

The Accidental University President—Life Comes Full Circle

Arye Nehorai, the founding editor of the "Leadership Reflections" column for *IEEE Signal Processing Magazine*, is a special friend of mine from our days as Ph.D. students in the Information Systems Laboratory, Department of Electrical Engineering, Stanford University.

When Arye first approached me to write this article, I hesitated, thinking it should be reserved for those who have made their mark in a purely research-oriented or academic career. I, therefore, procrastinated.

What changed my mind? Perhaps it is the free format and the interesting viewpoints presented in the column thus far, the inspirational experiences of established leaders in signal processing, academia, and management. It also stems from a desire to share my experience, a rather unique one, coming from a country that grew its GDP per capita 40-fold in four decades. Singapore is a small country with a strong emphasis on defense and a country without a tradition of research in science and technology.

I had always enjoyed science and mathematics in school and seriously contemplated studying either physics or mathematics at university. That I went into electrical engineering is partly due to the unique Singapore institution of granting undergraduate scholarships to foreign universities. There was too, perhaps, subtle influence from my electrical engineer father.

GRADUATE SCHOOL ABROAD

In 1967, Singapore was still a third-world country and a recipient of international aid. I was the proud recipient of a Colombo Plan Scholarship offered by Canada as well as the Singapore Presi-

dent's Scholarship. Since most scholarships were in engineering, I found myself studying electrical engineering at the University of Alberta. Although I did not study physics or mathematics as an undergraduate major, I would find later in my graduate studies that I went down the paths of applied physics in lasers and optics and applied mathematics in, what else, signal processing.

In 1971, I entered graduate school at the California Institute of Technology, studying electrical engineering. Actually, it was more like applied physics. The deep science at Caltech left a lasting impression on me. Having finished the Ph.D. qualifying examinations and on the verge of starting my research in integrated optics with Prof. Amnon Yariv, I was disappointed that Singapore wanted me back, meaning that I had to stop at the M.S. degree. Talking to Amnon over 30 years later, I wondered whether, if I had stayed on, I might have played a role when he started up his optical device company that was later sold to Lucent for US\$2 billion. A career in fundamental research and a potential technological spinoff had passed me by.

BACK TO SINGAPORE

Returning to Singapore in 1972 and looking towards research and development as a career, I was disappointed. The multinational corporations used Singapore then as a cheap manufacturing base. There was very little R&D. At this time, a new defense research and development laboratory [later to become Defense Science Organisation (DSO)] was being set up, offering me not just a R&D opportunity but also interesting work rather than the normal compulsory military service. I entered the world of radar and electronic warfare. It was the begin-

ning of my association with signal processing. This was a pivotal choice that determined the shape of most of my career. The other option would have been military service followed by an administrative career in civil service.

Radar in those days was mainly analog. Digital signal processing (DSP) had yet to enter the field. One of my engineers got me interested in DSP in the late 1970s. Thus, when I finally had the chance to do my Ph.D. work under

In this issue, we are privileged to have Dr. Guanning Su, the president of Nanyang Technological University, provide us with insight and knowledge he has gained in his career. In this column, Guanning outlines the many choices he had to make in his career and examines the effects and experiences he gained. He shares with the reader his love for physics, mathematics, and his interest in research and development. He shows how his interest in research and development continues to drive his entire career through twists and turns. All this occurred in the context of a rapidly developing nation, Singapore, which multiplied its per capita GDP 40-fold in four decades. He also shares with readers his views on three important issues: the making of career decisions, the complexity of university administration, and the particular challenges of university administration in a rapidly developing economy (such as China and India are experiencing today). Throughout his career, the author has made many significant contributions to his country, and I am sure he will make many more in the future.

—Arye Nehorai
"Leadership Reflections" Editor

defense funding in 1980, I chose to go to the Information Systems Laboratory at Stanford University with Tom Kailath and Martin Morf. This was another pivotal choice—I could also have taken a scholarship to Waterloo and then lectured at the University of Singapore or gone into graduate studies on my own steam and followed an academic or research path like my friend Peng-Huat Ang, who later started a company and now works in venture capital. The generous terms of the defense scholarship settled matters for me. This was the second time I passed up an opportunity to go into academia.

My three years at Stanford were wonderful. Relieved of the day-to-day management duties, I could concentrate on doing research on source location using sensor networks. Engaging in research was great fun, and I could imagine how great the life of academia could be.

My reentry after Stanford was a bit of a shock. My previous supervisor had left the organization in the care of two of my colleagues. I entered as a third member of the “ruling triumvirate.” The organization had grown considerably. Any hopes of pursuing my research in signal processing soon flew out the window. Leading a national research organization quickly squeezed out research.

I did find a little time to apply my research to some projects. It was rewarding and satisfying to see the results. But my main contribution, as director from 1986, was to transform the laboratory from an import substitution mode to an innovation mode. In the process, many Ph.D.s were required, fundamentally shifting the balance in the laboratory. From 1992 onward, we reached a level enabling us to collaborate with nations such as Sweden, France, and Australia as well as the United States services laboratories and the Defense Advanced Research Projects Agency (DARPA).

The government service framework being too stifling to attract and keep the talent we needed, I fought for approval to organize the laboratories as a not-for-profit corporation, DSO National Laboratories. After serving as chief executive, I took on the appoint-

ment of deputy secretary (technology) in the Ministry of Defense, heading the procurement, IT, construction, and R&D funding arm, the Defense Technology Group. Two years later, I organized the Defense Technology Group as an autonomous government agency, the Defense Science and Technology Agency, serving as chief executive since March 2000.

EMBRACING ACADEMIA

In 2002, Nanyang Technological University, a major engineering and business university, began a worldwide search for a new president. Although I did not apply, my name was put forward to the search committee. In July 2002, while I was away as a visiting scholar on the invitation of Tom Kailath, the call came in back at Information Systems Laboratory from chair of the Council, Koh Boon Hwee, offering me the job of president of Nanyang Technological University.

This was the third time in my career that an academic life beckoned. It had never been this close and never loomed this large. In defense, I carved out a 30-year career and established an international network as well as solid credibility. It would have been an easy choice to continue until retirement.

The job as university president did not offer more financial rewards. It involved coming to grips with a diverse group of academics and the challenge of developing new systems and a new culture as the university faced many challenges with the passing of the baton from the retiring president. My head said there is no real reason to move. My heart said this is a unique opportunity that will not come again.

I took the presidency of Nanyang Technological University. On this third opportunity, I turned to embrace the academic life (and perhaps, make up for lost time).

THREE POINTS TO SHARE

There are three issues I would like to share with you. First, most of you are younger than I am. You shall have many more such decisions to make at turning points in your careers. How should you choose?

REMAIN FAITHFUL TO INTERESTS

In my case, despite the compromises made due to practical considerations, I remained faithful to my interest in R&D. By staying true to your interests, life has a funny way of coming full circle. I am now back at Caltech discussing collaboration.

Circumstances change, but people do not. It is important to know yourself and to pursue your passion. In the long run, things will work out, something like the law of large numbers.

One could go back and look at pivotal decisions, wondering “what if I had chosen to stay in Caltech?,” “what if I had not gone into defense research, but like many of my peers joined the government administration?,” “what if I had gone into academia when I had the chance?,” and “what if I had not taken this job as university president and stayed in the more sheltered world of defense?”

When things do not go well, such “what-if” questions are tempting. But do they do any good? The answer is obvious. In the probabilistic treatment that we are all familiar with, it is the a posteriori probability that we now have to contend with, not the a priori one. If life is a series of maximum likelihood estimations to optimize happiness, the maximum likelihood solution changes as soon as we make a turn at a fork in the road.

Leaders remain leaders if they continue to look far ahead (collecting data points and sampling the real world) instead of dwelling on past decisions. Past data is only useful if it gives us information that helps us in the future. It is human to say “I told you so” or tap the 20/20 hindsight. But only in so far as it is relevant to the future.

A SENSE OF DIRECTION

The second issue concerns universities. Today, two years after assuming the presidency, I am still learning about the complexities of universities, not just in my own institution but also from the many university leaders and presidents I have met. I imagine such learning will never cease.

I have found something in common among the very best universities in the world. They have a clear sense of their place and their direction. It is usually

set by the leaders and supported by faculty consensus and the stakeholders in society—government, trustees, parents, and students.

Globalization is affecting industries, first in manufacturing and now increasingly in research and development. Universities, as the generator of the high-level personnel required by industry, are bound to be affected as well.

The responses vary around the world. Most have yet to come to grips with this issue. Various responses are out there—branch campuses around the world, online learning, strategic partnerships, and student and research exchanges, to name but a few.

At Nanyang, we believe our future lies in being a global university, rooted in our part of the world with links reaching back to the vast Asian hinterland. This is part of our DNA, founded originally as a Chinese-language university serving the Chinese Diaspora. We have now turned into an English-language university comfortable with the language and cultures of the three major races in Singapore, Chinese, Indians, and Malays. In the past two years, we have deepened our links with the world in accordance with our mission: “Educating leaders, and advancing knowledge, for Singapore and beyond.”

We count among our major collaborators MIT, Stanford, Washington, Georgia Tech, Carnegie Mellon, Waseda, Peking, Tsinghua, and Shanghai Jiaotong, among many others throughout the world. We send our undergraduates out for up to a year of the Global Immersion Program, starting with China and the United States, and soon to include India, Indonesia, and Europe. We have exchange agreements with over 200 universities throughout the world. We have a truly international community of students, with foreign students comprising 20% of our undergraduates and more than half of our graduate students.

Along the way, I have also discovered university politics, the power of past culture and the challenge of creating a new one, the importance of leadership in key positions, and the power of the masses both in preserving the status and in creating change.

My learning process is continuing as I enter my third year. Even before completing the previous challenge of building three new schools, expanding by 6,300 students, and developing a comprehensive university, I now have a new challenge: becoming autonomous, with a guaranteed government funding stream but the need to create systems and processes approximating that of private universities such as MIT and Yale. This is the latest move by the government of Singapore to develop our university sector to face future challenges. It is a strategic and timely move to boost Singaporean universities to the top ranks but at the same time a tremendous challenge for me and my team.

ADAPTION IS KEY

The third issue is one of adaptation to a rapidly developing society. Singapore went through exhilarating, but also wrenching, transitions in the last four decades. China has been going through such a transformation for at least a decade. India is beginning her journey down the same path.

The changes a university must go through when society changes so rapidly can be disconcerting. Just two decades ago, the main expectation for our university was turning out engineers for industry. Today, a research focus with a sound technology transfer and spinoff process and a broad comprehensive curriculum with multiple options for graduates are required. Society is impatient and does not wait for the necessary university time periods required to transform the systems, the staffing, and finally the students. Add to this the demands of fund raising, industrial relations, and global linkages, and the challenges facing a university president in a rapidly developing country become extremely heavy.

I have no magic solution. But I do believe transparency and communication are keys for us to keep the university relevant in a rapidly developing society and to keep the critics off our backs. Perhaps ten years from now, Arye will come back and ask me to write a Part II. Then I shall share with you more adventures at Nanyang.

AUTHOR



Guaning Su is the president of Nanyang Technological University, one of the two major universities in Singapore, a position to which he was appointed on 1 January

2003. Since his appointment, he has been busy charting a new path for the university following a decision by the Singapore government to expand the undergraduate enrollment from 16,000 to 22,300 and the total student population to over 30,000. He obtained the B.Sc. degree from the University of Alberta, the M.S. degree from the California Institute of Technology, and the Ph.D. degree from Stanford University, all in electrical engineering. He built a 30-year career in defense research and management, serving as chief executive of the Defense Science and Technology Agency before taking up the presidency of Nanyang. **SP**

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