CHAPTER 1

ECONOMIC QUALITY

The UTSQ moves the concept of quality for software intensive products beyond the issue of software defects. UTSQ focuses on economic return to the User. Quality is defined and measured as providing the expected economic return. Bug free software can fail to meet the User's expected return. While pioneering software that is very buggy can far exceed expected returns.

Problem with Current Quality Models

The *Engineering Process* to produce bug free software on time and on schedule is central focus of the current software quality models. This is in many cases a poor surrogate for the real goal of generating User economic return.

A statistic of "defects per thousand lines of code," or any other similar statistic, measures only a small part of the total system. Code quality measurements say nothing, for example, about:

- Does the functionality meet the User's needs?
- Is the human interface easy to use or problematic?
- Is *knowledge transfer* about system usage adequate and efficient?

In fact the number of software code deficiencies is in most cases less important than the location of code errors.

FRAMEWORK

The real world generates example after example of users eagerly adopting products known to have issues. What could motivate this behavior? The answer has to be econometric return – *Economic Quality*

HEURISTIC

The "skill set" of the User (labeled as PeopleWare in UTSQ) has a direct impact on the Economic Return of a software-intensive system (see Chapter ###: PeopleWare).

This is the driving force that creates the "early adopter" phenomena. Highly skilled, techno-centric users embrace a new technology and contribute to successfully deriving Economic Return by exercising extensive technical knowledge to the process.

Later, as the product is sold to less Technically savvy people, the cost of the user acquiring the know-how to successfully use the product increases and thus the Economic Return decreases.

This lower User Return can dramatically reduce sales and creates pricing pressure.

in UTSQ. The early adopters of a technology envision an econometric value that more than justifies the cost of buggy software.

UTSQ defines quality as an economic event evaluated by User expectations.

Economic Quality is delivering the user's expected economic return.

This is a very demanding measure because it deals with both the effectiveness of the system design and implementation plus the management of user expectations.

Quality issues arise from both development processes and the sales positioning.

Quality "Delivery Gap"

Is the difference between the target economic return of the system design and the actual economic return delivered.

Quality "Hype Gap"

Is the difference between the marketed economic return of the system design and the target economic return delivered.

Return can easily dissipate. For example, defect can reduce value, complexity can increase user cost, or a poor training program can make learning to use product very costly. Each of these, and more, are dealt with in the following chapters in the development of the Unifying Theory of System Quality.

It goes without saying that providing a quality system to the user is difficult. Numerous opportunities exist for the expected user-return to be reduced. Only a strong vision of what is required coupled with powerful management systems can deliver.

ECONOMETRIC MODEL

The metric for quality is a ratio of expected Return to actual Return. If the User is experiencing equal to of greater return that expected then the

ratio is greater than one and the User is happy. If expectations are not being meat then the ratio is less that one.

(2-1)
$$Q = \frac{\sum_{\delta=1}^{n} R_\delta (1-d)^\delta + \sum_{\delta=n+1}^{\infty} \tilde{R}_\delta^n (1-d)^\delta}{\sum_{\delta=1}^{\infty} \tilde{R}_\delta (1-d)^\delta}$$

Where:

$(1-d)^\delta$ Discount factor d is the cost of capital of the User in period δ. See ####

$\tilde{R}_\delta$ Is the User's estimated return for period . This estimate is made in period 0 before adoption of software-intensive system.

$\tilde{R}_\delta^n$ Is the User's estimated return for period δ. This estimate is made after the User has experience with the product, in period n, for the future periods. Thus the User is re-forecasting Return.

R_δ Actual return experienced in period δ.