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## Encounter with administration engineering led me to follow a researcher's career.

Dr. Tanaka says as a child he liked playing amid nature and was extremely inquisitive. However, a dream of becoming a researcher never occurred to the boy. What drastically changed the course of his life was an encounter with administration engineering as a field of research. Approaching highly complex social phenomena, administration engineering aims to solve problems by developing mathematical models and offering concrete solutions for practical problems. Dr. Tanaka explains that this discipline is appealing partly because it has the powerfulness of making specific solutions to real-world problems, something which is common to engineering, and partly because it offers scientific excitement common to physics which describes natural phenomena by simple laws.

### What was your childhood like?

I was born in Musashino City of Tokyo, where Nogawa Park, Koganei Park and Inokashira Park were found within several kilometers from my home. On holidays and during summer vacations, my father often drove a car to take me to nature-rich destinations like Yamanashi and Nagano prefectures, which also helped make me an outdoors-oriented boy. Insect hunting was my favorite pursuit, which I used to enjoy with my friends. I was particularly fond of stag beetles. I was also interested in stars and constellations. I remember I was too excited to sleep at night when thinking about the end of the universe (Laughter). All in all, I was a natural science freak throughout the elementary and junior high school days.

In the meantime, I had learned to play the piano in my childhood. During my junior high school days, I even learned under a music college teacher, wishing to advance to a music college. However, I quit piano lessons halfway after hesitating to decide which way to go.

Under such circumstances, I went to a local metropolitan high school. It was around that time that I was awakened to the fun and excitement of mathematics. It was really surprising for me to know that the area of a figure surrounded by a curve can be found by means of a manipulation called integration. Just at that moment, I found mathematics is a really fascinating subject – for the first time in my life. Looking back at myself, I seem to have had the inborn sensitivity to appreciate the fun of natural sciences and mathematics. But it doesn't necessarily mean I got good grades in these subjects (Laughter).

### That's why you chose an engineering course rather than biology upon entering the university?

Well, at Keio University, I chose the Department of Administration Engineering simply because it appeared somewhat interesting due to the diversity of areas it covers, such as humans, urban planning and social problems. Once class studies actually began, I found the approach used in administration engineering very interesting as it expresses social problems, human behaviors and other complex and "soft" targets mathematically and sheds light on their underlying structures. In those days, I was still interested in physics due to its ability to describe phenomena in the world in terms of simple laws. But after receiving class lectures, I came to realize that administration engineering could also use the similar approach in dealing with real-world problems. I was lucky in that sense.

### Did you make up your mind to choose a researcher's career when you joined the Department of Administration Engineering?

No. My future as a researcher never occurred to me in those days. What's more, I was not so serious about learning until the end of the third year. In fact, I was enjoying a student life, doing a side job as a lecturer for a cram school, engaging in basketball, badminton and outdoor circle activities.

I was awakened to the fun of learning only as a fourth-year student, when joining the lab of Professor Osamu Kurita (now professor at the Department of Administration Engineering). The way Prof. Kurita talked to us was impressive. Particularly, his powerful analysis of various social problems using his wealth of knowledge as well as mathematical models was overwhelming. I was compelled to study under this professor. Even now I am still under the great influence of Prof. Kurita's research style – mathematically approaching targets like urban and regional problems that have spatial structures.

But there were some tough aspects in my research life. It was because our lab had the policy of emphasizing the process in which students need to find their own research themes. As a student barely entering a research life, I had many difficulties. I had a hard time setting the theme through trial and error but somehow developed a model from zero. This hard-earned experience was the origin of my career as a researcher, which remains a fond memory even today.

In reality, what structures to focus on varies according to the





## Modeling of social problems is truly exciting. I'd like to develop and deliver models of my own.

### Ken-ichi Tanaka

Dr. Ken-ichi Tanaka was born in Tokyo, Japan. His specialties are operations research and social systems engineering. After graduating from Keio University Department of Administration Engineering, Faculty of Science and Technology in 2000, he completed the master's course at Keio University Graduate School of Science and Technology in 2002, then completed the doctoral course at the same graduate school in 2005 (Dr. Eng.). He became a research associate at Tokyo University of Science Department of Management Science, the Faculty of Engineering. Then he served as an assistant professor for the Department of Systems Engineering and then for the Department of Informatics at The University of Electro-Communications. In April 2014, he became an assistant professor at Keio University Department of Administration Engineering, Faculty of Science and Technology. In April 2016, he was promoted to the current position as an associate professor of the same department.



individual researcher. As such, the work of modeling inevitably involves the person's subjectivity. No wonder modeling is often referred to as "art & science." To put it another way, the fun of modeling lies in that each completed model contains some artistic elements that reflect the creator's view of the world. Given that human or social problems are not governed by strict laws as in the world of physics, coexistence of multiple, dissimilar models is acceptable. For me, this was another intriguing aspect of this discipline.

For a while during my master course years, I was at a loss whether I should find employment in the real world or not. But I finally decided to continue research work and enrolled in the doctoral course, remaining under the guidance of Prof. Kurita.

#### After graduation from Keio, what experiences did you acquire?

After completing the doctoral course in March 2005, I became a research associate at Tokyo University of Science (TUS) in April. Then, in October 2008, I moved to The University of Electro-Communications (UEC). The years with UEC were when I tackled research themes that constitute the cores of my current work. Indeed, new ideas for research I conceived then turned to be a great asset for what I am doing now.

After five and a half years of teaching and research activities at UEC, I returned to Keio in 2014.

#### What is the current organization of your lab?

Established only three years ago, my lab has a modest number of member students: two master-course first year and five undergraduate students. Our policy here is to allow the students to proactively address themes they have found interesting. Naturally, their research themes range very widely, from a problem for ranking sports teams to mathematical analysis of cityscapes. When it comes to themes brought in by students, it is often the case that I also need to join them and rack our brains together, which in turn is another opportunity for me to learn anew and can lead to new discoveries.

#### How do you spend your days off?

My family consists of four members – a son who is an elementary school second grader, a daughter turning two years of age soon, my wife and myself. Going to aquariums and museums together and making trips are pleasant refreshers. My family is a source of my power.

Especially, my wife is a good adviser for me. She often offers useful advice on my new research themes. If I fail to make my wife understand my points, my research work is bound to go nowhere (Laughter). Don't you think so?

#### What do you think are the merits of Keio University?

I'd like to point out the fact that both the teaching staff and students maintain a strong attachment to the Keio organization. It's wonderful to find everyone always aware of and practicing the calls: "Keio should deliver impactful research results to the world" and "What should be done to make Keio an even better organization?"

Speaking of the Faculty of Science and Technology overall, it has an atmosphere of supporting young people. The whole faculty is willing to support young researchers in terms of research funds and opportunities for studying overseas. The strong feeling of unity and identity is the source of strength for Keio.

#### ◎ Some words from students . . . ◎

● Whatever questions we ask, Dr. Tanaka always responds sincerely and kindly with easy-to-understand answers. He is a really good teacher. Dr. Tanaka's scope of knowledge is extremely wide, meaning he has many topics to talk about. What we can learn from Dr. Tanaka seems endless.

(Reporter & text writer : Madoka Tainaka)

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<http://www.st.keio.ac.jp/kyurizukai>

