



Traits Found in Effective Reliability Programs

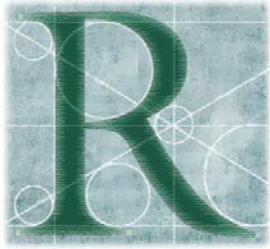
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A couple of days...

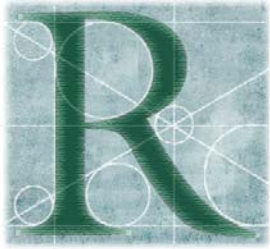


- Upstairs – calm, orderly, effective
- Downstairs – urgent, interruptions, frustrating



Background

- The 10x program in HP in the 80's
- Revitalized program at HP in 2000
- Consulting experience across industries



Maturity

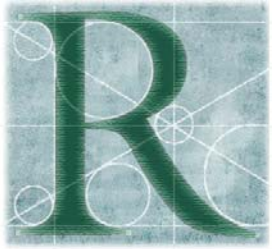
Measurement Categories

- Mgmt Understanding and attitude
- Quality Organization Status
- Problem Handling
- Cost of Quality
- Quality Improvement Actions

Maturity Stage

1. Uncertainty
2. Awakening
3. Enlightenment
4. Wisdom
5. Certainty

Crosby, 1979



State Clear Goals

Reliability 4 Elements

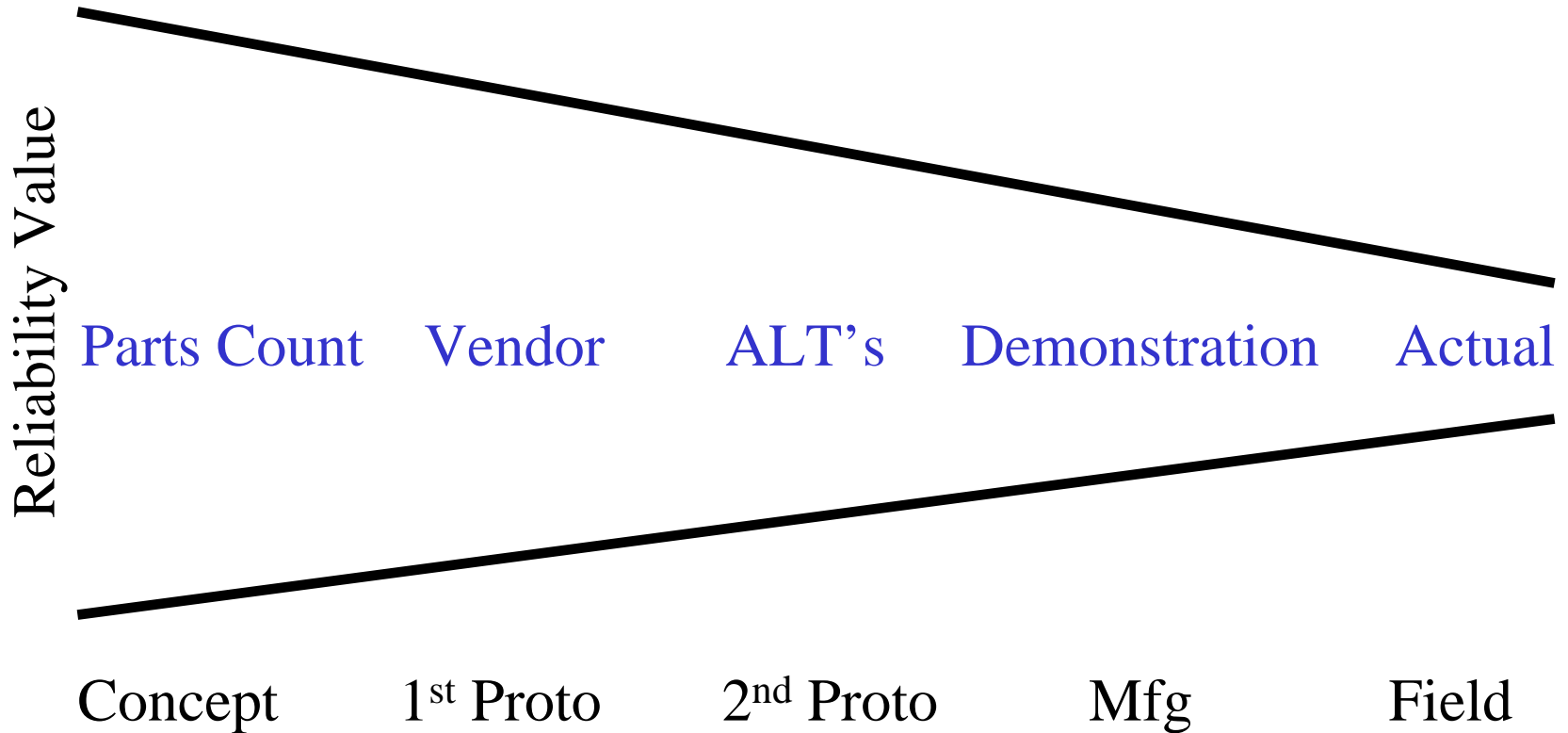
- Function
- Duration
- Probability
- Environment







Make the Estimate





Enable Tradeoffs

A procurement engineer has a ‘good’ deal

- Current MOSFET costs \$0.10
- New one costs \$0.05
- With shipping 10,000/month that’s a savings of **\$500/month**.

Do you sign off on this deal?



MOSFET Reliability

| Part Cost/10k units | FIT Failures/ 10^9 hrs | Rel. of part | # of Failures | Failure Cost (\$100/return) | Total Cost |
|---------------------|--------------------------|--------------|---------------|-----------------------------|------------|
| \$1000 | 1000 | 0.9912 | 87 | \$8700 | \$9700 |
| \$500 | 2000 | 0.9826 | 173 | \$17300 | \$17800 |

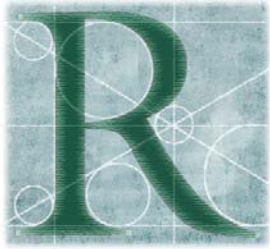
Total Cost of **\$8100/month**



Consider higher cost

| Part Cost/10 k units | FIT Failures/ 10^9 hrs | Rel. of part | # of Failures | Failure Cost (\$100/return) | Total Cost |
|----------------------|-----------------------------|--------------|---------------|-----------------------------|------------|
| \$1000 | 1000 | 0.9912 | 87 | \$8700 | \$9700 |
| \$2500 | 500 | 0.995 | 43 | \$4300 | \$6800 |

Total Savings of **\$2900/month**



Secure Failures

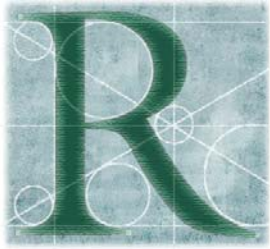


- Find failures
 - FMEA
 - HALT
 - ALT
 - RDT
 - Field Trials
- Get to root cause



Every failure counts

- Lets say out of 100 prototypes, 5 exhibited unique failures.
- If the goal is 95%, good right?
- A 90% lower confidence bound is 63%.
- Consider variation and sample risks



Summary

1. State Clear Goals
2. Enable Tradeoffs
3. Secure Failures

What are your questions?