

# Growing Your IT Business? Head For The Right Queue

**STeP-IN Theme Conference  
on Performance Testing**

September 15, 2006 @ Bangalore, INDIA



Performance Engineering Associates

#403, 30<sup>th</sup> Cross, 4<sup>th</sup> Block Jayanagar,  
Bangalore – 56 0011

# Contents

- Missed Business Opportunity
- Missed Opportunity And Technology Maturity
- The Software Performance Landscape
- The Nature Of Mathematical Modeling
- How An ASP Grows
- 4 Case Studies
- Heading For The Right Queue

# The Glass of Milk – Half Empty or Half Full?

## Understanding missed business opportunities



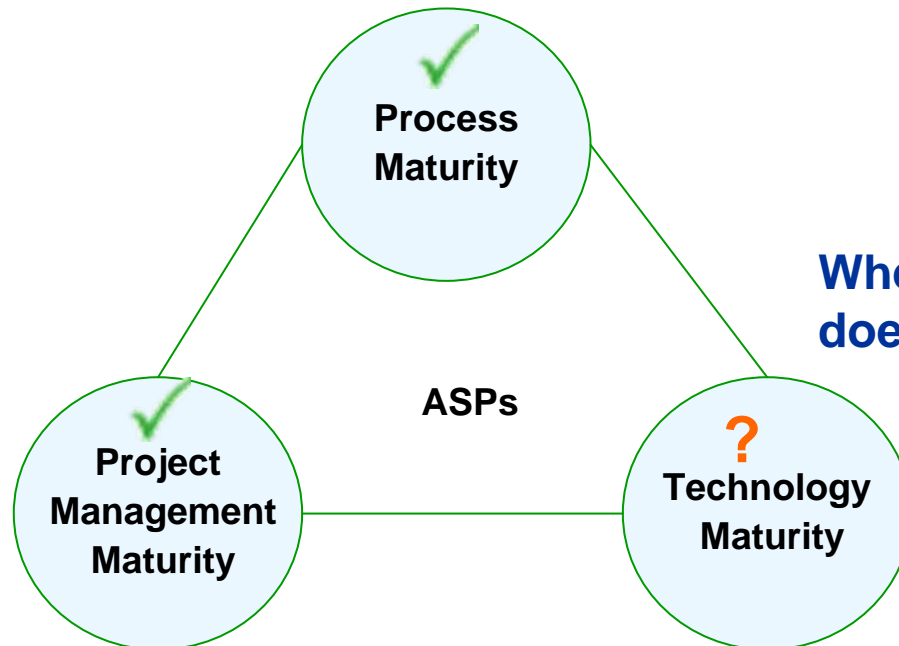
Performance Engineering Associates

- Real-life scenarios of **missed opportunities**

- ASP gets **\$80 mn** worth of business but **\$200mn** worth of business is squandered away.

- ASP displaces a Big 5 consultant but is able to tap barely **2%** of the IT budget of **\$130mn**.

## WHAT WAS MISSING?



Where are we and why does it matter?

STeP-IN

## More on Technology Maturity...

- **What does technology maturity achieve?**
  - True end-to-end capability as an IT service provider *per se*
  - Key differentiator in a highly competitive market
  - Higher quality of solution
- **Two sides of technology capability**
  - Functional
  - Non-functional (actually a broad term; ISO/IEC 9126 standard define various quality attributes such as security, performance etc)
- **Most crucial and weakest link**
  - Pervades all aspects of the system
  - All stages of its lifecycle
  - Weakest link in the non-functional technology maturity chain is **Software Performance**

**What makes it a weak link?**

# The Software Performance Landscape

## Understanding the weak links

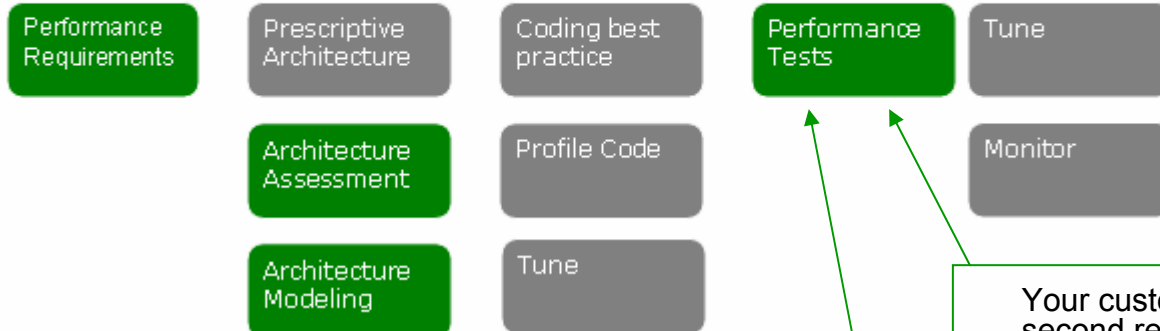


Performance Engineering Associates

### Functional Activities & Steps (Waterfall model)



### Performance Engineering activities & steps



Your capacity plan is finalized 3 boxes with 3 CPUs each. Business forecasts require planning for 10% increase in workload. How do you scientifically translate that to an increase in the number of CPUs/boxes?

Your customer requires sub second response time in the target environment, what response time do you need to get in your scaled down test environment?

Your application response times averages to 1.1 second. You target is < 1second. Hardware is cheap even if we double it. Will that work?

**What is the “special ingredient” that defines the maturity level (and hence the quality of solution) in all these questions?**

# The Nature of Mathematical Modeling

- Not merely number crunching or plotting fancy graphs
- Commonly(?) used mathematical models

## **The Utilization Law: $U = X S$**

*where,*

*U, the utilization*

*X, the throughput*

*S, the average service demand*

## **Relevant steps of use:**

Capacity baselining, Performance testing

## **One example application:**

Quantify the scalability limit of the system

## **Little's Law: $N = X (R+Z)$ (closed systems)**

*where,*

*N, the total number of users in the system*

*X, the throughput*

*R, the response time per user*

*Z, the think time per user*

## **Relevant steps of use:**

Performance Testing, NFR Analysis

## **One example application:**

Used to validate the correctness of a load test

## The Forced Flow Law: $\lambda = X$

where,

$\lambda$  , the arrival rate of request

$X$ , the throughput

### Relevant steps of use:

Performance testing, NFR analysis

### One example application:

Relates user behavior to actual throughput

## The Poisson Distribution

$$\text{PDF } P(k) = \frac{\nu^k e^{-\nu}}{k!}$$

### Relevant steps of use:

Workload model

### One example application:

Determines the workload load limit for a desired service level

## Scaling from test environment to production environment

$$SF_i = ( U_i^{\text{LAB}} / U_i^{\text{TARGET}} ) *$$

$$\frac{\sum_{m=1}^{m=M} ( X_m^{\text{TARGET}} * D_{(m,i)}^{\text{LAB}} )}{\sum ( X_m^{\text{LAB}} * D_{(m,i)}^{\text{LAB}} )}$$

$m=1$

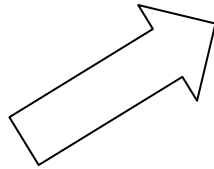
### Relevant steps of use:

Performance Testing for capacity projection

### One example application:

Extrapolates performance test results to a larger box

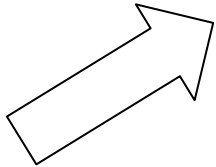
Using mathematical models



## Level 3

- Review / Validation / Define [Pieces Of] “Customer’s NF Model”. This Includes,
- IT System Capacity Model
- Operational Workload Model

Handling non-functional aspects



## Level 2

- “Gathering” Of Non-Functional Aspects
- Non-Functional Validation (Compliance Checking)
- IT System Benchmarking, Monitoring, Platform-specific Tuning, Profiling Etc.

## Level 1

- Bottom-line [Functional] Responsibility
- Functional Solutions
- Complete Project Management & Mature Quality Processes etc.
- Verification & Validation In Functional

# Case Study 1 : Telecom Provider

## Level 2



Performance Engineering Associates

### Context and Problem

- ◆ Application development & maintenance (ADM) + systems management for a large telecom provider
- ◆ “Usual” problem of controlling cost-quality tradeoff for IT
- ◆ Excessive dependence on a Big 5 vendor especially in IT system management

### Level 3 Opportunity for ASP

- ◆ ASP gets to begin work on system management which has a \$ value 2.5 times that of the ADM piece

### Result

- ◆ The ASP occupies a pride of place at Level 2, encompassing tuning, performance testing, gathering NFR, project management etc
- ◆ Client experiences customer delight and awards them “preferred” status
- ◆ ASP loses > \$200mn worth of opportunity/yr

### Client’s Desired End-state

- ◆ Have a multi-vendor scenario for enterprise system management

### (Missing) Approach and Methodology

- ◆ Lack of scientific approach for workload modeling and capacity management techniques

### Risks

- ◆ The ASP operates in commodity zone
- ◆ Under constant threat from competition
- ◆ ASP relies on individual “people-familiarity” for continued business

**Food for Thought: Is this an acceptable business model for you?**

**STeP-IN**

# Case Study 2 : Media & Entertainment Company

## Level 2



Performance Engineering Associates

### Context and Problem

- ◆ Existing system had several functional and severe IT system performance issues, and seen as an outcome of goof-ups by a Big 5 firm.
- ◆ CIO-level decision to involve the ASP
- ◆ Large remedial exercise that encompassed functional + non-functional pieces

### Level 3 Opportunity for ASP

- ◆ Use a scientific performance test plan to demonstrate technical maturity for a CIO desperately looking for a trusted vendor

### Result

- ◆ ASP displaces the Big 5 vendor by demonstrating maturity in functionality building and project management.
- ◆ ASP barely able to tap 2-3% of \$100 million/year IT budget
- ◆ CIO level relationship unexploited even though given on a platter

### Client's Desired End-State

- ◆ CIO's personal need for having a trusted vendor for his \$100mn IT budget (CIO holds a project-level steering committee meeting every month!)

### (Missing) Approach and Methodology

- ◆ ASP adheres to the process set by the Big 5 vendor for the performance aspects.
- ◆ Ad hoc test plan prepared by the Big 5 firm was faithfully adhered to.

### Risks

- ◆ The ASP operates in commodity zone
- ◆ Is under constant threat from competition

**Food for Thought: If you displace a Big 5 vendor and get coveted CIO level visibility, does that meet your criteria for success?**

STeP-IN

# Case Study 3 : Electronic Component Distributor

## Level 3



Performance Engineering Associates

### Context and Problem

- ◆ End-to-end platform and application re-engineering for one of world's leading specialized electronic component distributors.
- ◆ 0.5% of turnover, in a slow-down year, to be spent on the IT re-engineering initiative
- ◆ Classic business + technology drivers for re-engineering – user productivity, single customer view, mainframe limitations.
- ◆ CEO / CIO expectation on performance at mainframe levels (sub-second for all transactions).

### Approach and Methodology

- ◆ **Response time SLA definitions and capacity limits defined using Poisson distributions**
- ◆ **Stochastic performance test plan**
- ◆ **Server virtualization based on queuing analysis of workload.**

**Food for Thought: Given that there was a Big 5 incumbent, would not operating at Level 3 merely have diluted scope? Or would the ASP have lost the entire re-engineering initiative to the incumbent?**

### Client's Desired End-State

- ◆ Have a single vendor conceptualize, architect, re-engineer and maintain the system.
- ◆ Highly optimized capacity plan that would deliver a high performance and extensible architecture without exceeding the budget

### Benefits (for the ASP)

- ◆ Displacing a Big 5 incumbent for a multi-million \$ initiative.
- ◆ CEO / CIO trusted advisor relationship

**STeP-IN**

# Case Study 4 : Banking Product Vendor

## Level 3



Performance Engineering Associates

### Context and Problem

- ◆ Product development scenario in the banking domain
- ◆ Rapid growth in customer base coupled with rapid increase in heterogeneity across deployment platforms
- ◆ Reduce the need to have a new cycle of benchmarking each time there is a new client environment/ deployment platform

### Approach and Methodology

- ◆ **Stochastic workload models**
- ◆ **Performance and scalability models (queuing models) of the system**
- ◆ Use of published hardware benchmarks and scalability metrics

### Client's Desired End-State

- ◆ Be able to predict performance on target platform without access to it
- ◆ Corollary: Do only one round of testing on one test platform rather than one for each deployment platform

### Benefits (for the Product Vendor)

- ◆ \$250K per client saved on benchmarking labor costs alone
- ◆ Turnaround time for a deployment reduced from 6-8 weeks to zero

**Food for Thought: Could the desired end-state achieved at all without operating at Level 3?**

STeP-IN

## So How Does The ASP Head For The Right Queue?

**Questions?**

**Thanks!**