

Preface

The progress of network technology is amazing. In addition to humans, things are now being connected, as Internet of Things (IoT), Cyber Physical Systems, Industrie 4.0, etc., indicate. When IoT was proposed, the sensor technology was not mature enough to realize its goal. But with its remarkable progress, now everything is quickly getting connected.

It contributed greatly to flexible and adaptive production, but what is more important is it will change engineering from extrinsic to intrinsic. Traditional engineering has been product-focused. Engineers believed if they produced a good quality product, their customers would be happy and satisfied. They regarded customers just as passive consumers. But why are users called customers? That is because they are very active and would like to customize their products. They have intrinsic motivations to actualize themselves.

The concept of User Experience (UX) opened engineers' eyes. Until this concept is proposed, engineers paid attention only to products. They considered processes just in terms of efficiency or cost reduction. UX demonstrated processes also yield values. And more often, process values are more important than product values, because processes are more deeply related to intrinsic motivation.

One important aspect of motivation is learning to grow. Traditional hardware products do not grow, although they function very well. Motivation and emotion originate from the same Latin word “*movere* = move.” Customers are full of rich intrinsic motivations, and they would like to take actions to achieve their goals. And when they overcome the difficulties, they feel the sense of achievement and fulfillment, which brings the greatest emotional satisfaction. Once their challenges are successful, they would like to go one step further toward a little more difficult challenge.

Traditional engineering looks at production from producer's viewpoint, i.e., from technology, and they made tremendous efforts to provide the richest experience with their sophisticated products. But these experiences are extrinsic. What customers really want is to realize their intrinsic motivations. They would like to challenge for making their dreams come true.

Biologists point out that only human can think about the future. Animals can use tools, but these tools are picked up from nature and they use them just for the immediate purpose. Humans spend a great amount of time and efforts in making tools to realize their dreams. That is why humans are called *Homo Faber*. But traditional engineering is still shortsighted. Engineering which sees the far distant future is strongly called for.

In other words, traditional engineering has been producing products, and their focus was *what* and *how*: *What* products they should develop and *how* they can produce them better? Engineers believed if *what* and *how* are selected appropriately, they could offer happy experience to their users.

But what customers really would like producers to take into consideration is *why*: *Why* do they want such a product? They expect producers to create a new experience, which is intrinsically motivated.

The quickly progressing network and such emerging technologies as additive manufacturing, 3D printing, etc., have a great potential to respond to such desires of customers. The current stage of networking is focused on the current framework of society and industry, but at the next stage, it will become very much creative. It will change its structure very flexibly and adaptably to respond to the personal intrinsic need or desire of each customer.

Thus, engineering is quickly moving from *what and how* to *why*. And to develop *why* engineering, we have to study more about motivation, because it is very much multifaceted and it varies widely from case to case.

The chapters in this book cover a wide range of topics. The editor hopes the reader will find clues in these chapters as to how they can develop such intrinsic motivation-focused engineering. These chapters are very rich in themselves, but it is hoped that by connecting and integrating them with focus on intrinsic motivation, the reader will find a guiding principle.

Finally, I would like to thank all authors from the very bottom of my heart for contributing such excellent chapters, and I would also like to thank Mr. Anthony Doyle, Ms. Janet Sterritt, Mr. Balaji Sundarajan and Ms. Swetha Sethuraman at Springer.

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