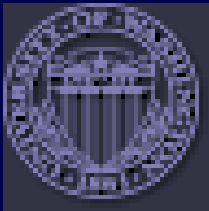


Classification of Major Event Days

Presented by Cheryl A. Warren, National Grid & James D. Bouford, National Grid

Additional Authors: Richard D. Christie, Dan Kowalewski, John McDaniel, Rodney Robinson, David J. Schepers, Joseph Viglietta, and Charlie Williams

July 14, 2003

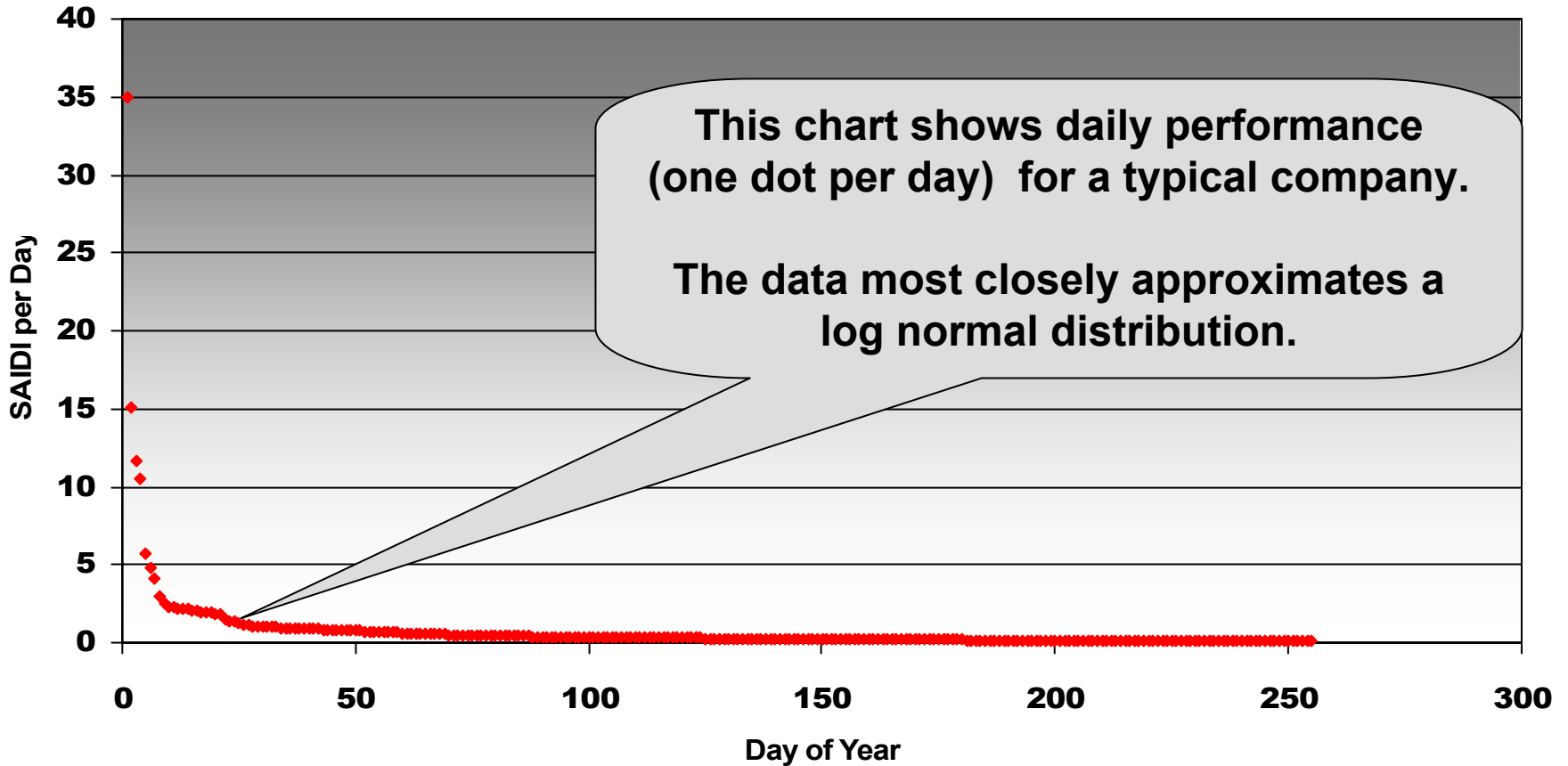


Methodology Development

- ◆ **IEEE WG on System Design, that has over 130 members, developed the “2.5 Beta methodology” in P1366/D12.**
 - ◆ **Members include utility employees, regulatory staff, employees from manufacturers, consultants and academics.**
- ◆ **Several methods were tested and rejected because they did not meet the basic requirements stated in foundations of the process.**

A View of Reliability Performance

SAIDI per Day



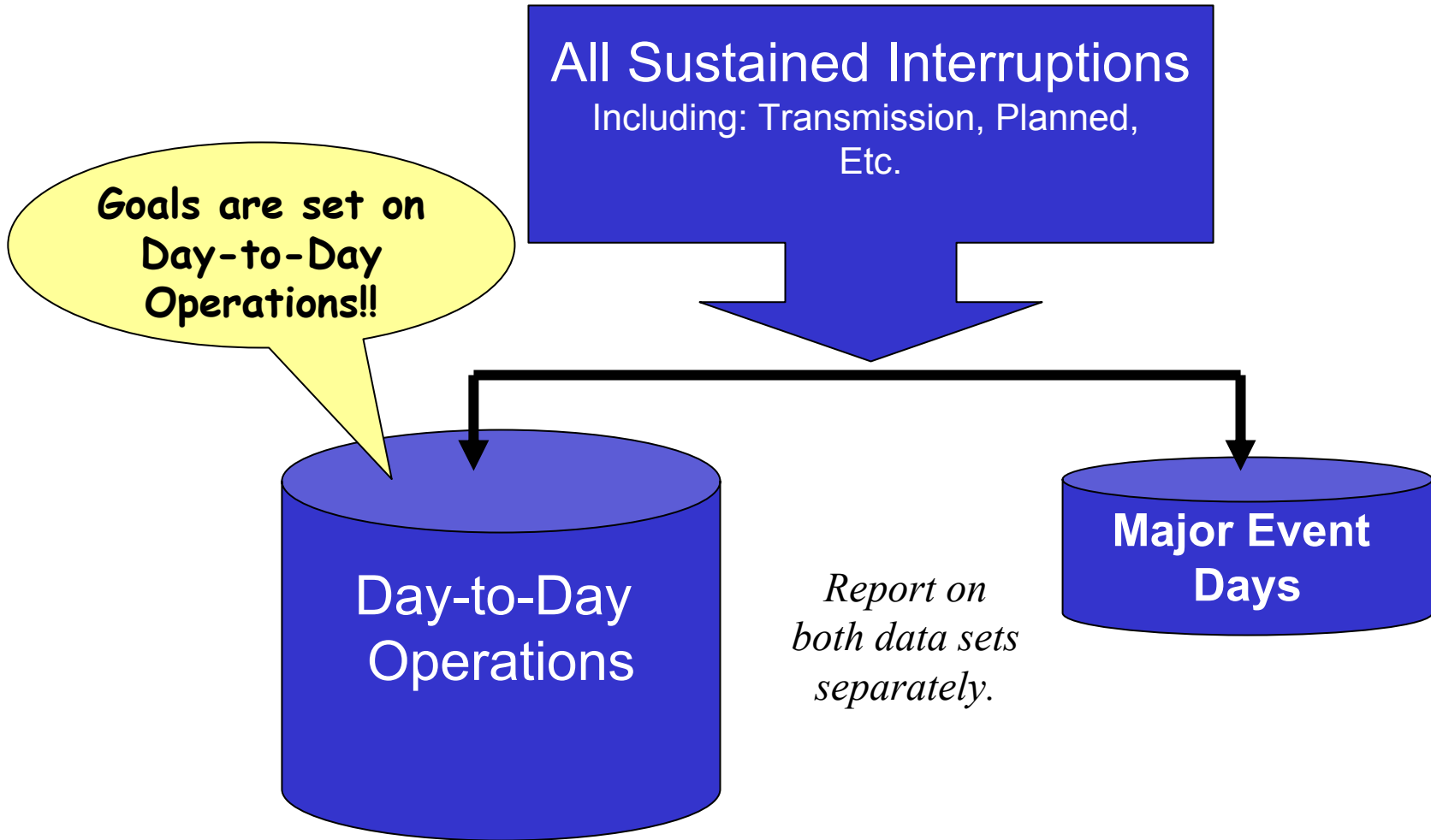
Benefits of the Approach

- ◆ **Adoption of the 2.5 Beta methodology**
 - ◆ **will allow for calculation of reliability metrics**
 - ◆ **provide Companies and commissions with a more accurate indication of a Company's controllable service quality results**
 - ◆ **allow a review of the response to crisis mode events**
 - ◆ **a less distorted indication of the reliability results for Companies of all sizes**

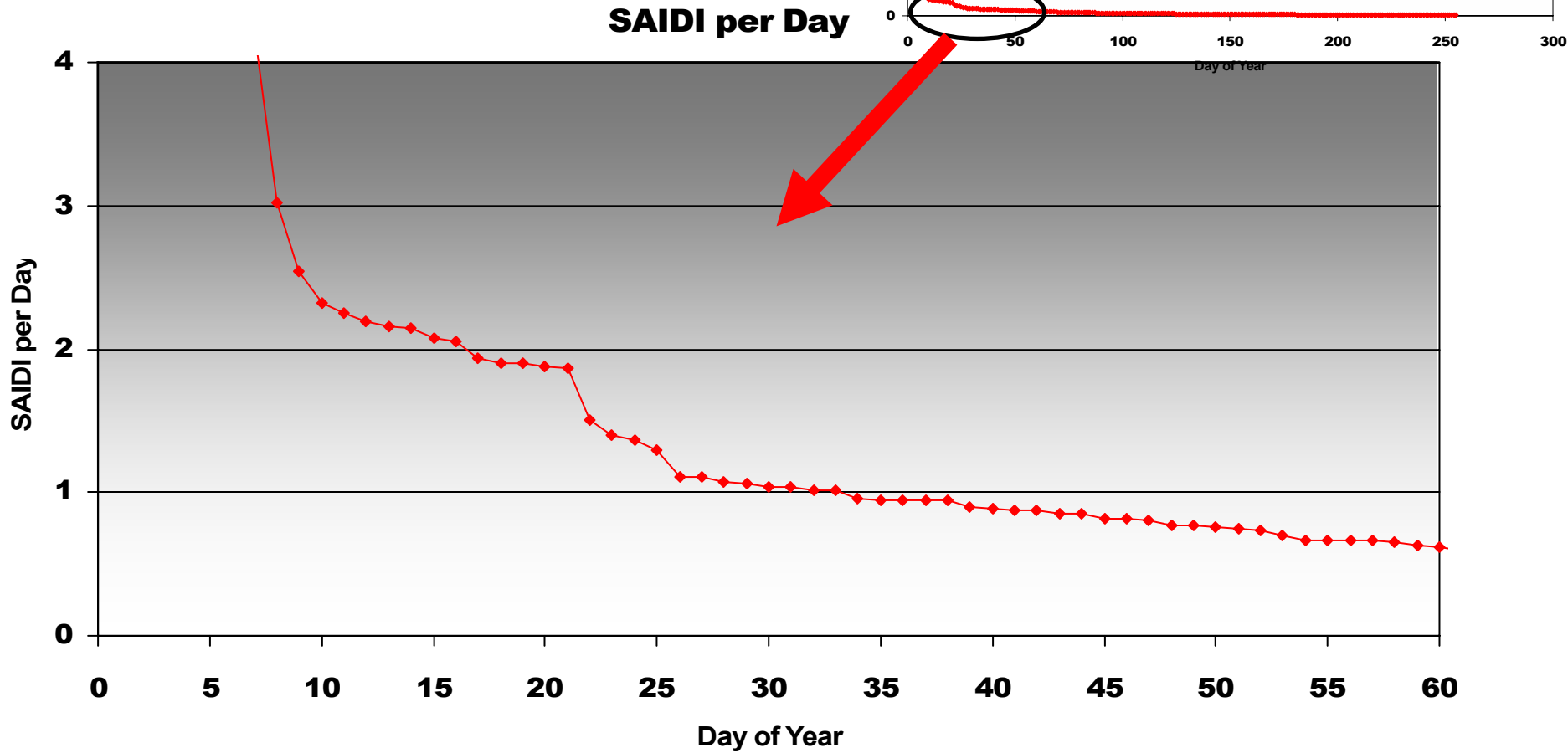
Two Categories for Measurement

- ◆ The 2.5 Beta Methodology allows segmentation of reliability data into **two** distinct sets.
 - ◆ One set represents those events of such a reliability magnitude that a **crisis mode** of operation is required to adequately respond. (**major events**).
 - ◆ The other set represents the reliability impact of those events that a company has staffed to respond to in a manner that does not require a crisis mode of operation. (**day-to-day operation**).

Major Events versus Day to Day Operations



Reliability Performance



Foundations of the Process

- ◆ **Definition must be understandable by all and easy to apply.**
- ◆ **Definition must be specific and calculated using the same process for all utilities.**
- ◆ **Must be fair to all utilities.**
 - ◆ **Large and small, urban and rural....**
- ◆ **SAIDI was chosen as the indicator because it is size independent and it is the best indicator of system stresses.**

Foundations of the MED Definition

- ◆ **Purpose is to partition the data into daily performance and major event days.**
- ◆ **Major event days are days where the system operational and/or design limits are exceeded.**
- ◆ **We suggest**
 - ◆ **Using day-to-day events for trending, internal goal setting, and Commission mandated targets.**
 - ◆ **Separately reporting performance during major events.**

Methodology Described

1. Collect values of daily SAIDI for five sequential years ending on the last day of the last complete reporting period. If fewer than five years of historical data are available, use all available historical data
2. If any day in the data set has a value of zero for SAIDI, do not include that day in the analysis.
3. Take the natural logarithm (\ln) of each daily SAIDI value in the data set.
4. Find α (Alpha), the average of the logarithms (also known as the log-average) of the data set.
5. Find β (Beta), the standard deviation of the logarithms (also known as the log-standard deviation) of the data set.
6. Compute the major event day threshold, T_{MED} , using the equation:

$$T_{MED} = e^{(\alpha + 2.5\beta)}$$

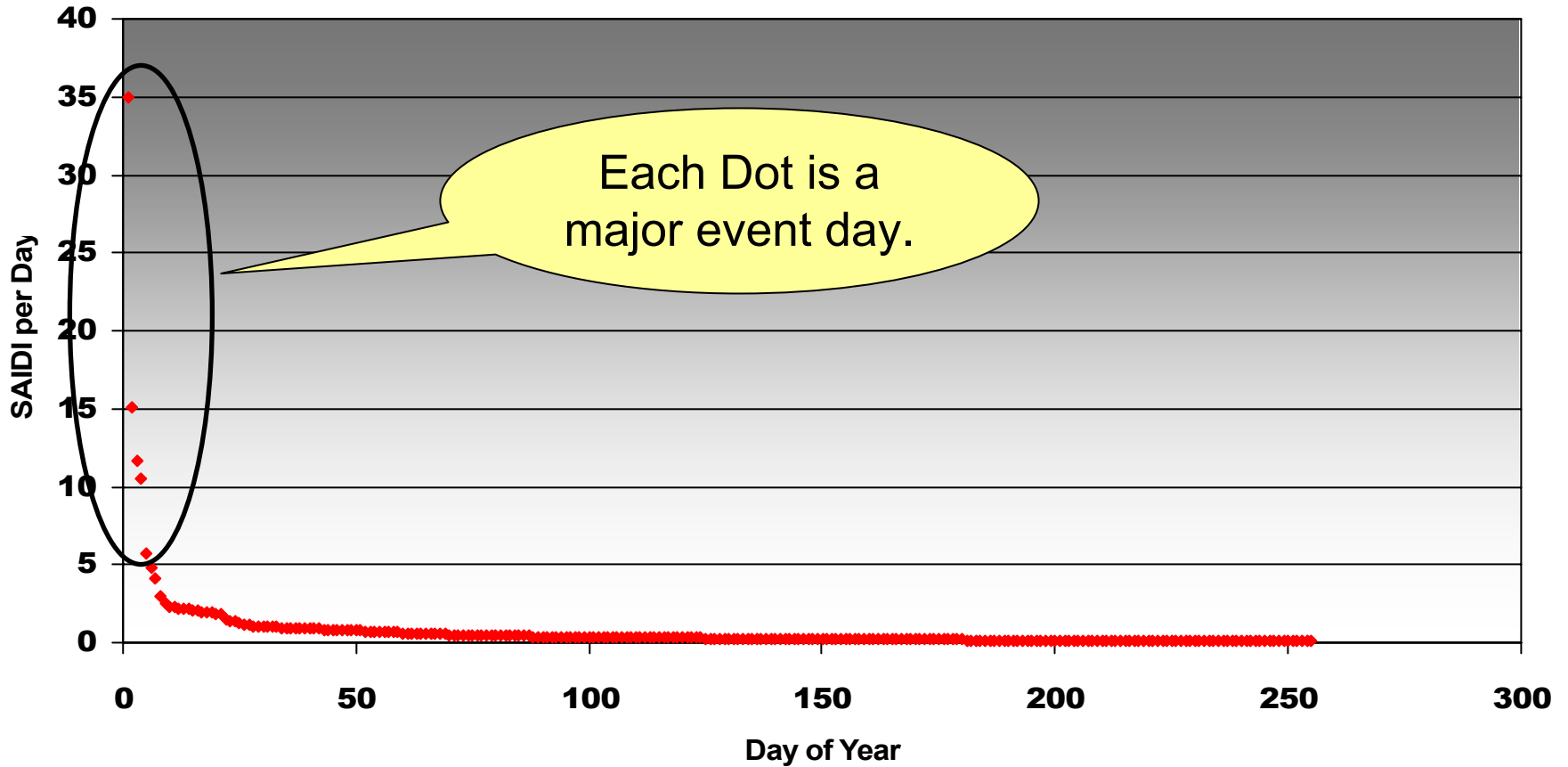
7. Any day with daily SAIDI greater than the threshold value T_{MED} that occurs during the subsequent reporting period is classified as a major event day.

Methodology Facts

- ◆ **When calculating daily SAIDI...**
 - ◆ **interruption durations that extend into subsequent days accrue to the day on which the interruption begins.**
 - ◆ **This technique simplifies calculations and ties the customer minutes of interruption to the instigating event.**
- ◆ **Even though only SAIDI is used to determine major event days, all indices should be calculated after the data is segmented.**

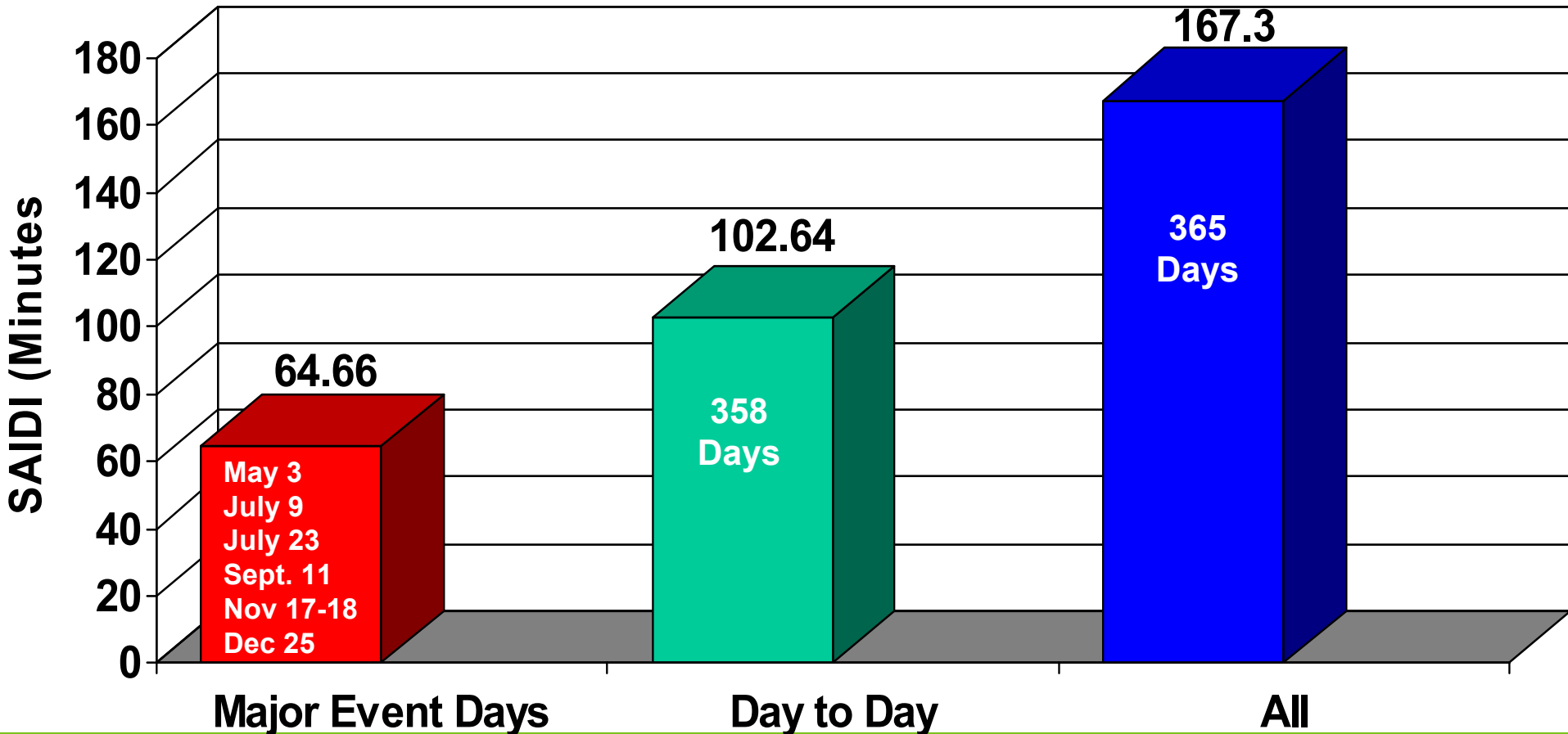
Major Event Days

SAIDI per Day



Results from One Company

SAIDI

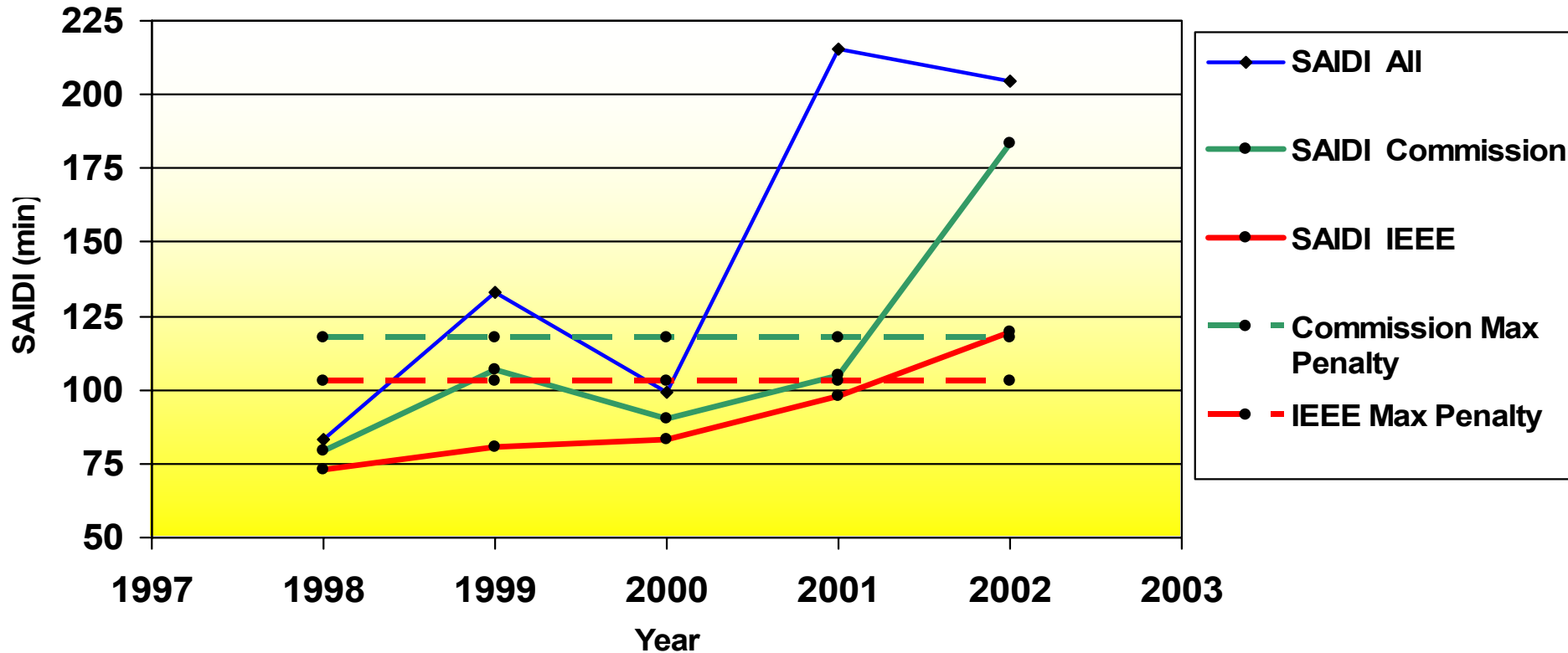


One View of the Methodology

One Company's Performance

Major Event Criteria:

Commision- 15% System, IEEE - 2.5 Beta Method



Adopting 1366 will provide....

- ◆ **consistency in terms and indices used in reliability index calculation,**
- ◆ **a more objective definition for classifying major events,**
- ◆ **a truer representation of the effect of system design and operation on reliability performance,**
- ◆ **a mechanism to report separately on major events so that no information is “excluded”!**

Summary of IEEE 2.5 Beta Methodology

- ◆ **Improves system reliability representation, thereby making goal setting and trending more meaningful.**
- ◆ **Provides a mechanism for reporting on both day-to-day performance and major events. A mechanism that**
 - ◆ **allows for review of day-to-day performance without considering the outliers that often mask it.**
 - ◆ **AND, does not “exclude” data yet meaningfully focuses on major event performance in its own right since it is a very different operating condition**
- ◆ **Consistent method that can be applied by all.**

Status of P1366/D12

- ◆ **P1366/D12 was balloted during June 2003.**
- ◆ **95% Affirmation**
- ◆ **Will recirculate Guide to accommodate comments.**
- ◆ **Expect to complete balloting by August 2003.**
- ◆ **Should go to RevCom in September 2003.**