Straits Times, 15 Feb 2019, Let's get poetic about the wonders of an engineering education
(https://www.straitstimes.com/opinion/lets-get-poetic-about-the-wonders-of-an-engineering-education**)**

In a paradox rich with Dickensian undertones, one could say it is perhaps the best of times and the worst of times to be an engineer.

After all, many signs turn to the significant promise of being an engineer in an era when technology pervades every realm of our human existence. Engineers and the innovations they forge serve to lubricate, accelerate and automate many everyday processes, thereby enhancing our quality of life and boosting individual and societal well-being.

Every successive iteration of the industrial revolution has ushered in some laudable transformations, mechanising processes that are arduous, toxic or tedious. Just think about the seismic advancements in waste management, factory production and data computation that have liberated humans from these painstaking tasks. These are monumental achievements that engineers can and should claim full credit for.

By the same token however, precisely because of the gargantuan impact technology has on our everyday lives, engineers are increasingly excoriated for many of the ills of innovation.

Consider the blame that has been laid on technologists for an ever expanding litany of societal problems such as environmental degradation, climate change, internet addiction, online disinformation, privacy incursions and even social polarisation.

With the swelling influence of Big Tech and the looming pall of Big Data, concerns about the grave responsibilities that engineers can and should bear are far from evaporating.

This unduly tarnished image that engineering has recently acquired is both unfortunate and aberrant, considering the discipline's lofty origins. Basic yet fundamental inventions such as the pulley, lever and wheel have revolutionised agriculture and transportation. Engineers have built on these foundations to tame electromagnetism, thereby enabling a rapid electrification of our planet by integrating and interconnecting power grids. These advancements have in turn triggered an avalanche of wireless data transmissions that drive our information society today.

As a city state devoid of natural resources, Singapore's economic success has also been closely intertwined with engineering and is largely attributed to our technical prowess. Widely seen as a technocracy, the country's leaders have been known to appoint engineers to the highest echelons of the government and public service, including luminaries such as Deputy Prime Minister Teo Chee Hean, former Cabinet ministers Lim Hng Kiang and Yaacob Ibrahim and former head of civil service Peter Ho. Over the years however, the profession has gradually lost its shine among university hopefuls, with top students favouring seemingly more versatile disciplines such as law and business.

This trend of declining enrolment is regrettable as engineering is perhaps more industry focused, societally relevant and future-ready than ever before.

It steeps students in the competencies of analytical and systems thinking, and equips them with the critical skill of simplifying seemingly convoluted and impenetrable devices, structures or processes undergirding our world. Although the classical engineering approach of reductionism is often criticised

as over-simplification, its very parsimony has enabled engineers to design increasingly complex and sophisticated products and systems.

The staggeringly intricate design of a new commercial airliner is a perfect case in point, being the fruit of the collective genius of aeronautical, electrical, material, mechanical, software and systems engineers working in concert.

The Internet, cities, social networks, and even the ubiquitous smartphone, are further examples of engineered complex systems which cannot simply be viewed as the sum of their constituent parts.

Neither can such multi-faceted systems be built with insights from narrow disciplinary lenses as they necessitate expertise that transcends traditional knowledge boundaries. Indeed, engineers have been relentless in collaborating across disciplines to forge new ways of understanding and creating complex systems, marshalling artificial intelligence to support and augment their irrepressible urge to innovate.

As a discipline therefore, engineering offers the next-generation innovator an impressive complement of theoretical, analytical, technological, and practical competencies. Furthermore, when farsighted engineering curricula break down disciplinary silos, and expose students to the humanities and social sciences, engineers can be even more conscious and conscientious in appreciating the deep impact of the technological infrastructures they build. Vested with this formidable repertoire of skills, engineers can be pivotal players in many organisations across all levels, including at the executive, managerial and strategic planning levels.

Engineering is thus a remarkably valuable discipline for its time and its utility will only rise as Industry 4.0 becomes a reality. Each new chapter of the industrial revolution yields more profound changes to humanity at a confoundingly rapid pace, with far-reaching implications for virtually all human beings. With a technology-driven future on our horizon, there is no finer moment than the present for students to harness the strengths of engineering.

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