

Role of Engineers in Documentation and Communication

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Engineering, a historical discipline, makes use of established scientific laws and theories and attaches them in a broad way to practical works. Human beings have always produced practical tools that could help them solve their needs and improve their quality of life on Earth. Communities throughout history have benefitted from their engineer's performance and carried a great influence in multiple facets of their lives, such as infrastructure, economic wealth, overall life quality, etc. In my study of engineering practices, I have seen and understood how engineers perform a vital role in society and how good practices in documentation management and communication can bring about visible improvements.

Role of Engineering and Sustainable Development

As I began the course, I delved into the basics of engineering theory itself and how it is linked with scientific research and development. As I progressed through different areas of learning, I learned the wide aspects of an engineer's role in facilitating the integration of business, technical, cultural, social, economic, environmental and political issues within engineering programs and projects. Engineering designs and projects are not isolated pieces of equipment but carry social and environmental implications for the present and the future. Humans started by crafting a hammer from a stone and continually progressed with engineering solutions. They went on to design large-scale urban sanitation systems, energy-efficient infrastructures, bridges, and tools.

The impact left by these systems was inherent and unavoidable. It was interesting for me to learn the connection between society and engineering itself. It is society and its needs that distinguish engineers from scientists. Science seeks to develop an understanding and knowledge of the workings of the physical universe, and its pursuit may or may not have societal implications or serve a social need. Engineering plays a role in the overlap of societal needs with scientific knowledge. I understood the domain of engineering to be the application of scientific knowledge that humans have established to use to serve the needs of their society. Initially, engineering, especially in the Middle Ages and early Industrial Age, was widely used to increase military power and capability. However, for many countries I observed, the trend began to shift after World War II, and engineering designs and projects began to focus more on developing or improving societies, sustainable development, economic growth, and making countries safe.

Engineers have a role in creating and promoting designs that have a minimum adverse impact and wisely use natural resources where the principles of sustainable development are not compromised while still creating the maximum positive impact. Engineers have to take three principles of

sustainable development into consideration in their projects and designs: the economic factor, the environmental factor and the social factor. In my perspective, an engineer should know how to balance a good business that provides services and goods or creates an infrastructure with an impact on the earth's ecosystems as well as how the design or project serves the people's social needs or impacts their quality of life. Therefore, engineers should have three main objectives in mind to achieve sustainable development.

The viability of the planet must be maintained while enhancing the people's wellbeing. Equity must be ensured for the future as well as the present generation, and problems should be solved through a proactive and holistic approach. To achieve the objectives of sustainable development, I was an advocate of good engineering practices that should understand and promote the complexity of the nature of interactions that are occurring in social and physical systems and always be cautious in the use of technology in engineering projects. It is very important, in my perspective, to understand our limitations and realize that our scientific understanding of social and physical systems to this day stands limited and that there has been a visible direct impact that has come inevitably as a result of human interventions. It is also possible that a problem that may be apparently solved today may worsen some situations in the long run due to the actions or decisions taken due to rebound or retroactive effects (Richard Dodds, 2005). Therefore, I see engineering projects as not just technical challenges but ones that lead towards a social or environmental transformation, negative or positive.

Manage Information and Documentation

One of the most important aspects of engineering practices that I learned was how the quality of documentation and its control have a major influence on the efficiency and overall performance of projects. The designers are responsible for the blueprints that represent the concepts and ideas that manufacturers use to fabricate the product. However, more importantly, the documentation and its quality can determine how efficient and effective the production turnaround time can be. If the documentation is adequate or deficient, then it directly impacts the production, which can lead to rework, delays or variations that then lead to an increase in project costs and time. Poor information management can lead to delays even before manufacturing begins or bring the manufacturing process to a halt.

Improper documentation could range from inadequate standard operating procedures, poorly written work instructions, improperly constructed fixtures, incorrect blueprints and drawings, poorly designed workstation layouts, and inappropriate production equipment, all of which contribute to human error. Poorly written documentation can lead towards additional trouble that can be avoided. In my experience, it is often the case that a worker fabricated the component using outdated designs because information management was poor and could not be conveyed to the worker properly. In my view, much of the process inefficiencies in many industrial settings could be improved by improving the quality of documentation in order to reduce delays, variations and costs for both the company and the client (Andy Bowers, 2017).

Moreover, I have seen that all engineering projects involve financial transactions relating to supplies and deposits. Here, keeping a proper and clearly documented record of invoices, receipts, and charges is vital for business income reports and expenses. If I were the manager, the last thing I would want is to search and shuffle through dozens of financial receipts, only to find them missing. Larger projects move through expense and incomes at increased rates. In those places, it is vital to have a well-developed system of documentation that organizes documentation and saves time. I also learned that due to the complexity and challenging nature of engineering projects and the processes involved, the management of information between members of engineering teams and design is crucial.

An engineering design is efficient and effective only when it is handled within budget and time constraints. Therefore, for me, documentation that can clearly define and communicate the design to other people is the most important in managing an engineering project. I also see how stressing effective information management and proper documentation saves from many ramifications. It could be from poor communication to legal ramifications. Certain countries have documentation management laws that they do not comply with, which can lead to criminal charges. It can also result in loss of information and important backup. An example I can think of in this case is a mechanical contractor hired to install HVAC cooling units in a building and telling the project supervisor that he has no idea how many units were planned for the building, all because of improper documentation.

Effective Communication

Successful engineering is an outcome of effective communication. It is important that technical professionals are taught effective communication as a discipline. In my view, there is a step-by-step approach to achieving effective human communication, and numerous studies have provided insights into the processes of human communication and perception. As a result, important procedures and tools were developed using those insights that increase communication effectiveness. As a student, I was often surprised by the amount of writing that was required in engineering courses, but going through real-world examples and the ramifications of miscommunication in this discipline, I have grown to understand its importance.

I learned how engineering projects are multi-disciplinary ventures that involve a team of technicians, business specialists, and human resource managers and could even involve public health officials and psychologists. Therefore, to be able to communicate effectively and collaborate with a diverse team, especially when there is a requirement to explain complex processes to a non-technical audience, skill is required. In my view, engineering communication studies should develop students into proficient speakers, writers and communicators, both online and live. In my view, those engineers who want to advance in their careers must learn to be effective communicators, who should have the ability to communicate technical project plans and complex ideas, as well as persuasive abilities. Clients are also able to recognize engineers who communicate well, and in today's competitive world, it is a necessity, not just an added bonus. Since there are multiple disciplines that engineers have to

collaborate across, it is important that the multiple stakeholders involved are able to understand their ideas properly. This technical coordination involves collaboration, teaching, and learning – all prerequisites for strong communication skills (Jonas Dulevicius, 2005).

I see engineers as innovators who not only have ideas but also the ability to communicate those ideas. Even though I came across colleagues who were introverted, in this discipline, I understood that I was responsible for supporting and educating them from idea to action. In a business, it allows employees to foster a better working relationship with external and internal stakeholders, which limits misunderstandings. Misunderstandings can often lead to big mistakes, something I experienced first-hand during my placements. I saw in many cases that time wastage, as well as misinterpretation of requirements, resulted from ineffective communication that resulted in employee disengagement. Despite knowing the fact that engineers are more technical-minded by nature, it is important to realize that not knowing how to communicate effectively can put them at a disadvantage when faced with people outside of engineering. Sometimes, engineers have to work within global multicultural environments, where attention must be paid to language barriers and cultural differences. From a technical standpoint, a lack of proper communication can become a menacing barrier in such a case.

In conclusion, even when an engineer works in an advanced contributing role where he has to work individually, it is important for him to not only know how to communicate well but to choose the right model of communication. I believe these skills can be developed and learned with practice, and I personally look forward to paying more attention to them at the individual level to be able to connect with my teams effectively.

References

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