
Editorial

Shuichi Fukuda

System Design and Management Research Institute,
Keio University,
4-1-1, Hiyoshi, Kohoku-ku, Yokohama, 223-8526, Japan
Email: shufukuda@gmail.com

Biographical notes: Shuichi Fukuda is an Adviser at the System Design and Management Research Institute, Keio University. He has worked and received his doctoral degree from the University of Tokyo in 1972. He has also worked as an Associate and Full Professor at the Osaka University and Tokyo Metropolitan University (TMU). Since his retirement from the TMU, he worked as a Consulting Professor at the Stanford University, and Visiting Professor at the Open University of Japan, Osaka University and Cranfield University, UK. He served as the President of ISPE, Vice President of Reliability Society, IEEE, Chair of CIE Division and Deputy Technical Group Leader of Systems and Design, ASME. His research interests are design engineering, emotional engineering, reliability engineering, decision making, and management of engineering and technology. He is a member of the Engineering Academy of Japan, honorary member of JSME, Fellow of ASME, IEICE and ISPE, and glory member of REAJ.

Until the mid-20th century, our world was small and closed with boundaries. Therefore, we could apply mathematical approaches in a straightforward manner. But our world expanded very rapidly so engineers paid tremendous amount of efforts to expand this rational world and succeeded in establishing the controllable world. The progress and expansion of engineering today are based on this idea of controllability.

But as we approach the 21st century, the expansion of the world is accelerated, and it becomes an open world. There are no more boundaries. Thus, people's needs and expectations are getting diversified and personalised. Therefore, engineers are forced to change their strategy from individual product-based to team-product-based design and production. Machines are getting connected. We need a strategy for their team organisation and management.

As Herbert Simon pointed out, when the problem space becomes too large and consequently its degrees of freedom become very large, we cannot optimise. Rationality is bounded. And outside of the bounds of rationality, we have no other choice than to satisfy us emotionally. To realise this goal, we need to make a decision which action to take.

Emotion and motivation come from the same Latin word 'movere'. So, motivation and emotion are deeply connected and constitute are a motivation-action-emotion cycle. Decision-making is called for to operate this cycle appropriately. But until very recently, we could focus on the issue of how we operate team products which are composed of only non-living things.

IoT has changed the scene. Internet is very much different from the traditional message transaction between humans and machines. Our traditional approach is humans give instructions and machines responded. Although it looks as if it is two ways, it is one

way in reality. But internet is a communication tool. The difference between communication and conversation is everything can be expressed in words in conversation, while in communication, the listener tries to understand the true intent of the speaker. In IoT, machines are provided with this capability of communication. They can 'guess' what are on our minds and can give suggestions, provide alternative plans, etc.

Although there are so many works on team organisation and management, but they deal with the cases of fixed number of team members with strict rules.

In short, this is the perfect information game. So, current AI is expected to contribute greatly. But in IoT Connected Society, the number of team members varies with the situation and there are no fixed rules. What makes the problem more difficult is the team members are composed of living humans and non-living machines. This is a big challenge for engineering.

In this volume, IoT is not directly discussed, but various issues of decision making for making us happy emotionally in a connected society are described. The editor hopes that they will provide you with some new ideas how we can deal with this challenge.

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