IBM Software Group

TPF Users Group Spring 2005

TPF Quality - Measurement and Analysis

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Venue : SCP Subcommittee

AIM Enterprise Platform Software

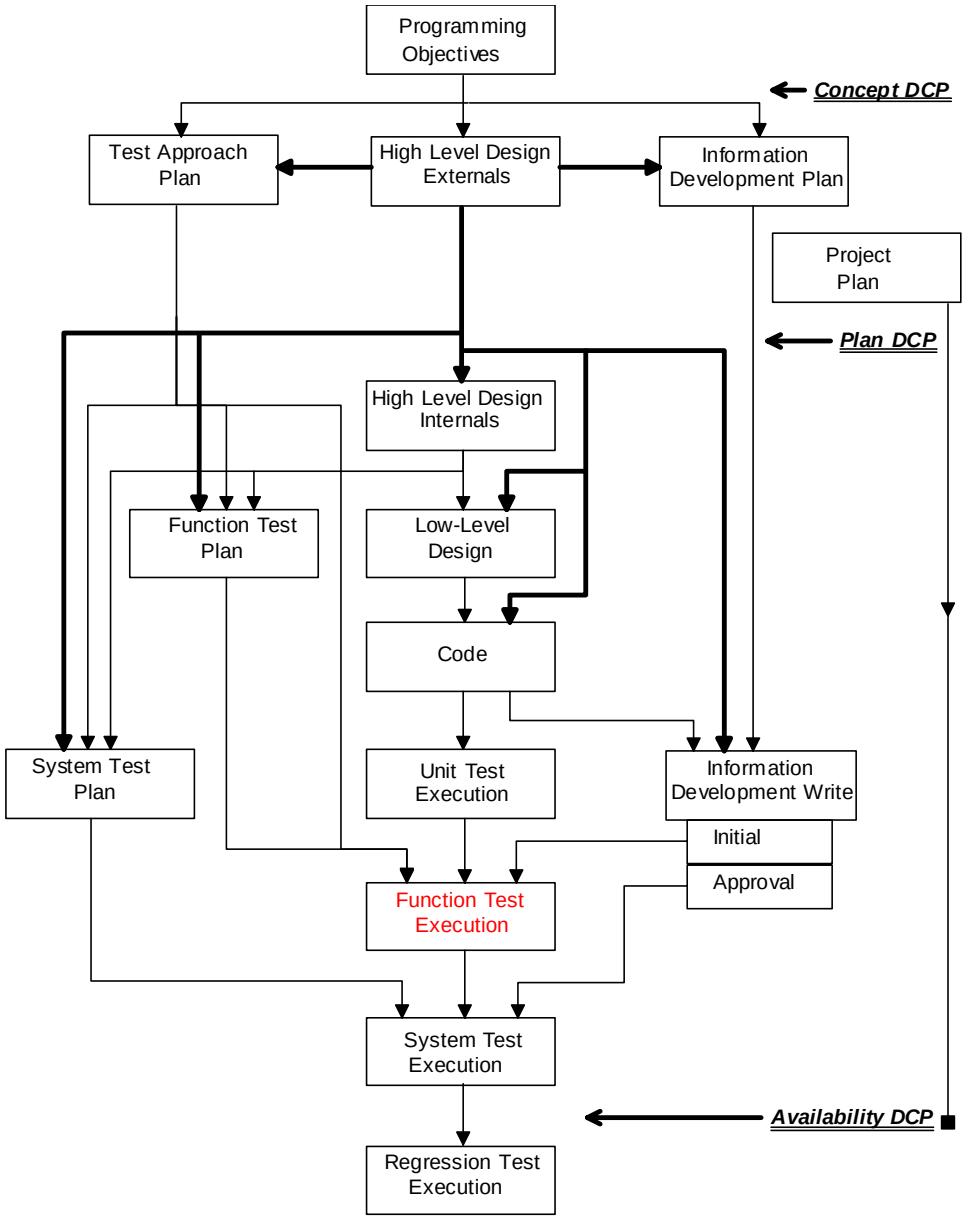
IBM z/Transaction Processing Facility Enterprise Edition 1.1.0

Objectives

- The TPF lab understands, controls and improves quality by using
  - process
  - measurements
  - tests
  - field data
  - models and analysis
- How customers could use these techniques

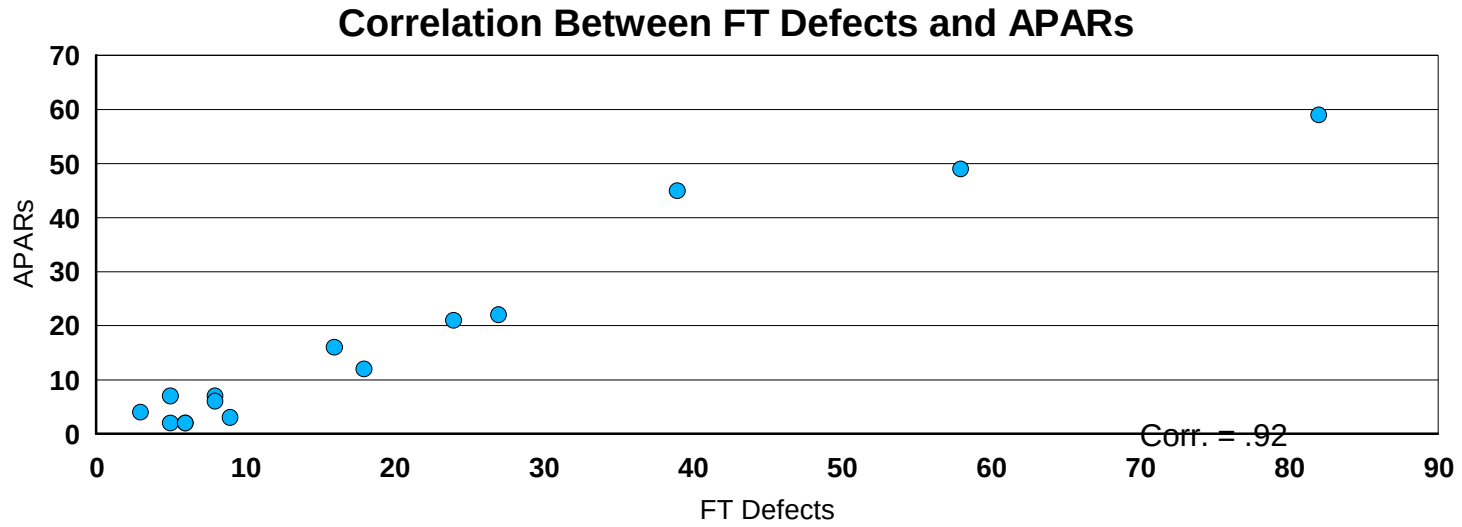
TPF Development Process

- Closed loop process
- Employee managed => buy-in
- Management review
- Predictable and repeatable



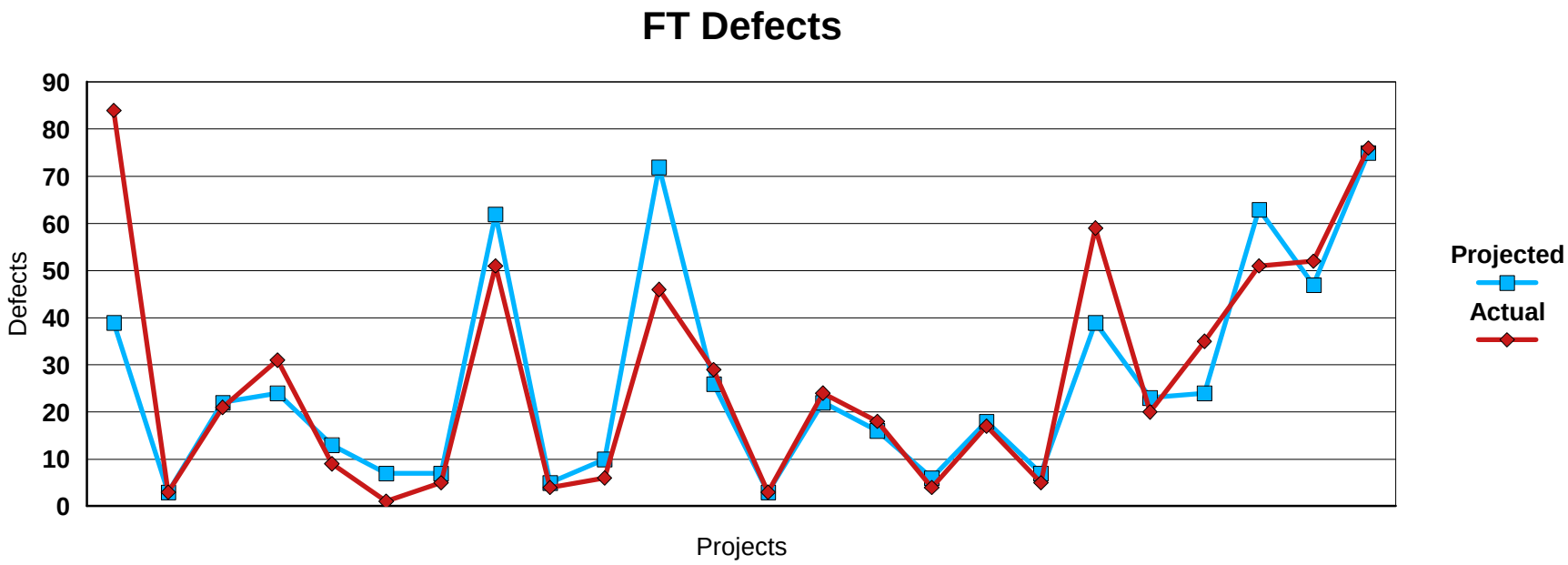
Predictive Model

- Years of data analysis
- Evaluation Shows:
  - Assuming Consistent Process
  - Weak correlation design/code forward
  - Very strong correlation FT defects to APARs
- Developed Predictive Model
  - Use FT defects
  - Validate with ST defects
  - Correlation Very High(0.92)



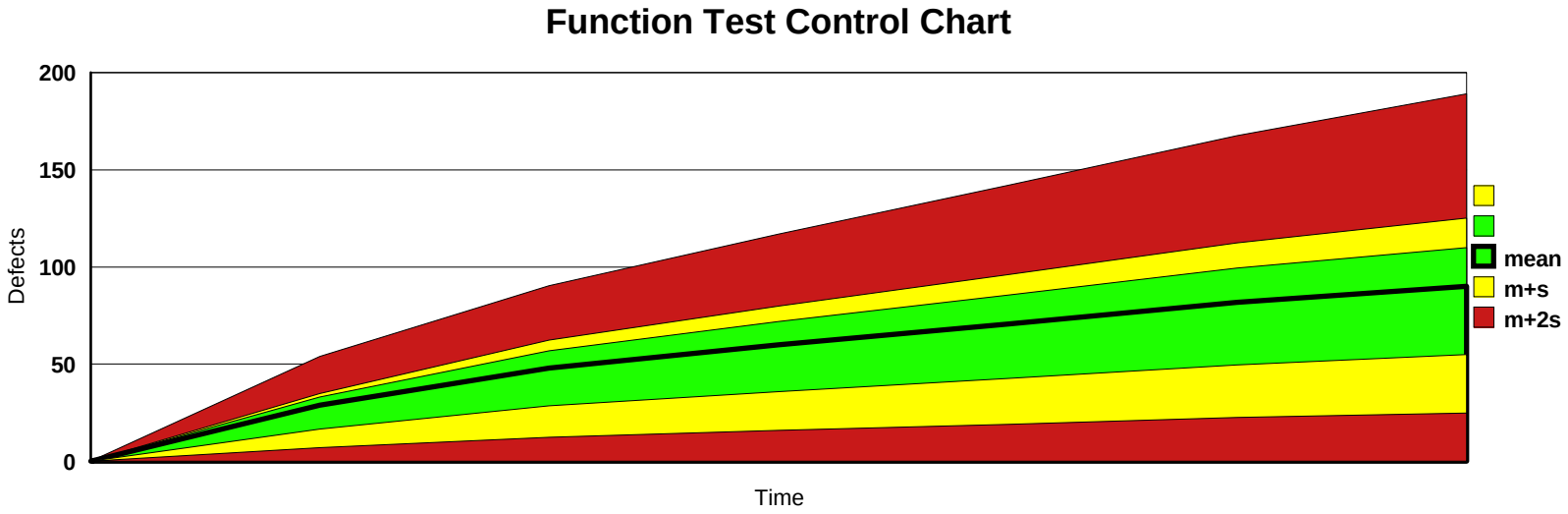
Function Test - Predictor of APARs

- Defect goal is determined by
  - Complexity
  - KLOC new/changed
  - Usage intensity
- Function Test defects are then used to predict number of APARs - over project's life over all customers



A Specific Function Test Measured over Time

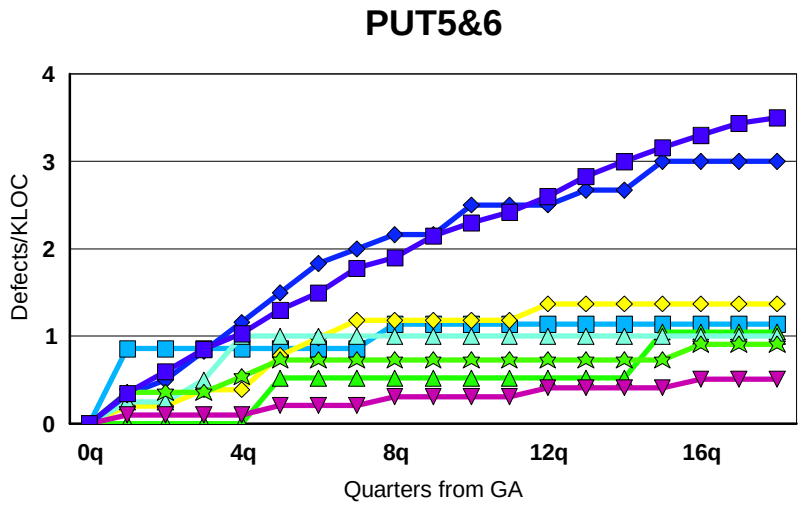
- Interested in final defect count at Function Test end
  - How defects arrive over time (as measured by test case completion)
  - React at between 2 and 3 sigma deviation from the mean(t)
    - Above mean - may indicate code quality problem
    - Below mean - may indicate weak test

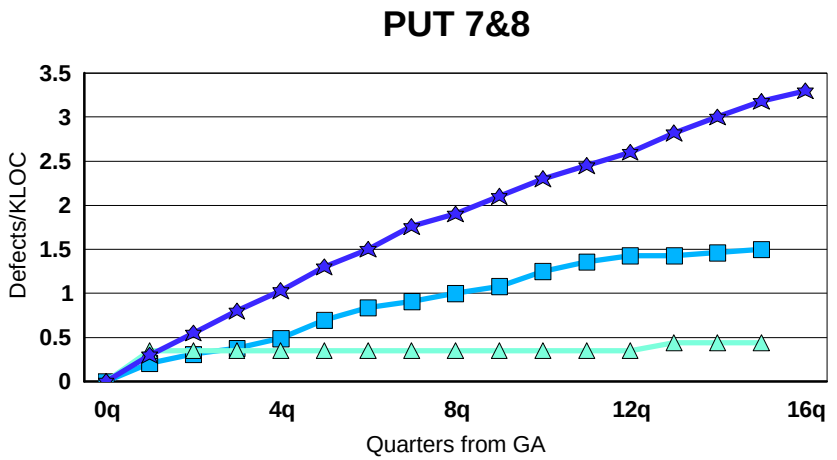


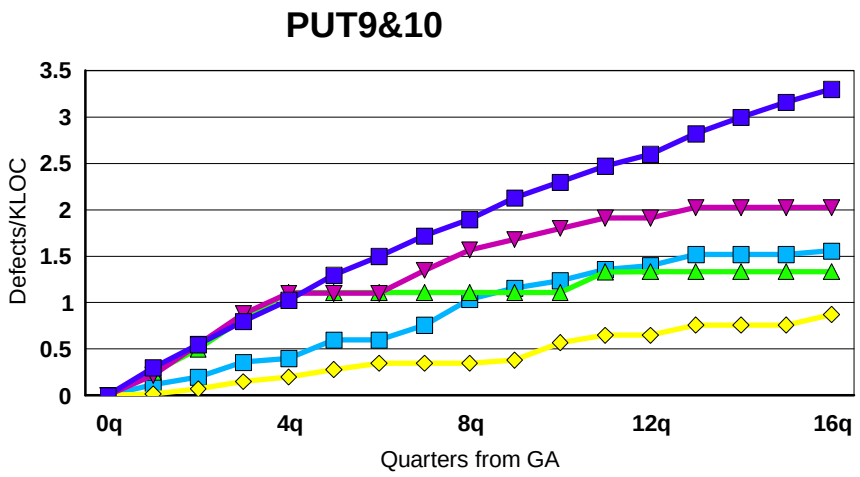
Trend in TPF Lab Quality

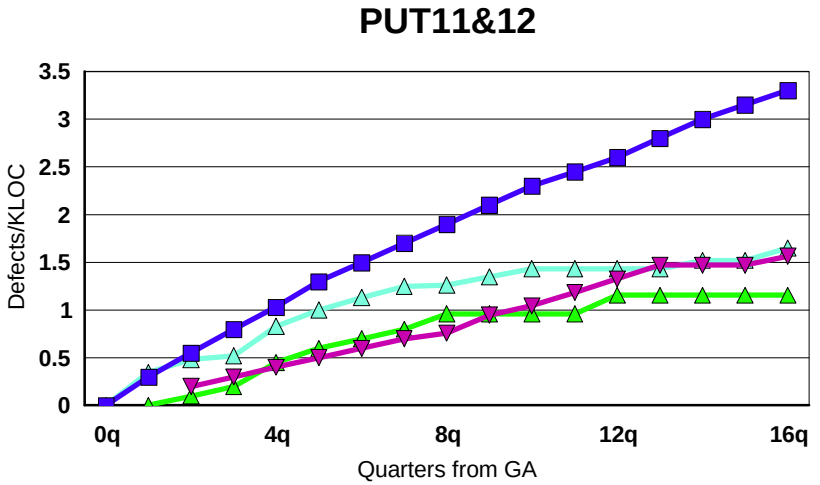
- In 1994 the lab delivered a very high quality release --TPF4.1
- TPF quality has improved since 1994
  - track all PUT and project defect rates
- Difficult to determine exact ratio
  - relatively small customer set
  - usage of projects varies significantly
- Latest PUTs tracked against goal of .85 of TPF4.1 rate
- Lab uses very conservative KLOC counts
  - use ported code at factor of .1
  - ported code has almost 0 defects
  - several huge ports > 100K

PUT and Project Defect Tracking









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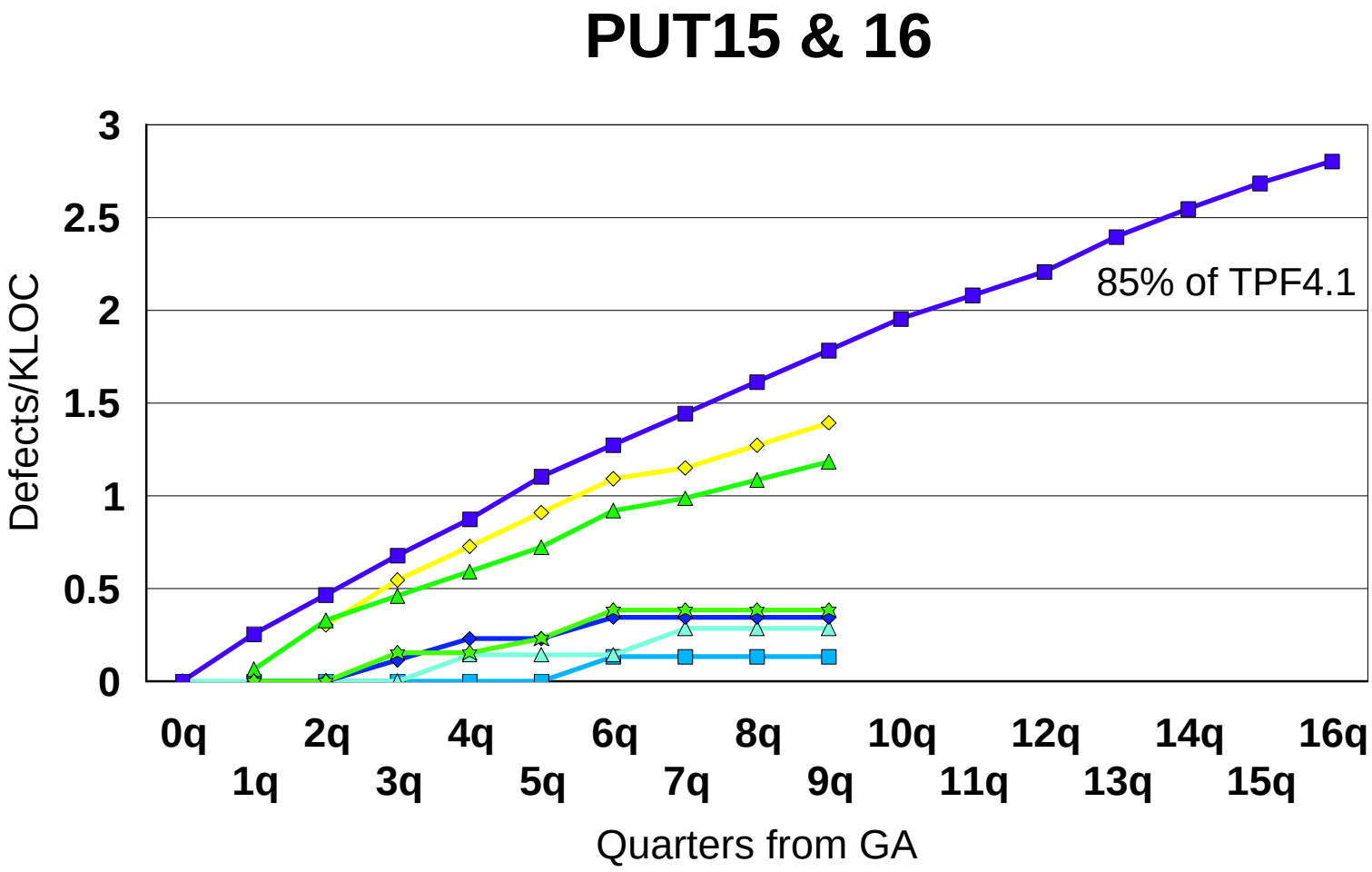
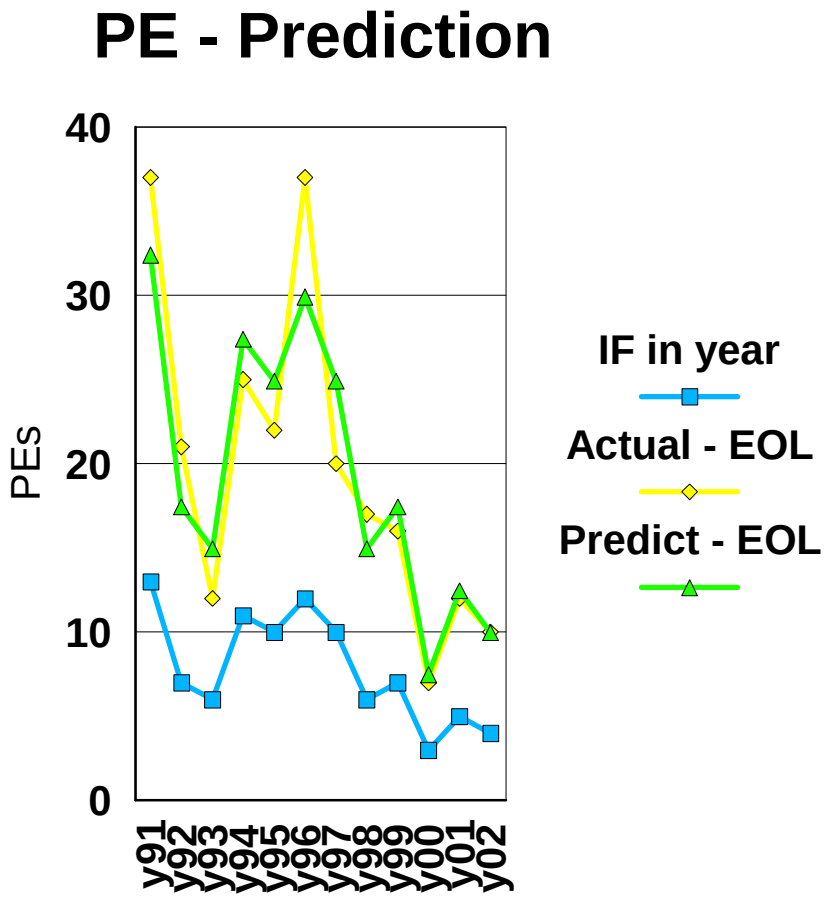
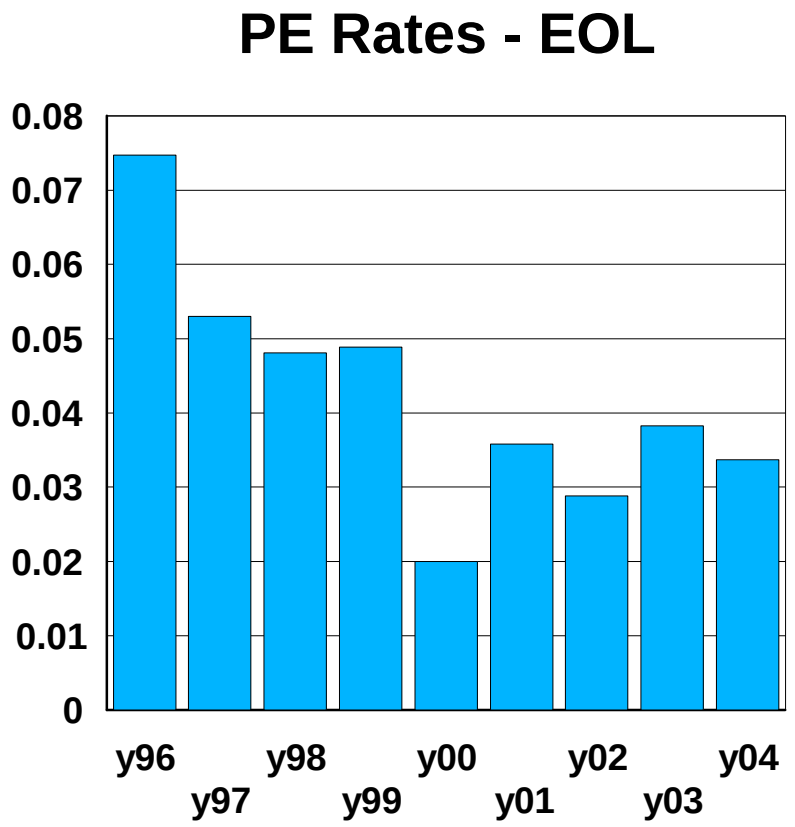


APAR Failures (PE)

- PE considered worse than Development defect
- Separately track and perform causal analysis on each PE

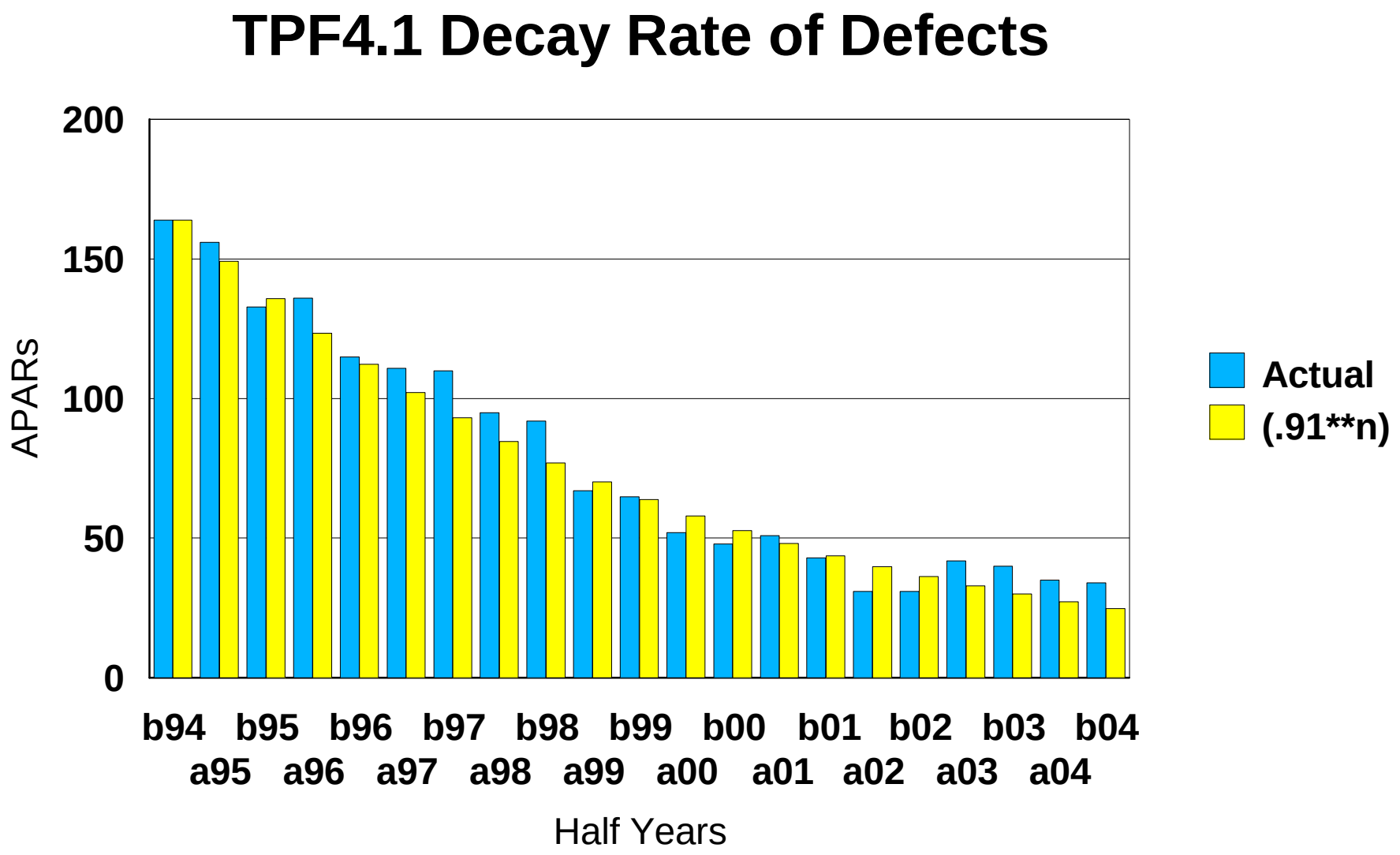




New Development vs. APARs

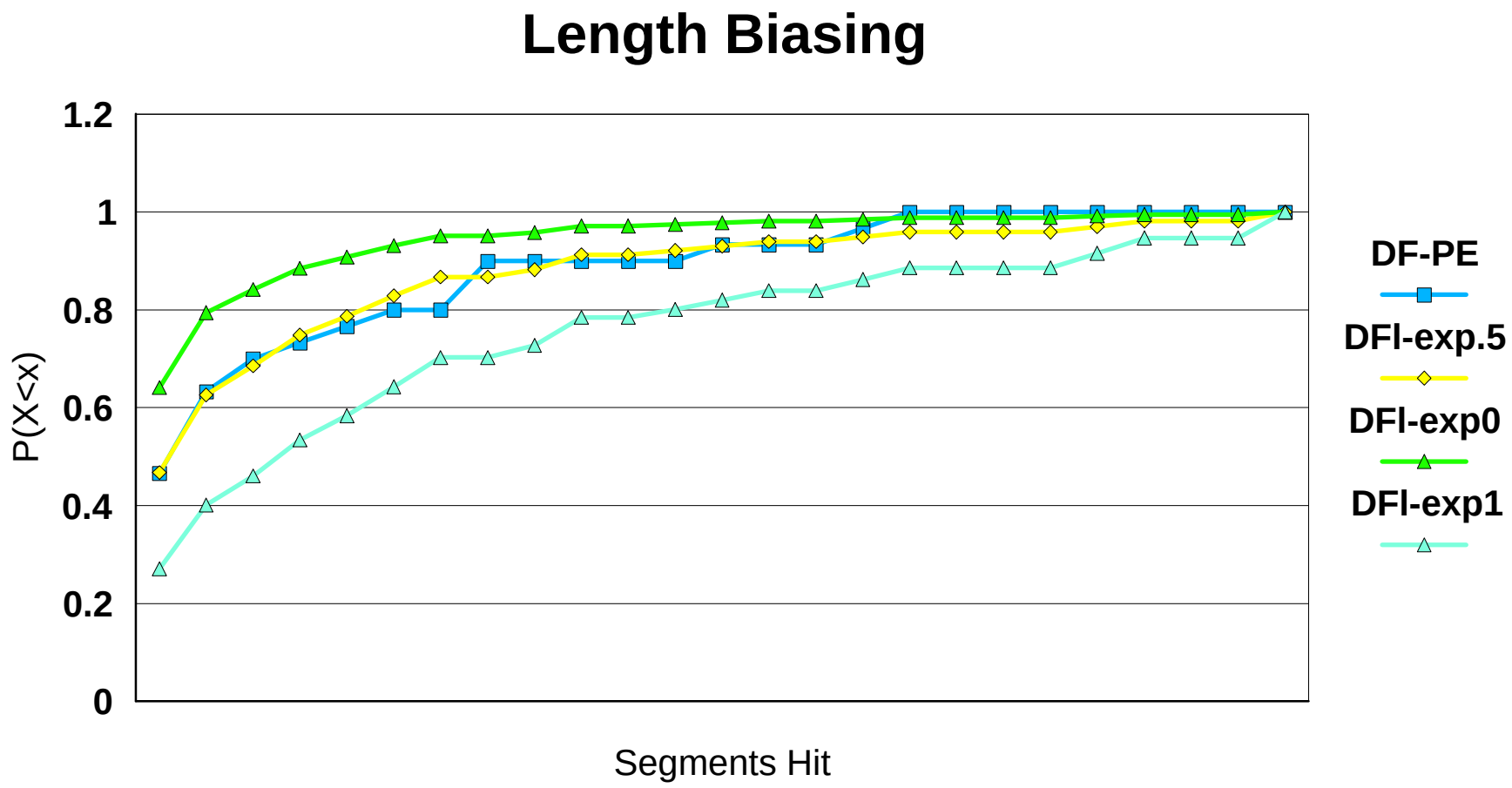
- APAR defect rate is roughly 1/2 of new development defect rate
- APAR
  - failure probability is roughly .04
  - LOC =20
  - LOC/failure = 20/.04 = 500
- Development
  - roughly 4 defects per KLOC
  - LOC/defect = 1000/4 = 250

Defect Stochastic Arrival Process



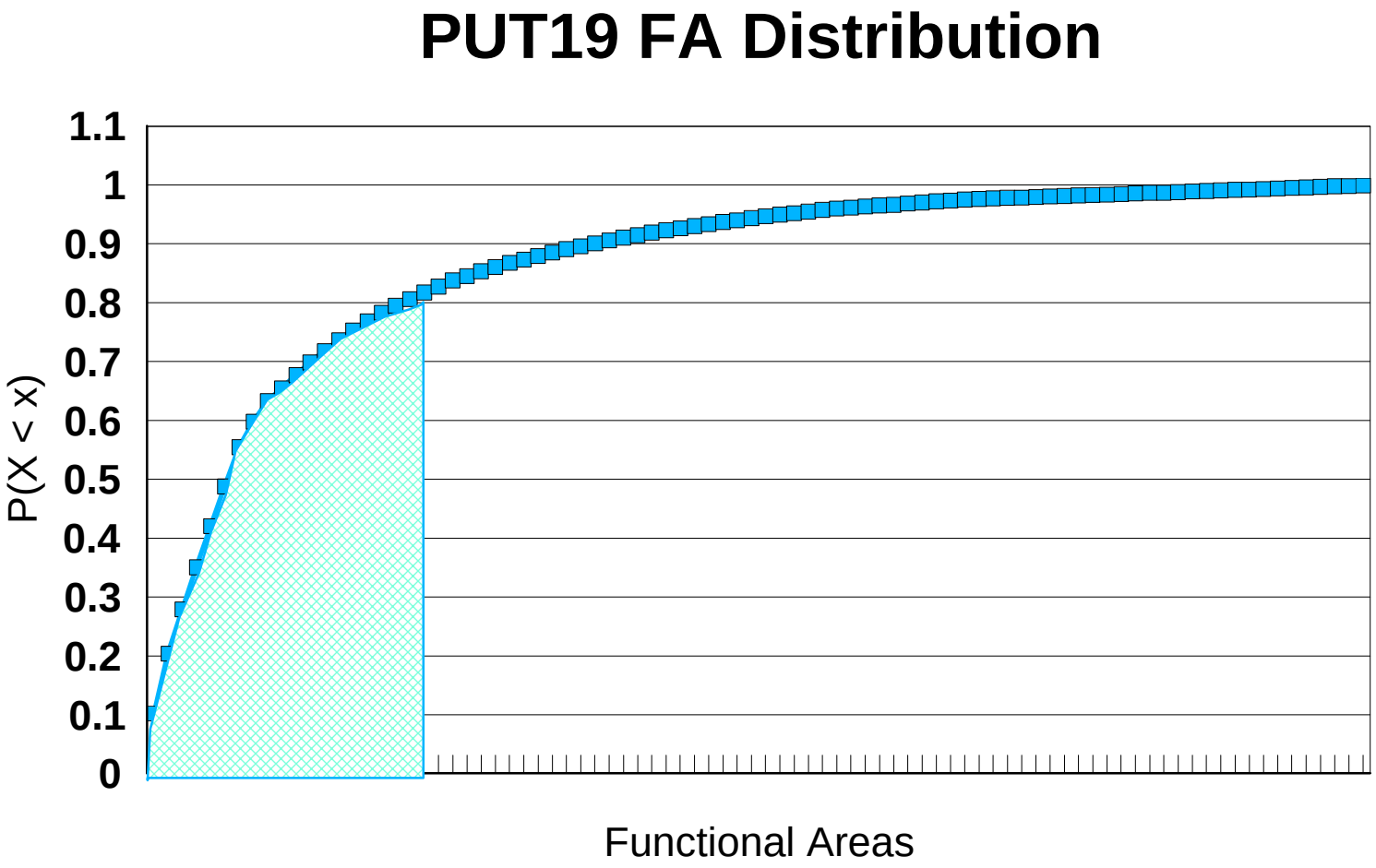
Predicting APAR Failure Probability

- Probability distribution is NOT uniform
- Failure probability increases with number segments hit (square root of)



Greater Testing in the more Failure Prone Areas

- Continually improving our testing methodology
- Small number or areas cause majority of the problems



Final Thoughts

- Each customer environment is different
  - no perfect method
- Determine your most important goals
- Measurements that reflect success/failure of goal
  - MUST have valid numbers
    - if you can't measure something then do not try
  - GUESS which ones may have an effect on the goal
    - then show correlation
  - if you can not measure, must treat as a random effect-noise
- Process should bring almost all efforts up to some acceptable standard

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