

# Application Performance Management Using Apdex

**NCACMG Seminar**  
**June 7, 2007**

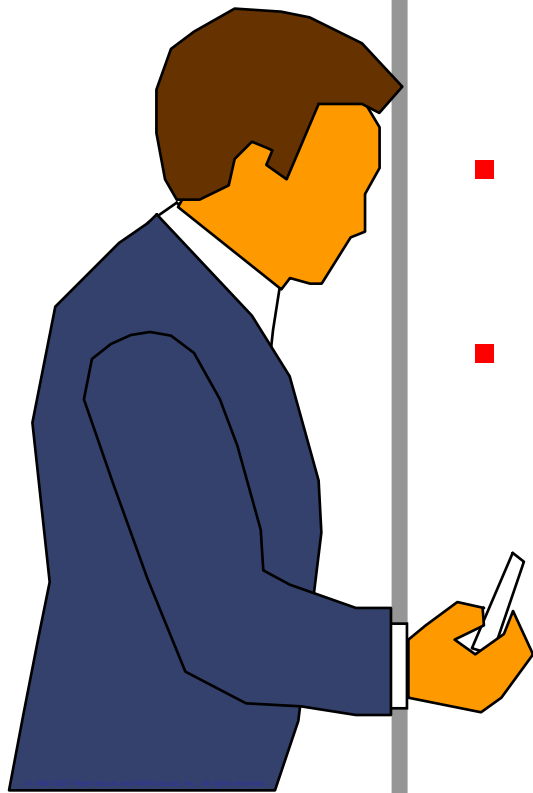


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# Outline



- **Apdex: Application Performance Index**
- **Apdex Case Study**

# Two Views of Performance



## **ITIL:** Information Technology Infrastructure Library

- “Achieving both high financial quality and value in IT operations,” *Wikipedia*
- **Make sure all the system elements are operating**
  - Alarms, drill-downs, root cause analysis, time to repair
- **Make sure there is sufficient capacity**
  - Load analysis, capacity planning, resource deployment
- **Axiom: If all the parts are working and nothing is overloaded, then performance is good enough**

**Inside**

## **APM:** Application Performance Management

- “Ensure that application performance meets or exceeds end-users’ and businesses’ expectations”, *Wikipedia*
- **Make sure that users are productive**
  - Link performance to the business
- **Operate a continuous quality improvement process**
  - Bring six-sigma thinking to IT
- **Axiom: If all the users get satisfactory experience all the time, then performance is good enough**

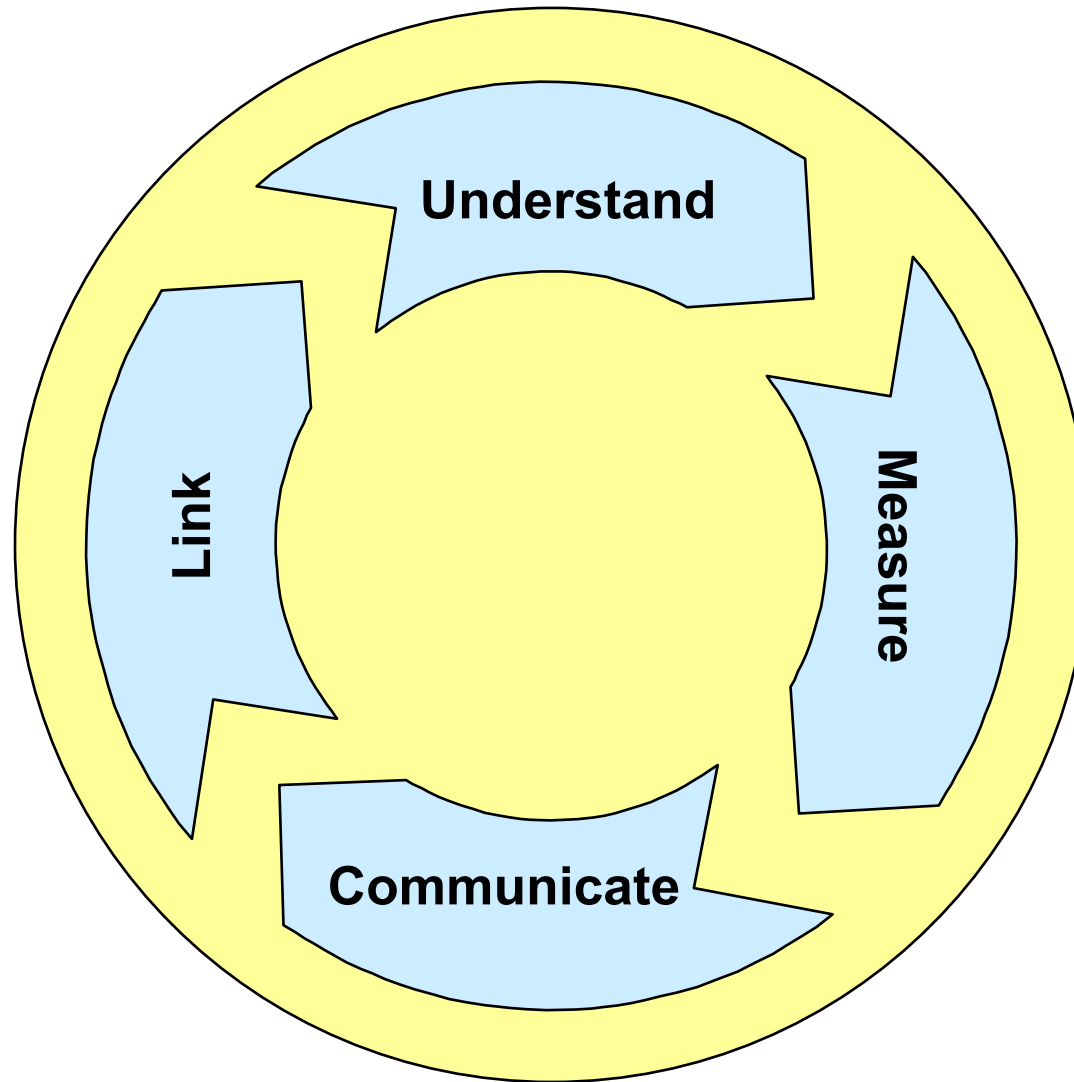
**Outside**

# Application Performance Management (APM)



- **APM is the ongoing monitoring and improvement of applications to support business needs**
  - Recognized need to actively manage application performance
  - Applications are critical to the business
  - The user experience with the applications is what really matters
    - Response time is the leading edge indicator of other performance issues
- **Four process stages (best practices) make APM work well**
  - **Understand**
    - Know your applications, users, and requirements
  - **Measure**
    - Properly measure key aspects of application performance
  - **Communicate**
    - Provide relevant performance reports to management
  - **Link**
    - Show specific business-performance links

# APM Continuous Improvement Cycle



# Using Apdex for APM



- **Apdex is an open standard**
  - Numerical measure of user satisfaction with the performance of enterprise applications
  - Reflects effectiveness of IT investments in supporting business objectives
  - Developed by the Apdex Alliance, an independent not-for-profit organization ([www.apdex.org](http://www.apdex.org))
  - Lets you leverage the knowledge-base of the Apdex community
- **The Apdex method helps improve APM best practices**
  - **Understand**: Provides a common language by which to discuss response time with users
  - **Measure**: Defines a framework to select effective solutions among the various measurement approaches
  - **Communicate**: Converts confusing measurement data into a simple index that is easy to understand outside the IT organization
  - **Link**: Enables structured involvement by corporate management to set performance targets and SLA goals

# Today's Problem: Many Numbers, Little Insight

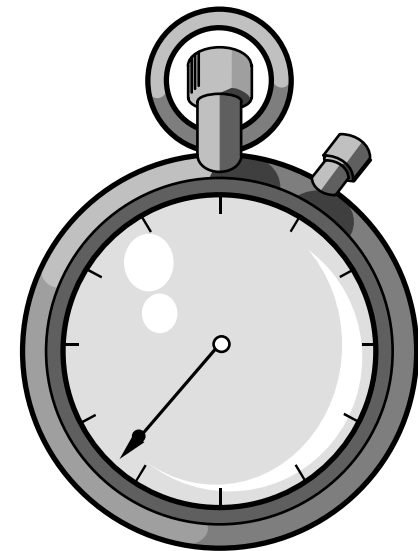


*Which application is in trouble?*

	<b>Measured Response Time (seconds)</b>				
	<b>App A</b>	<b>App B</b>	<b>App C</b>	<b>App D</b>	<b>App E</b>
<b>Day Average</b>	6.0	12.5	3.1	8.4	2.0
<b>Best Hour</b>	5.0	6.8	2.8	4.1	1.7
<b>Worst Hour</b>	18.6	18.9	8.6	19.3	6.5
<b>95<sup>th</sup> Percentile</b>	8.1	17.3	10.7	12.9	9.5

# 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**



# How Users View Application Task Performance



- **Satisfied**
  - User maintains concentration
  - Performance is not a factor in the user experience
  - Time limit threshold is unknowingly set by users and is consistent
- **Tolerating**
  - Concentration is impaired
  - Performance is now a factor in the user experience
  - User will notice how long it is taking
- **Frustrated**
  - Performance is typically called unacceptable
  - Casual user may abandon the process
  - Production user is very likely to stop working

# 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<sub>T</sub>)
- Count the number of samples within three performance zones
  - Satisfied, Tolerating, Frustrated

## Given

Target response time T and  
Sufficient response time measurement samples

## Then

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

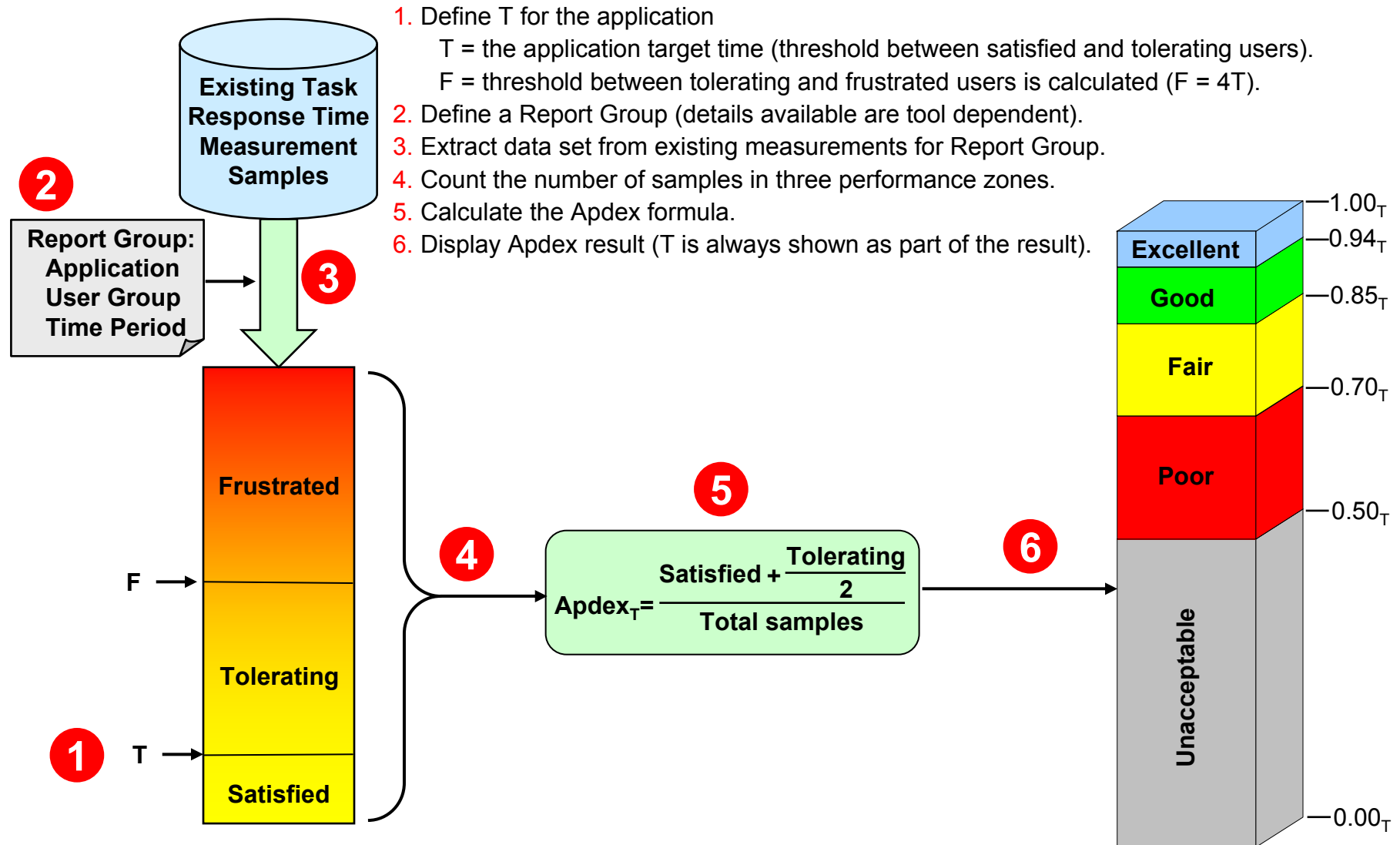
## Note

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

## Index

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

# Putting it All Together

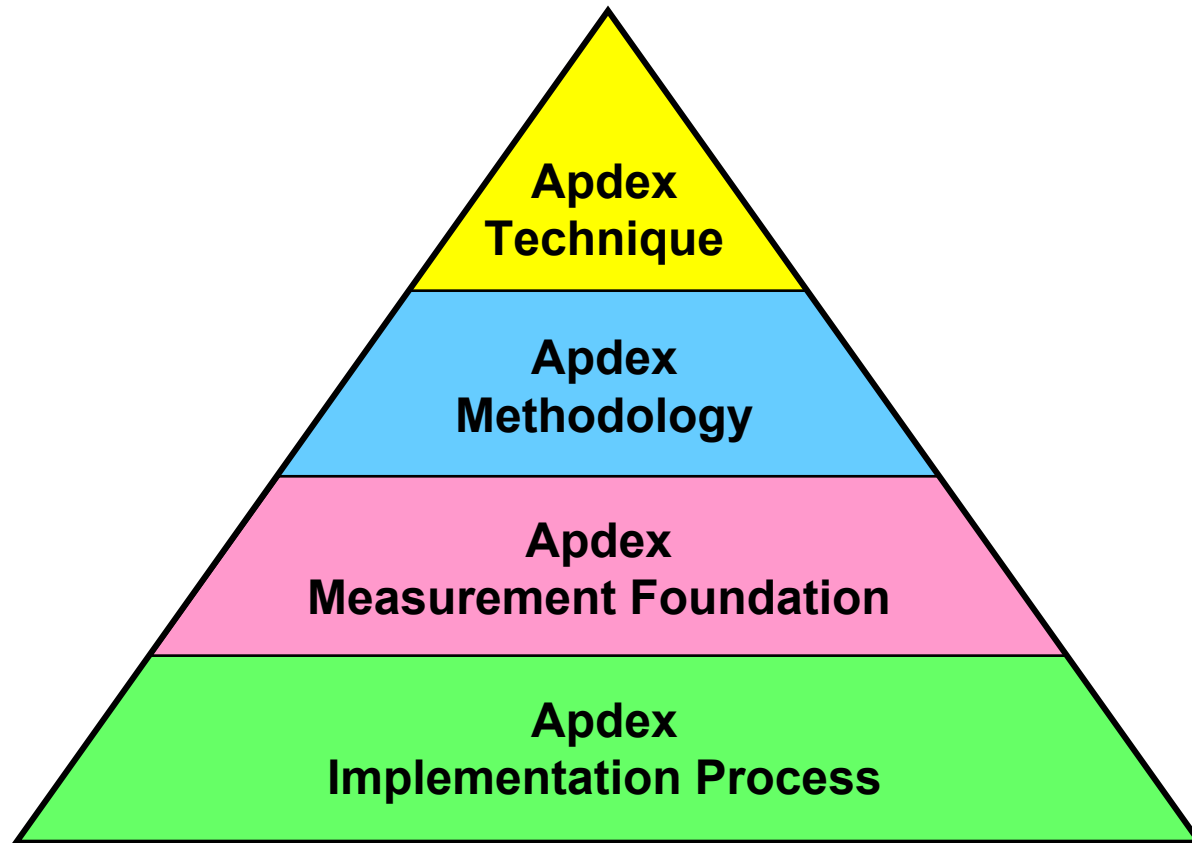
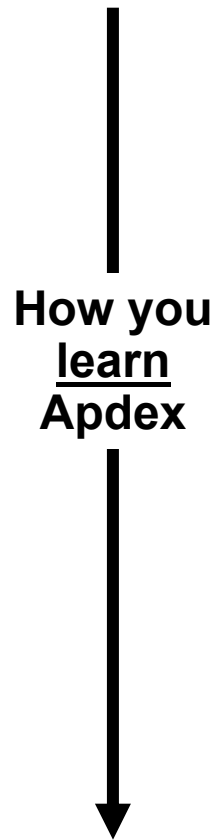


1. Define T for the application  
T = the application target time (threshold between satisfied and tolerating users).  
F = threshold between tolerating and frustrated users is calculated (F = 4T).
2. Define a Report Group (details available are tool dependent).
3. Extract data set from existing measurements for Report Group.
4. Count the number of samples in three performance zones.
5. Calculate the Apdex formula.
6. Display Apdex result (T is always shown as part of the result).

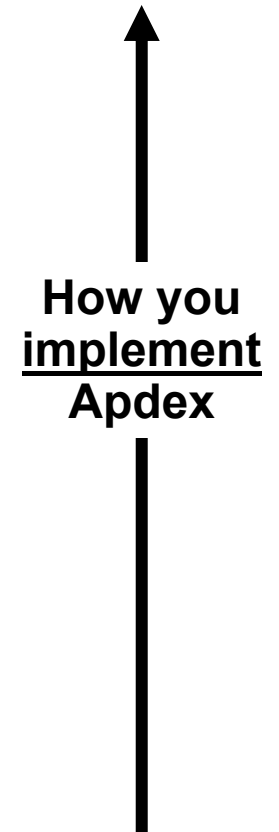
# How Apdex Parts Fit Together



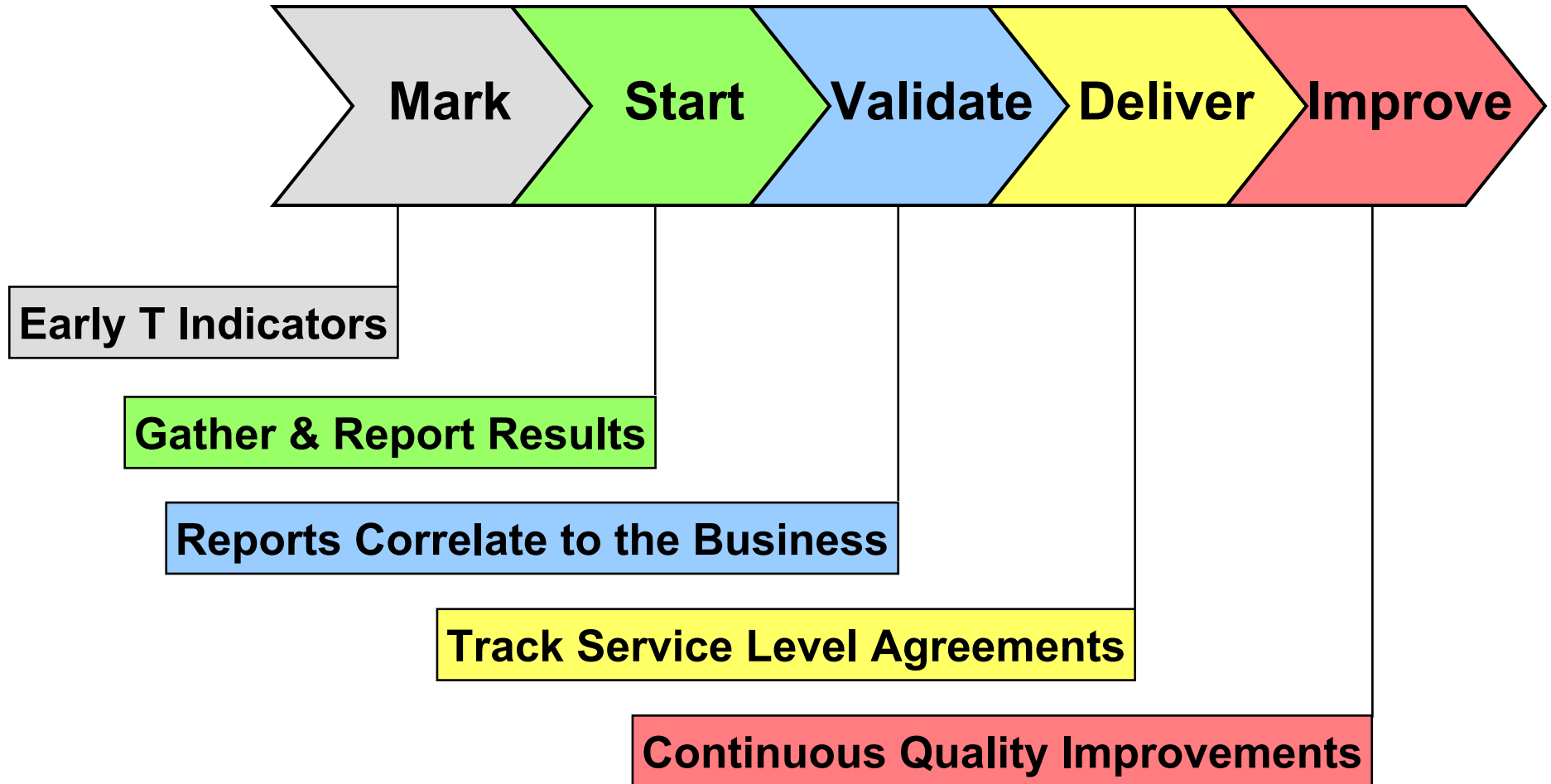
Top-Down



Bottom-Up



# Apdex Methodology



# The Apdex Alliance



- **Apdex Alliance mission is to develop open standards that define methods to report and benchmark application performance**
  - Open collaborative approach
- **Organization**
  - **Contributing Member – Charge to be formally associated**
    - Corporate membership for organizations active in IT performance
  - **Supporting Member – Free**
    - Individual interested in applying the Apdex methodology within their organization and supporting the goals of the Apdex Alliance
- **Apdex is FREE**
  - You can use Apdex in your organization or a commercial product
  - You or your organization do not need to join Apdex to use Apdex
  - You join to learn more and be plugged into the community

# Current Members

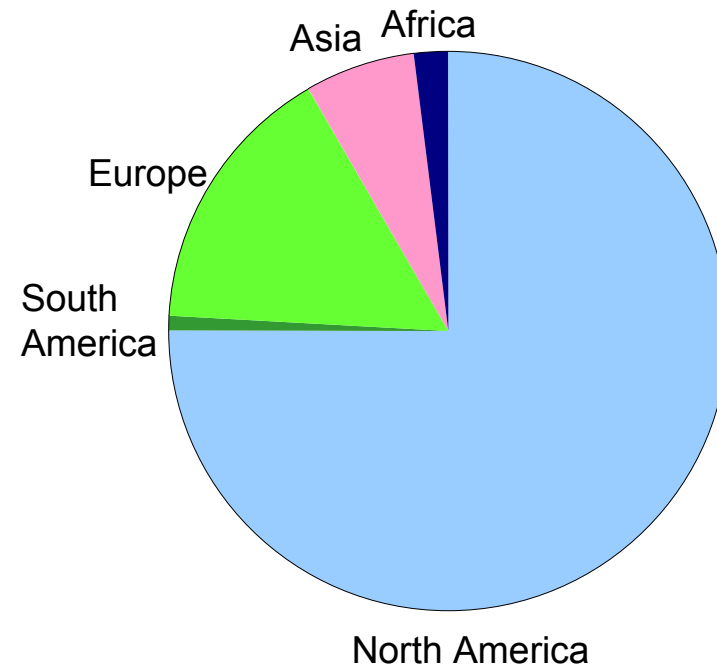


- **Contributing Members**

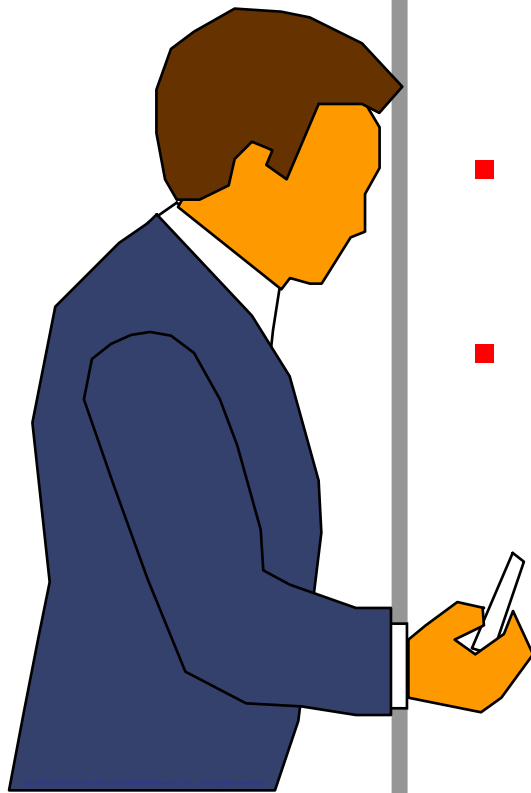
- Auditec
- Compuware
- Gomez
- Juniper
- Keynote
- NetForecast
- Akamai/Netli
- Network Physics
- Packeteer
- WildPackets

- **Supporting Members**

- More than 300 global participants



# Outline



- **Apdex: Application Performance Index**
- **Apdex Case Study**

# Case Study Measurements



- **NetForecast has been using synthetic agents to measure the response time of the Apdex Contributing Member's web sites**
  - Home pages of ten web sites (mostly in the US)
  - Five “user” locations where the agents are located
    - California, Colorado, Florida, Minnesota, and New York
  - Measurement every 15 minutes
- **We generated three different reports of performance**
  - Each report uses the exact same measurement data
  - These are three different views of the same raw numbers
  - They represent three levels of APM sophistication

# Deviation From Normal

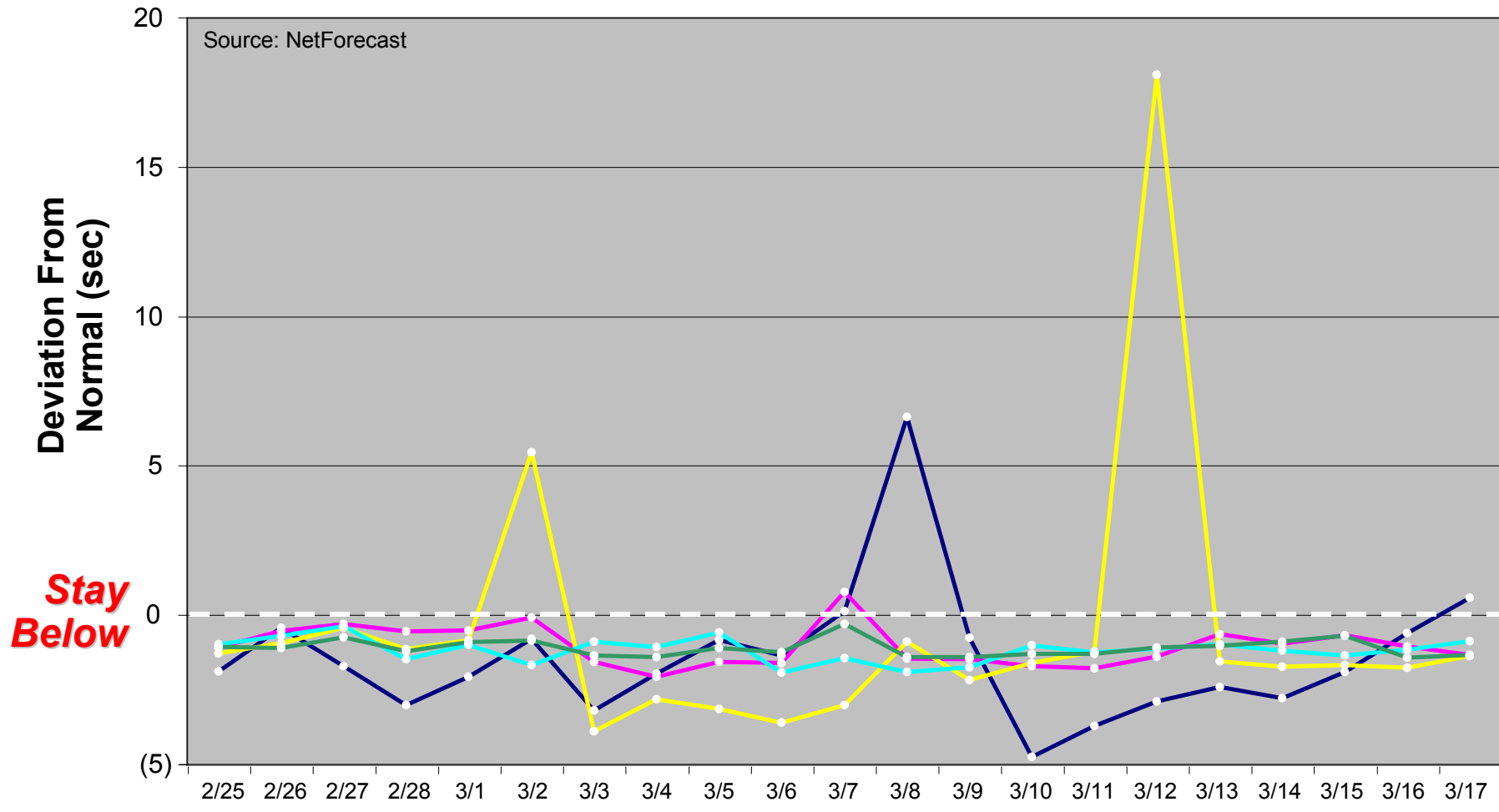


- **Simplest approach**
  - No conversation with the application users or management
  - Let the data report on itself
- **How it works**
  - Rolling average per region plus 50% to define an automated threshold
  - Show each region-day *average* as the delta to the threshold
    - Negative means that the day was below the threshold which is desired

# Deviation From Normal



California Colorado Florida Minnesota New York

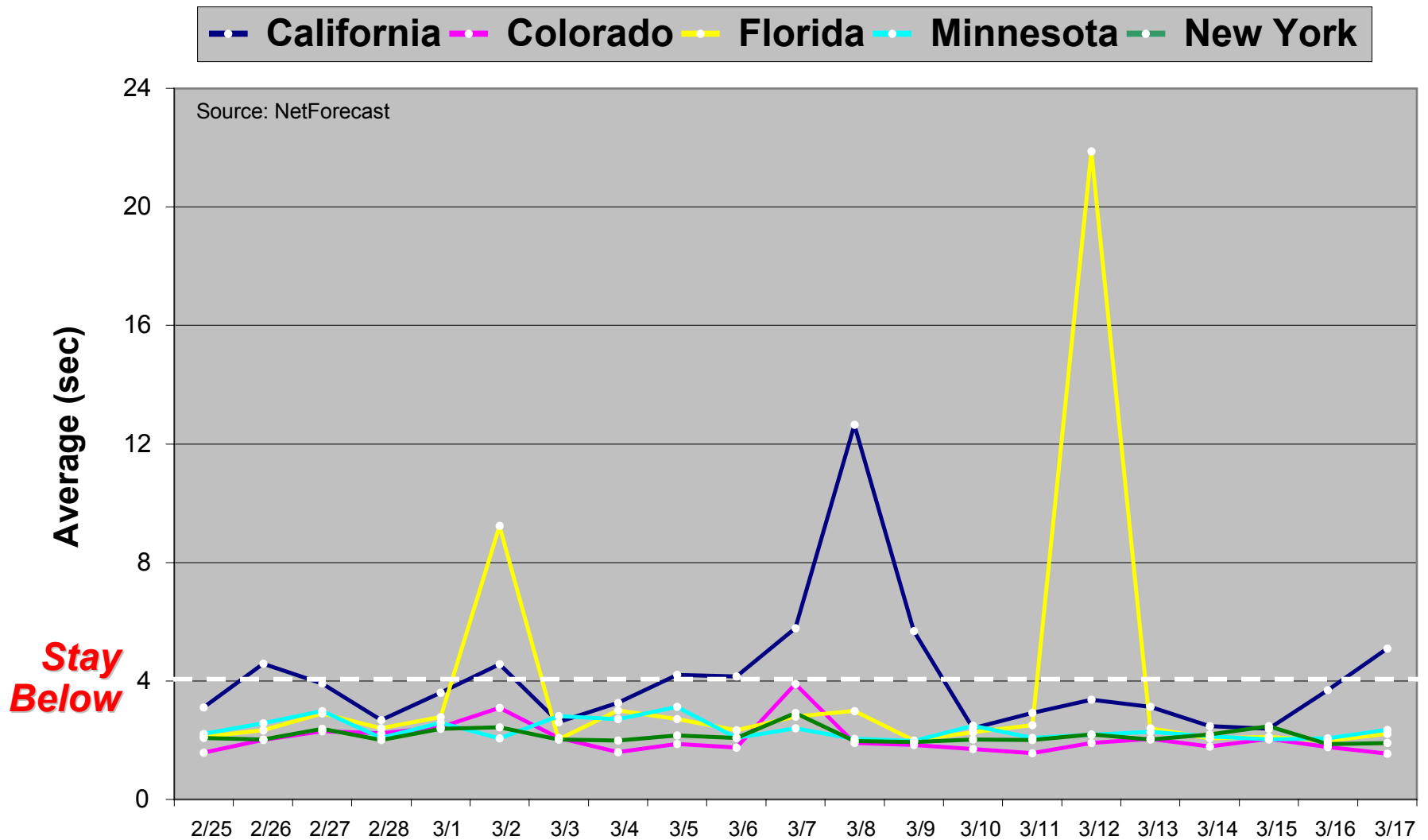


# Average With Threshold



- **More proactive APM**
  - Engage some corporate management in the process
  - Figure out a specific threshold that represents the good/poor performance boundary
- **How it works**
  - In this case, we define a business-to-business response time threshold of 4 seconds
    - Many sources point to a B-to-B target of 4 seconds
  - Track the region-day *averages* against the target
    - Below the threshold is good

# Average With Threshold

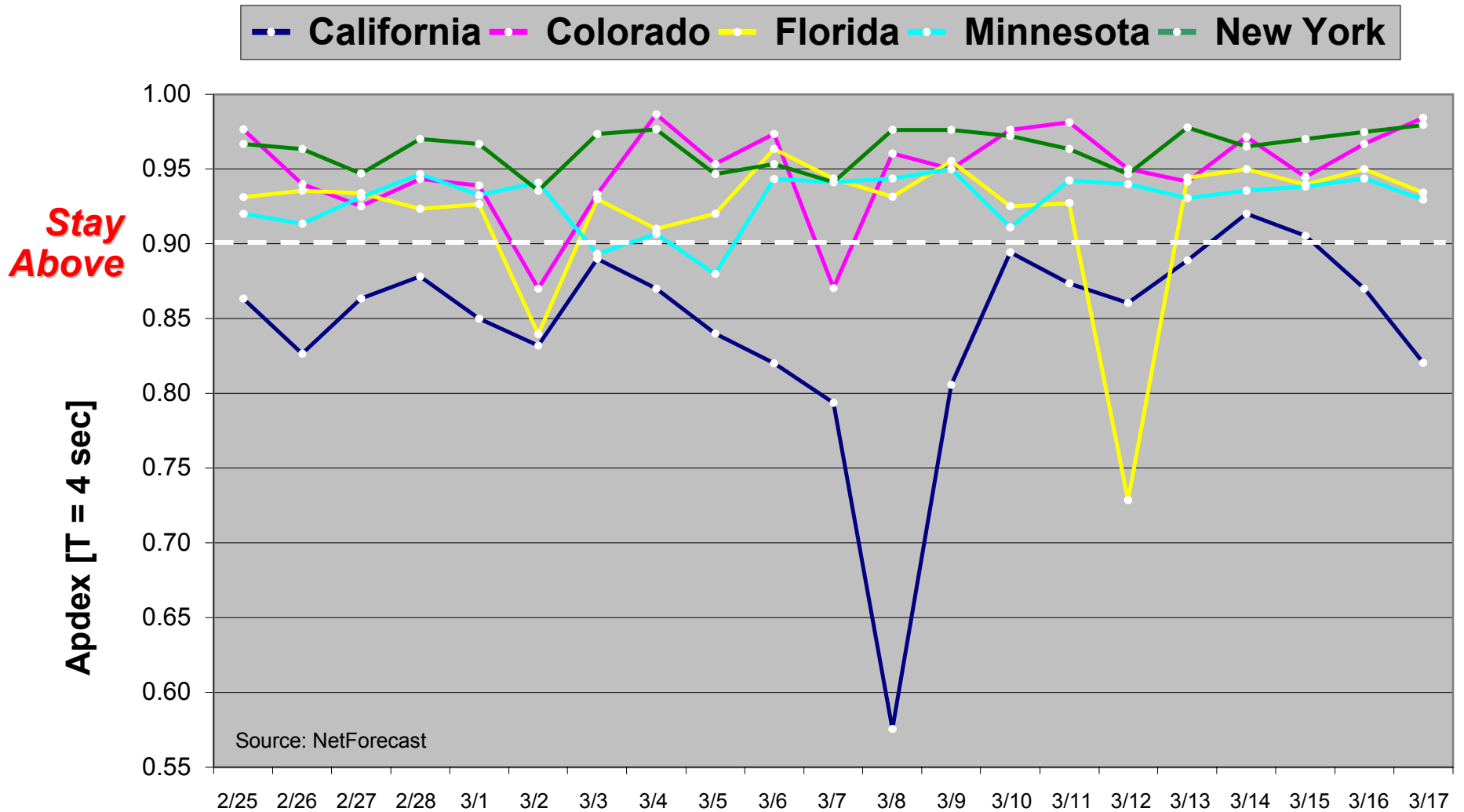


# Apdex With Objective



- **Apdex-based SLA**
  - Requires a two-part management dialog: T and service objective
- **How it works**
  - **Define Apdex T**
    - T is the threshold between satisfied and tolerating performance as seen by the user
    - In this case, the same 4 seconds is used
  - **Define the Apdex performance objective**
    - How high on the Apdex scale of 0 to 1 should we deliver?
    - In this case, 0.90 (just below excellent 0.94) was chosen
    - Track the region-day *Apdex* scores against the objective
      - Above is good

# Apdex With Objective

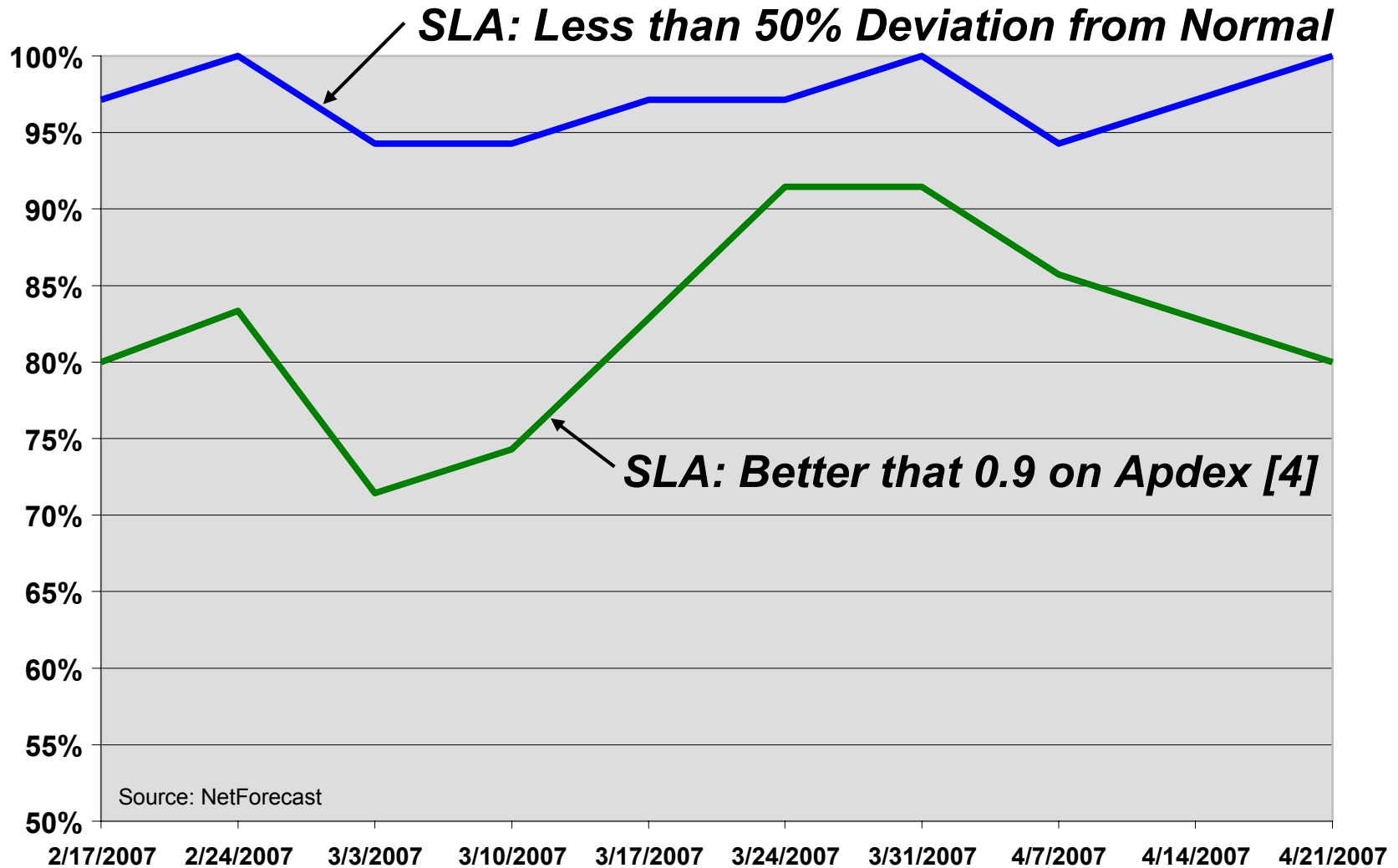


# What the Three Views Say

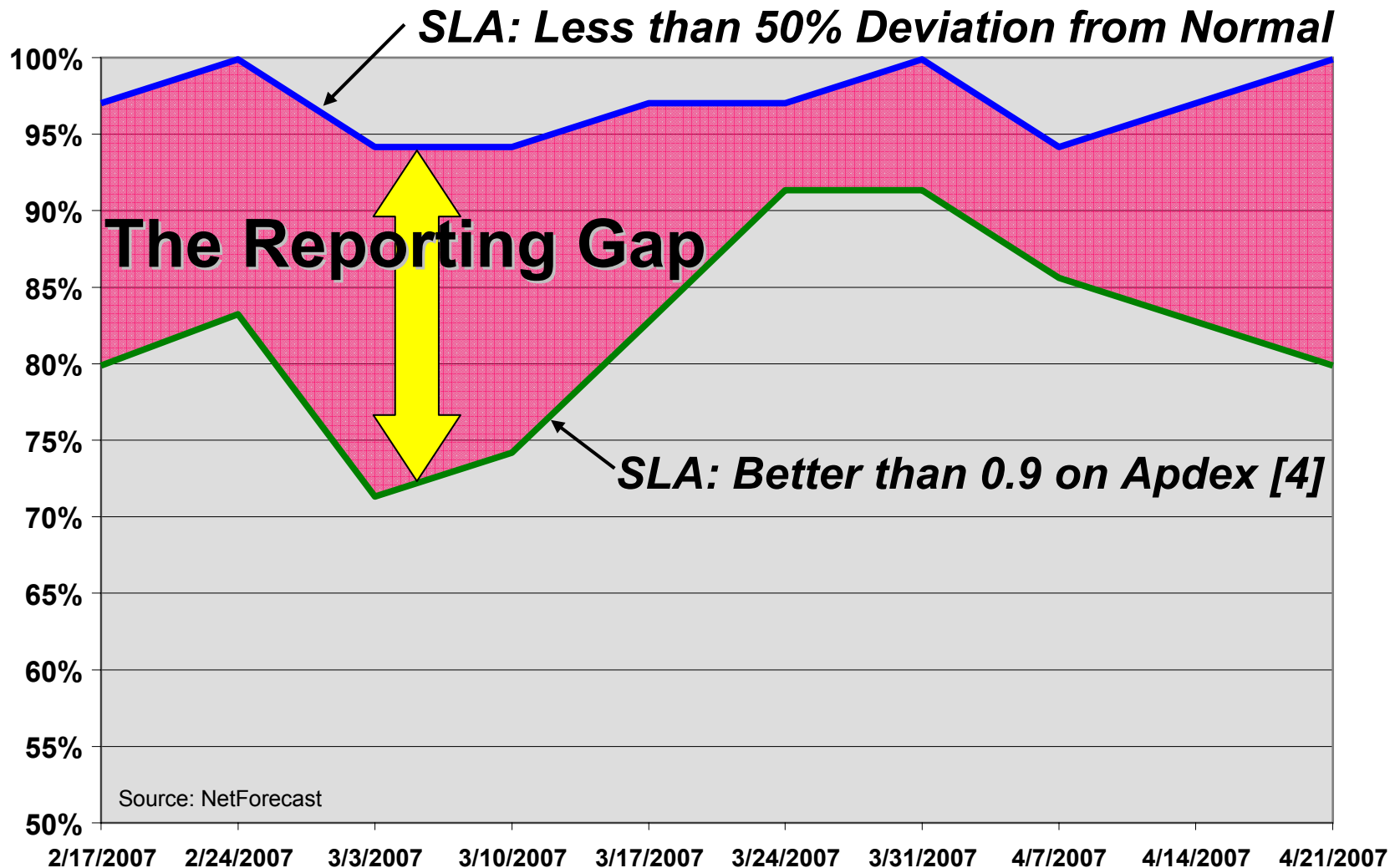


- **Which regions are chronically in trouble?**
  - Deviation From Normal: None
  - Average With Threshold: None
  - Apdex With Objective: California
- **What were the worst performance problems?**
  - Both averaging methods say that the worst event was Florida on 3/12
  - But Apdex shows that the California 3/8 incident actually impacted users the worst

# Region-Days Meeting Their SLA by Week



# Averages Under-Report Actual Performance



# Summary



- **Apdex is a better view of measurement data**
  - Apdex results are more granular (spread out) than averages
  - Apdex finds incidents that are washed away by averaging
  - Apdex provides more valuable information
  - Eliminates the problem of under-reporting the real user experience
- **Apdex supports APM best practices**
- **Apdex is a better foundation for meaningful SLAs**
  
- **Please join the Apdex community**
  - Sign up to be a supporting member

# Thank You



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Information about Apdex and joining  
the Apdex Alliance is at [www.apdex.org](http://www.apdex.org)