Chapter 1
The Role of Science, Technology, and the Individual on the Way of Software Systems Since 1968

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ABSTRACT
The NATO conference held in Garmisch in 1968 was on the future of the computer and software world, and it presented the process of realization of what has been talked about in those dates to the present day. This chapter also examines the development of software systems since 1968, depending on the technological developments. The contribution of mathematics and physics to the development of information systems was explained in chronological order by comparing the possibilities of yesterday and today. Complementary contributions of science and technology have been evaluated in the evolutionary and revolutionary developments ranging from the definition of information theory in 1948 to teleportation. It can clearly be seen that discrete mathematics directly affects the improvements in computer science. This review study clearly shows that it would not be possible to talk about digital transformation and quantum computation if the discoveries of Shannon, Turing and Neumann, and the studies of other scientists before them did not exist.

DOI: 10.4018/978-1-7998-2142-7.ch001
INTRODUCTION

At the NATO conference in Garmisch in 1968, the future of the computer and software world was dealt with. The arguments at the sessions were in preparation for today’s digital world. The conference was held for two consecutive years and software engineering was recognized as an independent discipline. One of the editors of the meeting booklets of today’s software infrastructure, Randel (2018) evaluated fifty years of software engineering. The paper summarizes the development of software engineering as a new discipline. The transfer of conference reports to an electronic platform in 2001 (McClure, 2001) informed the IT industry about the conversations held at the conferences and confirmed that all progress in information technologies and the software sector aligned with previous experiences.

The roles of science, technology, and human beings are all entwined when examined in the context of software engineering. Although all engineering disciplines utilize these three parameters, software engineering differs from others. The resulting software product in this discipline is abstract and is the product or a portion of the product that must entirely be completed. However, in civil engineering, for example, it is possible to open a bridge before the side roads are completed. This example should not be confused with the delivery of the software product to the user in parts. No matter how small a software product is, it is a stand-alone product and must be delivered to the user in a fully operational state. Examples can be increased for all other engineering fields that offer tangible, concrete products. Therefore, software engineering is different from other engineering disciplines because customer satisfaction is most prominent; the software needs to meet the needs of the user. This puts the human factor in the first three criteria. Today’s rapidly changing software products require developers to work closely with the customer. In this context, the evaluations of satisfaction and performance for software engineers and software developers are indispensable criteria for this engineering discipline. In fact, the quality of the work performed in most labor sectors has been measured psychologically by scientific studies for a long time. There are many models investigating the relationship between the pleasure of the working environment and quitting the working, and intention not to work. While the intention of a software engineer or a product developer to quit their job is an important risk factor for the company, doing the job willingly is a positive appraisal for the business. In fact, the degree to which an organization’s employees are satisfied with the working conditions and the working environment is an indication of how much that organization attaches importance to its employees.

In the first fifty years of software engineering, and by changing over from hardware engineering to software development processes, new techniques were developed and tools were used to deal with the complexity problem. During the evolution of
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