

# Systems Engineer: the ultimate phronetic leader?

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## ABSTRACT

The phrase “Engineering Leadership” may seem, at a first glance, as the result of a simple juxtaposition of two, otherwise not related, concepts; on the contrary, an analysis of the respective roots and evolutions shows an undeniable “fil rouge” connecting the two with links intersecting ages and cultures. Leadership is charged with the expectation of providing guidance to decision making under conditions of uncertainty, incomplete information and high complexity; what is mainly needed to that end is wisdom. The pertinence of wisdom to leadership has been outlined by ancient philosophers (Aristotle "phronesis", Thomas Aquina "prudencia"), and continues to be the subject of study today. This has resulted in the identification of the traits that, mainly, characterize wise leaders. Engineering, as a natural instantiation of the human aptitude to solve practical problems, can be reasonably assumed to be as old as humankind, but when considering modern engineering, some of its roots can be tracked down to the cultural environment of the European Enlightenment; specially to: its belief in reason and knowledge as enablers of human progress; the praise of mechanical arts as “useful” arts and of their practitioners as people “very estimable and very useful, bringing happiness to humanity”; and the belief in the ability of the expansion and dissemination of knowledge to help solve practical problems. Indeed the engineers of the time saw themselves, and were reputed by society, as useful servants of the state. The purpose "to be useful to humankind" has hence become a deep rooted trait of engineering; this is well documented in the definitions of engineering by dictionaries and encyclopaedias, across diverse languages and cultures. Engineers more and more often are required to address societal problems whose solutions lie at the interstices of diverse disciplines, and that, therefore, require a wide interdisciplinary knowledge and a good understanding of the social impacts of engineering activities. Thus, to fulfil its purpose of benefiting humanity, engineering has often to deal with problems that ever increasingly exceed its traditional (technical) boundaries, to address areas never explored before; here technical prowess is no more sufficient, but the ability to judge and take action for the good for humankind is also needed. These new demands may appear as an added burden to the engineering practice, but, at the same time, open a great opportunity for them to show how, through technology and an interdisciplinary approach, they can effectively address societal problems, contributing to the creation of a better world. To realize this opportunity engineers must have the willingness to stretch their traditional "comfort zone" beyond pure technology, and to broaden their social role; it is a true call to

leadership. The topic of Engineering Leadership has indeed seen a growing interest in the last years. Both Universities and Organizations have implemented programs to foster the development of leadership traits in engineers; for that purpose the traits and capabilities relevant to Engineering Leadership have been investigated and identified.

When comparing the traits of wise leaders with those deemed as characteristic of Engineering Leaders, a large overlapping becomes apparent. On the other side, a strong similarity between the traits and capabilities of Engineering Leadership and those traditionally considered typical of effective Systems Engineers is easily verified. As the "Guide to the Systems Engineering Body of Knowledge" underlines, Systems Engineers' specific role in determining customers' needs and desires, and their having to deal with aspects about which they have no direct expertise, puts on them "two ethical responsibilities over and above those of most other engineering professions." And indeed Systems Engineering pays a special consideration to ethics and to the behavioral characteristics of its practitioners. Thus, while it is not intended here to claim Engineering Leadership to be an exclusive fiefdom of Systems Engineering, this last appears to be in a true vantage position to respond to the demand of phronetic leadership. The Systems Approach, and its inherent Systems Thinking, can be reasonably seen as a solid foundations for an Engineering Leadership, and thus their diffusion, among the engineers from any discipline can be expected to be enable engineering to help mankind in meeting its present and future needs[1].

## REFERENCES

- [1] Arrichiello, V. (2016), Systems Engineer: the ultimate phronetic leader?. INCOSE International Symposium, 26: 1824–1837. doi:10.1002/j.2334-5837.2016.00263.x

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**Vincenzo Arrichiello** holds a Laurea Degree in Engineering from the University of Genova. He has practiced Systems Engineering for more than 30 years, covering positions either in large companies (Defense Contractors) and engineering consulting Companies (as a co-owner), applying the systems approach across diverse industry fields (Aerospace& Defense, Robotics, Packaging). He has been Head of the Selex SI Academy, and Director of the relevant Systems Engineering School. He teaches Systems Engineering courses in some University Masters. He was one of the founders of the Italia Chapter of INCOSE and is now serving as Past-President.