KPA
Insights through analytics

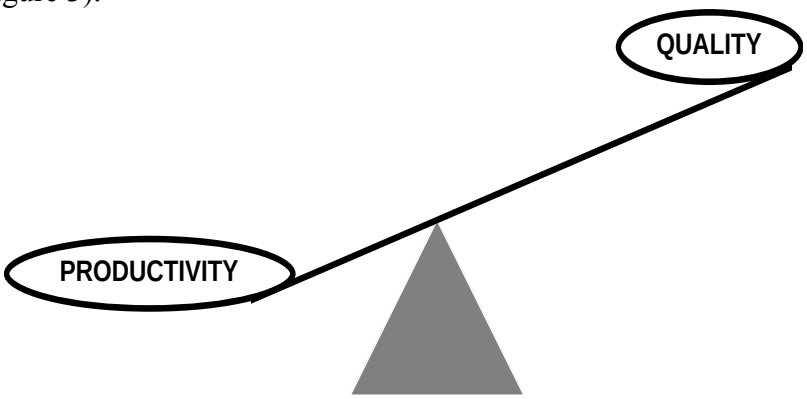
The Israel ESPINODE

Software Process Improvement Series

Part III

Quality gets Results[1]

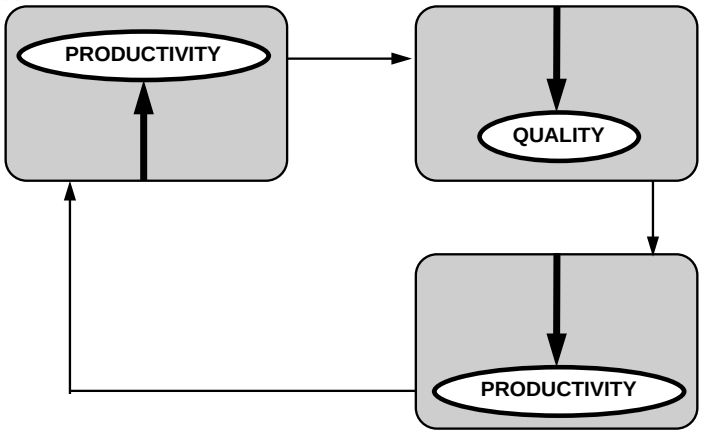
There is a mistaken notion to the effect that if orderly processes are introduced into the daily work environment, quality may go up, but productivity will go down. The flip side of this notion is that if productivity goes up, quality will decrease. These notions are illustrated in Figures 1 and 2. In actuality, neither are true. Improvement in quality results in improvement in productivity (see Figure 3).



WHAT MANY BELIEVE

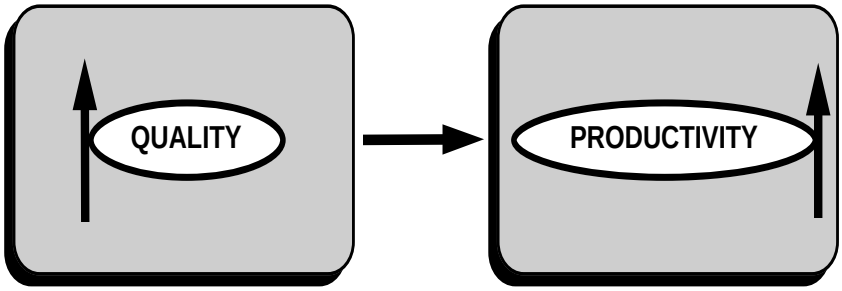
Figure 1

[1] Adapted from the book by Kenett and Baker: **SOFTWARE PROCESS QUALITY: Management and control**, M. Dekker Inc., 1999



THE APPARENT DILEMMA

Figure 2



RESOLVING THE QUALITY-PRODUCTIVITY DILEMMA

Figure 3

The following are some examples of the benefits that have accrued to software organizations from process improvement, i.e., improvement in quality AND productivity.

- Hughes Aircraft Co., in Fullerton, CA, invested $500,000 in software process improvement and reduced project overruns by $2 million/year.
- Raytheon Equipment Division, Software Systems Laboratory, invested $1.1 million in software process improvement and reduced the 1990 cost of non-conformance by $8.2 million, resulting in a return on investment (ROI) of 7.7.
- Fujitsu: In the late seventies, 40% of software projects were over budget and behind schedule. Five years later they reduced it to 15%, and slashed defect rates by a factor of 10 (through the use of increased code and design reviews).

- IBM Federal Systems Division produced 500,000 lines of source code (500 KSLOC) for use in the on-board space shuttle systems, and 1.7 million lines of source code (MSLOC) for ground support systems. Through a focus on early detection (over 85% of errors are discovered prior to integration build), they reduced defects from 2/KSLOC to 0.11/KSLOC in three years.

- AT&T Network Software Center: Implemented over 100 quality improvement projects in the late 1980's. As a consequence, they succeeded in reducing open faults from 700 in 1989 to 200 in 1991, and reduced the development cycle from two years to 6 months.

Conversely, we find that the failure to improve quality is costly. A GAO report found that in a sample of $6.77 million worth of information systems software projects for the Department of Defense (DoD), only 2% of the projects were ultimately delivered in usable condition. Almost a third were paid for but never delivered. Almost 50% were delivered but never used, because the amount of rework required to make them useful was prohibitive. It was findings such as these that contributed to initiating the projects sponsored by the DoD to foster process improvement. One such project resulted in the establishment of the Capability Maturity Model (CMM) and associated assessment methodologies.

T. Capers Jones [*Patterns of Software Systems Failure and Successes*, Boston: Thomson International Computer Press, 1996], reports that canceled projects consume 15% of all software efforts in the US each year, costing some $14.3 billion and a loss of 285,000 person years in programming time. In general, the larger the project, the greater is the probability of cancellation. For small systems (around 100 function points), the cancellation rate was around 7%, but about 20% for systems about 1000 function points. For large systems in excess of 10,000 function points (approximately 1 MSLOC), the cancellation rate approached 50%, and 65% for systems approximately 100,000 function points in size. These included operating systems, telecommunications systems, major defense systems, and the like. Projects are canceled for a variety of reasons, such as the need for the application disappearing. But many of the causes relate to poor process implementation, such as enormous cost overruns, or the application being too far behind schedule.

Clearly, there is a significant cost to organizations for failure to implement process improvement – or even to take a first look at how well their processes are working for them.

Part IV of the series will discuss organizational structures that have to be put in place in order to achieve process improvements.