even though the current development of artificial intelligence would eventually release us from labors either physical or informational, the individuals and society will need to find new styles and ways of living for wellness in the new technology world. It is quite probable that we may have to overcome a great deal of suffering to reestablish a conciliation with technology, as the nature of our life and society to be brought about in a new AI-geared technology might be drastically different from the conventional one we

have been familiar with, and the change might be much faster and overwhelming than we might have thought. It is evident that people will need to find a nontraditional style of self-actualization and society will aspire to a new principle of endorsing harmony.

Human potential is the power of an individual that enables her or him to actively sustain an endeavor to achieve a goal in maintaining a social relationship with other people. It involves vision, activity, sustainability, empathy, ethics, humor, and aesthetic sense. Social potential is the power that a society of people possesses as a whole. It encompasses generosity, supportiveness, conviviality, diversity, connectedness, and innovativeness. We believe that human and social potentials complement each other to enable conviviality, and that Prof. Tohkura focused on human perception to explore the research into the human-harmonized information technology on the road toward the convivial society. The framework of the human-harmonized information technology centers on understanding and enhancing cognitive dynamics resulting in the interaction between pathos based on embodied perception and logos based on modern civilization.

First, we have been shedding light on high-level but often tacit sensations in the search for better scientific understanding and technological support. For example, we have found that a sensation of presence results from complex dynamics over multiple sensations and tactile information—for instance, a feeling of hugging plays a critical role in convincing us of a presence. We have identified some tacit non-verbal cues that help people a lot in dealing with interpersonal relationships. We have also found that overtrust may result from an unconscious dependence on tacit cues.

Second, we have been developing artificial systems that can recognize the world in the way humans do. These new artifacts are useful in building a common ground in human–artifact symbiosis, which may make human–artifact interaction both proficient and reliable. The haptic sensation is a relatively new area of research. Some research teams in our research area have worked on not only high-performance recognition and production but also on integrating haptic sensation techniques in a multi-modal interaction environment.

Third, we have worked on design and dissemination. Design is a key to applying technology to produce satisfaction in society. Design encompasses activities of inventing social activities to composing a solution to achieve a desired goal by combining existing solutions and negotiating with the users for a consensus possibly with compromises in return for benefits. We have exploited the state-of-the-art technology to design novel services ranging from information display to a life-long infrastructure for food. Disseminating a tool is an important contribution from research based on computer science. Dissemination has many aspects in common with design, as tools need to be designed generically so they can fit into many application scenes.

Finally, we placed much emphasis on longitudinal large-scale interactive display at public places such as the National Museum of Emerging Science and Innovation (Miraikan) as well as long-term sustained field trials, where we can not only reach out to a large number of people with a broad background but also learn directly or

indirectly from discussions on the spot where the technology is displayed. In this book, each contribution lays much weight on discussing the philosophy, concepts, and the implications underlying the project. The first volume, with the subtitle *Vertical Impact*, includes the nine works resulting from the projects launched in 2009–2010, while the second, with the subtitle *Horizontal Expansion*, the eight works from those launched in 2010–2011. Overall, the first concentrates more on basic perception, while the second more on compositional aspects.

Kyoto   Toyoaki Nishida
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