VIEW POINT

THE ROLES OF ACADEMIA & INDUSTRY

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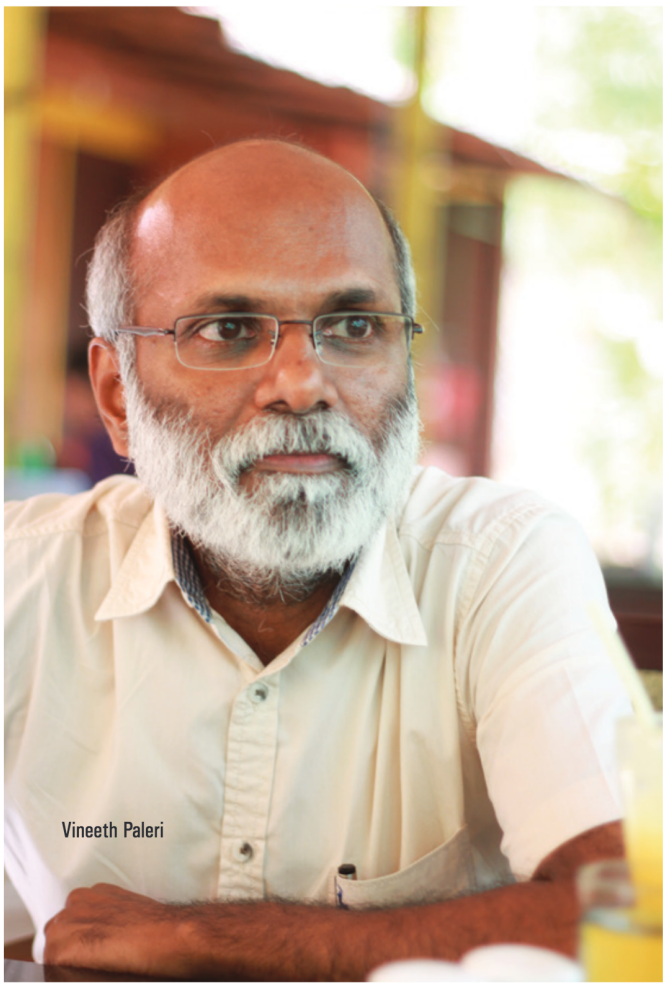

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There exists a great deal of confusion regarding the roles of academia & industry, leading to criticism & accusations against the other. The proper understanding of their roles may help to clear many of these confusions. To drive the points, the article takes extreme views regarding the roles of academia & industry!

The following comment by Harvey Earl of General Motors puts the goal of the industry bluntly: "General Motors is in business for only one reason. To make money. In order to do that we make cars. But if we could make money by making garbage cans, we would make garbage cans". Alternatively, the role the academia is the pursuit of knowledge. In other words, the Industry offers 'what society asks for' and academic institutions are supposed to offer 'what society needs'.

Universities are places of 'openness,' whereas Industry is a place of 'trade secret'. Universities are expected to make the knowledge generated available in public domain. They feel it so important that they may even have their printing press as in the case of Oxford University Press. The openness in the University campuses provide an environment for an individual to express his revolutionary ideas, which may even contradict with the current views of the society involving personal risks; Galileo Galilei, for example. Industry, on the other hand, is anti-individualistic, promoting 'team-work' and 'conformism'.

Universities are expected to strive for perfection to the extent that there should not be any excuse for compromise on quality. The Industry will be forced to compromise on the quality considering its utmost objective of profit-making and also being led to producing what the society demands to address its short-sighted immediate requirements.

The question, 'Are Universities being led by the Industry?' against its expected 'leading role' in providing solutions to problems faced by the society, is not out of place. In IT Industry, there are demonstrated paths to the development of reliable software using a disciplined approach to programming, i.e., programming methodology with proper specification and design before writing the code. The Industry seems to ignore such paths and produce software with several errors causing serious concerns regarding its consequences, including loss of lives. The Industry seems to be happy to deploy an army of testers to chase those errors rather than avoiding them in the first place. By way of modular design - having independent modules with clearly defined interfaces - using the fundamental concepts of procedural abstraction & data abstraction, it may turn-out that the complexity of software development is not exponential in the size of the code as normally assumed! Probably, Industry wants their products to be full of errors to make more benefits from the maintenance contracts? Universities also seem to close their eyes on this issue against their expected role towards perfection

On the issue of reliability of programs, my experience in teaching the course on 'Foundations of Programming' for the undergraduate students was quite rewarding. I could watch my students 'thinking' during the problem understanding & design stages before going to the terminal where they express the solution they have already obtained (not much thinking here!) in the chosen programming language. I could watch the students who have done a good job in their problem understanding and design stages were leaving the laboratory in no time, less than 30 minutes (yes, the problems were simple though), reflecting the confidence in their faces on the correctness of their programs. That was a pleasant experience compared to the general scenario where the students, the majority of them, spend many hours, mostly debugging their programs, and yet failing to from any opinion about the correctness of their programs. All the more, Universities should be places looking for simple solutions for the fact that such solutions lead to more reliable products, unlike Industry where products are intentionally complicated to make them proprietary.

> *Given the fact that the Universities outlive Industry, both the entities need to critically examine their roles as a 'giver' to the society at large*

'Buxton Index' is something important to bear in mind when considering academic-industry co-operation. 'Buxton Index of an entity, i.e., person or organization, is defined as the length of the period, measured in years, over which the entity makes its plans'. For Industry, Buxton Index is around 5, whereas for a University the Buxton Index is close to 50 because the knowledge imparted by it to its students should last a lifetime. Buxton Index is an important concept because close co-operation between entities (human beings included!) with very different Buxton Indices invariably fails and leads to moral complaints about the counterpart. The entity with the smaller Buxton Index is accused of being superficial and short-sighted, while the party with the larger index is accused of neglect of duty and of escaping from its responsibilities. Given the fact that the Universities outlive Industry, both the entities need to critically examine their roles as a 'giver' to the society at large.

Disclaimer: *The author wishes to express the fact that the views expressed in this article are not his own, but of E.W.Dijkstra, "The strengths of academic enterprise (1)". The author concurs with the views and feels that those views did not reach the public to the extent to which it should have been. Hence this article.*