Lay Waste to Waste
Lean Six σ

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BBLISA

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Errata

Errata:

Original version of the Control chart (as seen in video) had a run of 7 points on one side of the midline, this is not a problem. The Western Electric rule is 9 points not 7 for a chance probability of 0.001953. This deck has been fixed.

The Speaker

- Formal Quality Improvement from EMS

- IT motivation: same problems again and again impeding progress

- Development/adoption of new tools without paying attention to efficiency, requirements

- Processes changes that add steps without fixing issues.

Process is NOT a Dirty Word

- Everything has a process, the question is can you repeat the best elements?

- Many processes get "baggage" by responding (poorly) to a failure.

- Process improvement cleans up the baggage and makes the "best practices" into "current practices".

Origins

- Both Started in Manufacturing
- LEAN – Toyota (as TPS 1930) (1990)
  - Toyoda (Sakichi, Kiichiro)
  - Taiichi Ohno
- Six Sigma – Motorola (1986)
  - Bill Smith (Motorola)
  - Shewhart/Deming

Goals

- Do more in LSS time

- Do more with LSS effort

- LSS stress to do your job

You

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LEAN

A method to

maximize customer
value while minimizing waste

Six σ

A data driven method to improve quality and value by

removing defects

Bill on Waste

I wasted time, and now doth time waste me.

– William Shakespeare

Build the System Right

But be sure to:

Build the Right System

"There is nothing quite so useless as doing with great efficiency something that should not be done at all."

– W. Edwards Deming

Ask the Right Questions

- Why are we doing it this way?

- What value are we getting from this?

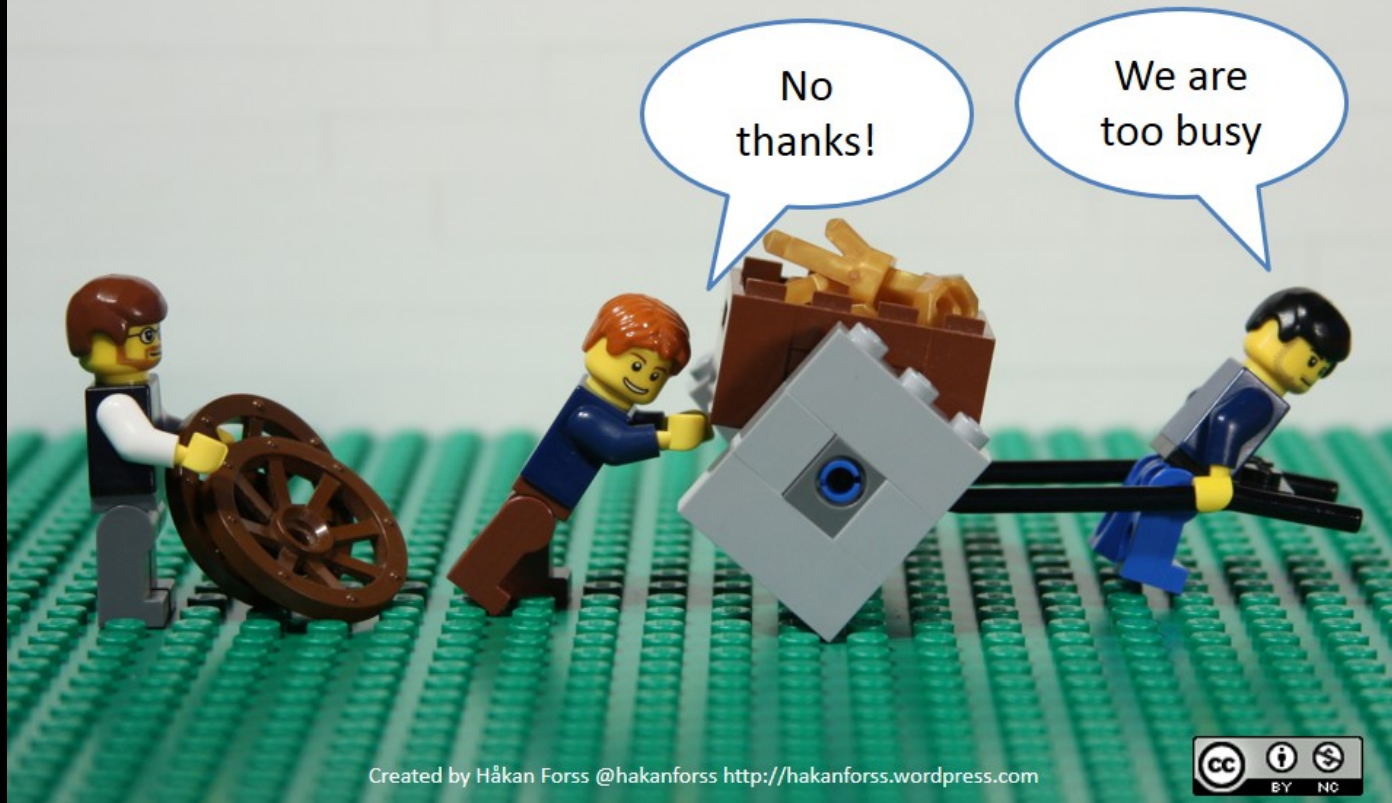- Who is the accountable person?

"We don't want questions, we want answers"

– run away, fast

"My greatest strength as a consultant is to be ignorant and ask a few questions."

– Peter Drucker

Why Improve Process?

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Insanity

doing the same thing over and over again and expecting different results.

– Al Einstein

(some) Developers Get This

Many

Agile Methodologies

derive from lean

Success Factors

- Management Support
- No 'Process Jumpers' (including bosses)
- Recognition that 'Things Aren't Working'
- Experts say 'I don't know', let's find out
- Accountability
- Process Culture
- Improving Process is Everybody's Job (not a select few)
- Don't shoot the messenger (or make them fix it)

85% Failure Due To

"Eighty-five percent of the reasons for failure to meet customer expectations are related to deficiencies in systems and process…rather than the employee… The role of management is to change the process rather than badgering individuals to do better."

– W. Edwards Deming

PI is a Process

- Tame the process

- Improve the process

- Perfect the process

- (compare to PMMI or CMMI maturity stages)

7 Wastes

DMAIC

5S

PDCA

VSM

Pareto Chart

Fishbone Chart

5 whys

7+1 WASTES

- Transport
- Inventory
- Motion
- Waiting
- Over-production
- Over-processing
- Defects
- Skills

RACI (single task)

Who	R	A	C	I
Developer 1	X			
Boss 1		X		
Boss 2	X			
Expert 1			X	

- Responsible

- Accountable

- Consultable

- Informable

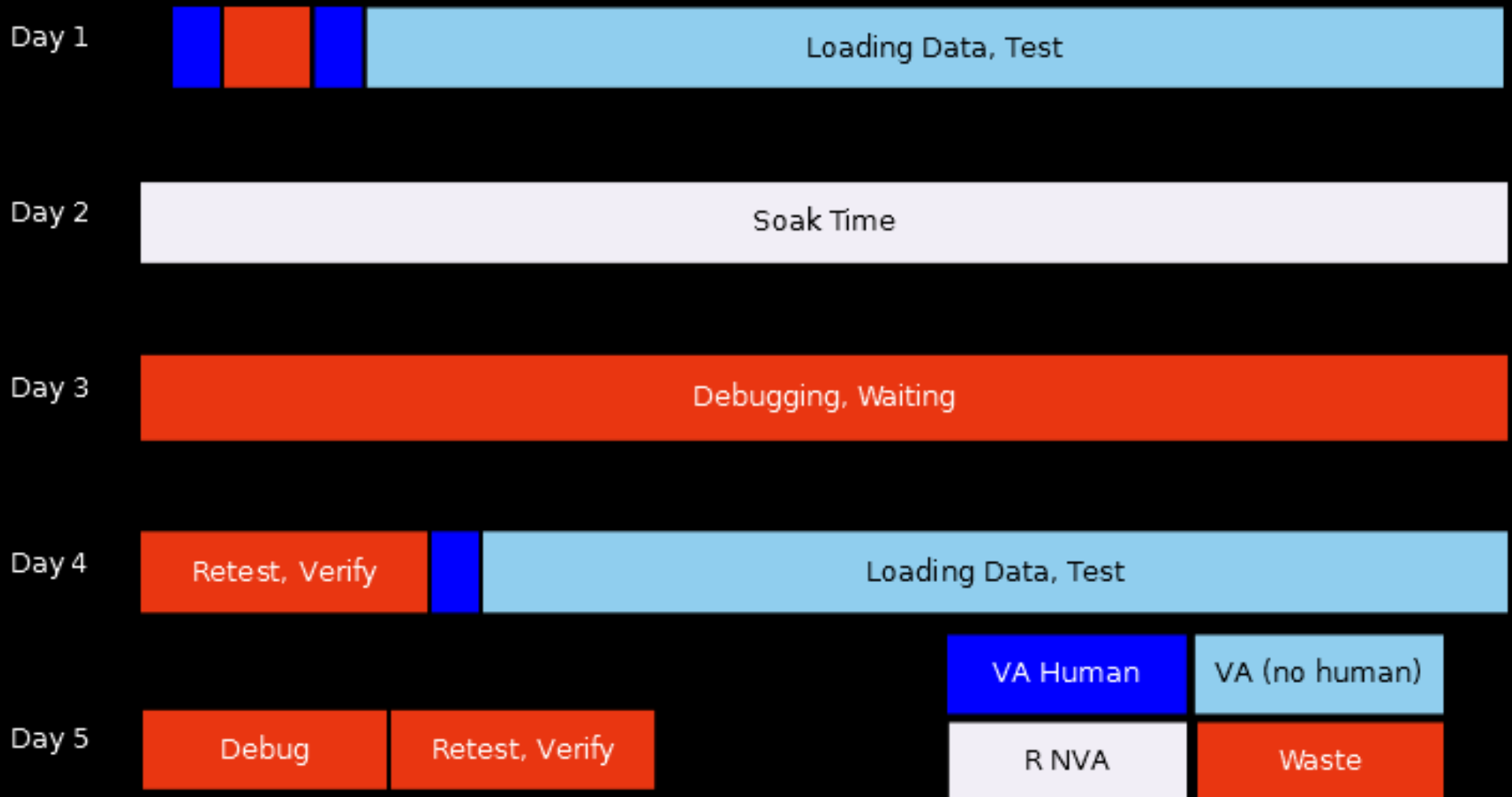Moving people from one role to another can reduce (waiting) time.

The 5 S

- Sort

- Straighten

- Shine

- Standardize

- Sustain

Value Stream Mapping

- Go to the site (gemba)

- See how it's done (practice) (not how you think it's done (theory))

- Categorize each step

  1. Value adding

  2. Required non-value adding

  3. Waste

- As seen from customer's POV

Example Ticket VSM

Day 1	Loading Data, Test
Day 2	Soak Time
Day 3	Debugging, Waiting
Day 4	Retest, Verify — Loading Data, Test
Day 5	Debug — Retest, Verify

VA Human	VA (no human)
R NVA	Waste

How bad was it?

- Total cycle time 35 business hours

- Value add time 14 hours (1 hour human)

- Time wasted 13 hours (~1.5 business days faster) (not including 8 hours RNVA)

  But wait, it's worse

- Context shifts (development and operations) cost 2 additional hours of human time

Yeah This is a Reason

Problem Identification

- Group failures into categories

- Count up instances (cost, hours spent) of each category

- Determine the "significant few" from the "insignificant many"

Pareto Chart

- Bar chart sorted by count

- Where is the biggest bang for the buck

- 80/20 rule

- May need to subcategorize and repeat
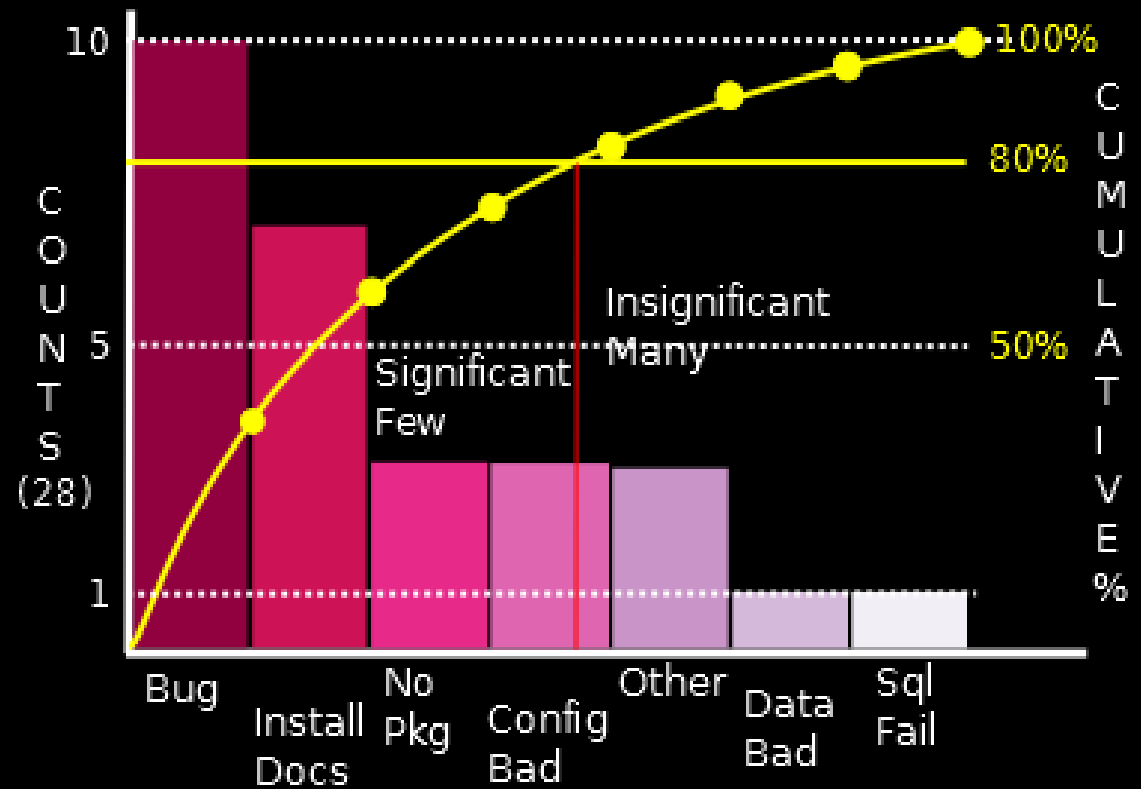
RCA (root cause analysis)

- 5 Whys

- Ishikawa Diagram

- Cause Mapping

- Kind of bogus, often failures are a sequence of steps. Interrupting any step stops the failure.

The 5 Why's

- Why?

- Why?

- Why?

- Why?

- Why?

Ishikawa Diagram (fishbone)
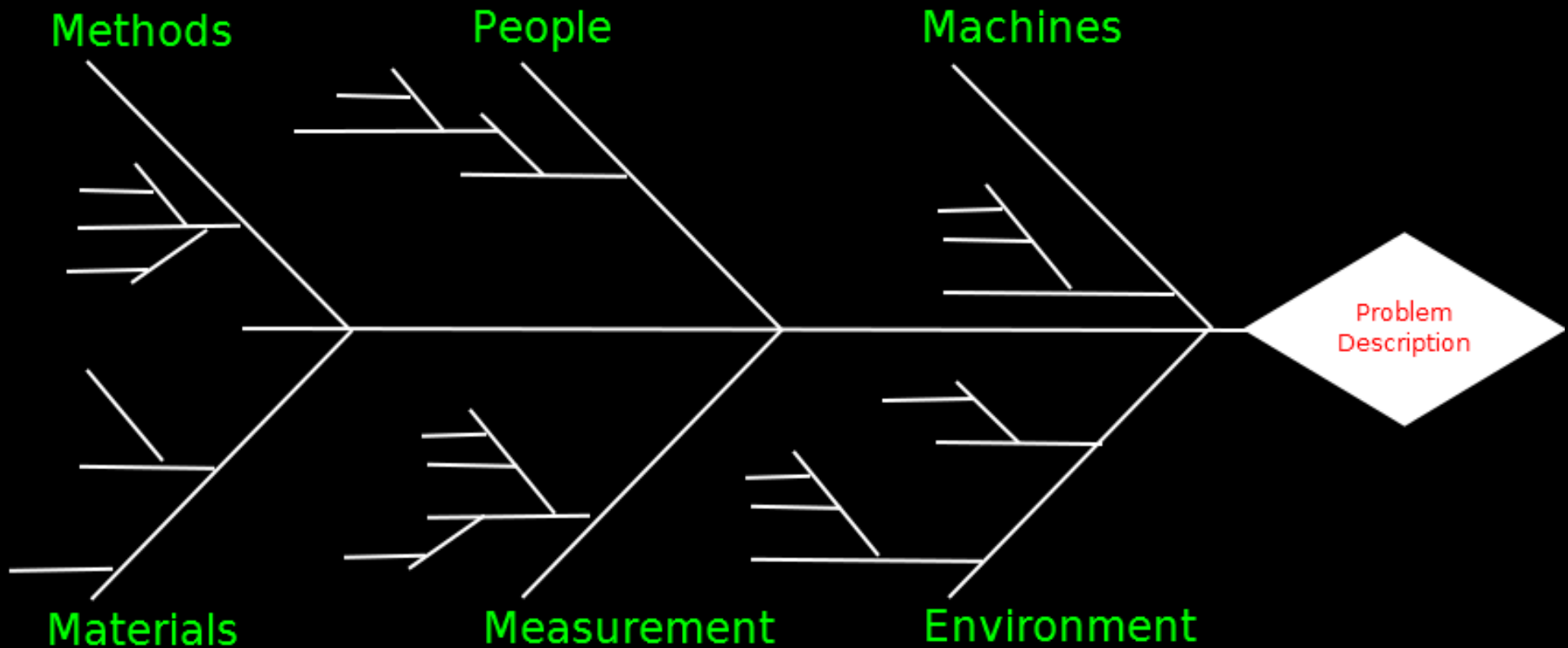
DMAIC / PDCA

- Define

- Measure

- Analyze

- Improve

- Control

- Plan

- Do

- Check

- Act

D - Define

- Problem statement (what is wrong)
- Identify CTQ's (Critical to Quality for customer)
- What will success look like
- Constraints
- Measurements (how do we know what's wrong)
- Business Case
- Deployment Plan

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Tollgate
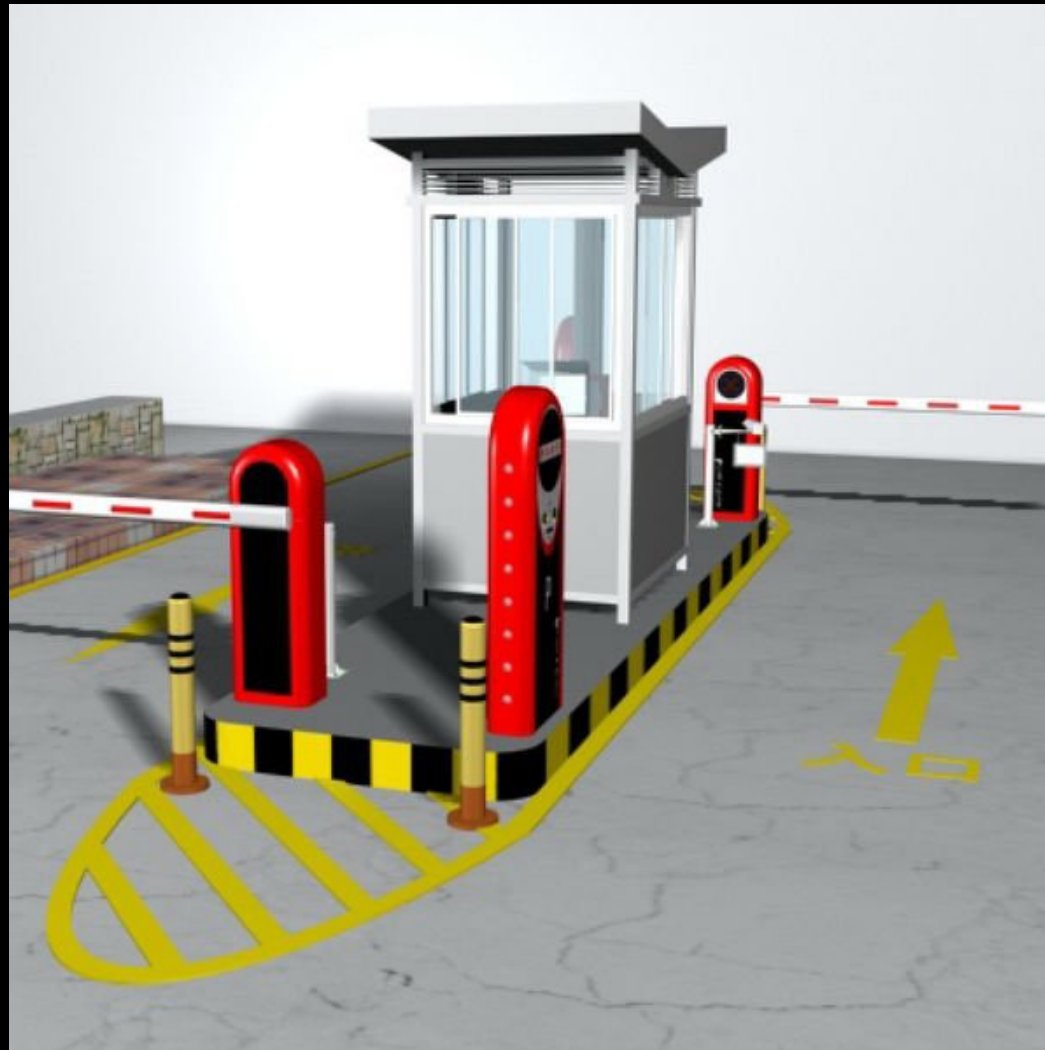
M – Measure

- What to measure
  - Do you need a proxy?
- How to measure
- Who measures
- Quality of measurement (accuracy, consistent (gage repeatability, reproducibility))
- Training

A - Analyze

- Analyze the data to

- Determine root cause

- Predict results (on measurements)

I- Improve

- Determine changes to fix

- Make changes

- Train workers

- Develop tools, forms, checklists

C - Control

- Has problem really been solved?

- Keep improvements

Problem Solved?
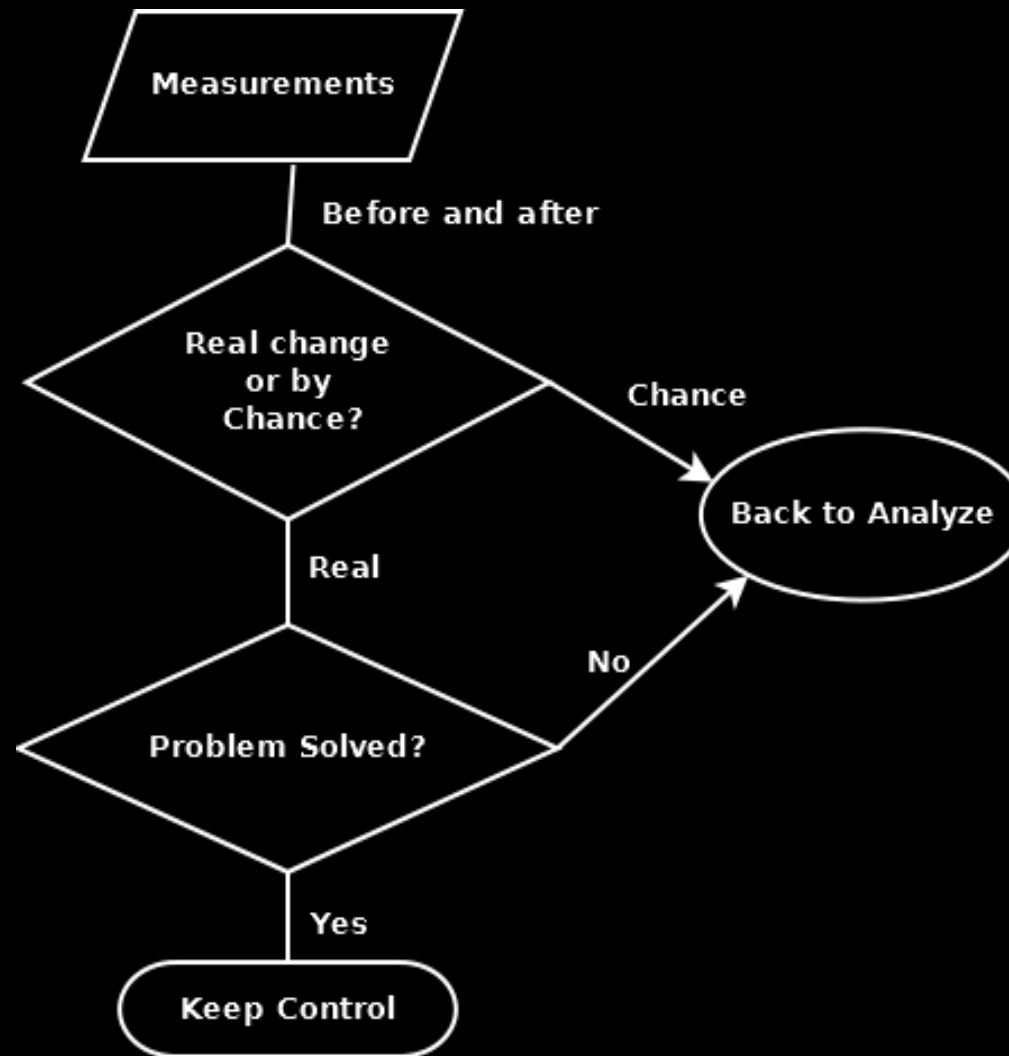
Lies, Damn Lies and ...

- Measurements
  - Real change or due to chance?
    - In average – t-test or Mann Whitney U
    - In min/max (variance) – F test (but be careful, needs normal data), Levene
- Data is messy, GIGO rules
  - Is your data valid?
  - Repeatable
  - Reproducible

Histograms

- A method to display frequency of data values

- Y axis is counts (frequency)

- X axis is binned numeric ordered values
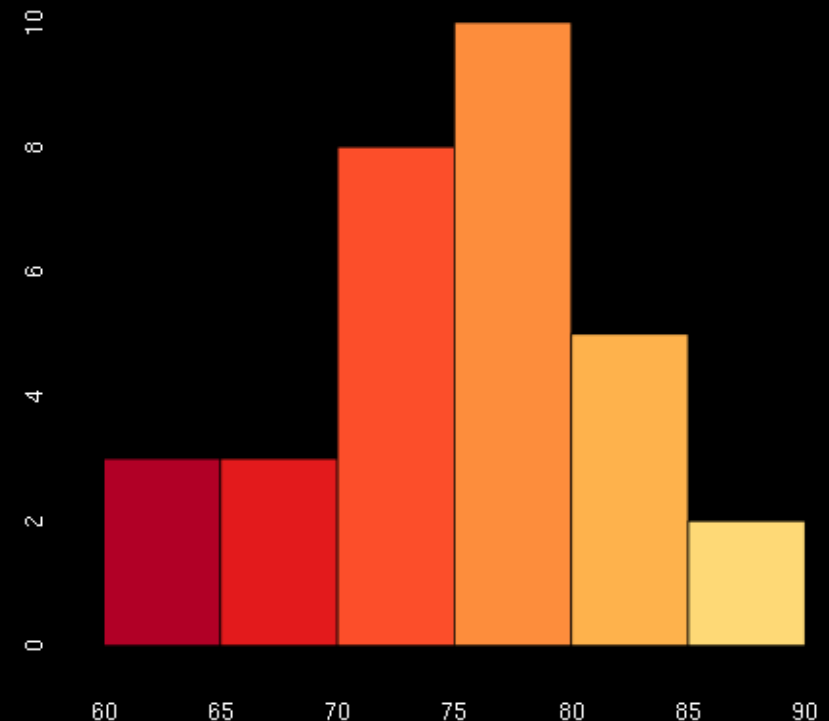
Data Collection

- Approximately 140 tickets closed/month

- Choose 20 randomly

- Count up number of interactions where a question was posed to the person opening the ticket.

- Repeat this for another month period

- Have two data sets month 1 and month 2

Significant Change

- ## Change or not a change

  - Center change (mean/average, median)

  - Best case

  - Worst case

Interactions
Month 1

Interactions
Month 2
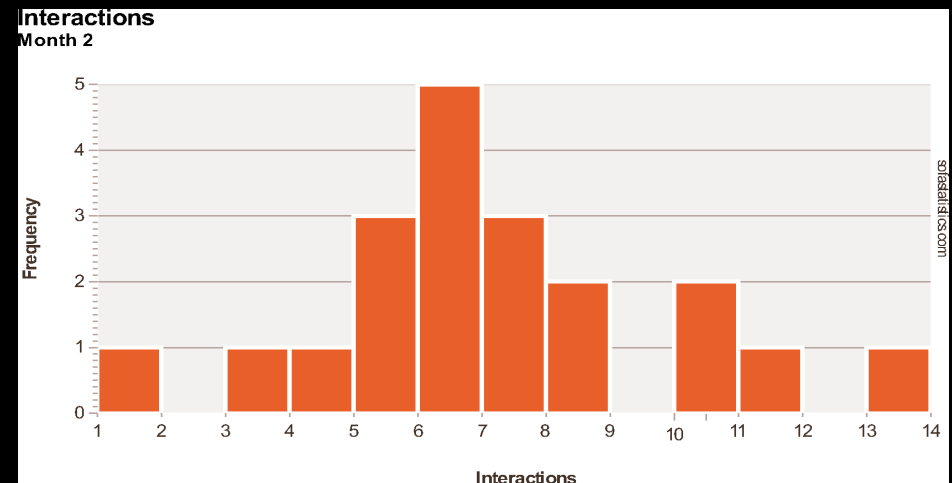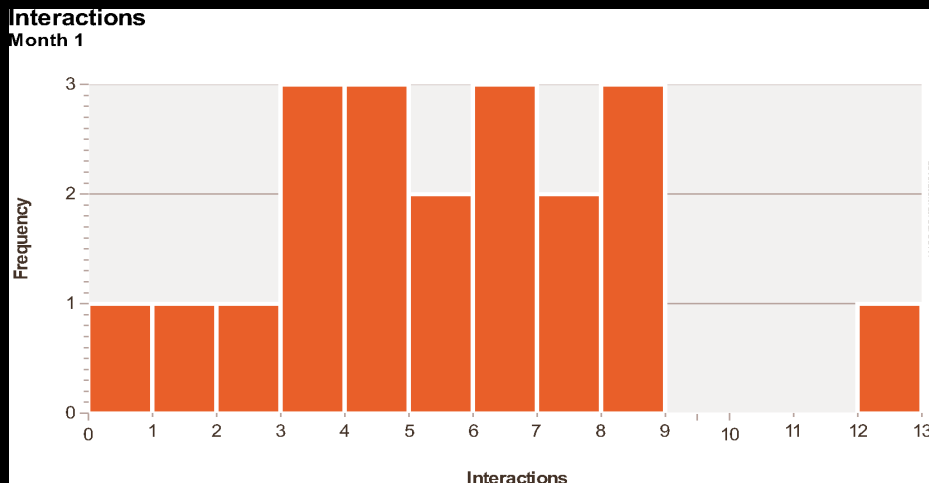
Box Plots
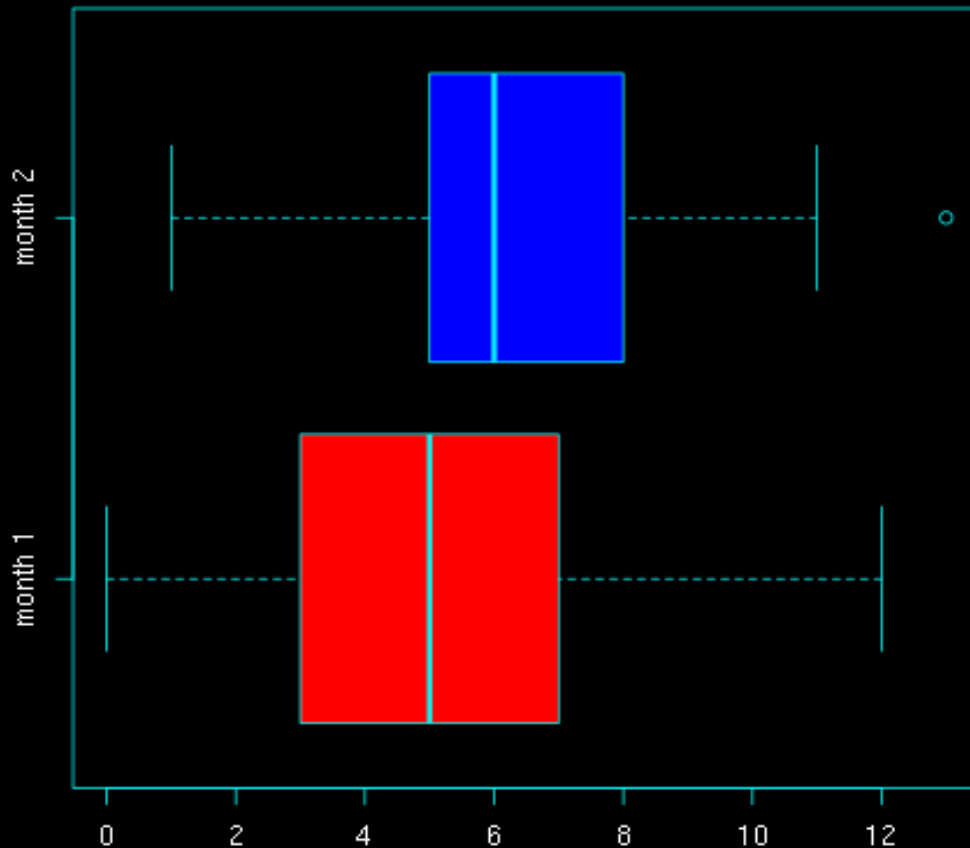
Seat of Pants Eval

- Line at median

- Box at Q1/Q3

- Whiskers last point inside 1.5 box width

- Outliers plotted

Staying in Control

- Prevent Errors

- Detect Errors

  - Repeat analysis (monthly, weekly)

  - Test to see if mean/variation changed

    or

  - Control Charts

Checklists

- Checklists are wonderful things...

- Reinforces process and increases consistency.
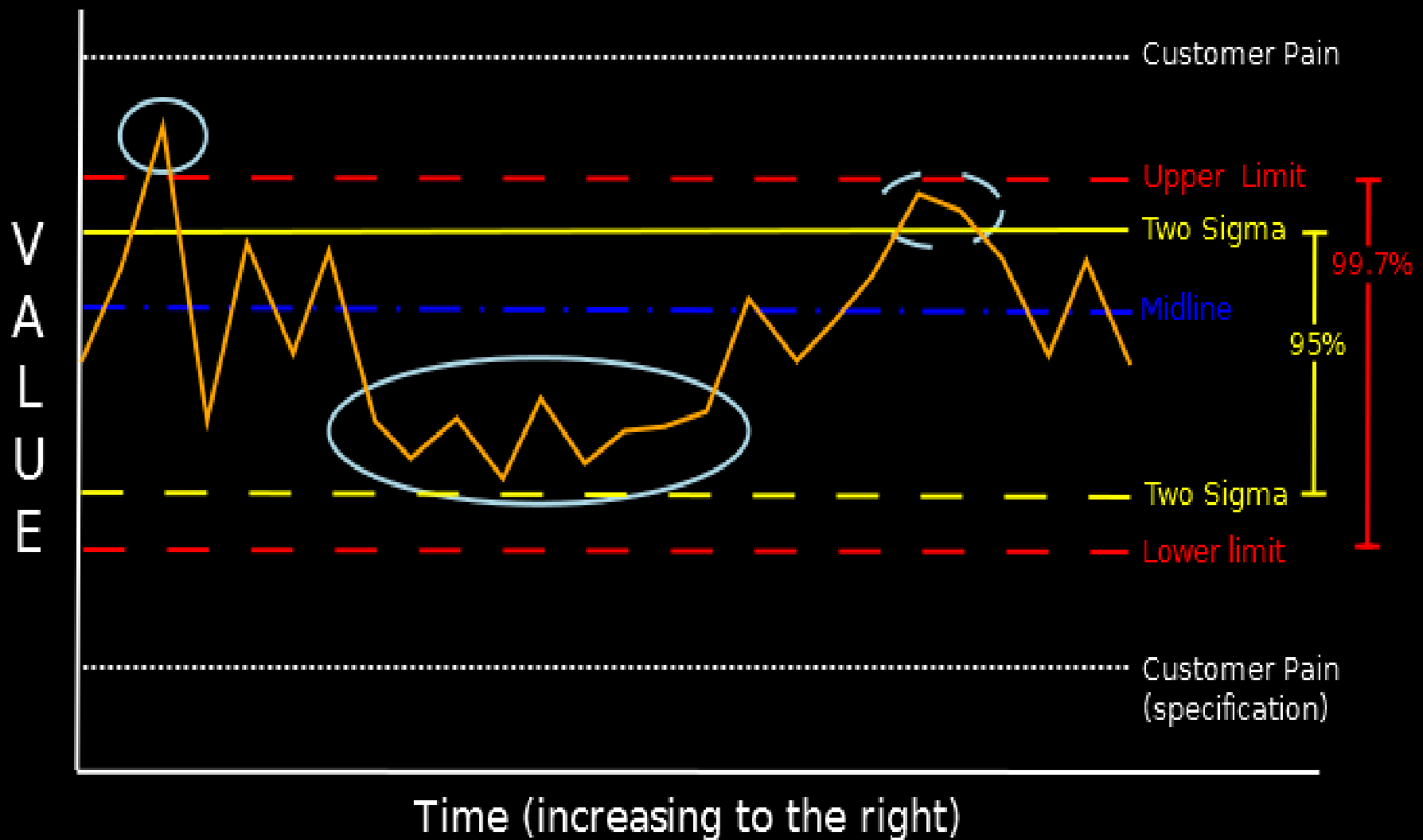
- ABC's – Airway, Breathing, Circulation

Poka what?

- Poka-yoke or mistake proofing

- Catch failure at earliest possible point

- Code reviews, Unit tests, Continuous integration, pre-commit tests for code check-in
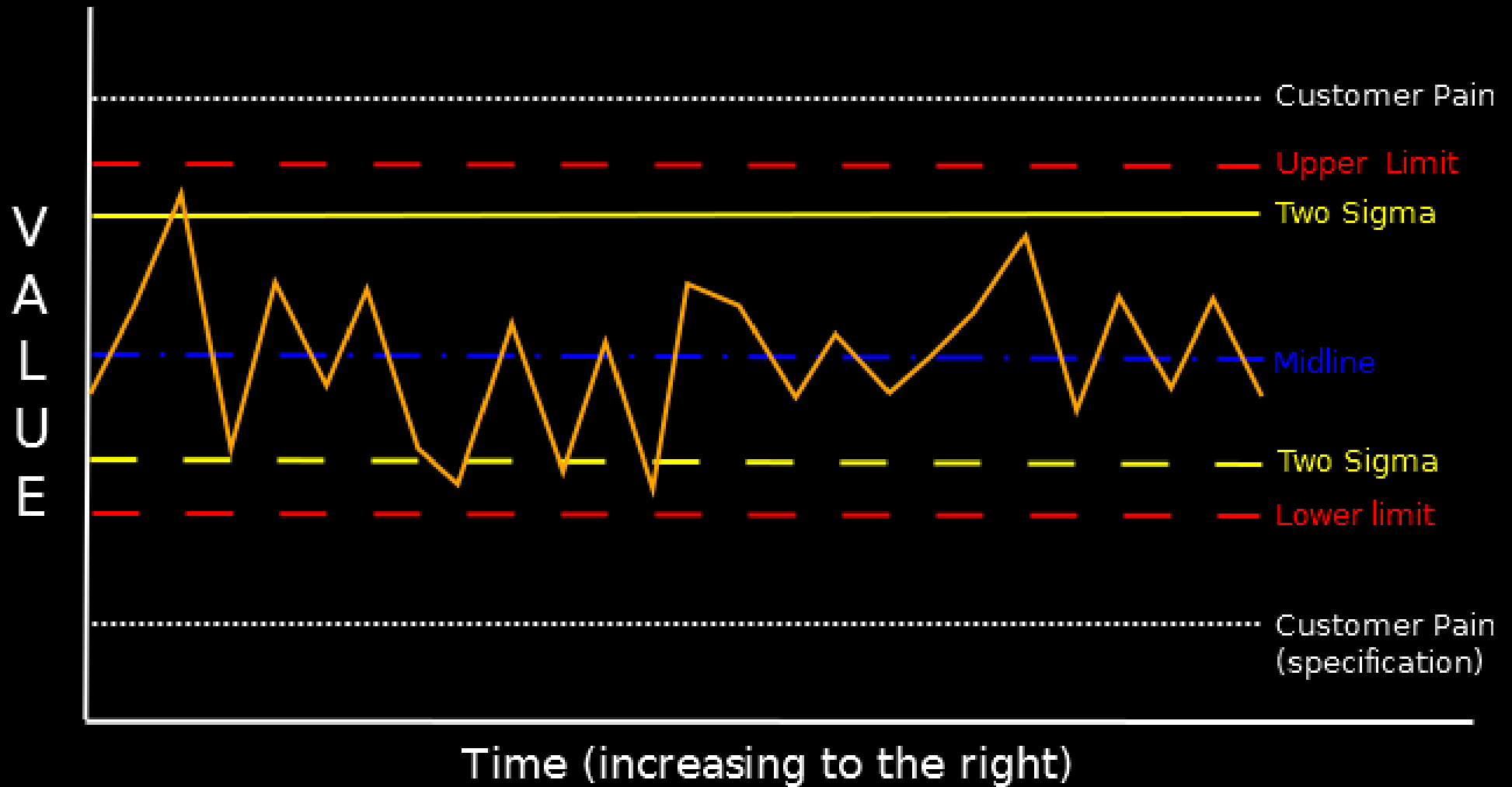
- Keyed (or color coded) plugs on computer hardware

Dodge said many years ago, 'You cannot inspect quality into a product.'
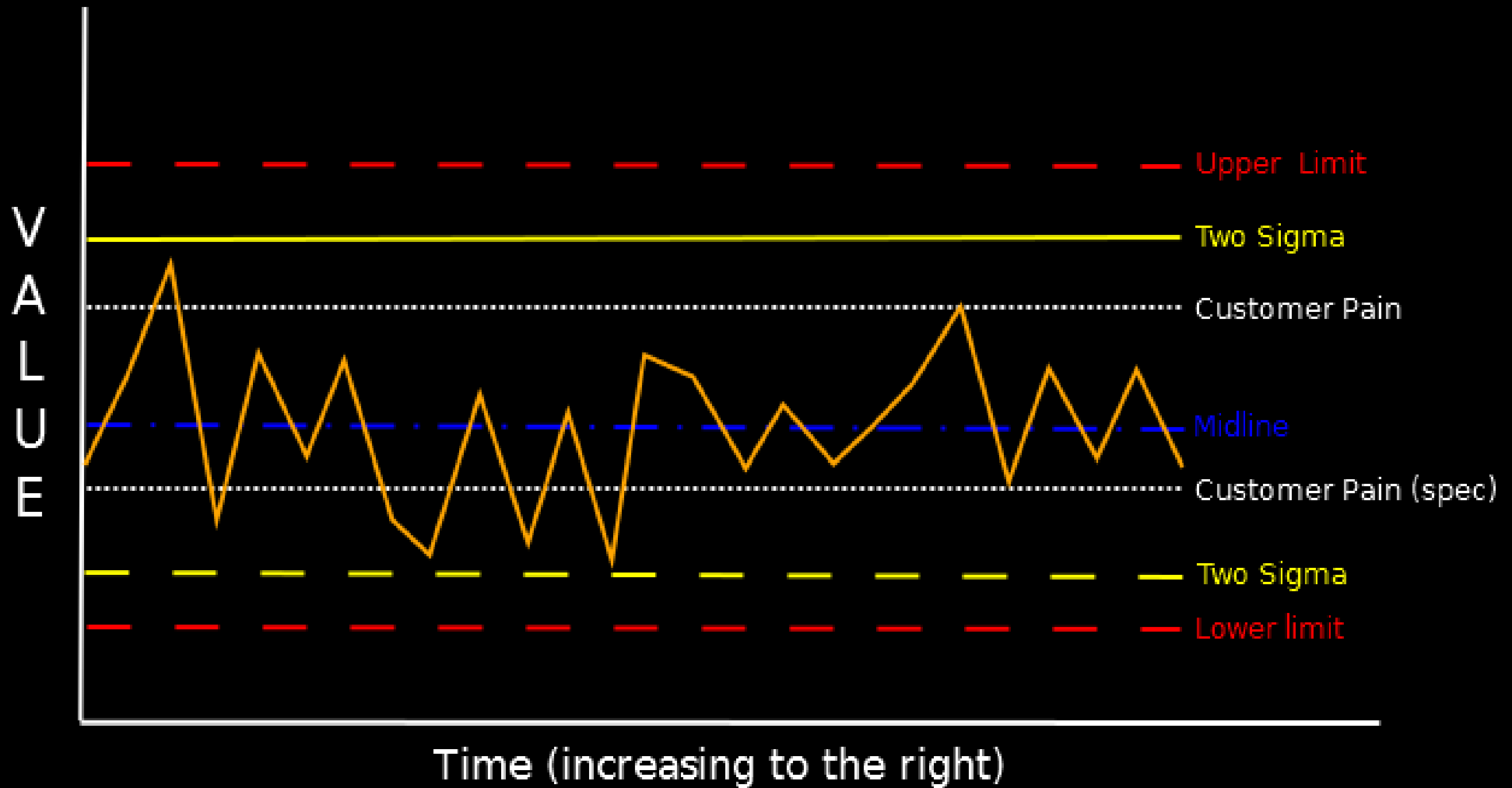
– Deming

Anatomy of a *Shewhart* Control Chart
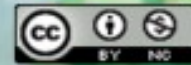
Can't Touch This...

Control Chart of PAIN

Maintain

World Domination

Learning to see waste and systematically eliminate it has allowed lean companies such as Toyota to dominate entire industries. Lean thinking defines value as 'providing benefit to the customer'; anything else is waste.

– Eric Ries

For Further Reading

- How to Measure Anything – Hubbard

- Lean Six Sigma for Service – George

- Lean from the Trenches – Kniberg

- Identifying and Managing Project Risk – Kendrick

- Lean Six Sigma for Dummies – Morgan, Brenig-Jones

- Too many web resources to mention

Challenges

- Think of a process at work and analyze it for one of the 8 wastes.

- Chose another process, what measurements would let you see if it's being done properly? How reliable will the measurements be? Can you make it more reliable?

- Find some process to Poka-Yoke. What errors are in it, how do you detect their introduction?

- Next time you solve a problem, Define it first: Acceptable results, How do you know? Predict what should result from an intervention?

Questions?

- Your chance to make me think......