DISTINGUISHING BETWEEN PROACTIVE & PREDICTIVE METRICS WILL IMPROVE PROCESS MATURITY

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The terms "proactive" and "predictive" metrics are considered to be interchangeable by many companies. While that usage is not necessarily inaccurate, it is not completely accurate either. Differentiating between these two categories of metrics may provide opportunities for companies to improve their ability to measure R&D and product development.

Definitions of Proactive & Predictive

Webster's Dictionary defines "proactive" as "relating to, caused by, or being interference between previous learning and the recall or performance of later learning." Webster's Dictionary defines "predictive" as "to declare in advance, especially: foretell on the basis of observation, experience, or scientific reason." Both definitions provide for an interpretation that "existing knowledge creates the ability to project or forecast an outcome." Perhaps this is why the terms are often used interchangeably. At the same time, it seems clear from Webster's definition that proactive is more qualitative and knowledge-based and predictive is more quantitative and based on hard data points. These more literal definitions may be useful to push the state of measurement ahead in industry.

Consider the product development process framework depicted in Figure 1. Most will recognize it as being generally representative of frameworks used in their company and industry. Most will also agree with the premise of the Figure. The greatest amount of variability should be in the early stages of the project and as time progresses the amount of variability should be reduced.

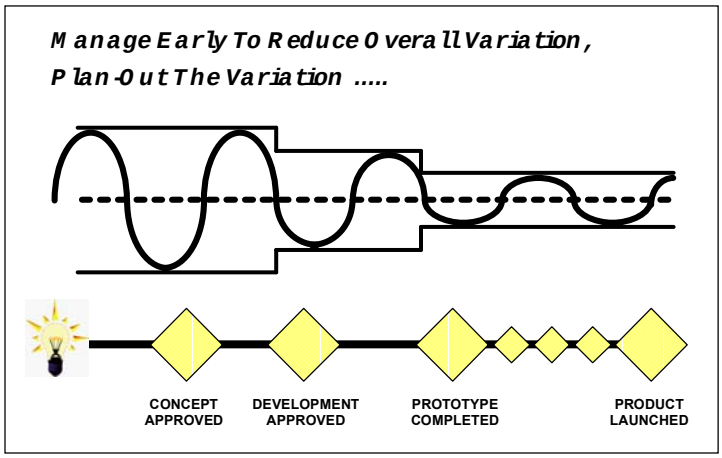

Figure 1: Expected Measurement Variability vs. Time

An Improved Measurement Framework

A more subtle point regarding Figure 1 that is often lost by practitioners in the heat of project definition and development is that prior to the "Development Approved" milestone the project is still in the *enterprise-wide process* of being considered for approval. After the "Development Approved" milestone the project is in the *project management process* of being executed. Any activities prior to Development Approved are still "proactive" and can be manipulated and changed to result in a more desirable outcome. Any activities after Development Approval measure actual performance against the goals and objectives set at the Development Approval milestone. Actual performance data is tracked and compared to the approved plan. Going back to Webster's definition of proactive vs. predictive, from a measurement viewpoint, it is useful therefore to define measures and improvements that can be applied before Development Approved as being "Proactive." Similarly, it is useful to define measures and improvements that are applied after Development Approved as being "Predictive."

Once the project is approved, actual data points are collected and compared to the project plan. The difference between planned performance and actual performance is *predictive* of the outcome. Therefore, it is practical and useful to further refine the usage of the measurement terms proactive and predictive and focus them in the context of a product development process framework [Figure 2]. Of course, there are "Reactive" metrics as well. Reactive metrics most always occur after the initial physical manifestation of a product. After this point in the process one asks the question *"Did the as-built model or prototype conform to the specification?"* If the answer is no, a change process is considered that either creates, lessens, or forgives conformance criteria. By definition, measurements of these activities are reactive.

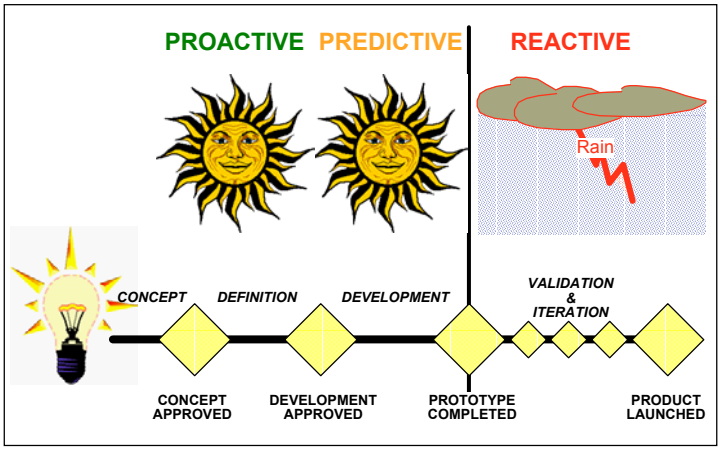

Figure 2: Proactive Zone vs. Predictive Zone

Proactive & Predictive Metrics Examples

Let's pick two Proactive and two Predictive metrics to make the case. The two Proactive example metrics are "reuse" and "target cost." The two example Predictive metrics are "schedule slip" and "on-time activities." Anything that can be done to optimize reuse and target

cost before the Development Approved milestone will have a positive benefit on the project and outcome. If one backs into reuse after approval, product architecture and project staffing among other activities will increase in variability. If one does not have a target cost before Development Approved, with a few exceptions, the business case will increase in variability. Both these metrics are most effective when applied proactively. The two Predictive metrics examples are even more straightforward. By definition, one cannot track either of these metrics before Development Approved because nothing has been approved to track *slip* or *late activities* against. One could argue that the two predictive metrics examples can continue to be applied in the "reactive zone" in figure two. This is true – but beyond the scope of this article.

Attaining Improved Process Maturity

Just about all of the frameworks that measure process maturity in industry today, regardless of the source of the framework itself, define it in the same way. The *degree to which a given company can reduce and control process variation* defines the degree of process maturity. The more variability can be controlled, the more mature the process. It follows then that if the greatest amount of variability is in the early stages of a project, and that variability is supposed to lessen over time, then the earlier that metrics can be reliably applied the more they will enable process maturity. GGI has been distinguishing between Proactive and Predictive metrics since 1997 [Figure 3]. We have found it useful to borrow a page from improvements manufacturing sector in the 1980s. First, one *monitors* a process so as to characterize it – *Process Monitoring*. Once a process is characterized and understood, it is possible to *track performance* of any given job or project and to know if the project or job is proceeding within the limits of the characterized process. If not, *corrective action* can be taken – *Process Control*. Finally, once a process is so well understood the *variation* can be mathematically *planned-out or managed-out* in advance – *Statistical Process Control*.

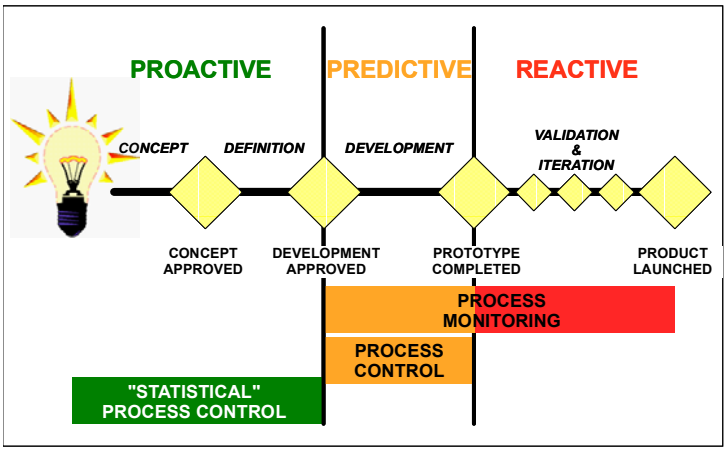

Figure 3: Process Control vs. Time

Summary

While R&D and product development environments may never reach the same absolute level of determinism as manufacturing environments, the same logic, in a relative sense, applies. Companies that rid themselves of unpredictable variability prior to the Development Approved milestone will have the most mature environments. The mastery of Proactive Metrics and the frequent application of Predictive Metrics will become attributes of companies attempting to maximize their process maturity.$^{K}_{R}$