

Measuring Application Performance

How to Get Started

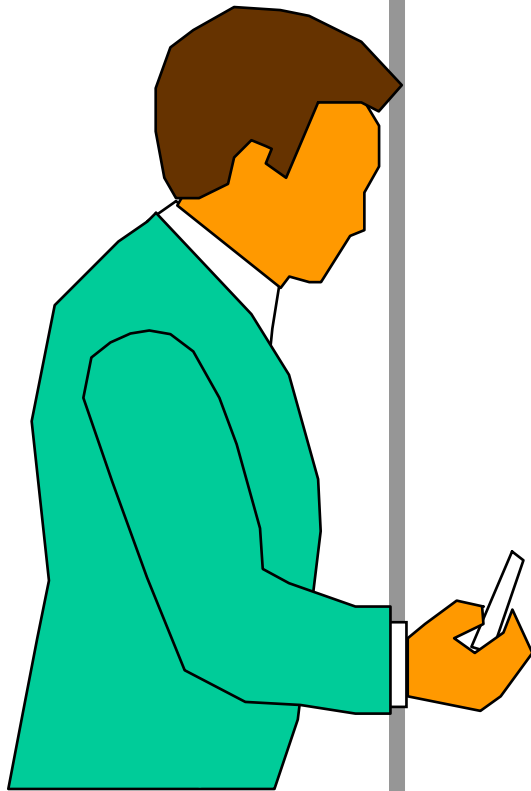


Interop NY 2006

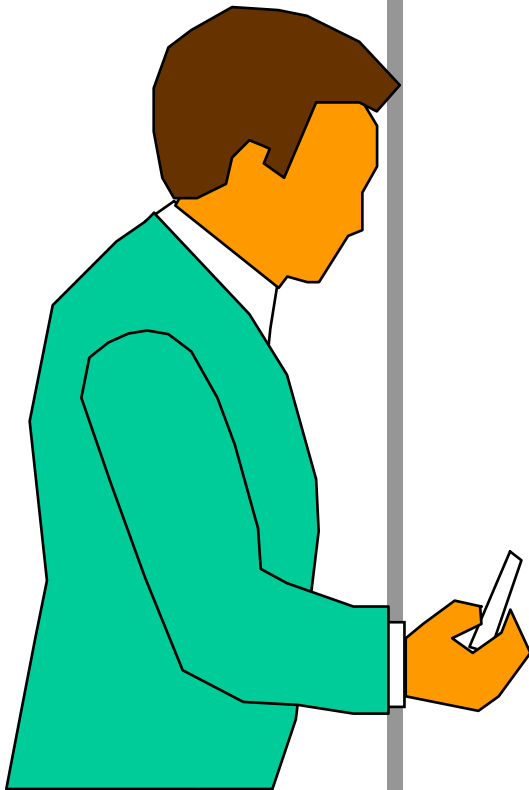
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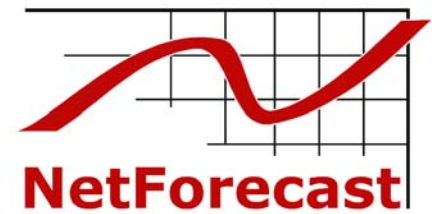


- **Why Measure Application Performance**
- **How to Measure It**
- **The Need for a Performance Index**



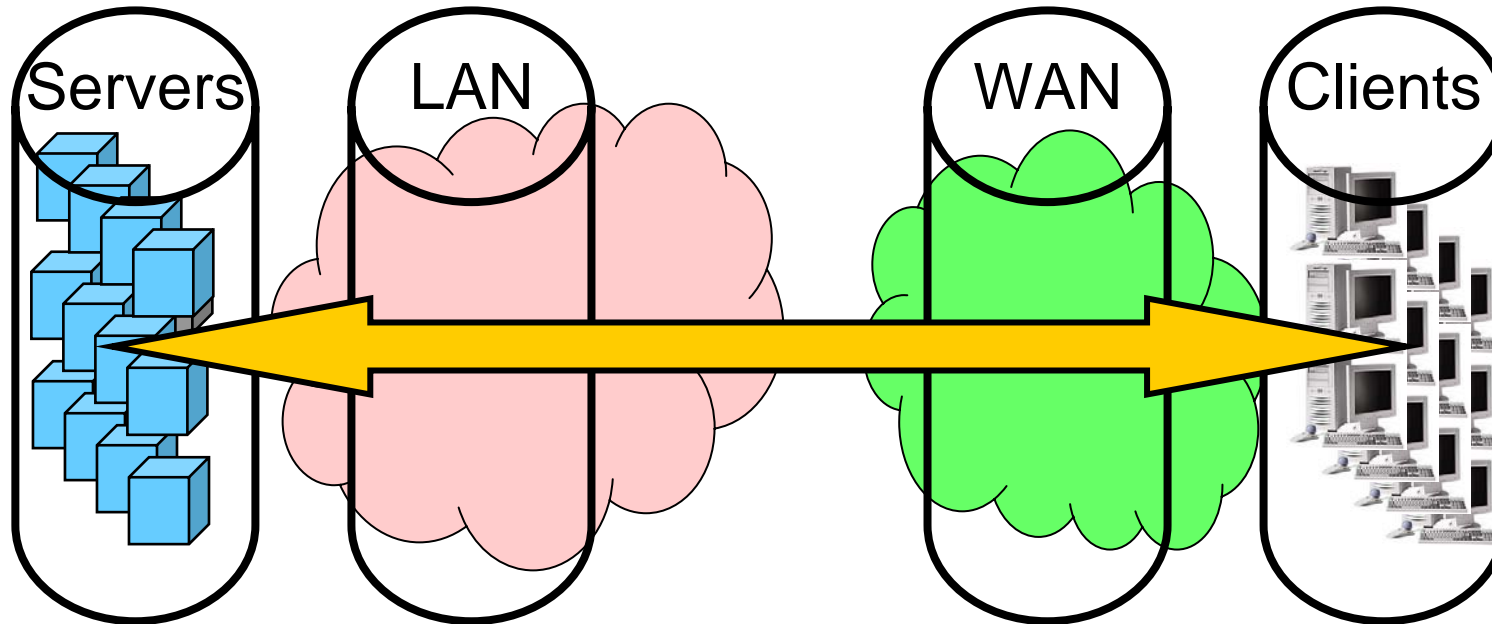
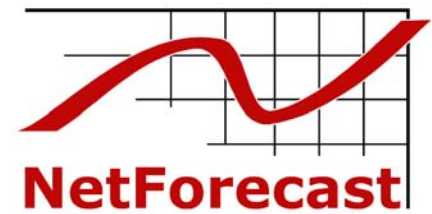
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Why Measure App Performance?



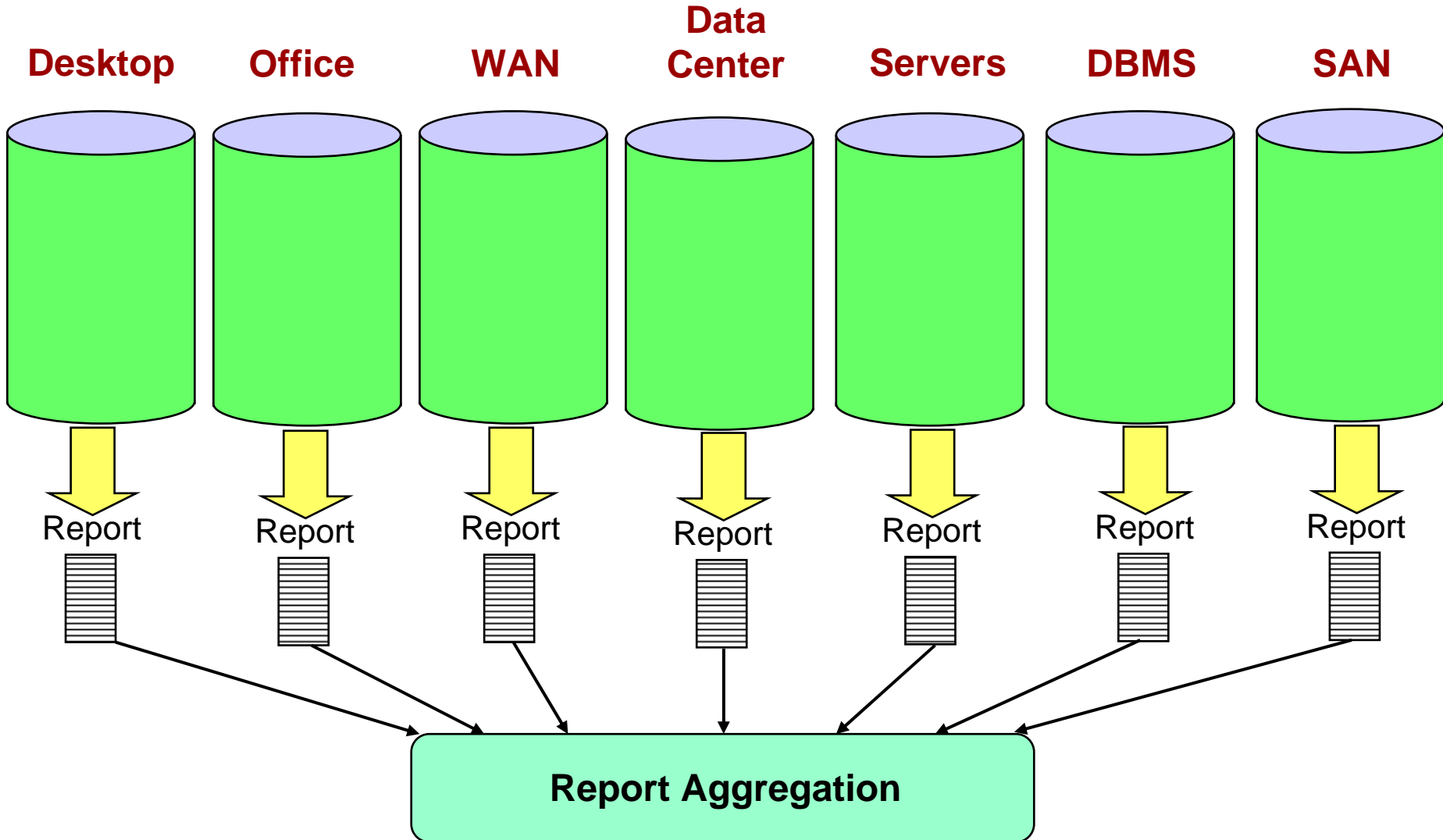
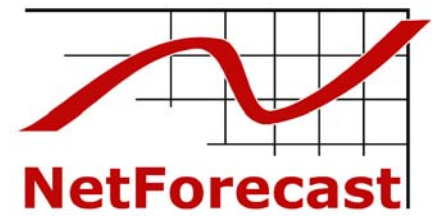
- **Applications are now critical to the Business**
 - Productivity of employees
 - Directly tied to revenue generating activities
 - Used by partners and/or customers
- **This is Business / IT Alignment**
 - IT is a critical resource to the Business
 - Need to insure applications operate at a performance level that supports the business
 - We require this kind of responsiveness from manufacturing, accounting, order entry, etc Must require this of our IT organization too
- **Quality management starts with measurement**

Why Measure App Performance?

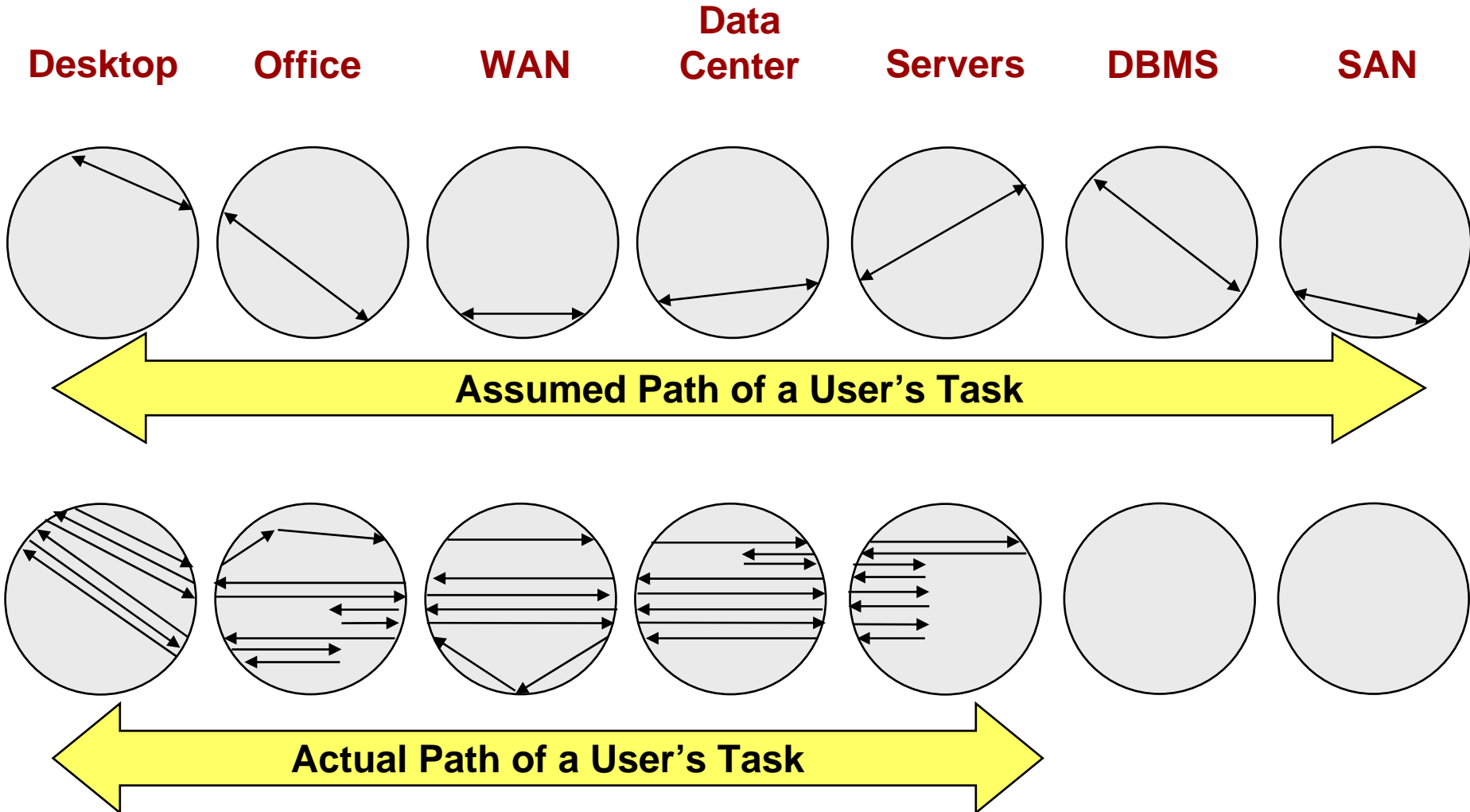
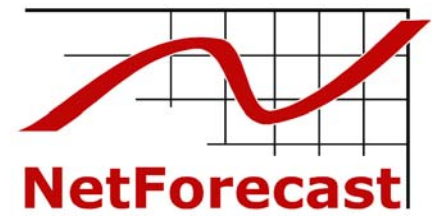


- Organizations often view infrastructure as silos
- Each group optimizes their own components
- No one measures across the infrastructure

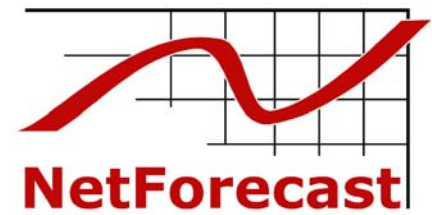
Typical Silo Management



Why Silo Performance Does Not Equal User Performance

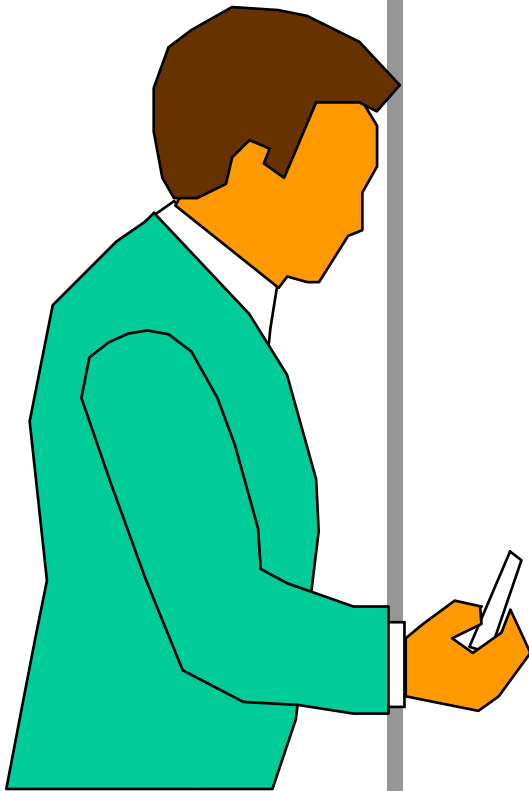


Why Measure App Performance?



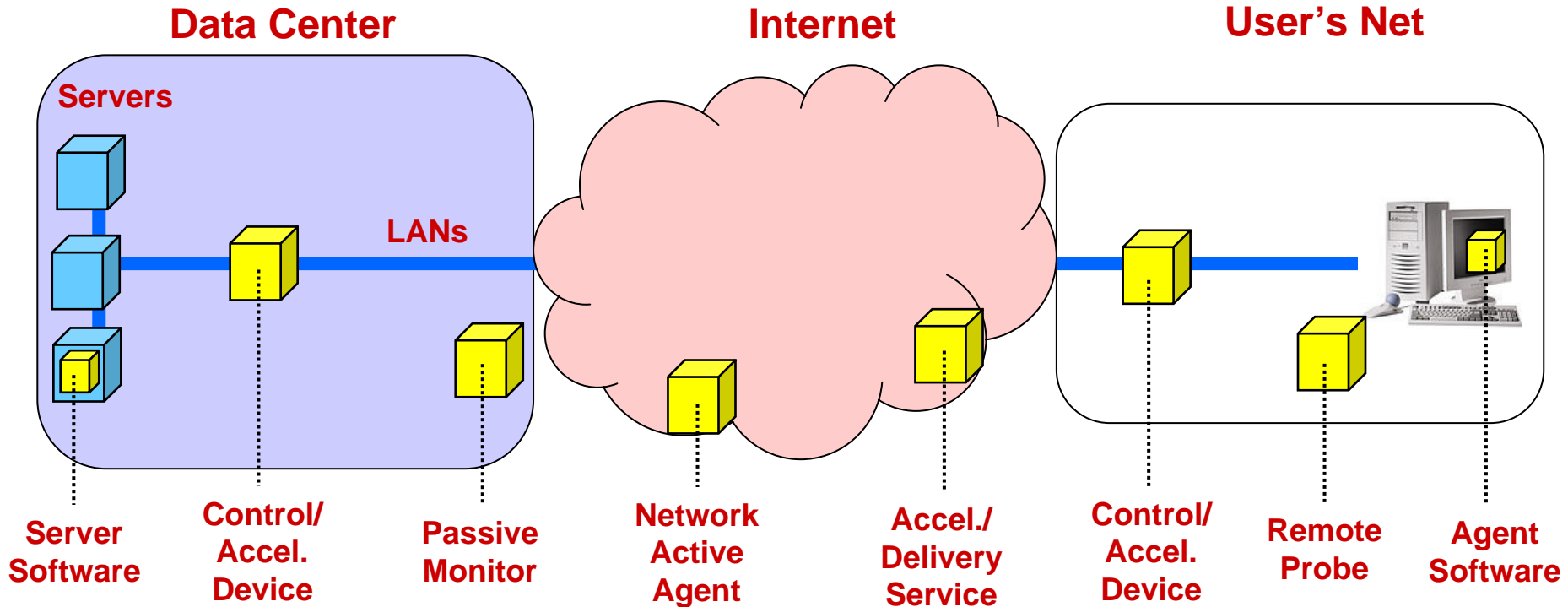
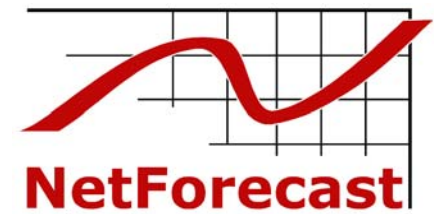
- **We have learned this lesson with Voice**
 - **Must test end to end to find problems**
 - **We have an index for measuring voice - MOS**

- **Step 2 – Tie measurement to Diagnostics**
 - **Know your performance**
 - **Find the problem**
 - **Define actions required quickly**



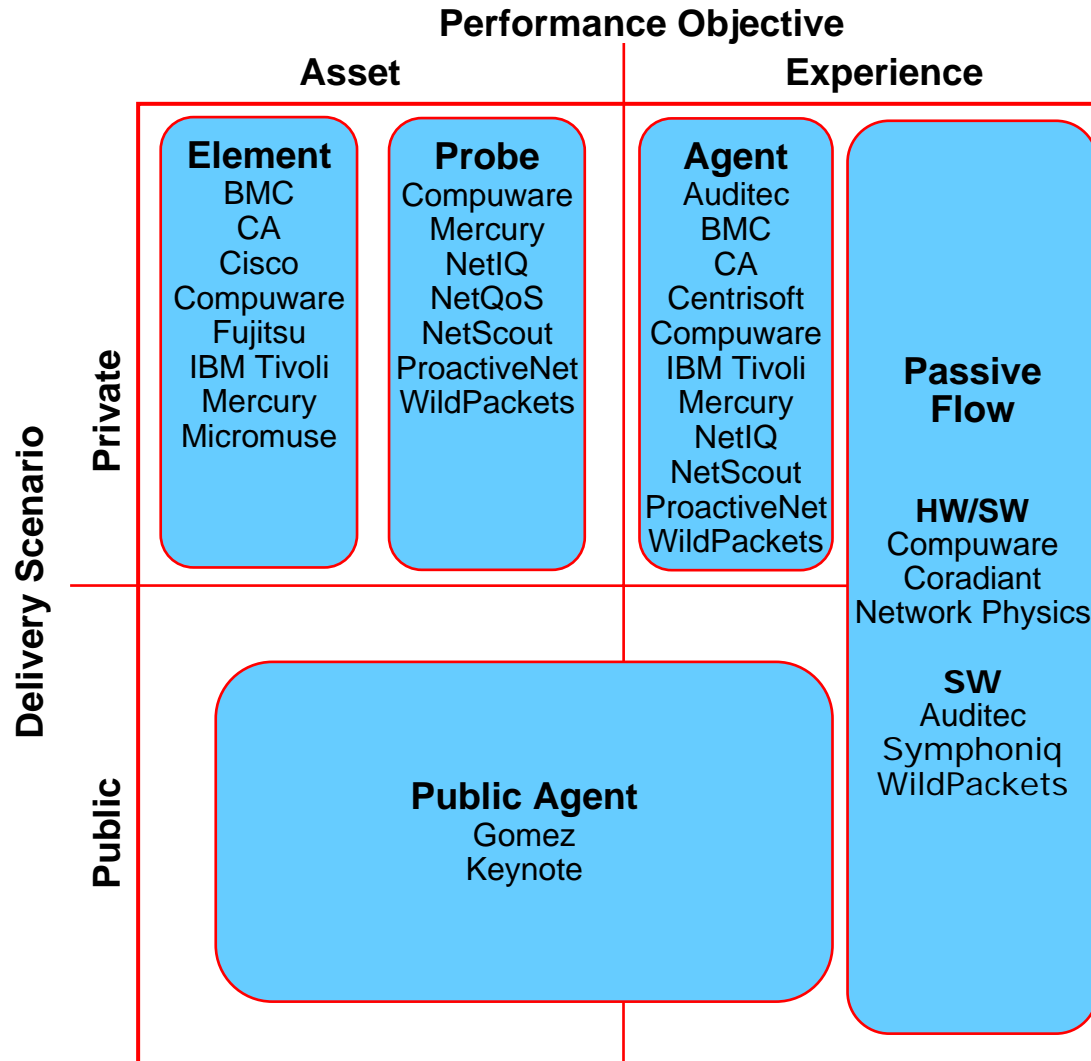
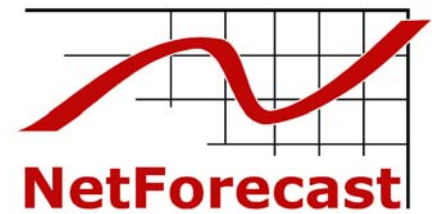
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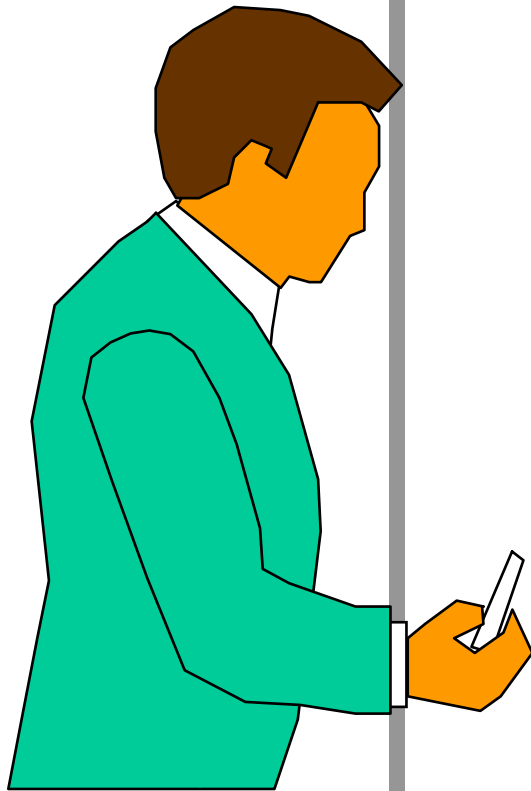
Measuring App Performance



- Many active or passive solutions exist
- There are inexpensive ways to get started
- NetForecast/BCR survey found a direct correlation between measuring and better overall application performance

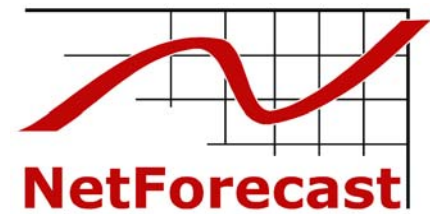
Measurement Vendors





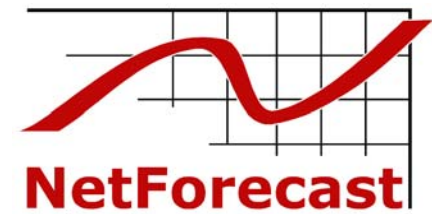
- Why Measure Application Performance
- How to Measure It
- **The Need for a Performance Index**

Reporting Application Performance



- **We Need an Index for Application Performance**
- **How do we measure performance today?**
 - Voice – MOS, scale of 1 to 5
 - Video – loss/latency/jitter (no good index yet)
 - Data Applications – task time or turn time?
 - IM – text delivery time?
 - Presence – presence update time?
- **How to aggregate values?**
 - How to combine values for a report group without losing information
- **How to present consistent answers across different types of applications?**

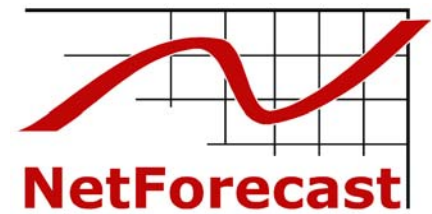
Existing Metrics Dashboard



Application	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	
Telephony	4.2	4.1	4.25	4.3	4.1	4.2	4.2	MOS
CRM-Data	4	3.5	4.2	4.1	3.8	3.4	3.4	Task Time (sec)
CRM-Voice	3.8	3.9	4.1	4.2	4.1	4.2	4.2	MOS
Citrix	1	1.2	2.5	2.4	2.6	1.2	1.1	Task Time (sec)
Presence	200	280	270	180	210	180	170	Update Time (ms)
Video	1.50%	1.40%	1.30%	1.40%	2.10%	0.40%	0.30%	Packet Loss (%)

- **Mixed metrics make finding the problems difficult**
- **Is a bigger number better, or a smaller number?**
- **Is 1.5% loss bad? Is 4 seconds for CRM good?**
- **How do I determine next steps?**

Deconstructing Data Application Transactions



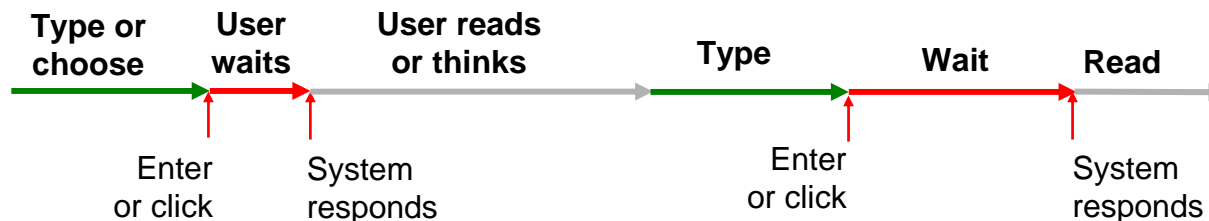
Session = Period of time that a user is “connected” to an application



Process = A group of user interactions that accomplish a goal



Task = Each interaction with the application during the session



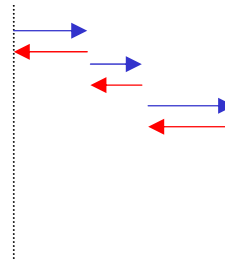
Deconstructing Application Transactions (con't)



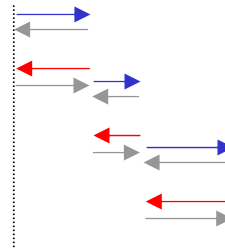
Wait



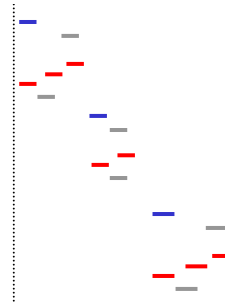
Turn = Each application client-and-server software interaction needed to generate a system response



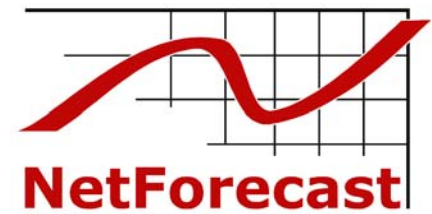
Protocol = Each TCP Open, ACK, retransmission, etc, required to operate a Turn and move Payload



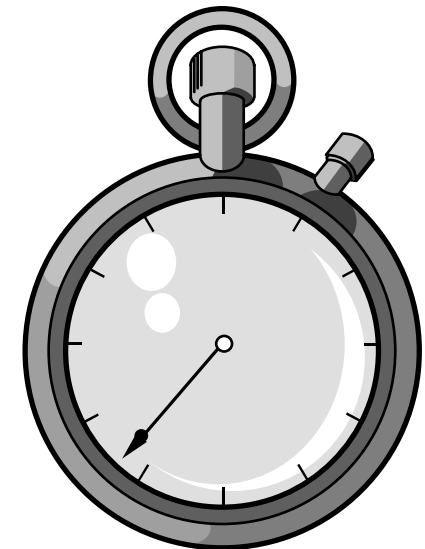
Packet = Each packet as seen on the wire in support of the above



The Task Defined



- **Task response time is the elapsed time required for an application system to respond to a human user input such that the user can effectively proceed with the process they are trying to accomplish**
 - Time when the user is waiting in order to proceed
 - User feels the *responsiveness* of the application
 - Long Task time makes the user less productive
- **The Task is what a user can time with a stopwatch**



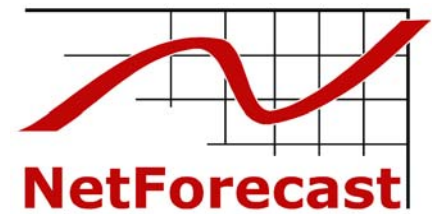
CA / Concord SPI



- CA / Concord proposes a Service Performance Index
- The primary goal is to aggregate many measurements of application performance into a single number
- “A Service Performance Index (SPI) is a number that reflects end-user experience in terms of response for a particular application” [1]
- This creates an index that reflects application performance for the report group
 - Users, application, time of day, geography, job type, customer type, etc.

[1] Driving Revenue and Productivity through Application Performance Management, Concord Communications White Paper

Viola – Service Level Index (SLI)



- **Viola Networks proposes a Service Level Index (SLI)**
- **“Today, most VoIP quality measurement systems will simply average aggregated scores together to produce a single MOS for the relevant grouping. When MOS scores are averaged together, the network manager examining the reports can quickly lose sight of the outlying poor quality calls.” [2]**
- **“The Service Level Index (SLI) is a weighted score showing the percentage of calls over the defined time period that meet the acceptable MOS threshold or are in the marginal threshold zone.” [2]**

[2] A Methodology for VoIP Service Measurement The Service Level Index (SLI), Eric Bear, Viola Networks White Paper, June 2006

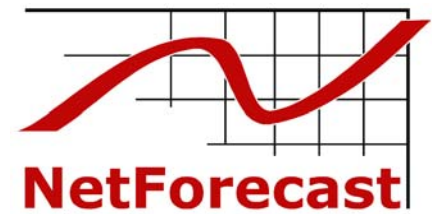
Application Performance Index (Apdex)

NetForecast

- The Apdex Alliance is a program of the IEEE-ISTO
 - IEEE Industry Standards and Technology Organization
- The **MISSION** of the Apdex Alliance is to develop open standards that define standardized methods to report, benchmark, and track application performance.
- The Alliance was formed in October, 2004
- Currently participation from more than 20 companies
- Two standards have been ratified
- Information at www.apdex.org

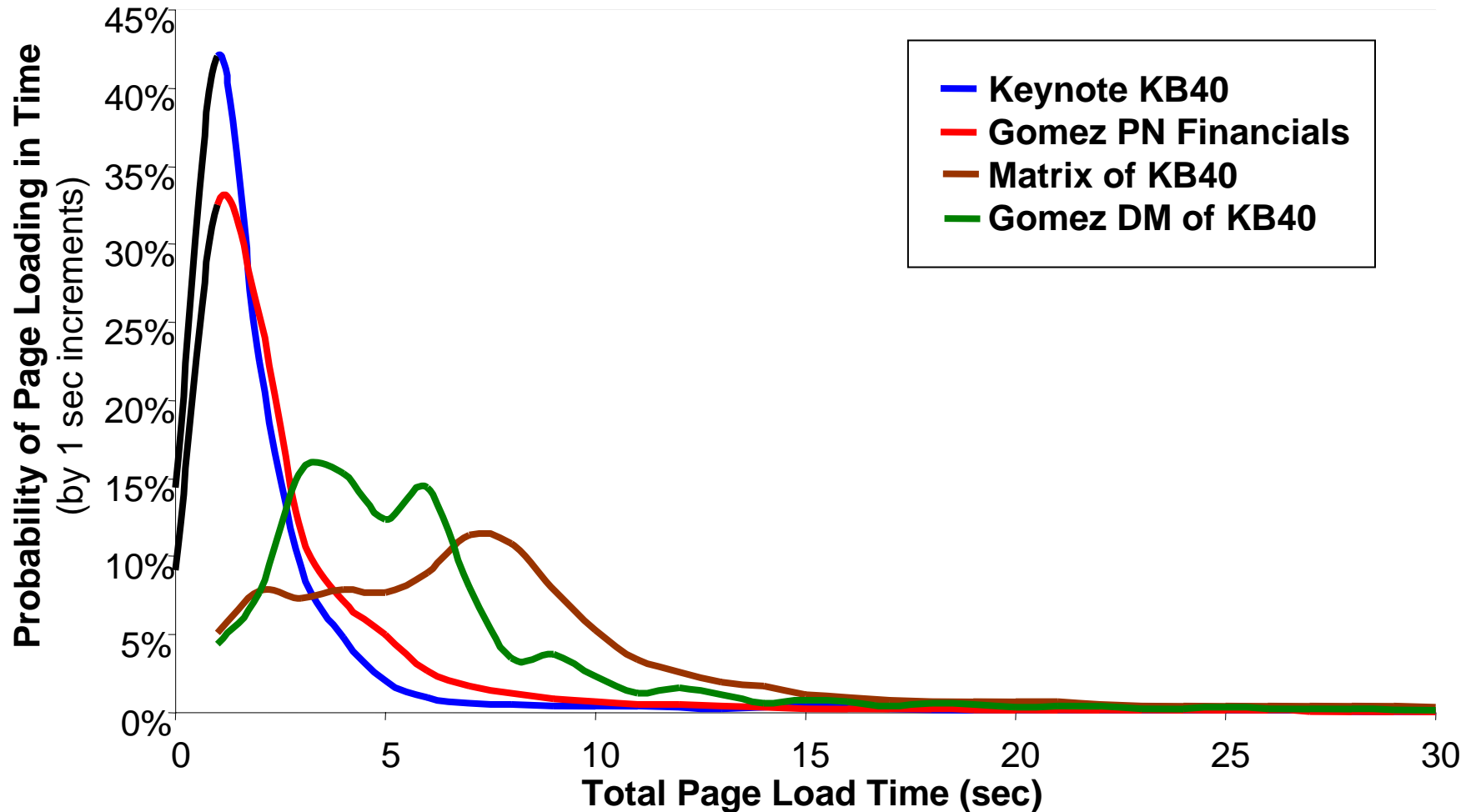
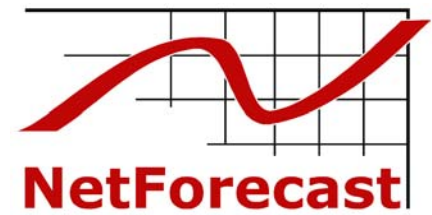


Apdex Defined

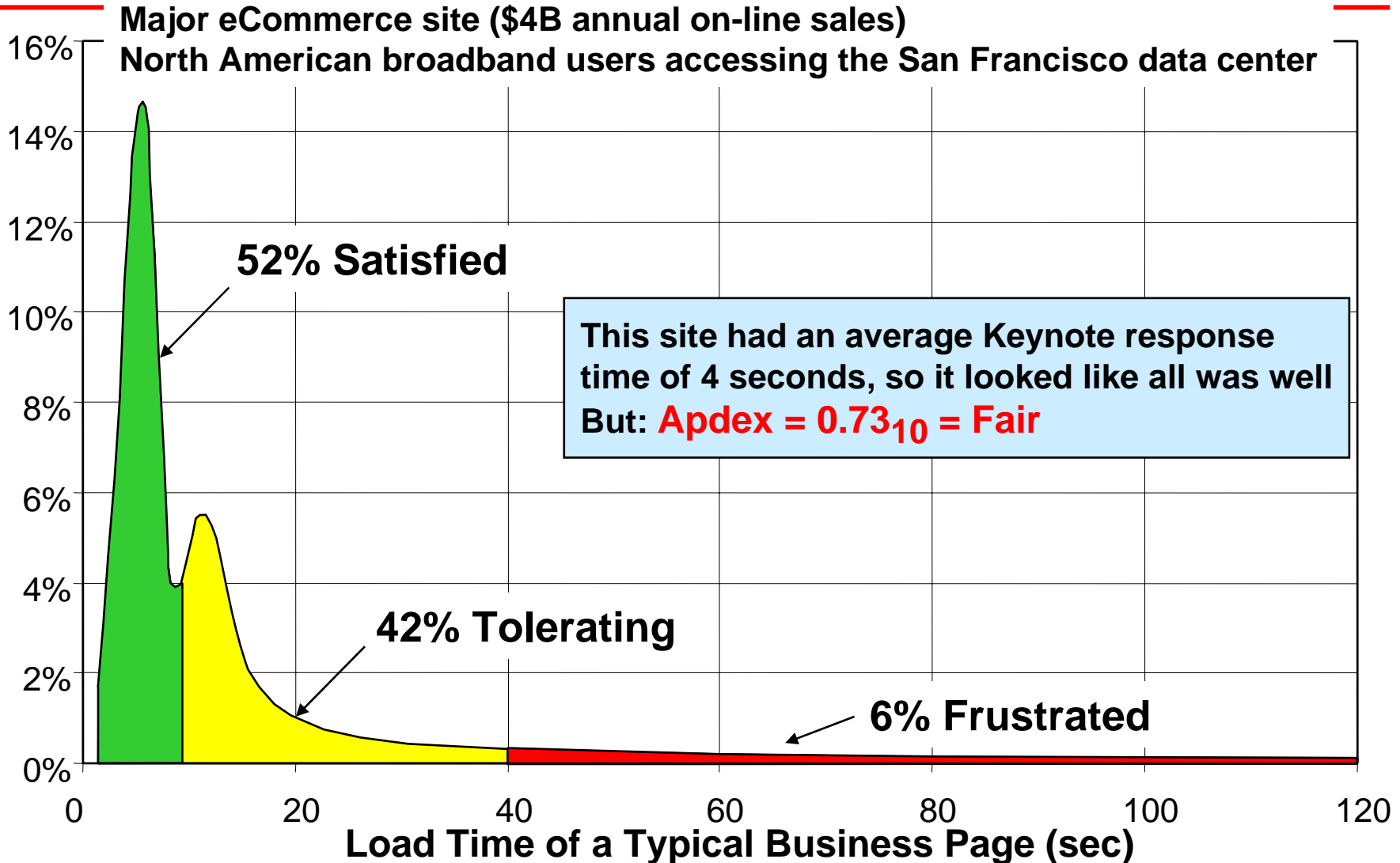
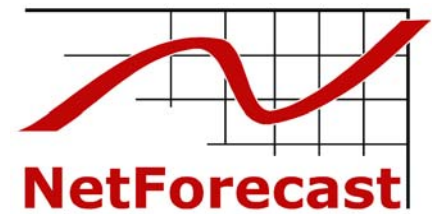


- **Apdex is a numerical measure of user satisfaction with the performance of enterprise applications**
- **It defines a method that converts many measurements into one number**
 - **Uniform 0-1 scale, 0 = no users satisfied, 1 = all users satisfied**
- **Standardized method**
 - **It is a comparable metric across all applications, and**
 - **Across enterprises**

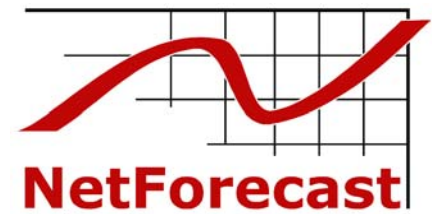
The Long Tail Problem



The Effect of the Long Tail on User Performance



How Apdex Works



- Start with a sufficient number of Task measurement samples
- Target response time “T” defines the satisfied zone (0-T sec)
 - T is shown as a subscript of all Apdex values (for example 0.80_T)
- Count the number of samples within three performance zones
 - Satisfied, Tolerating, Frustrated

Given

Target response time T and
Sufficient response time measurement samples

Then

$$\text{Apdex}_T = \frac{\text{Satisfied count} + \frac{\text{Tolerating count}}{2}}{\text{Total samples}}$$

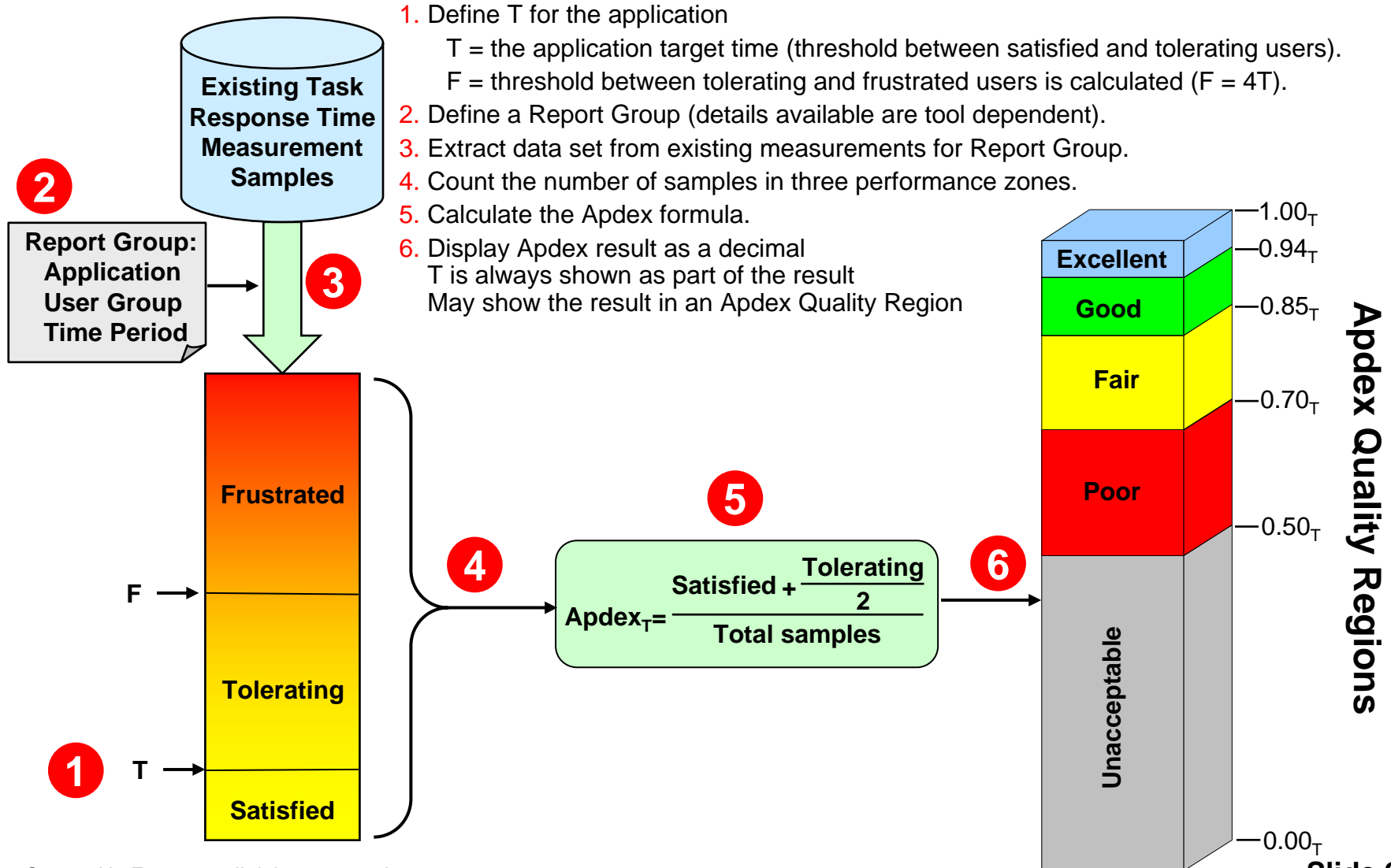
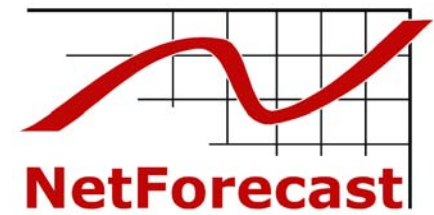
Note

Frustrated samples are not in numerator
but are counted in total samples

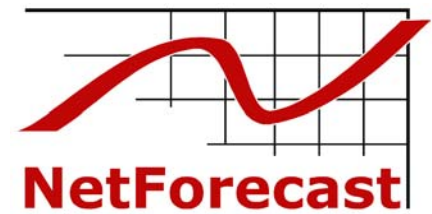
Index

0 = Failure; 1 = Perfection (all users satisfied)

Putting it All Together

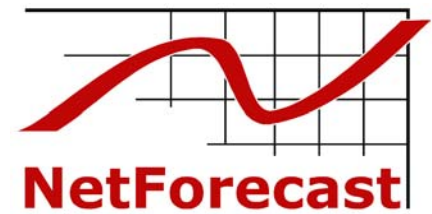


Aggregation of Values



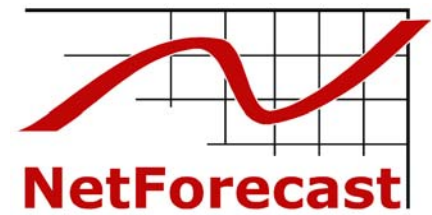
- **Today there is no ‘standard’ way of aggregating measurements for reporting**
- **Averaging loses outliers, which may be important**
 - Example, 500 calls, 450 at MOS 4.2, 50 at MOS 3.0
 - Average MOS for 500 calls = 4.08
 - SLA Threshold of 4.0 indicates all calls were OK
- **Max and Min values tell little about infrastructure problems that need to be addressed**
- **Standard Deviation is not well understood, and is relative to the measurement (i.e. is not a normalized index)**

Normalization



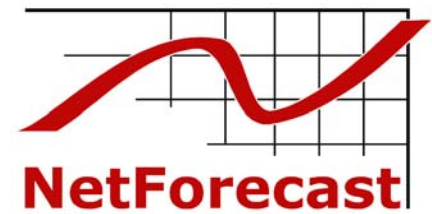
- **An Index can provide a Normalized answer**
- **Index provides a single scale (e.g. 0 to 1) for any measurement type**
 - **Normalize between types (MOS, PSQM, R)**
 - **Normalize between expectations (cell vs toll vs broadband)**
 - **Normalize to the specific requirements of each business**
- **Comparable to data application measure, thus:**
- **Able to manage combined voice / data applications**

Apdex Vision



- **Create an index that can aggregate data, voice, video, presence and other measurements into a single number to measure the performance of the application**
- **Make this number comparable to the existing Apdex for data applications**
- **Allow vendors to provide a dashboard with easy to understand results from a range of measurement techniques for voice applications, data applications and combined applications**

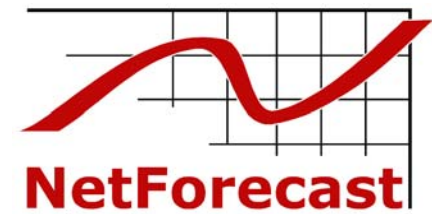
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Apdex Vision



Application	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Telephony	0.92	0.93	0.95	0.96	0.96	0.95	0.97
CRM-Data	0.97	0.97	0.96	0.95	0.96	0.97	0.96
CRM-Voice	0.89	0.88	0.97	0.97	0.97	0.96	0.97
Citrix	0.95	0.96	0.89	0.88	0.87	0.95	0.95
Presence	0.95	0.96	0.97	0.96	0.94	0.95	0.95
Video	0.89	0.85	0.89	0.84	0.83	0.92	0.92

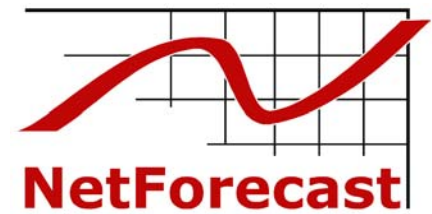
0 = bad
1 = good

↑
Tune QoS

↑
Deploy ADS
Technology

- Enterprise IT reports Apdex for business critical applications
- Management determines spending priorities based on value of application performance to the business
- Results demonstrated in Apdex index

Business / IT Alignment



- **Apdex can be a key reporting methodology for supporting business / IT alignment**
- **Businesses decide what level of application performance or quality is required for their success**
- **IT measures and reports based on those requirements using the Apdex methodology**
- **IT then justifies network expenditures based on real requirements from business units on capabilities required to support their needs**

Questions?

Thank You



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