

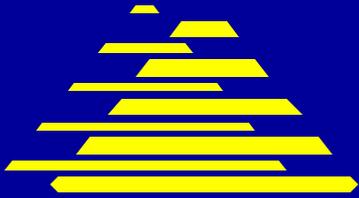
# Synergy of review techniques from PSP<sup>SM</sup> to TSP to formal inspections and CMM<sup>®</sup>

25<sup>th</sup> Software Engineering Workshop

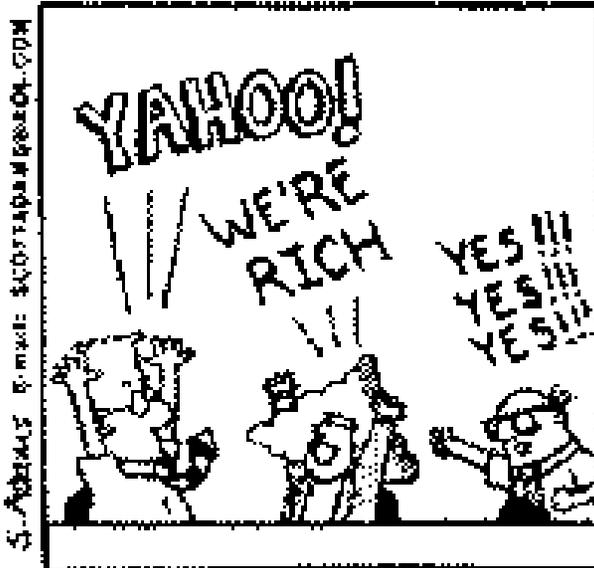
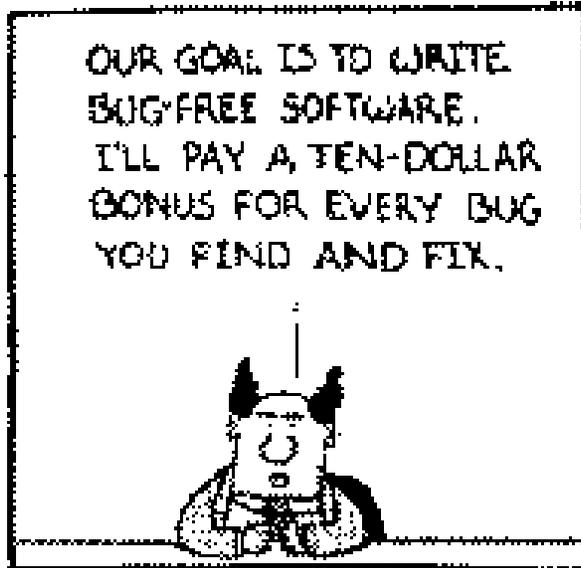
Daniel M. Roy

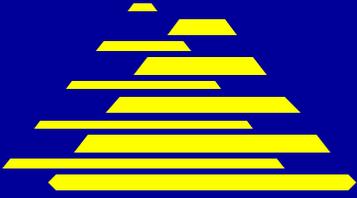
GSFC, 4 December 2000

PSP, TSP, Personal Software Process and Team Software Process are service marks of CMU  
CMM is and Capability Maturity Model are registered in the U.S. patent and trademark office



# Management commitment





# Agenda

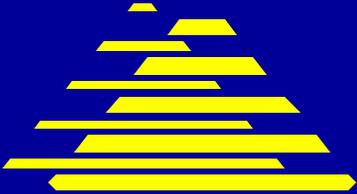
Inspection principles

Yield (effectiveness) consideration

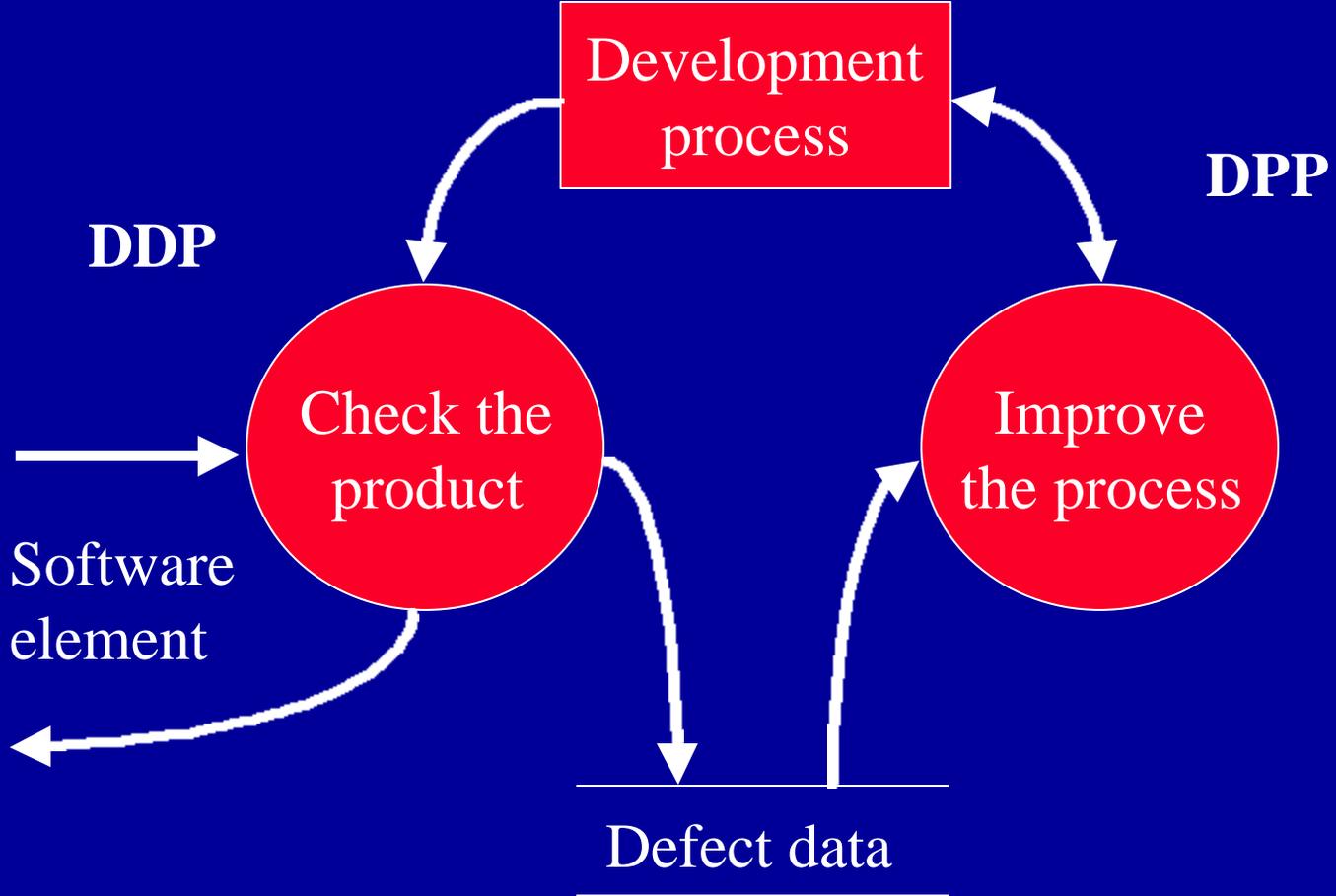
PSP reviews

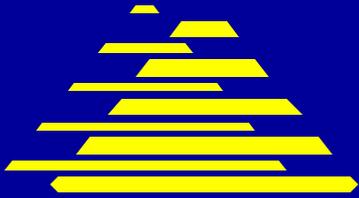
TSP inspections

Conclusions

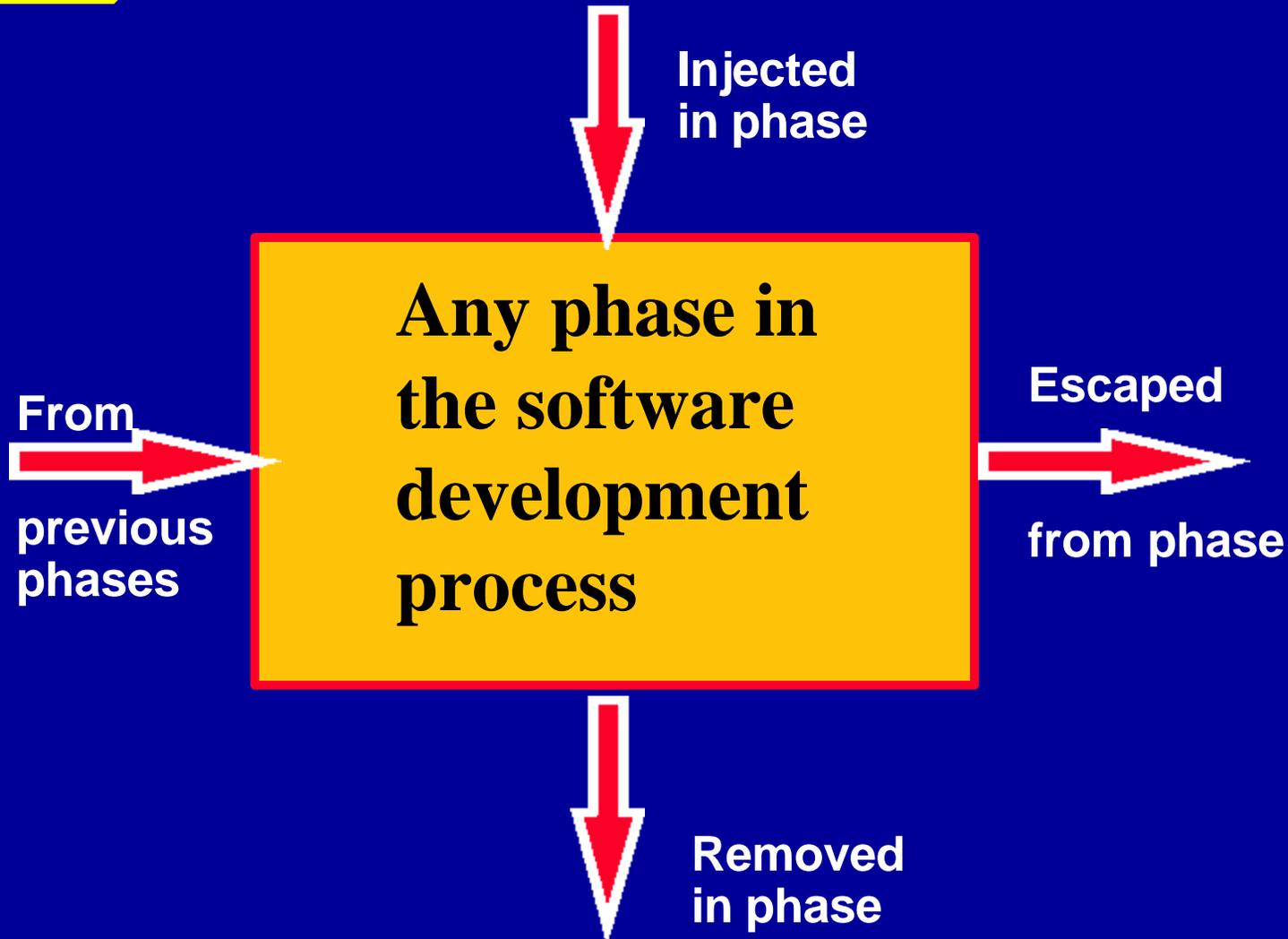


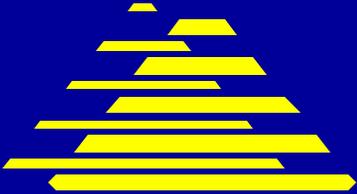
# Inspection functions



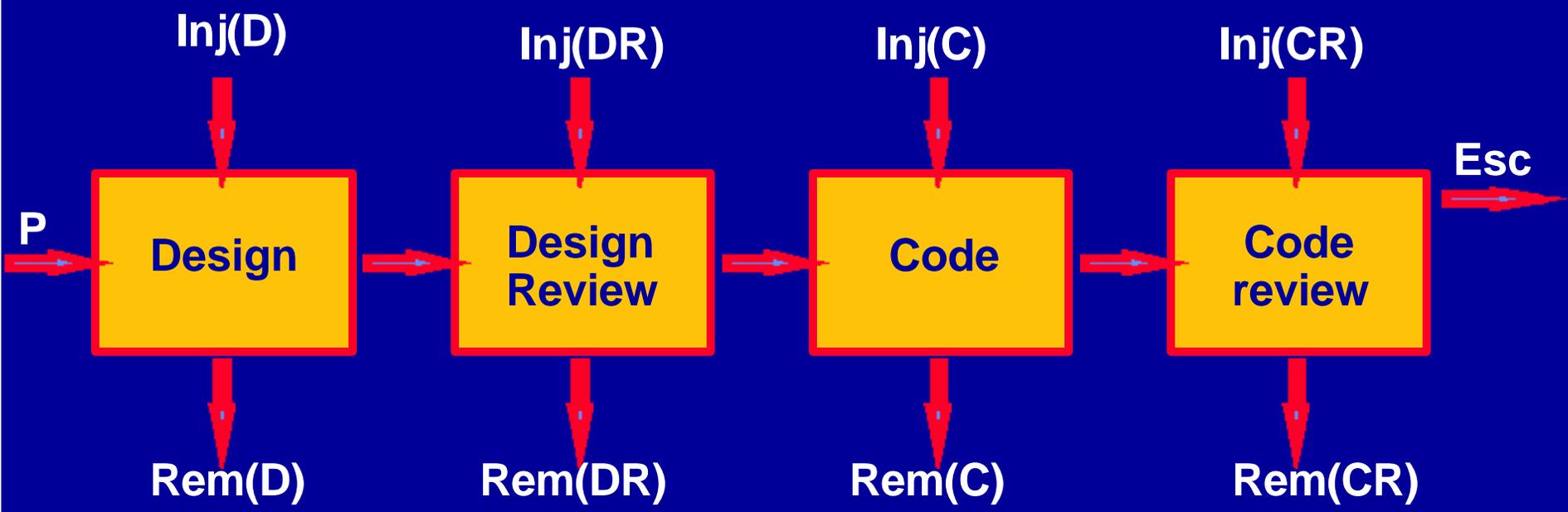


# A phase in the life of a defect<sup>5</sup>





# PSP (individual) yield

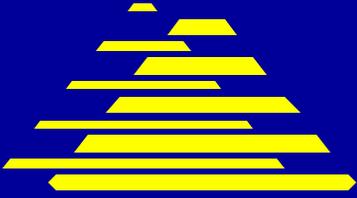


$$\text{PSP yield} := \frac{\text{All removed up to CR}}{\text{All injected up to CR}}$$

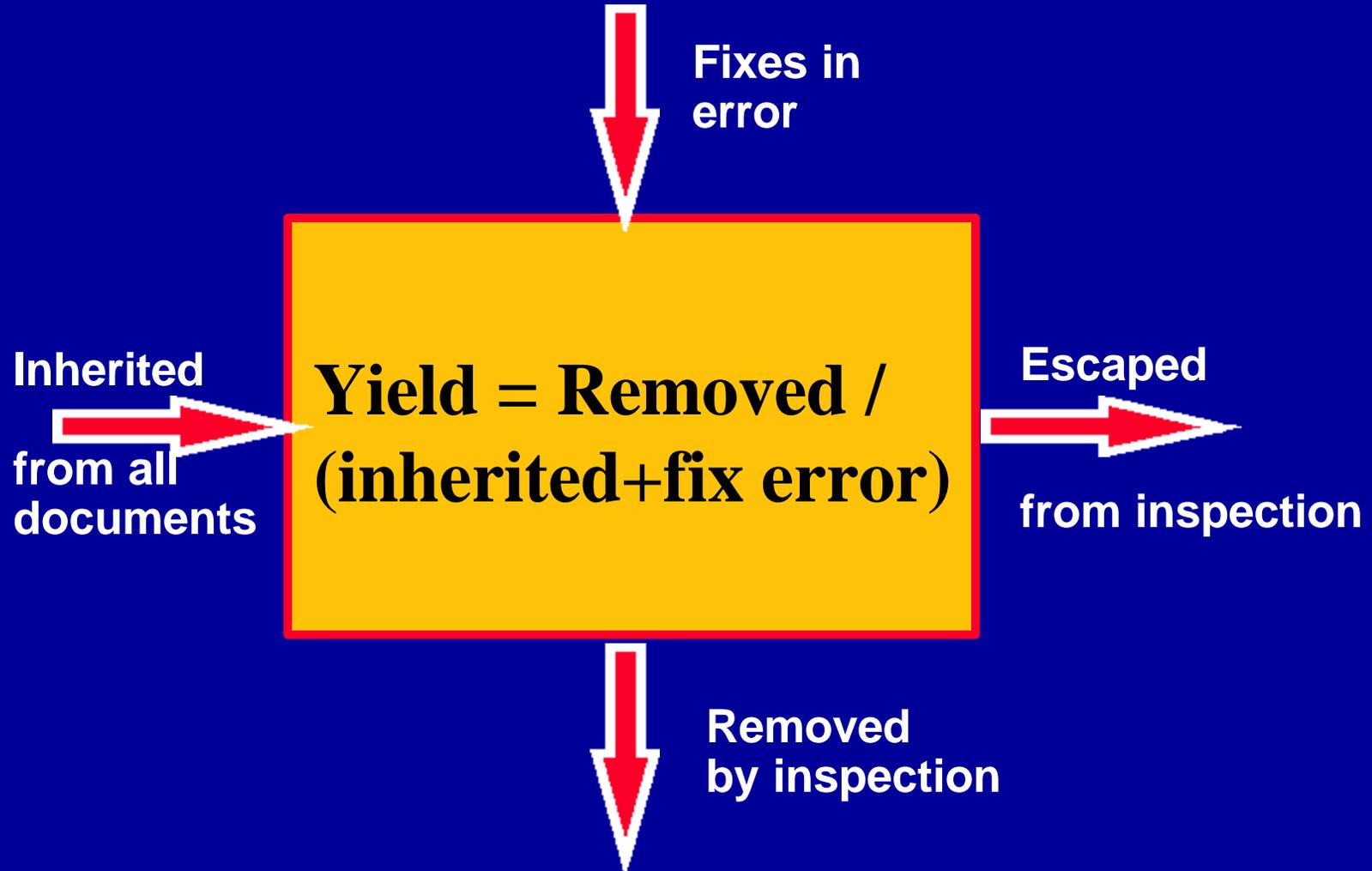


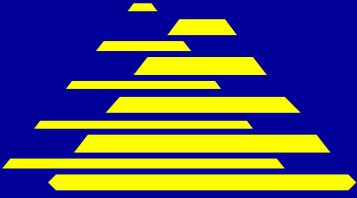
# MISTAKES

IT COULD BE THAT THE PURPOSE OF YOUR LIFE IS  
ONLY TO SERVE AS A WARNING TO OTHERS.

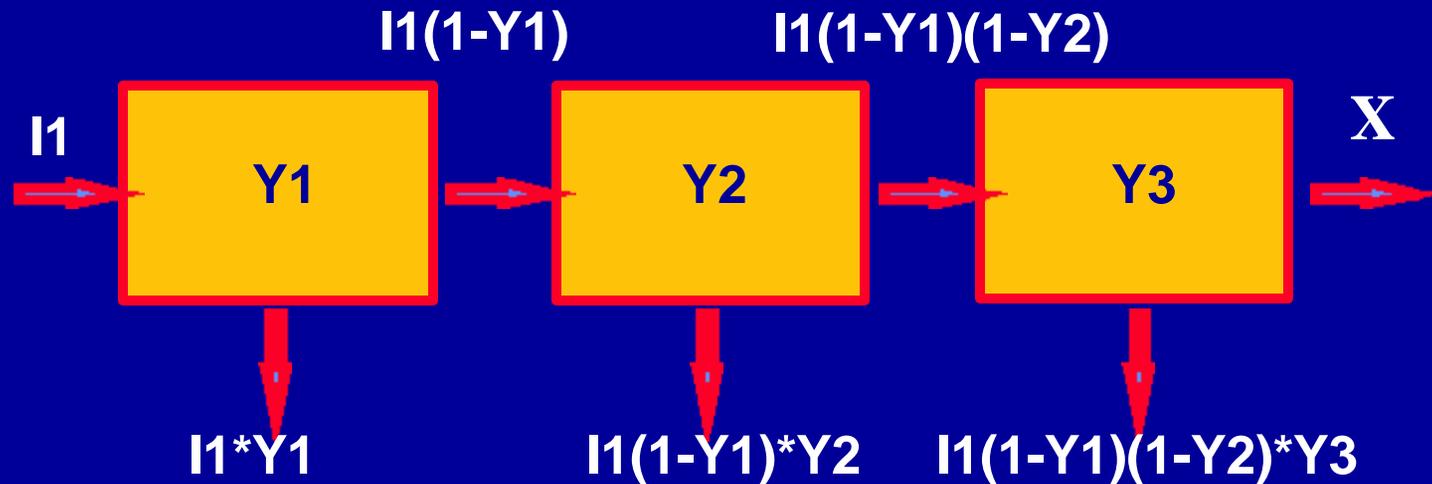


# Inspection (team) yield



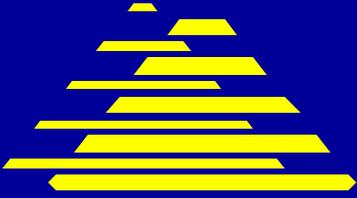


# Chain yield

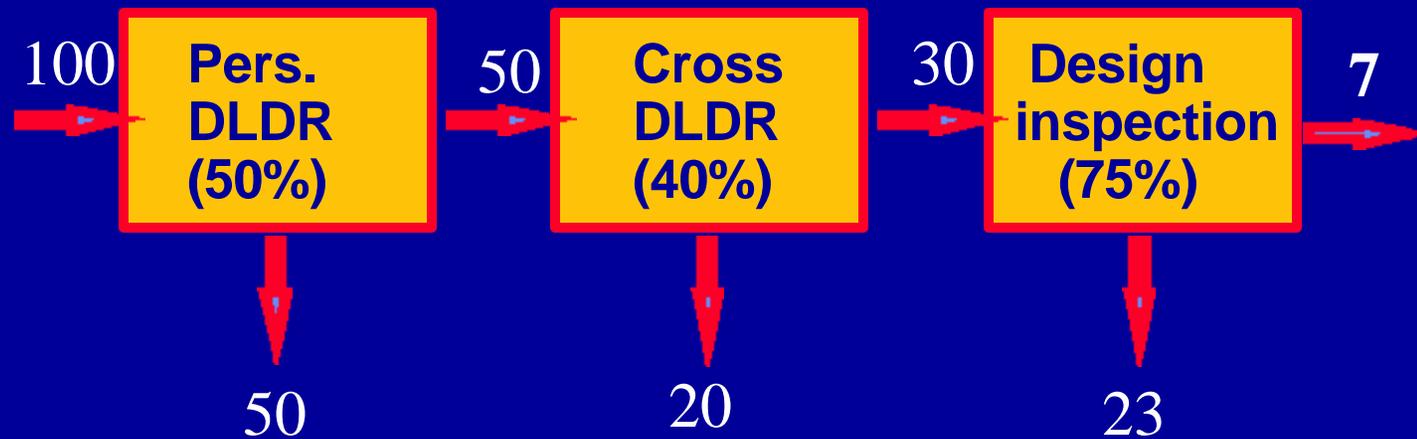


$$\text{Chain yield} = Y_1 + Y_2(1-Y_1) + Y_3(1-Y_1)(1-Y_2)$$

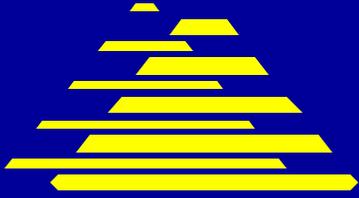
$$X = I_1 (1 - \text{Chain yield})$$



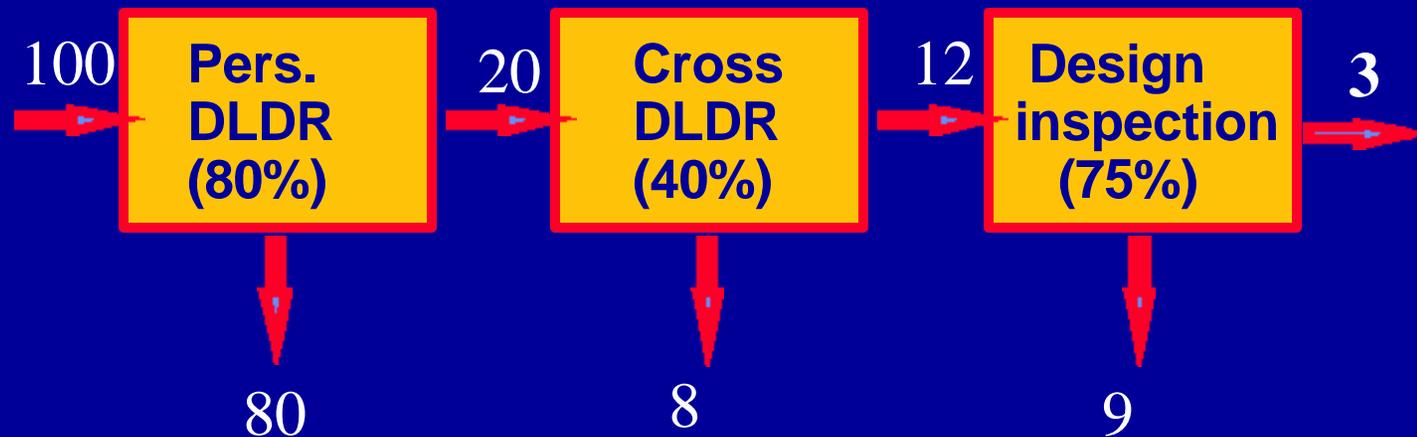
# Chain yield example-1



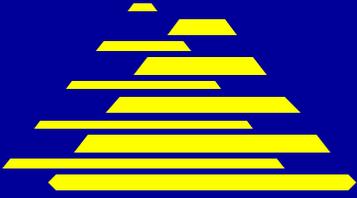
$$\text{Chain yield} = 0.5 + 0.4 * 0.5 + 0.75 * 0.5 * 0.6 = 93\%$$



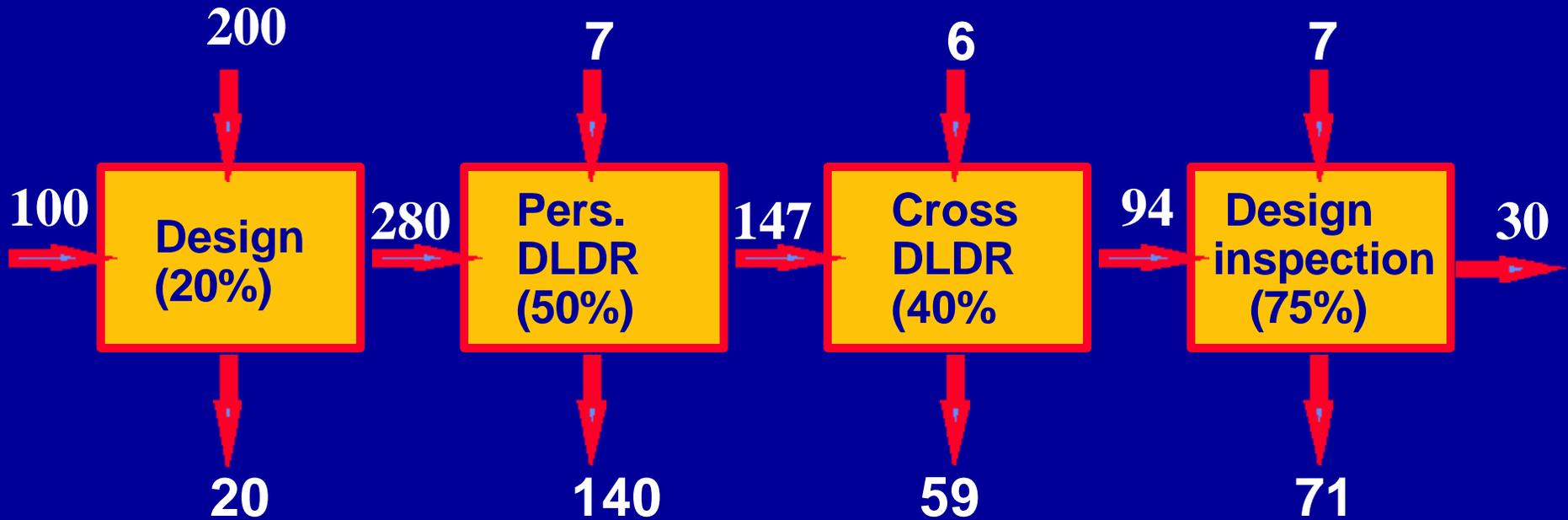
# Chain yield example-2



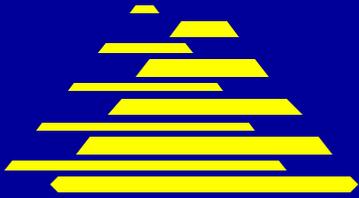
**If up front yield goes from 50 to 80%, chain yield goes to 97% and escaped defects are cut in half!**



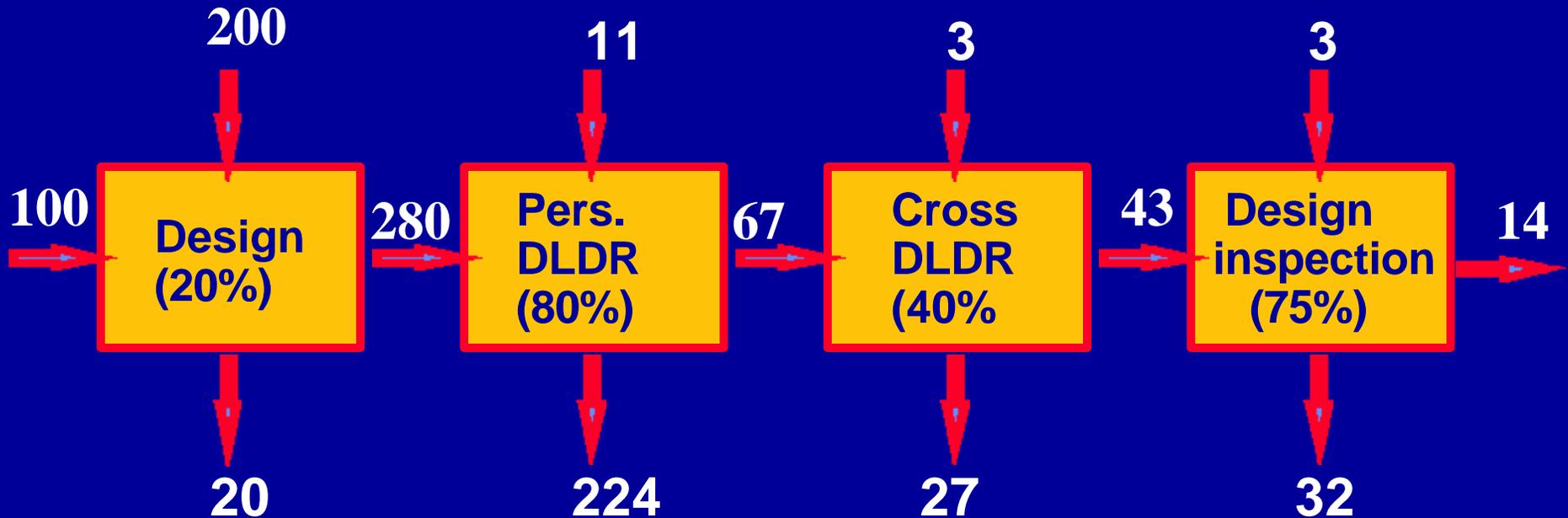
# Chain yield example-3



Errors are injected in design, 5% of the fixes for Design and personal design reviews are in error, and 10% of fixes are in error for cross reviews and inspections.

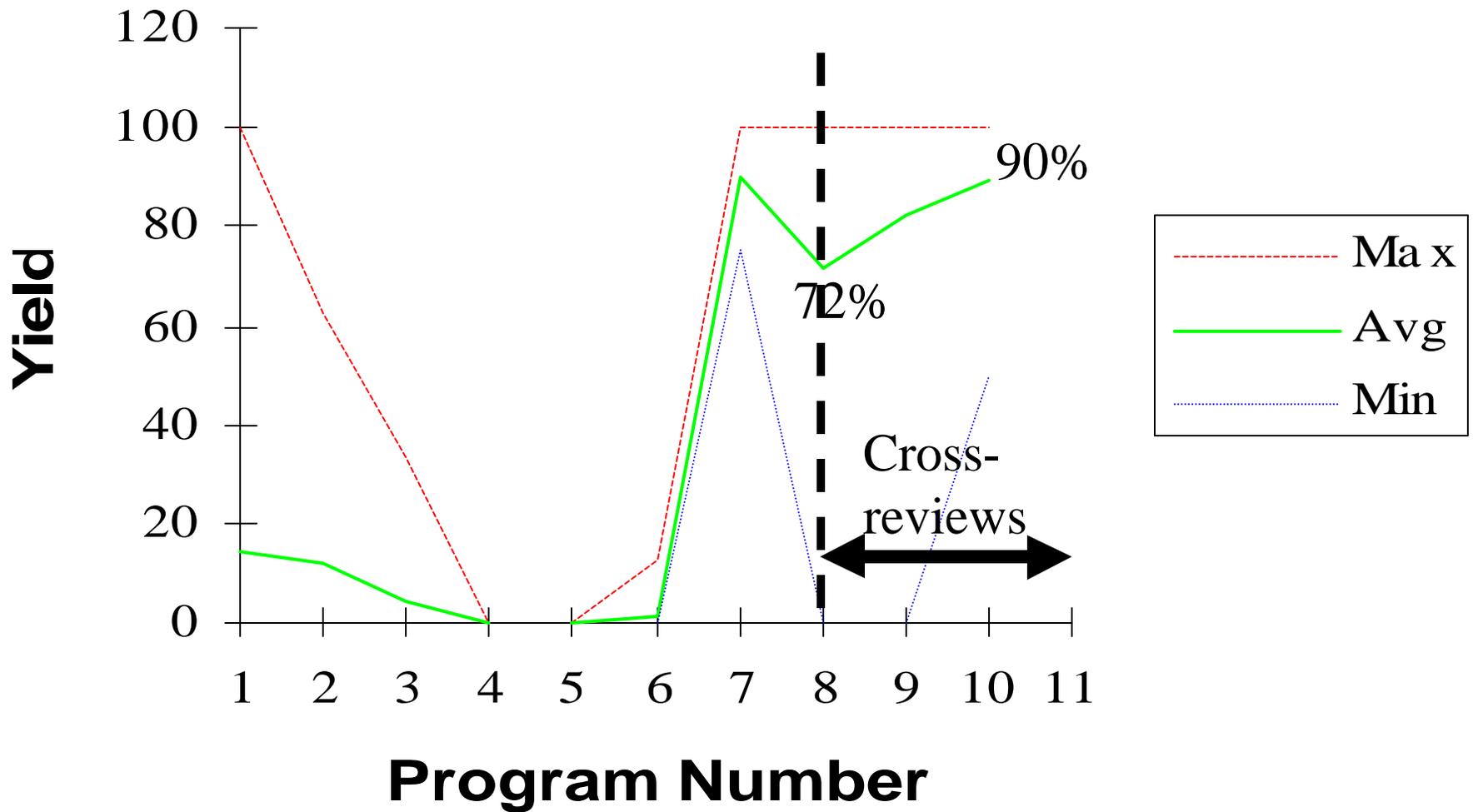


# Chain yield example-4

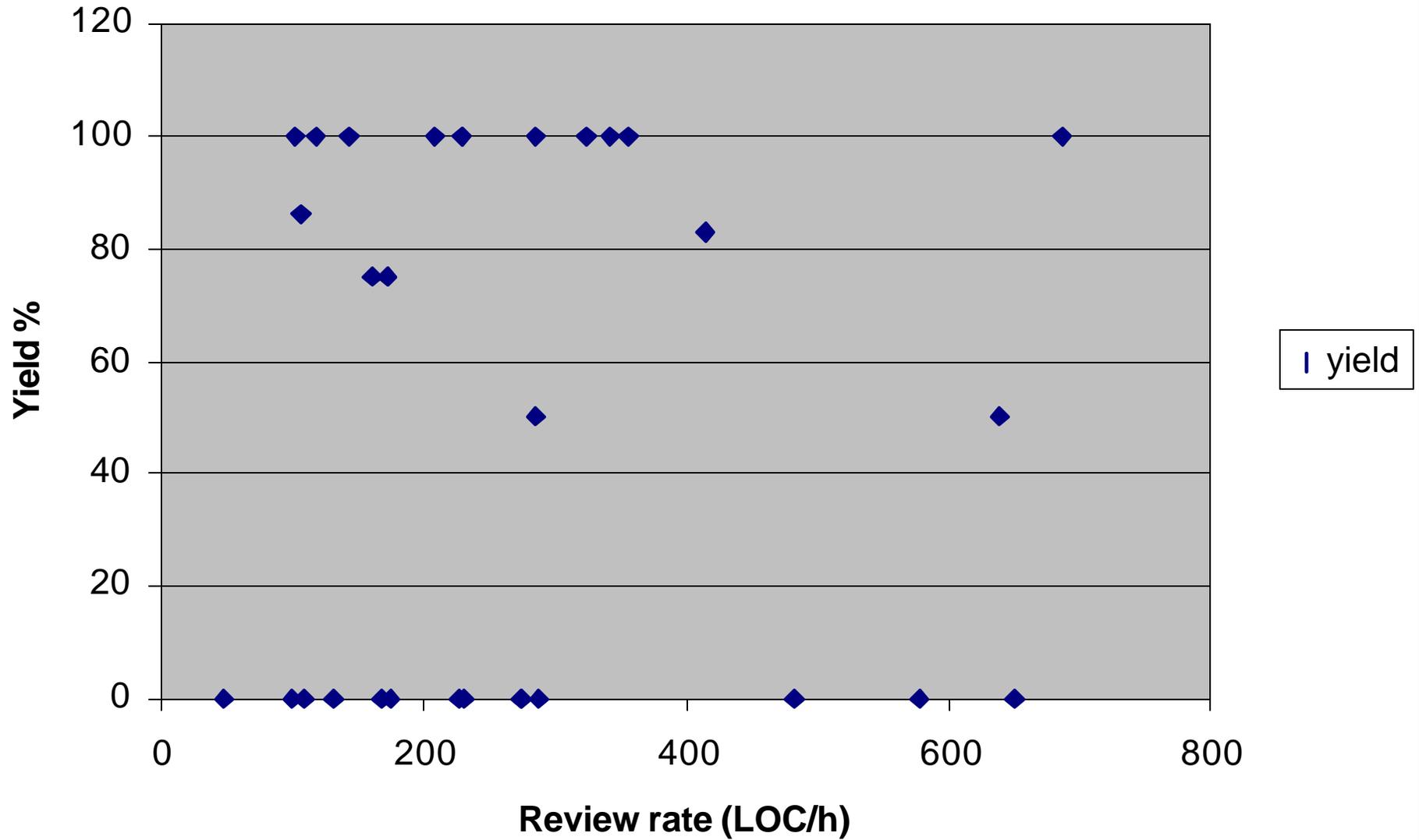


If personal design review yield goes from 50 to 80%,  
escaped defects are cut in half!

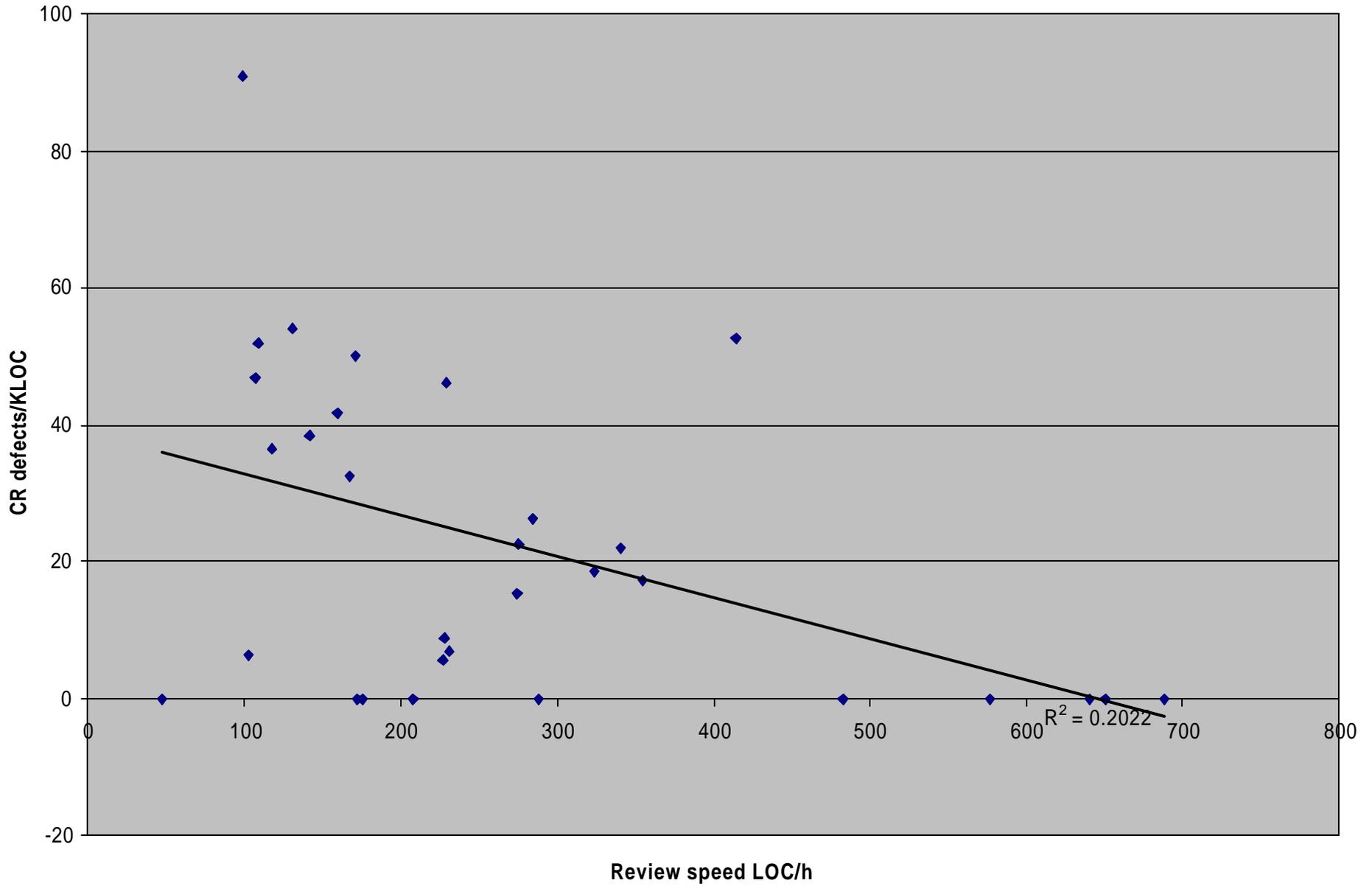
# Yield - All Students, All Programs

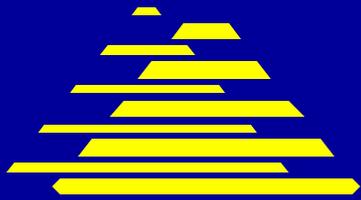


# PSP Yield



# Defects removed by CR





## PSP reviews considerations

Review from a printout, not from the screen

Use checklist & orthogonal defect classification

Track Hits and Misses

Update checklist after each program

- perform systematic causal analysis
- concentrate on most costly defects

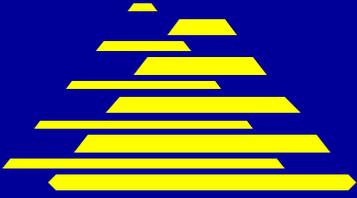
Take breaks, switch hats, and slow down!

- review time  $> 1/2$  time in phase
- plan to catch all “predicted” defects



# INEPTITUDE

IF YOU CAN'T LEARN TO DO SOMETHING WELL,  
LEARN TO ENJOY DOING IT POORLY.



# Cross review considerations

19

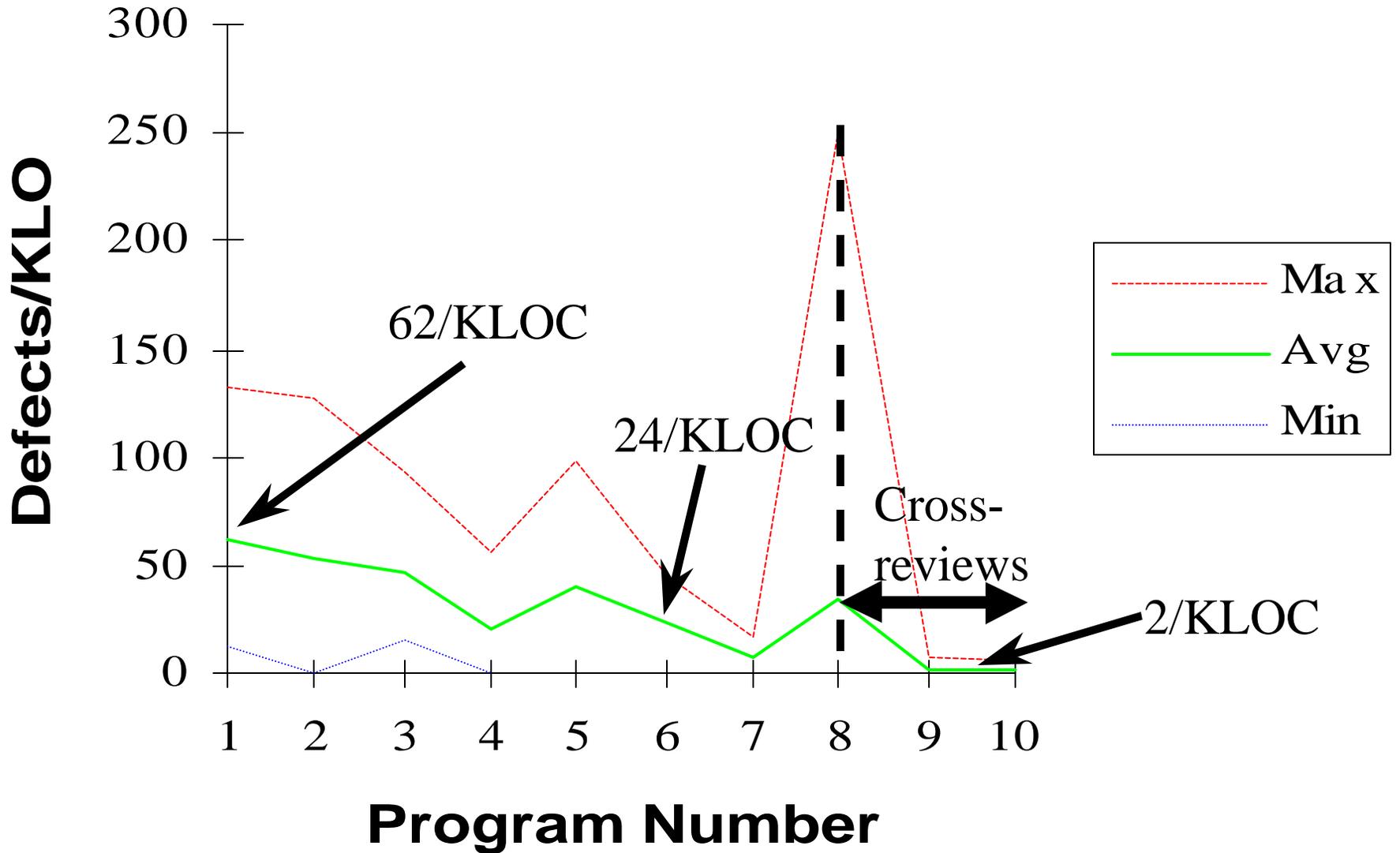
## Psychology:

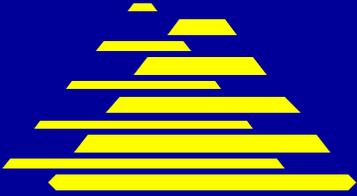
- Sensing with iNtuitive
- challenging, not threatening
- decriminalize defect

## Process

- mini structured walkthrough plus PSP data
- PBR for design, DBR for code?
- use trace tables (desk run program)
- cross-education (sharing process)

# Defects Found in Test - Range





# TSP considerations-1

Gather on the job data using PSP framework

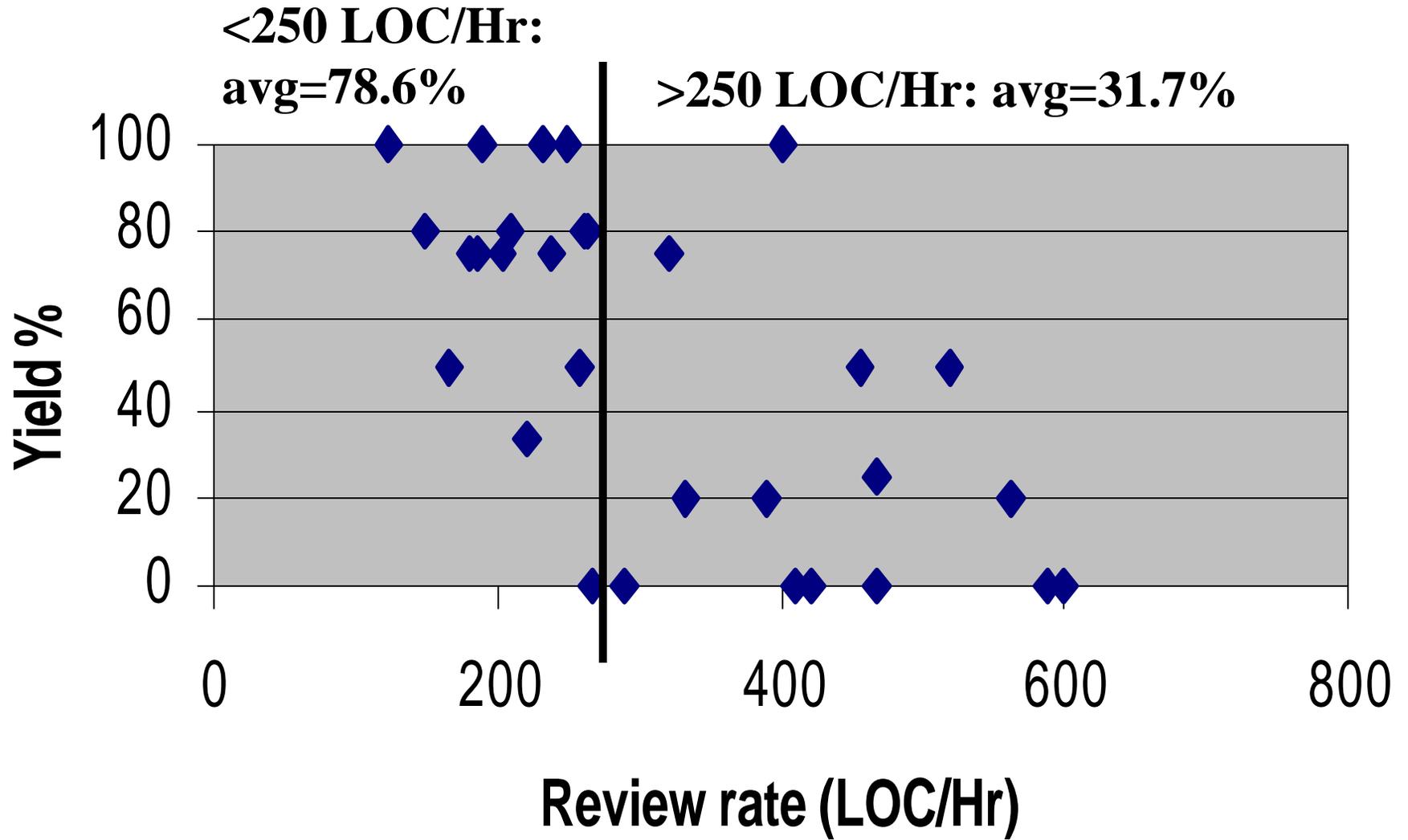
Process manager checks on reviews

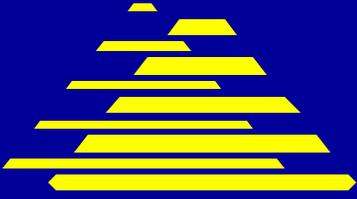
- PSP and cross review
- capture-recapture for team inspections

Quality manager analyses inspection data for quantitative process improvement (even up to PR KPA level)

See Watts S. Humphrey. 2000. *Introduction to the Team Software Process*. Reading, MA: Addison Wesley.

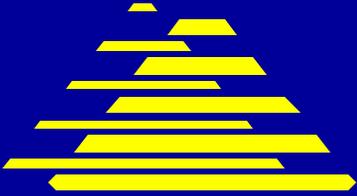
# TSP Yield





# DEFEAT

FOR EVERY WINNER, THERE ARE DOZENS OF LOSERS.  
ODDS ARE YOU'RE ONE OF THEM.



## TSP considerations-2

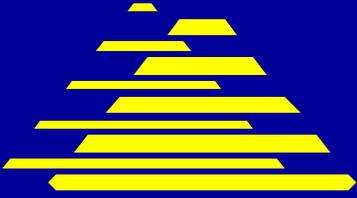
Slow down some more!

- $< 2p$  of requirements per hour
- $< 5p$  of high level design per hour
- $< 100$  LOC of PDL per hour
- $< 200$  LOC code per hour

Slower down I said

- $< 2$  defects/h DLDR removal rate, 5 in CR
- $A/FR > 5.0$





# Cost per defect

## PSP data:

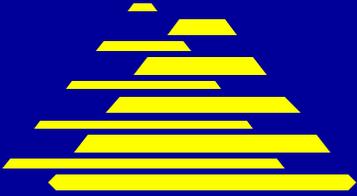
- DLDR: 15mn – CR: 5..10mn; XR: 10..30 mn
- UT: 20mn; Post dev: >1h

## DoD sample:

- 30 mn of inspection (total time) per defect<sup>1</sup>
- 2-10 Hours in integration test<sup>2</sup>
- 10-40 Hours in system test<sup>2</sup>

1-National sw quality experiment, Don O'Neill, SEL workshop, 1998

2- Barry Boehm: Software Engineering Economics, 1982



# Conclusion

Enforce the “optimizing” of PSP reviews

Encourage “buddy system” for cross reviews

“Inspectionize” your process

- routine part of TSP and CMM
- regular causal analysis

Loop measure; analyze; package; end loop;

Inspection data drives the learning organization

