



Lean Six Sigma Certification Course

Batch No.



About myself



Shamima Begum

PMP, ASQ CSSBB, CMBB, C-KPI

- More than 19 years of experience
- Journey started with Warid/ airtel oe team
- First ASQ CSSBB in Bangladesh
- Managed different types of projects in multiple industries
- Currently working as consultant in different industries
- Trainings in different countries
- MBA from Jahangirnagar University

Our Trainers Team



Please introduce yourself

- Tell us about yourself:
 - Name,
 - Educational Background
 - Organization,
 - Designation, role,
 - Why Six Sigma?
 - Your expectation from this course



Live sessions ground rules



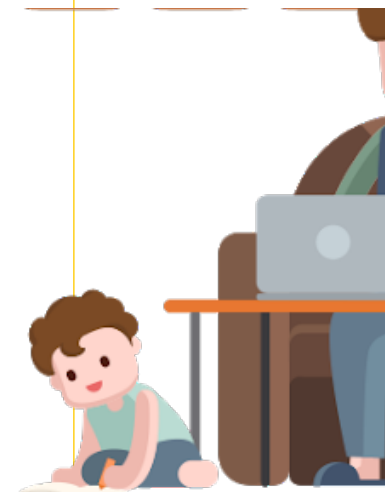
Follow session time



Please put the video on and speaker mute



Please ask questions, express opinions



New normal!!

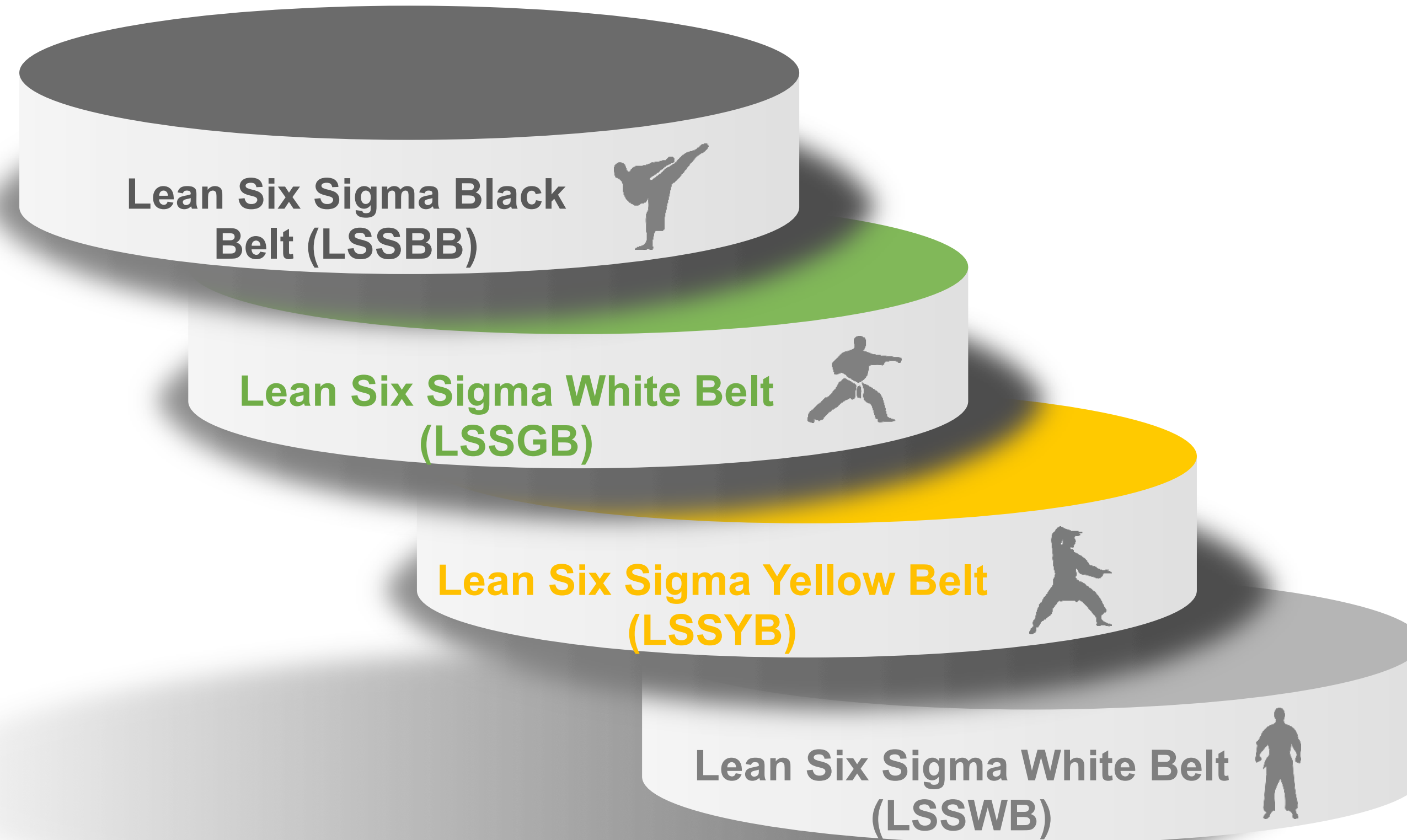
Its fine if we see or hear voices of kids sometimes



Module 1: Introduction



Training in different level



Lean Six Sigma White, Green, Yellow and Black Belt Course Modules

White Belt

Module 01: History of Six Sigma, how six sigma works, DMAIC methodology
Module 02: Understanding relation of six sigma with other quality management practices like Lean management, TQM, TPM etc.

Yellow Belt

Module 03: Define phase of six sigma with charter Pareto and affinity diagram
Module 04: Lean and flow chart for process
Module 05: Overview of measure tools and Fishbone Diagram
Module 06: Failure mode and effect analysis (FMEA), correlation
Module 07: Relation diagram (5Why),
Module 08: Tree diagram management, I-MR chart

Green Belt

Module 09: SIPOC, VSM (HT for mean,)
Module 07: Probability and Discrete distribution
Module 10 QFD+Gage R&R +Cpk
Module 11: Distribution for continuous data + Correlation and regression
Module 12: Measurement System Analysis (MSA)
Module 13: CI+HT calculation for 2 sample z & t
Module 14: Process Capability-Cp, Cpk, PP, Ppk
Module 15: Correlation, multiple box plot, Multi-vari and other statistical tools

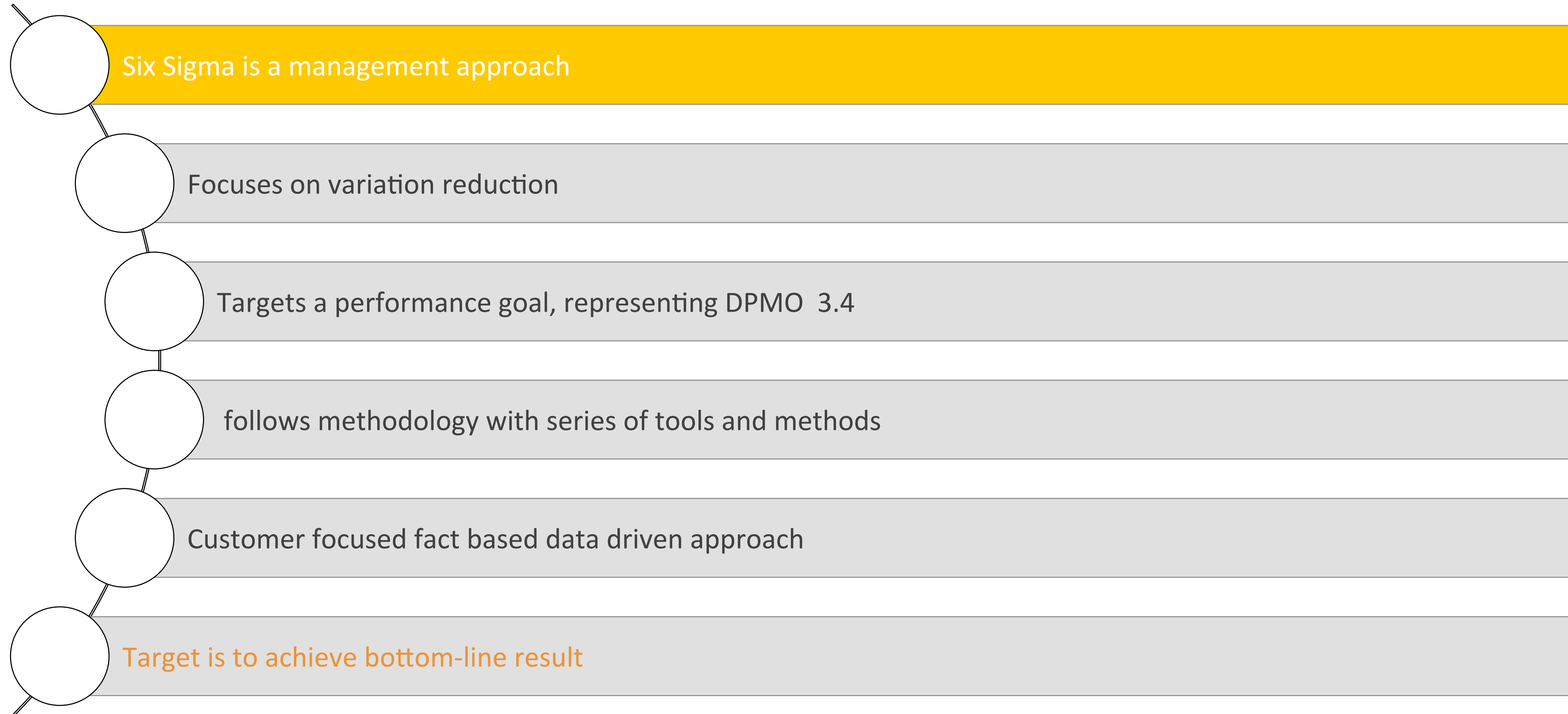
Black Belt

Module:16: IDI, Mult Hypothesis testing
Module 17: Design of Experiment+ Non parametric
Module 18: HT for Mean and proportion
Module 19 : HT for variance
Module 20: ANOVA and control chart
Module 21: DOE, DFSS, RTY,
Module 22: Process performance recap, mock on statistical part
Module 23: Leadership
Module 24: Strategy

Topic:

2. What six sigma is?

What Six Sigma is?

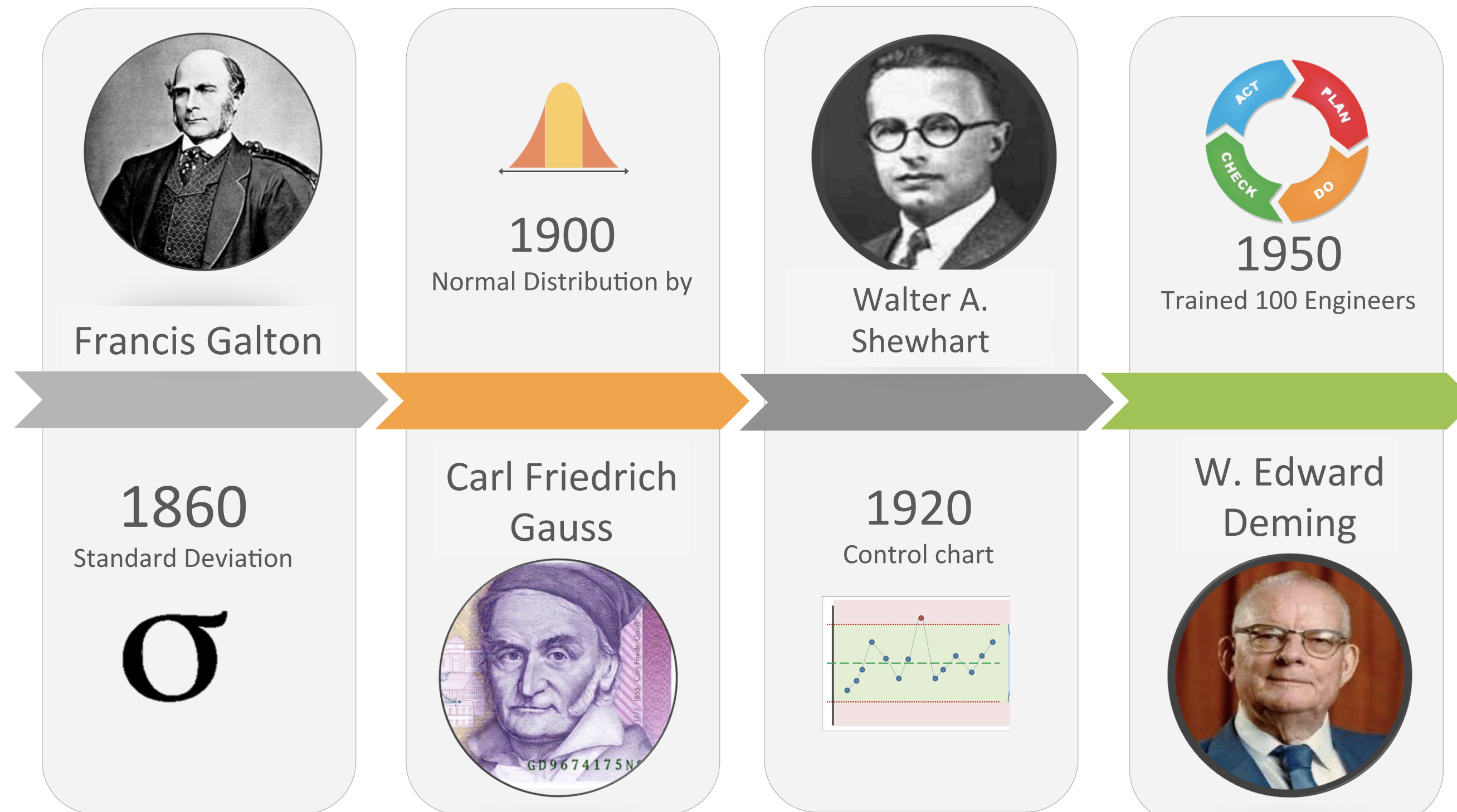




Topic:

History of Six Sigma

History of quality management



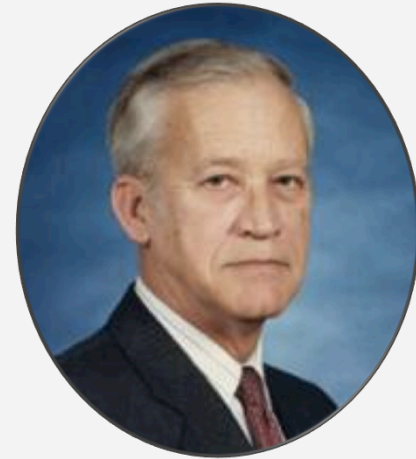
History of Six Sigma

1979:
What's wrong
with our
company!

Our quality
stinks!- Art Sundry
Sales Manager



Robert W. Galvin
President and CEO



Bill Smith,
The father of Six Sigma

1985: Coins the term Six
Sigma
1991: first Six Sigma
Black Belt from
Motorola

1995
Adopted six sigma

After five years of
implementing Six
Sigma, General
Electric reported
savings of \$12 billion.



Jack Welch
CEO, GE



Topic:

Demystifying six sigma

Average call handling time



Average call handling time is higher than expected

The less time we spend on the telephone, the less resources we need, and that means lower cost!

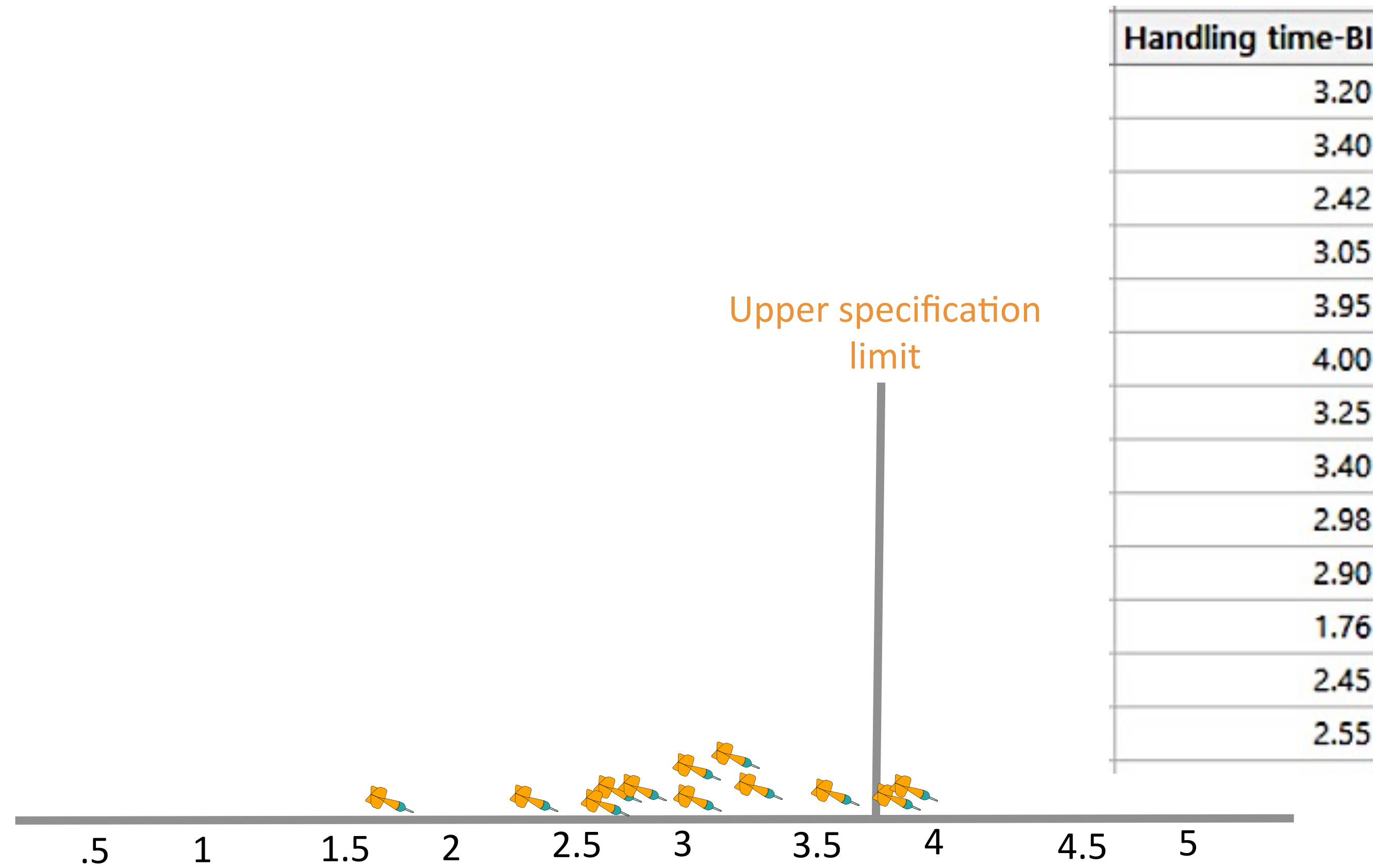
AHT reduction



Process:
Order status
inquiry at
customer call
center

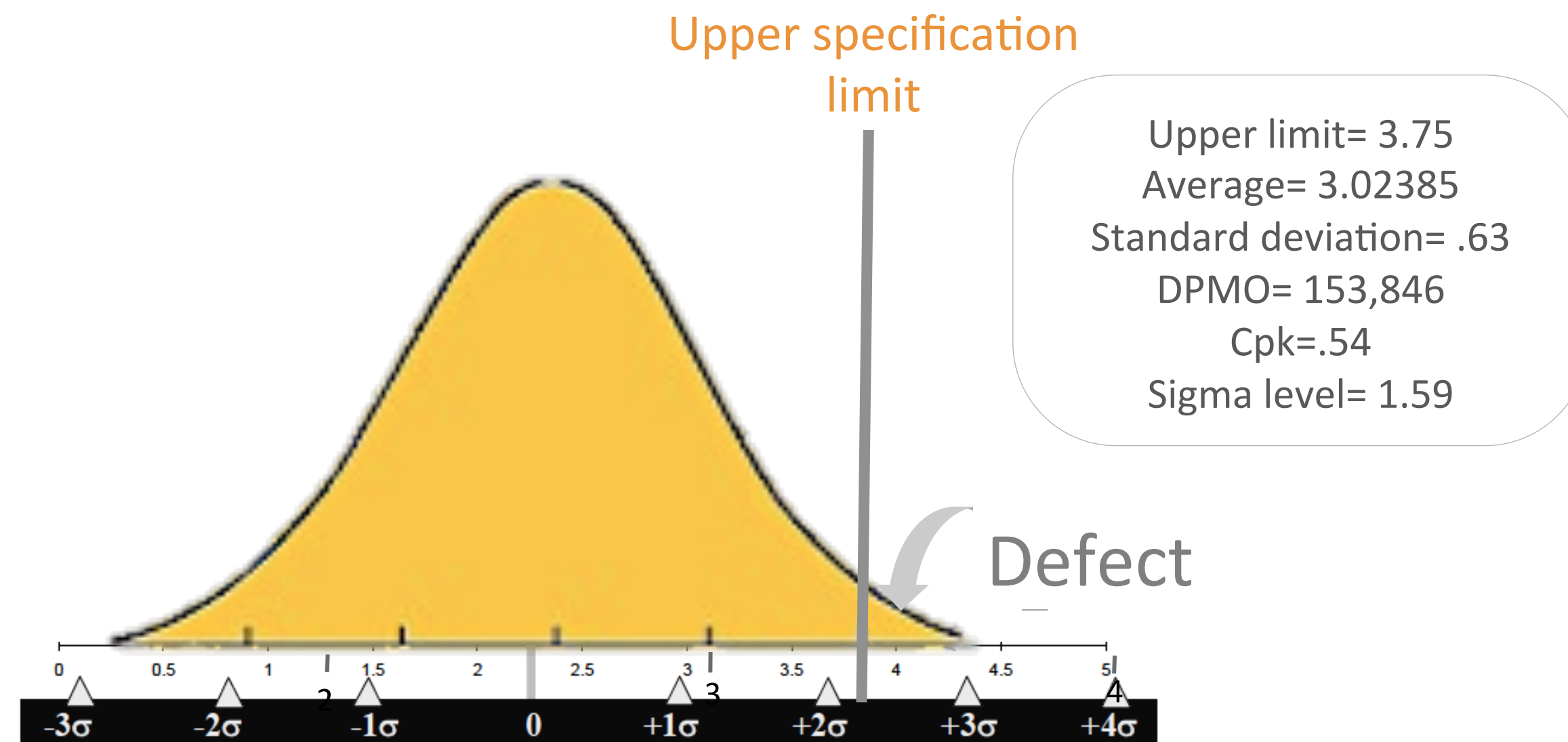
Key
Characteristics:
Time it takes to
answer to
inquiries

Baseline performance



Baseline performance

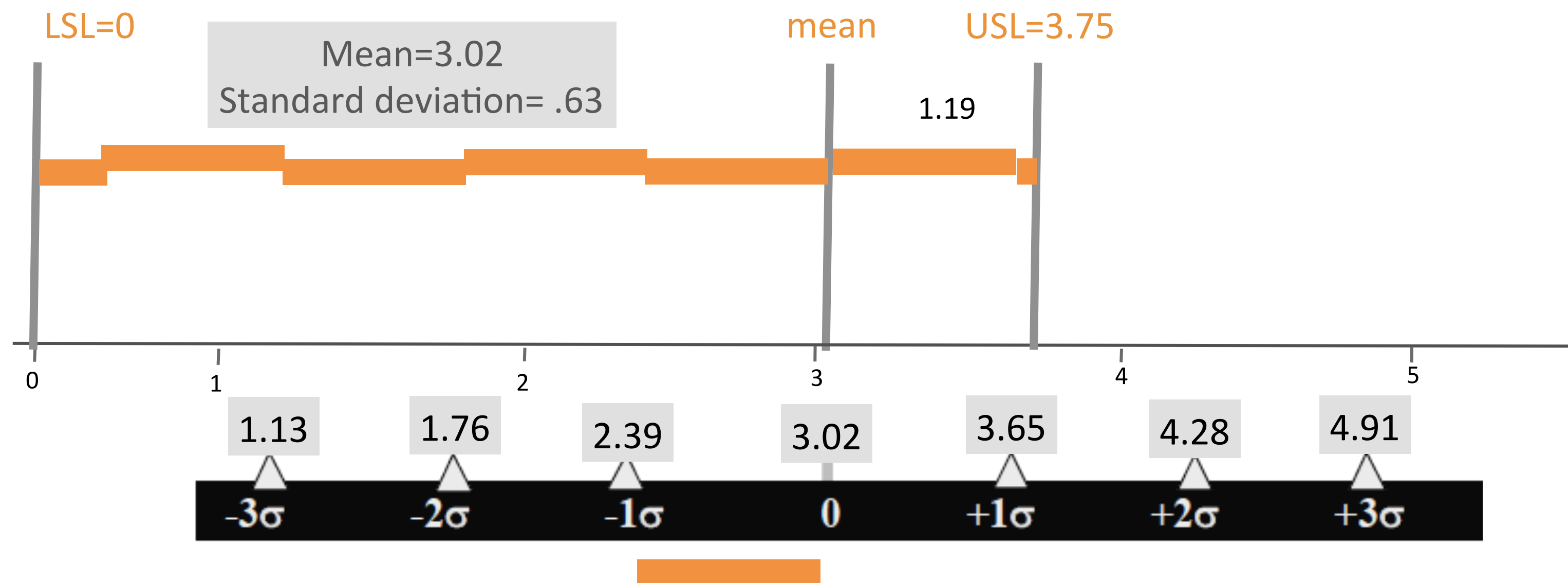
AHT
3.20
3.40
2.42
3.05
3.95
4.00
3.25
3.40
2.98
2.90
1.76
2.45
2.55



The real distribution for this type of measurement would probably not resemble this graph, as you will find out in subsequent workshops. This has been created for illustrative purposes only.

Standard deviation

We can improve sigma level by reducing variability around the mean!





Analyze

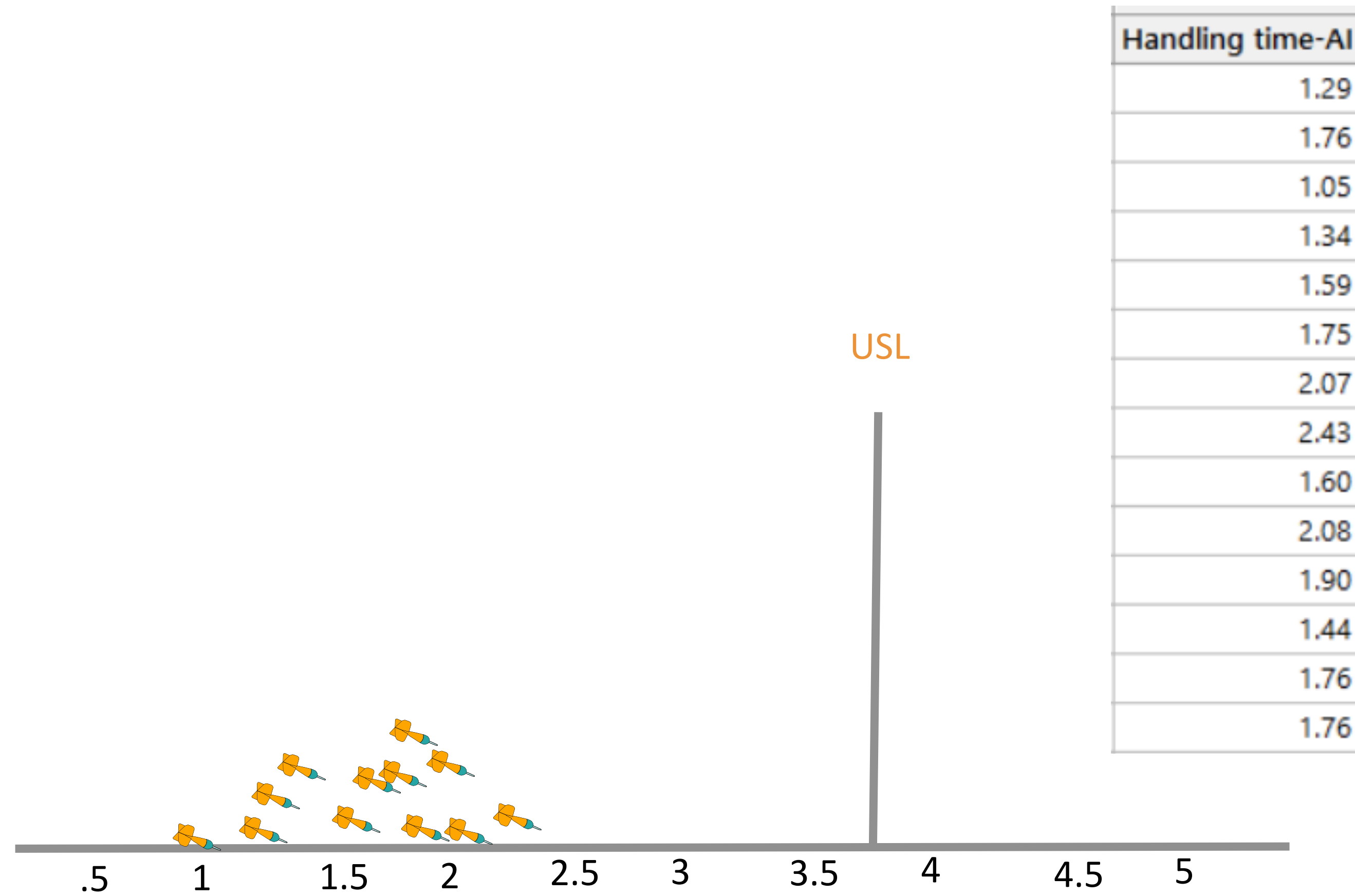
- Inexperienced customer service representatives.
- Lack of automation or no interactive voice response (IVR) system.
- Not taking time to review calls and processes.
- Ineffective call routing.



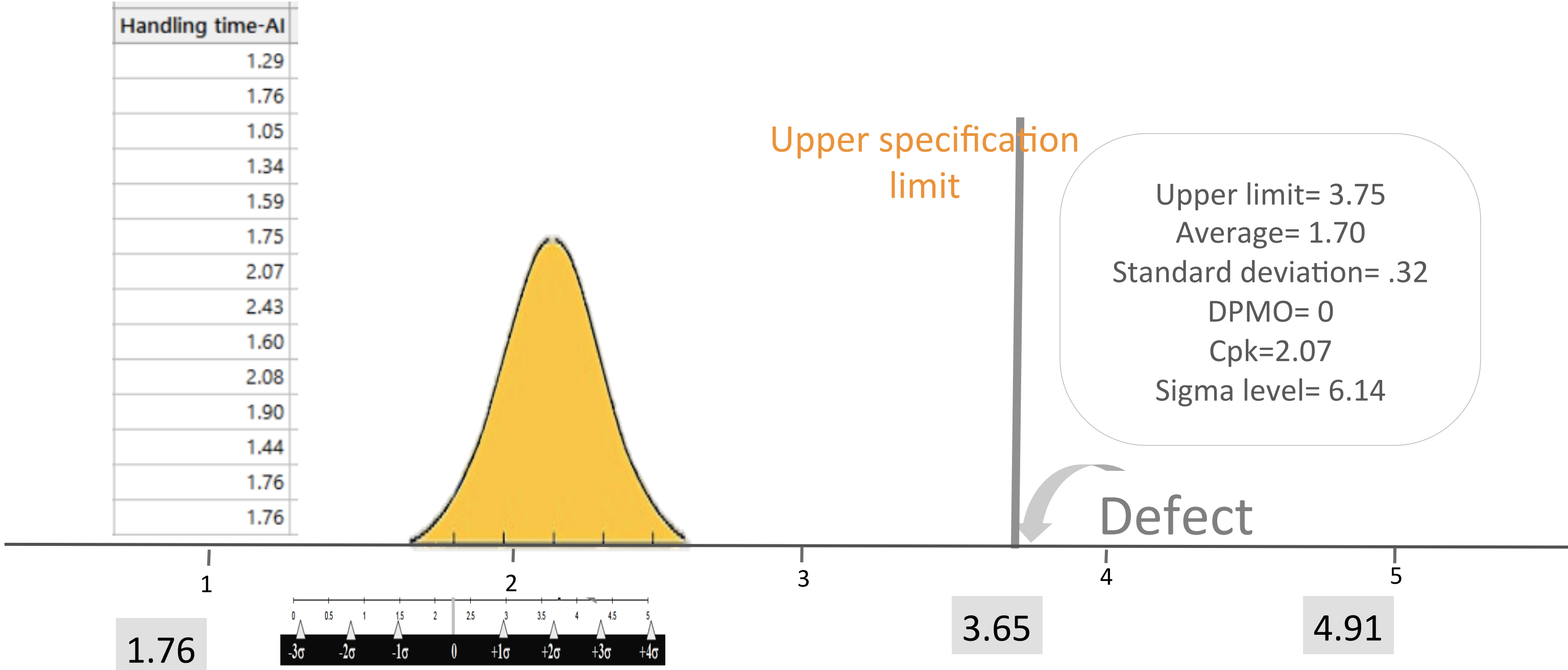
Improve

- Let Agents Listen to Examples of Low AHT
- Identify Silent Times
- Restructure IVR
- Know product
- Make data easily accessible
- Organize internal documents
- Create Cheat Sheets to Help Streamline Call-Handling Processes
- Buddy up agents

Improved performance



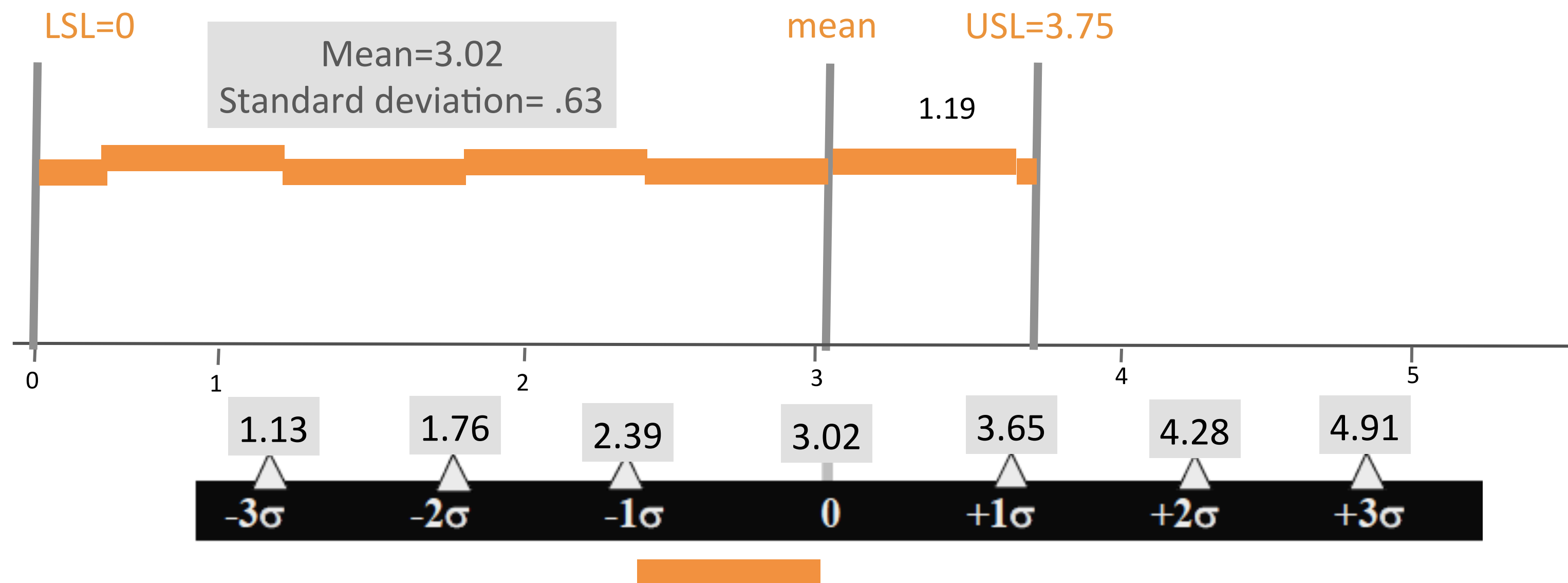
Improved performance

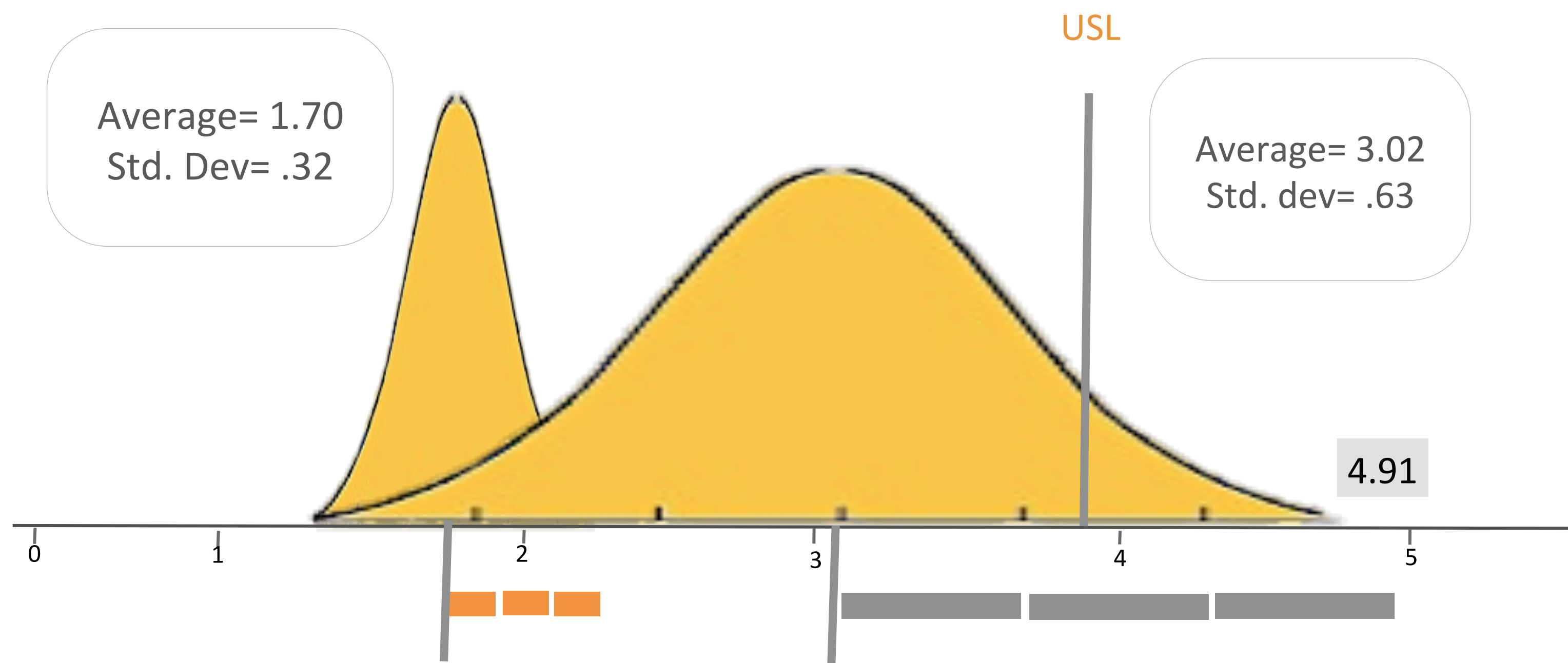


The real distribution for this type of measurement would probably not resemble this graph, as you will find out in subsequent workshops. This has been created for illustrative purposes only.

Standard deviation

We can improve sigma level by reducing variability around the mean!







Improved AHT





Topic:

How variation kills



7 What does variation mean?

- Variation means that a process does not produce the same result (the “Y”) every time.
- Some variation will exist in all processes.
- Variation directly affects customer experiences.

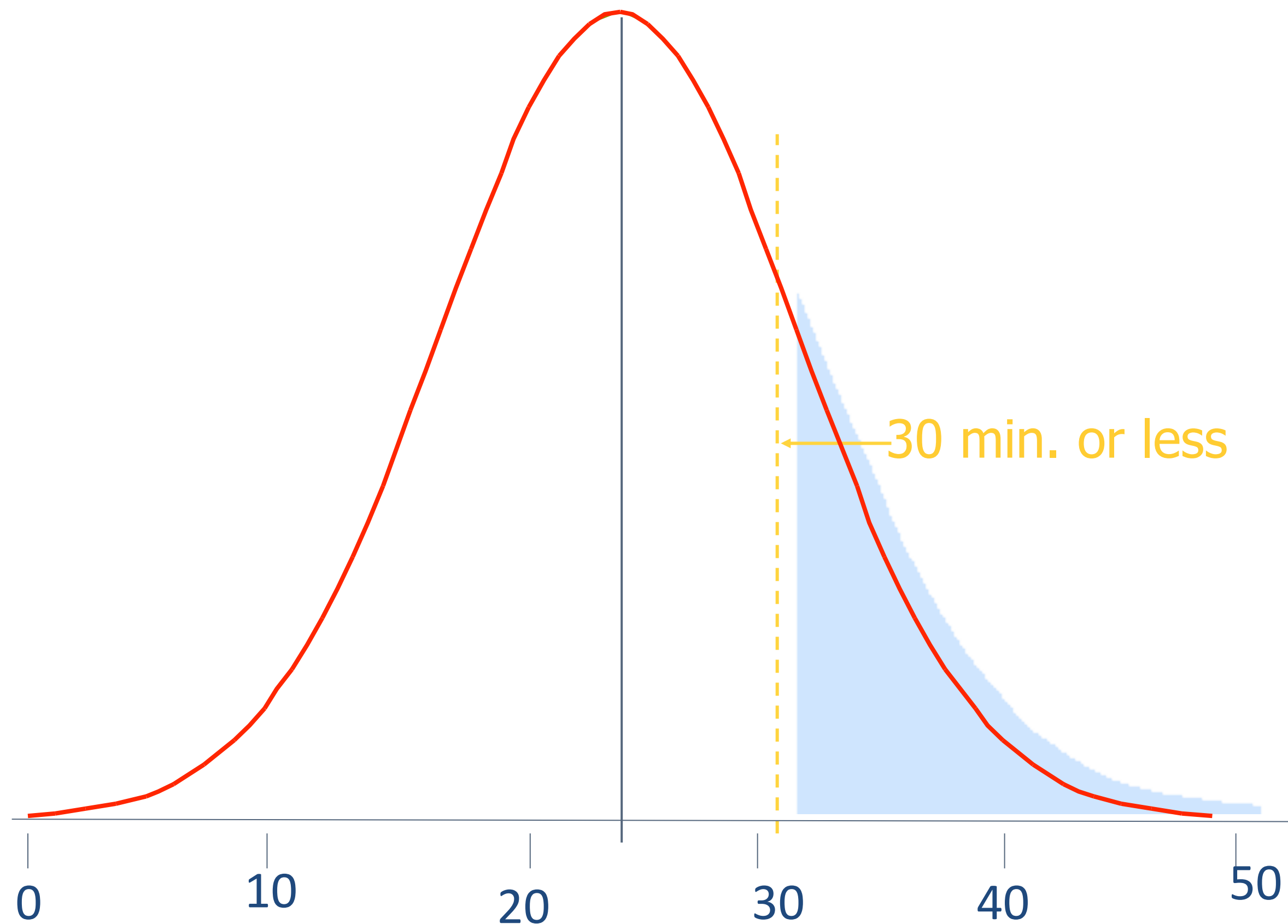
The pizza delivery example. . .

- Customers want their pizza delivered fast!
- Guarantee = “30 minutes or less”



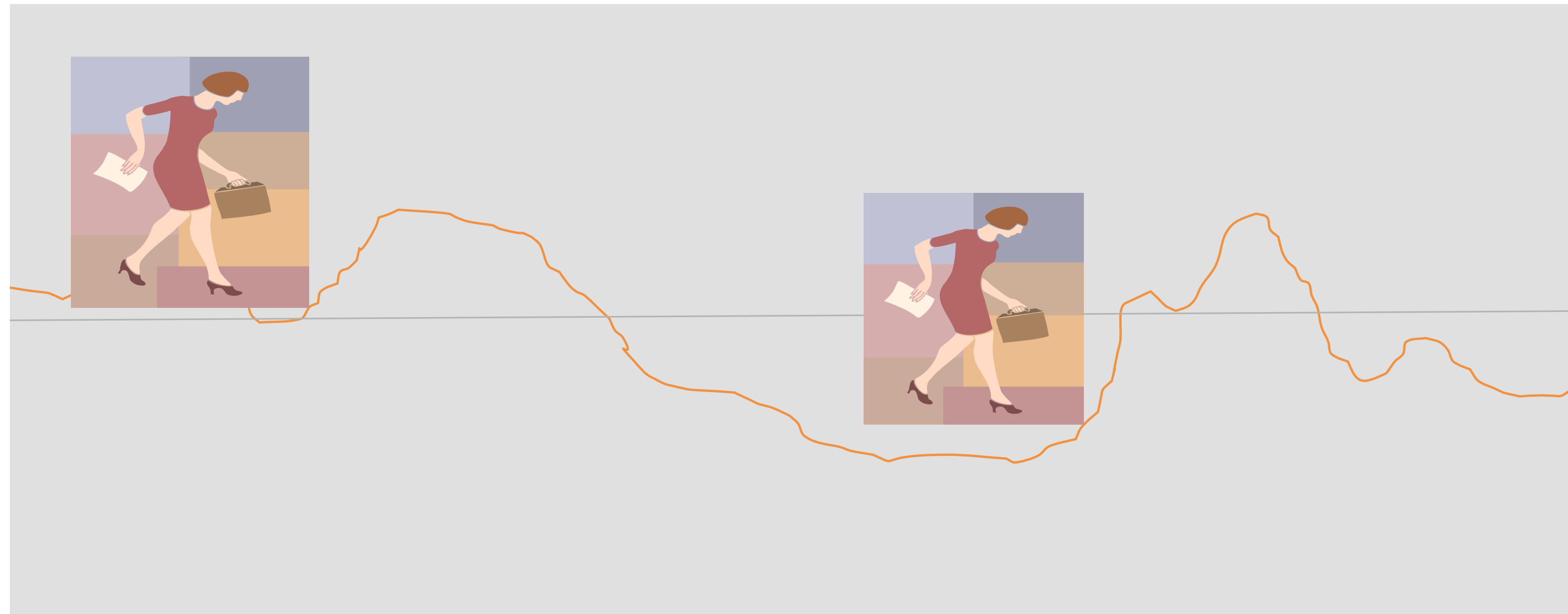
- What if we measured performance and found an average delivery time of 23.5 minutes?
 - On-time performance is great, right?
 - Our customers must be happy with us, right?

How often are we delivering on time?



Crossing a river

Your height up to nose is 4.5 feet !
Average height of the river is 4 feet!!



Variation Vs. Mean

Process	Measure	Average	% beyond avg
Pizza delivery	Time to deliver pizza	23 min	45% of the time delivered beyond 30 min
fault repair	Time to repair	1.7 hours	11% repairs were beyond 1.7 hours
Call center-quality of call handling	Resolution time	1.5 min	Only 30% agent have conformance score less than 1.5
Sales	Sales per agent (Productivity)	BDT. 2,00,000	40% SA have productivity of less than 200k

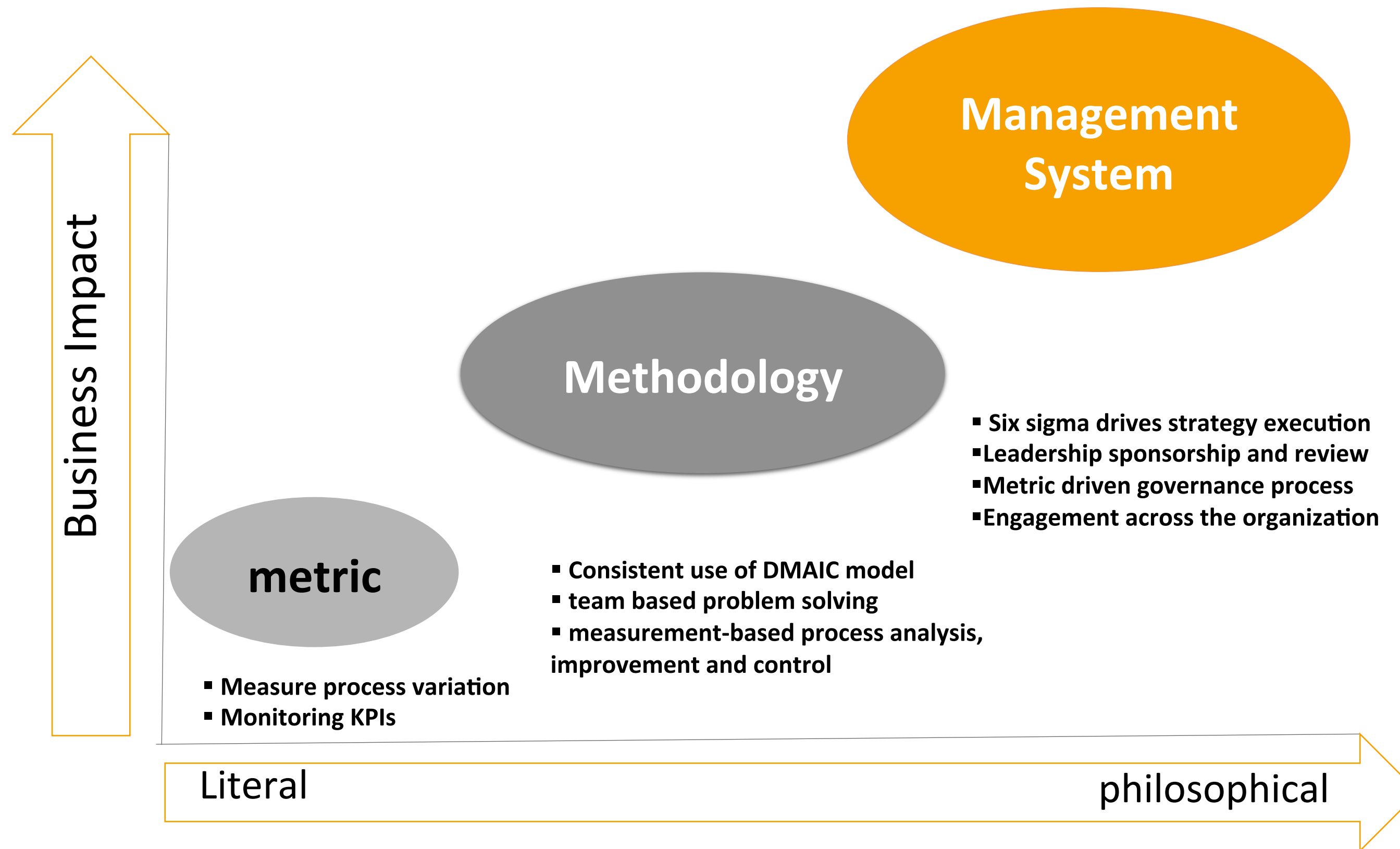
Customers experience the variation and not the mean/average

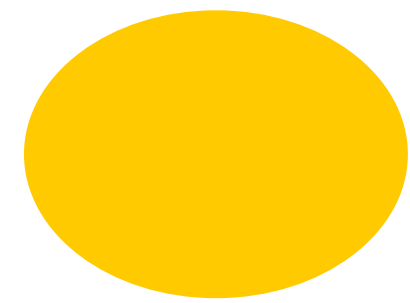


Topic:

Six Sigma Purposes

What is six sigma

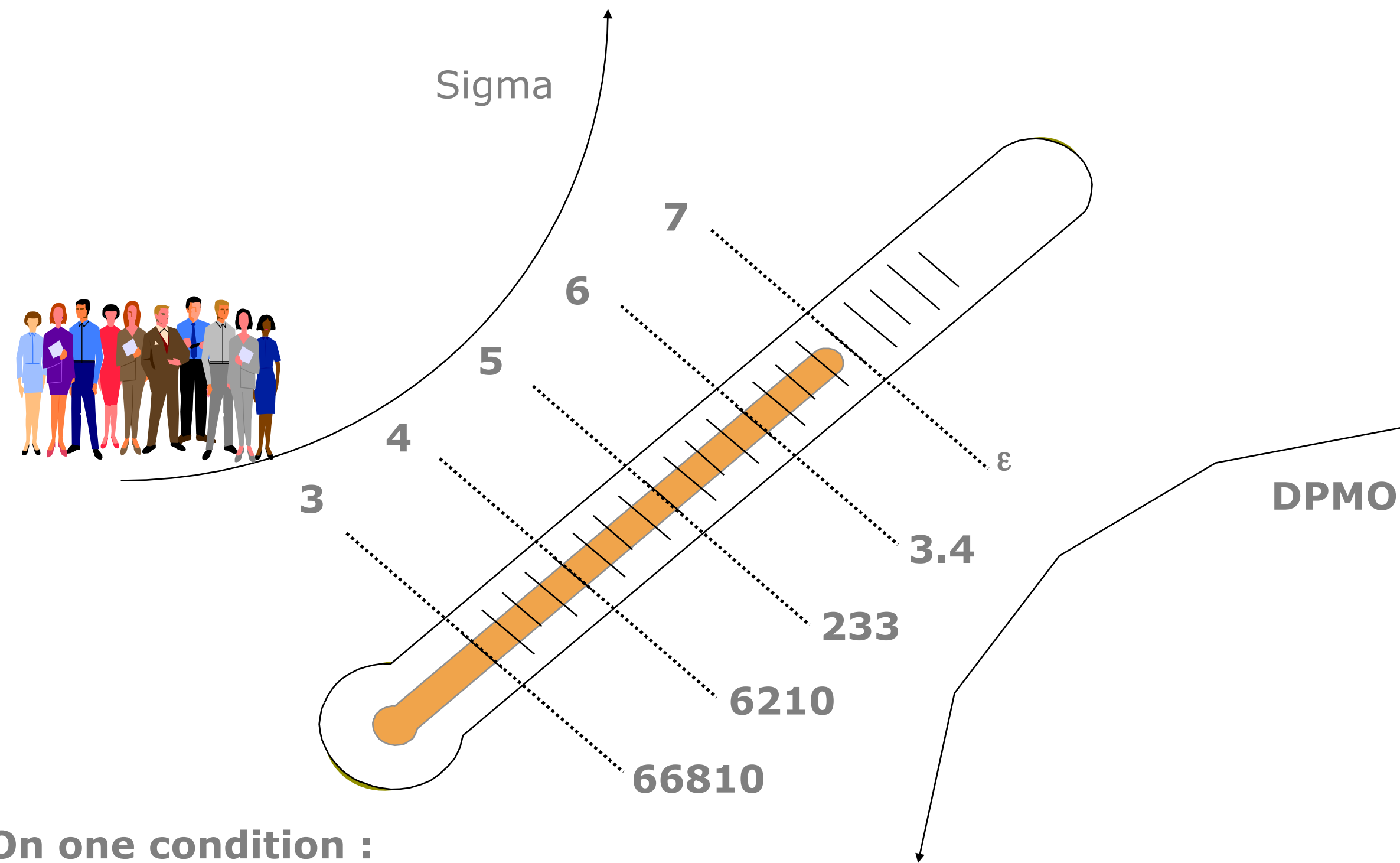




Six sigma 'Metric'?



A Universal Measurement Scale



On one condition :

Calculate the defects and estimate the opportunities in the same way...

Six Sigma Metric

Sigma	% Good	% Bad	DPMO
1	30.9%	69.1%	691,462
2	69.1%	30.9%	308,538
3	93.3%	6.7%	66,807
4	99.38%	0.62%	6,210
5	99.977%	0.023%	233
6	99.9997%	0.00034%	3.4

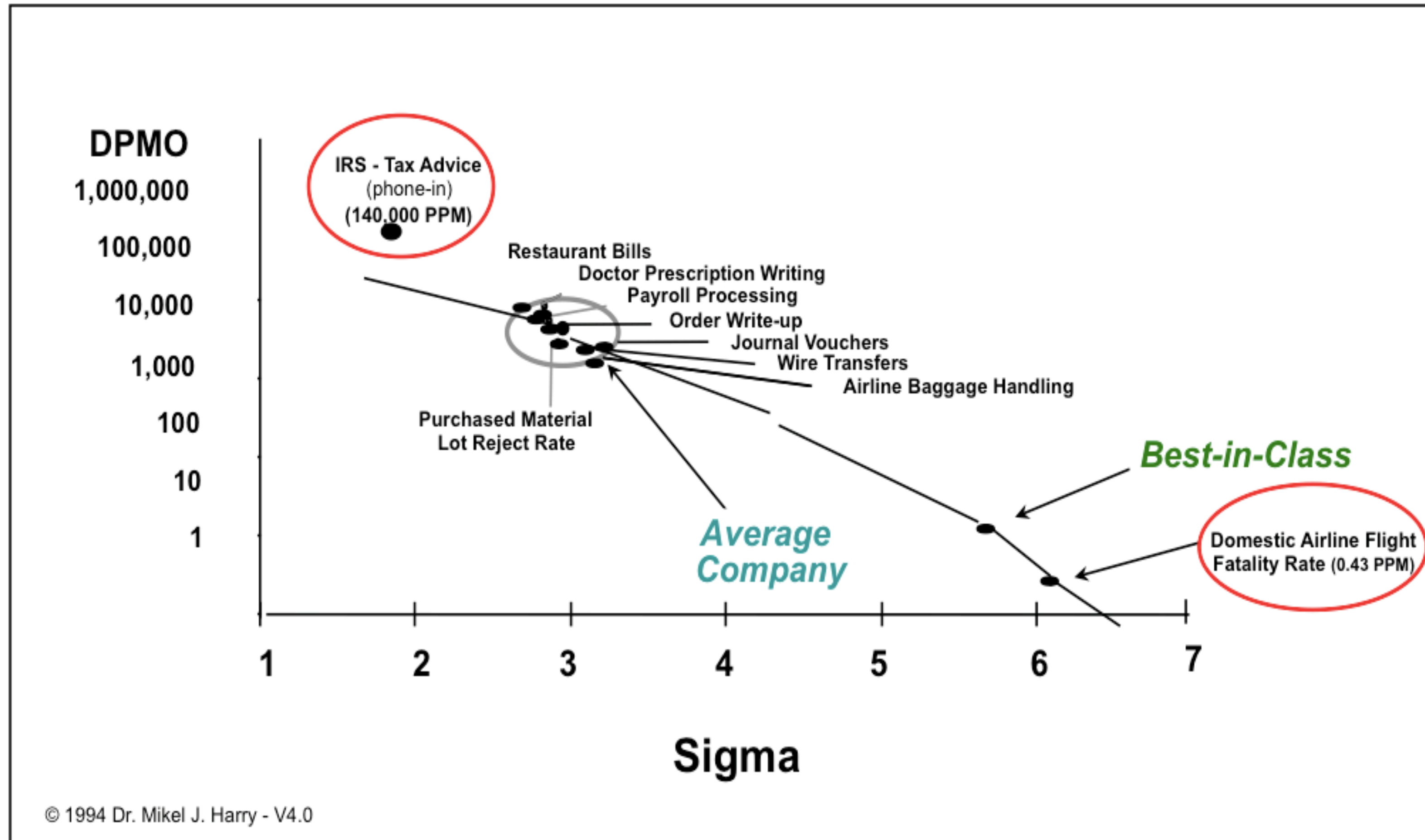


Sigma level

Achieving Six Sigma is like reaching for the fruit at the top of a tree...it gets progressively harder to do!

2 to 3 Sigma = 5X improvement
3 to 4 Sigma = 10X improvement
4 to 5 Sigma = 27X improvement
5 to 6 Sigma = 70X improvement

Benchmark



What's Wrong With 99% Quality?

3.8 Sigma 99% Good

20,000 mails lost per hour

Unsafe drinking water for almost 15 minutes each day

5,000 incorrect surgical operations per week

2 short or long landings at most major airports each day

200,000 wrong drug prescriptions dispensed each year

6 Sigma 99.99966% Good

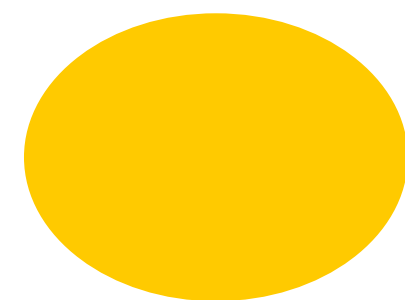
7 mails lost per hour

Unsafe drinking water for 1 minute every 7 months

1.7 incorrect surgical operations per week

1 short or long landing at most major airports every 5 years

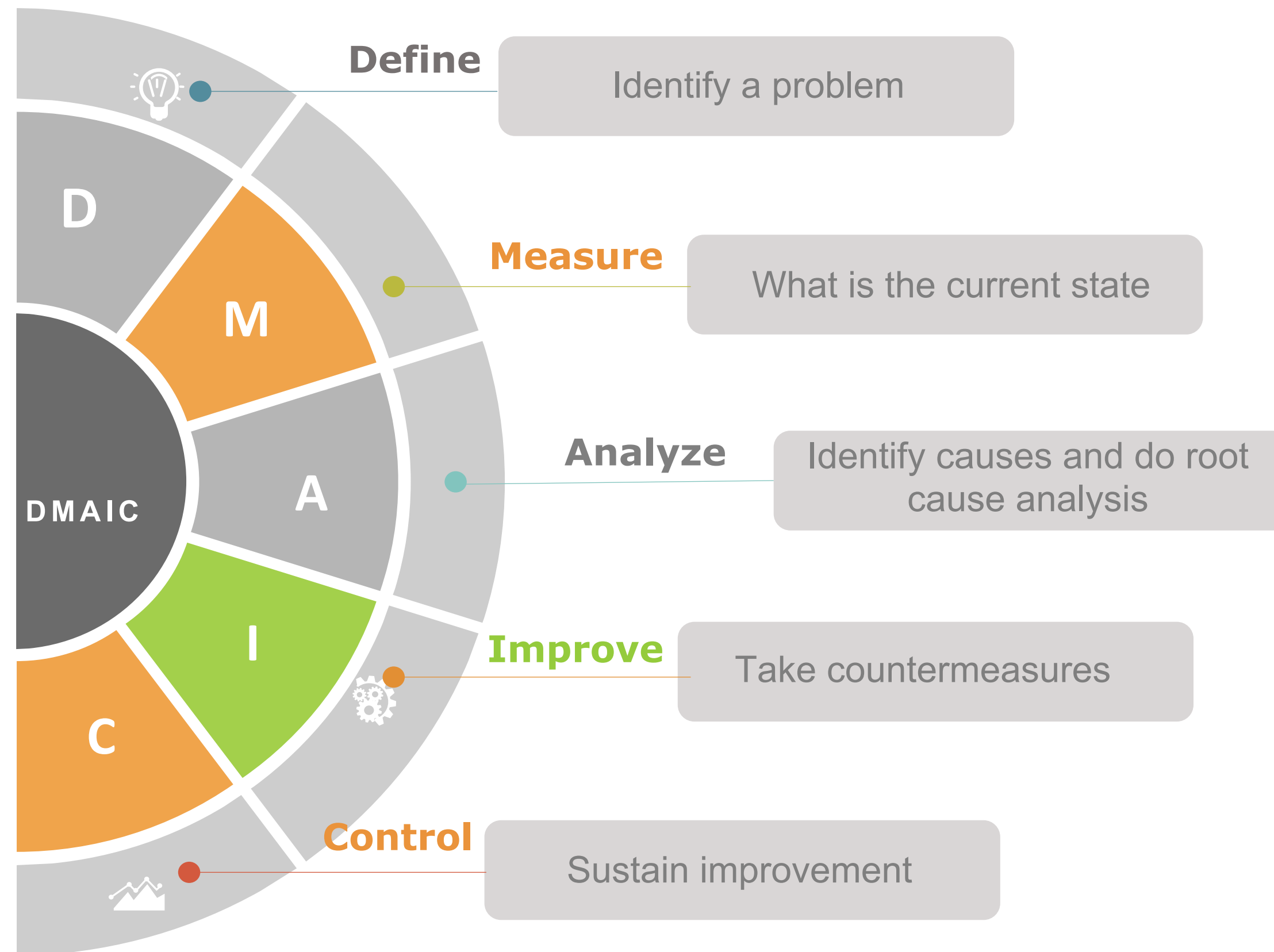
68 wrong drug prescriptions dispensed each year



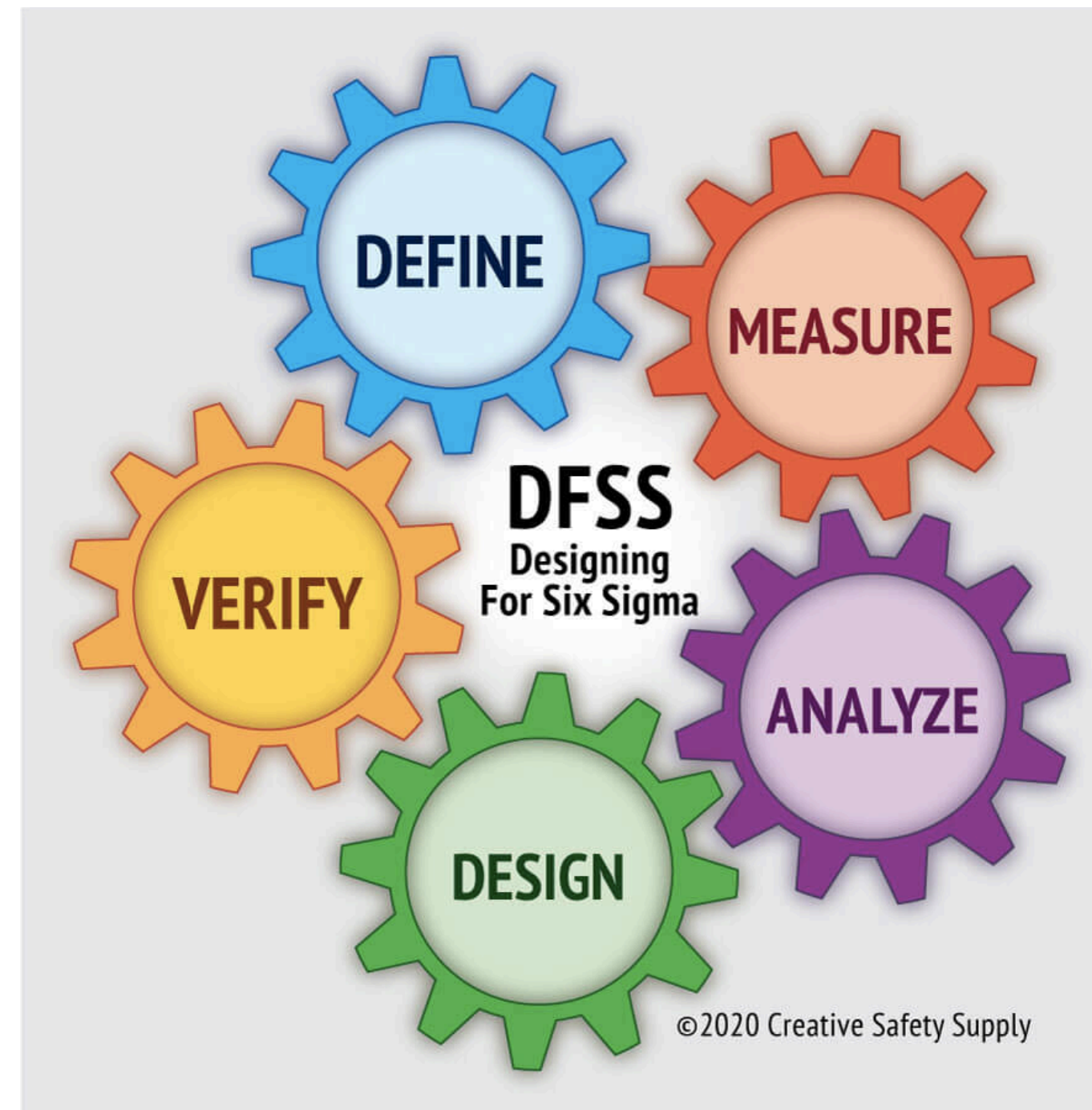
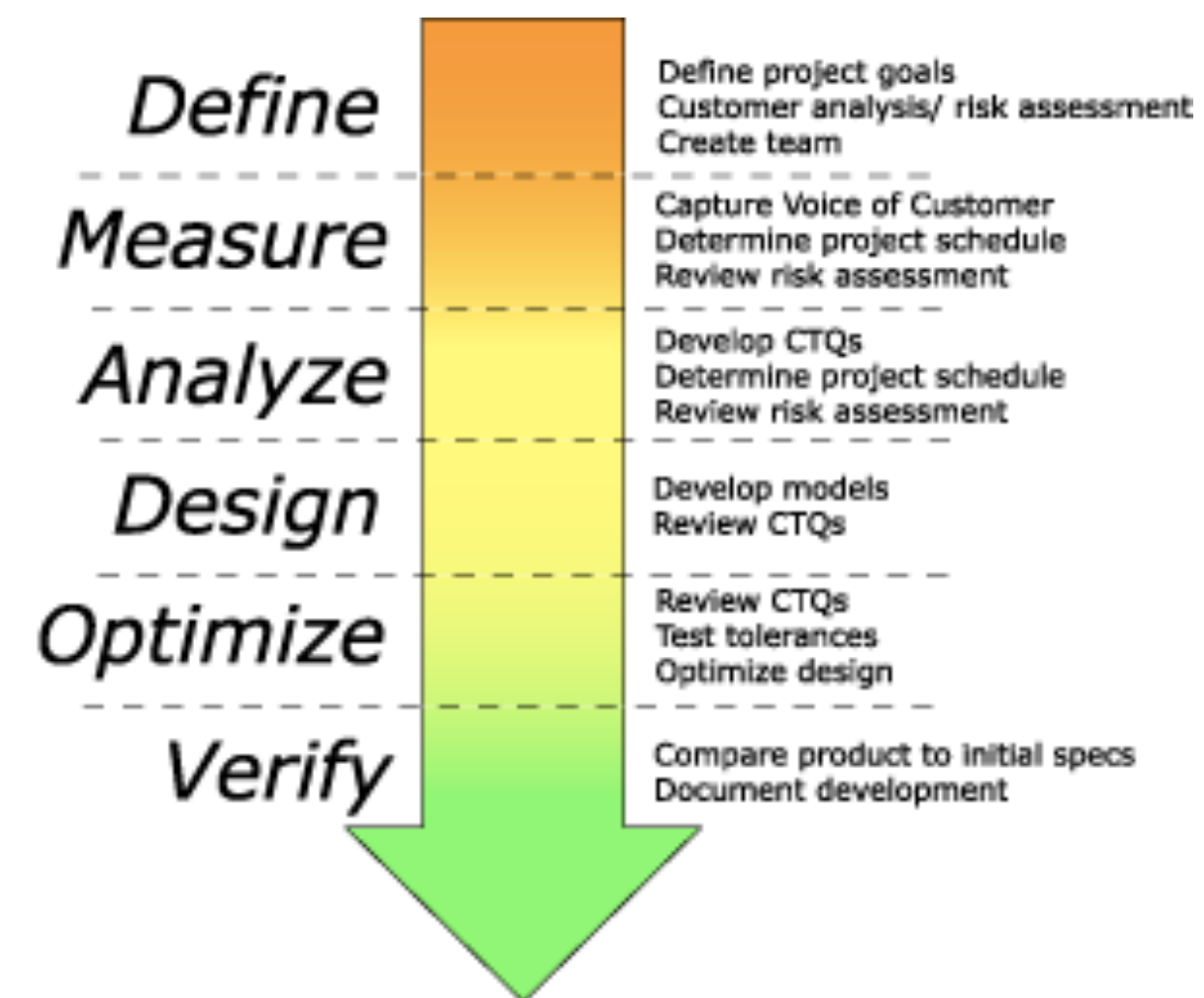
Six sigma methodology

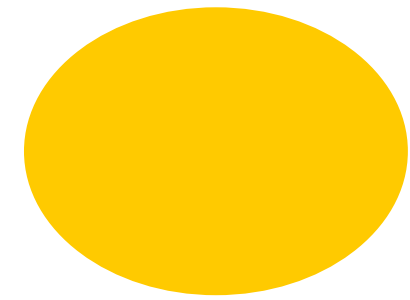


DMAIC Methodology



Design for six sigma





Management System



The Focus of Six Sigma – strategy execution

$$Y = f(X)$$

Y

- Y
- Dependent variable
- Output of the process
- Effect
- Symptom
- It is monitored

X

- X_1, X_2, \dots, X_n
- Independent variable
- Input to the process
- Cause
- Problem
- It is controlled

Simulation with arrow dropping exercise

Objective

- Understand data, Understand variation
- Use cause & effect diagram
- Improvement in team

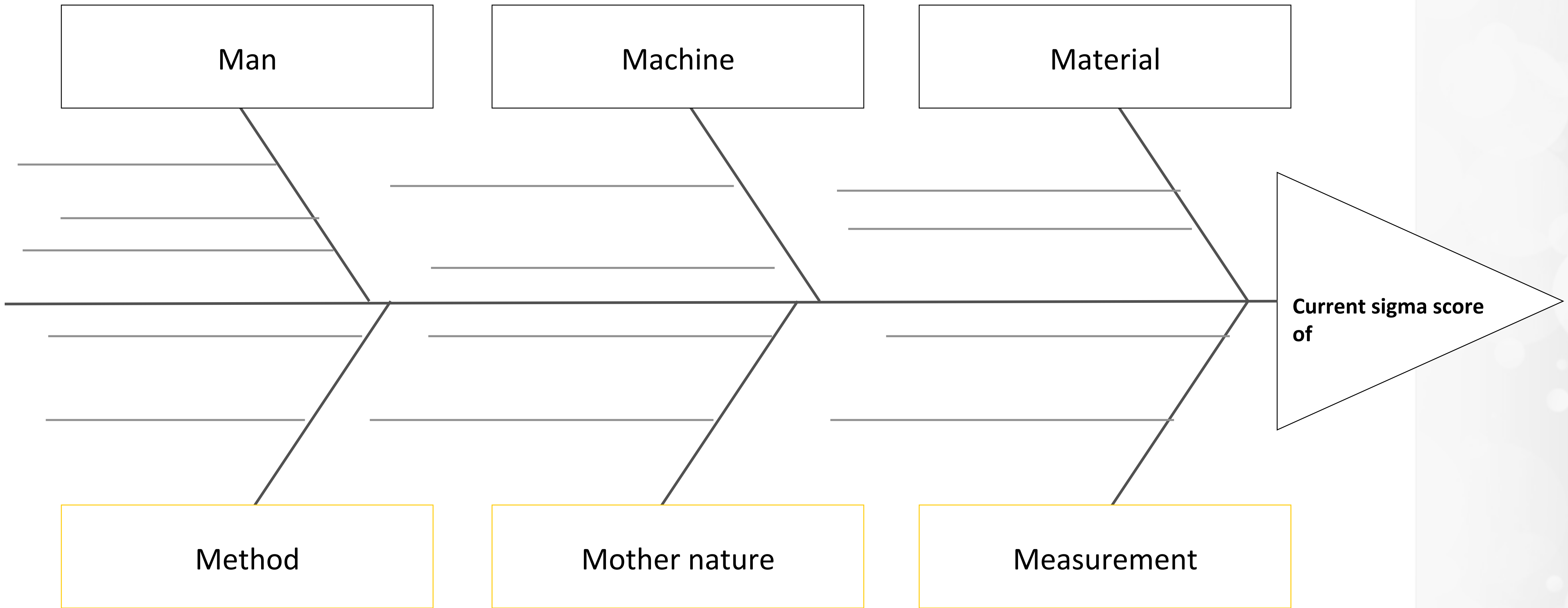
Instructions

- Drop the arrow into the sheet
 - Target 100
 - *Upper Specification Limit: 140*
 - *Lower Specification Limit (LSL): 60*
- *Find Cpk before improve*
- *Identify key causes using fishbone diagram*
- *Imrove and calculate Cpk again*





Cause and effect diagram





Module 2: Understanding Lean



Integration of Lean and Six Sigma

Lean

six Sigma

Improvement	Reduce Process Wastes	Reduce Variation
Justification	Speed or Velocity	6 σ (3.4 DPMO)
Main Savings	Operating Costs	Cost of Poor Quality
Learning Curve	Short	Long
Project Length	Days to Weeks	4 – 6 months
Complexity	Moderate	High

8 Waste (Muda)-DOWNTIME



Defect

- Output that is not meeting the expectation of customer



Overproduction

- Production that is not needed or before it is needed by next customer



Waiting

- Waited time for any raw material, input or machine breakdown



Non-Utilized Staff Talent

- Underutilizing staff talent, knowledge or skills



Transportation

- Unnecessary movement of product, material or information



Inventory

- Excess product or raw material not being processed or finished inventory



Motion

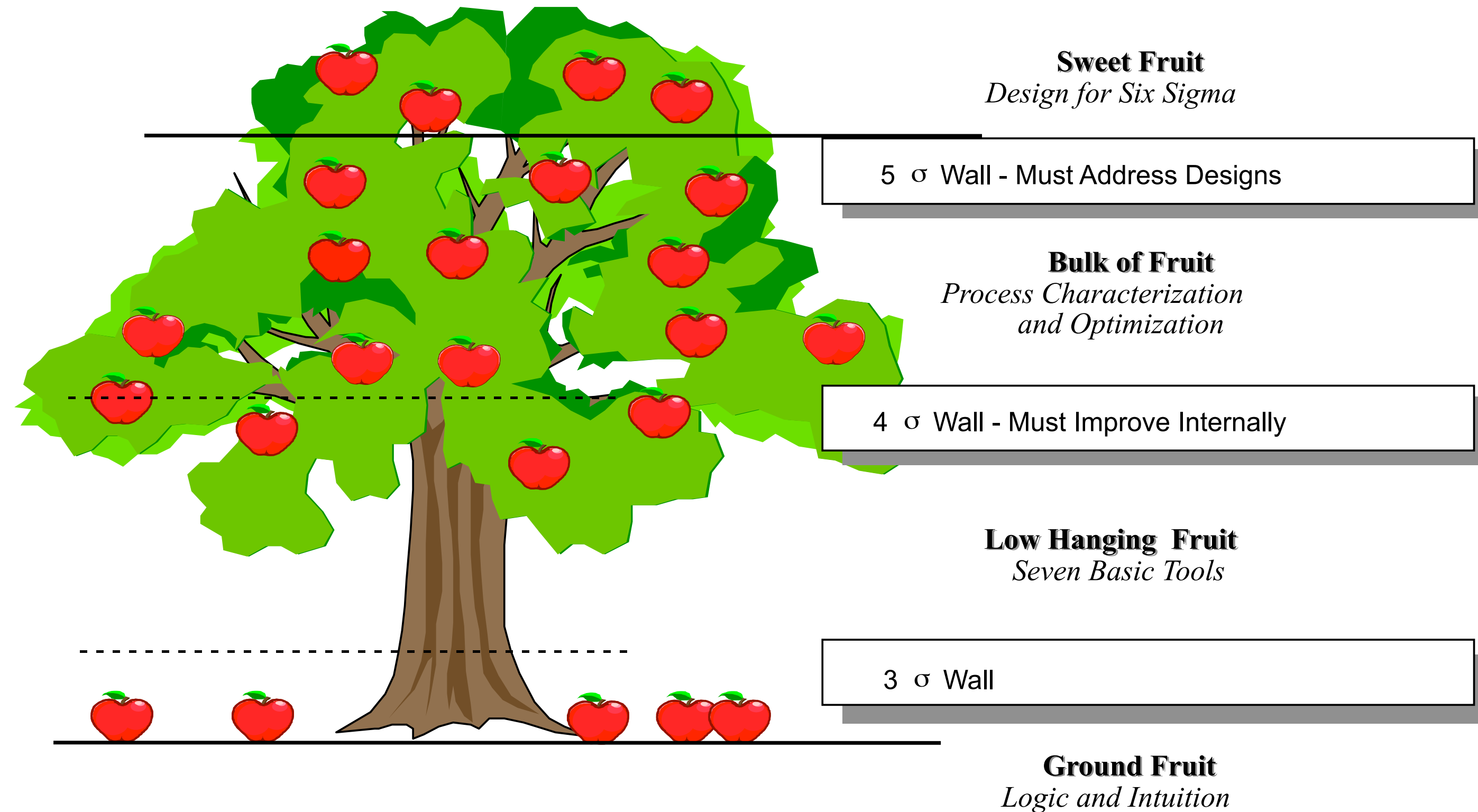
- Unnecessary movement by people



Extra processing

- Producing higher quality product that is not required by customer

5 Harvesting the Fruit of Six Sigma



Relation of TQM and Six Sigma

	TQM	Six Sigma
Improvement Tools	QCC tools	A advanced set of tools
Project length	3 months	4-6 months
Team members	Within functions	Cross functional
Learning Curve	Short	Long
Project selection	Bottom up	Top-down
Team involvement	100%	1% BB



Project example 1

Using new 7 QC tools





Theme selection

- MIS and warehouse inventory mismatch

Affinity diagram

১. হংকং জনিত সমস্যা

১.১ বক্সে পন্য কম-বেশি আসা

- 1 . MIS/Log-book/Bin-card এর ব্যালেন্স একই কিন্তু physical ব্যালেন্স কম।
- 2 . ইন্টেক বক্সে পন্য কম-বেশি।
- 3 . কন্টেইনার শীটের তুলনার বক্সে পন্য কম-বেশি থাকে।
- 4 . ওজন দিয়ে পরিমাপ করে পাঠানো।

১.২ কোড এবং কোয়ালিটি সমস্যা

- 1 . পন্য গ্রহন করার কিছুদিনের মধ্যেই নষ্ট হয়ে যায়।
- 2 . খারাপ কোয়ালিটির পন্য আসা।
- 3 . এক কোডের বক্সে অন্য কোডের পন্য আসা।

২. সিকিউরিটি জনিত সমস্যা

২.১ ওয়ারহাউস এবং প্রোডাকশন ফ্লোরের সময় এক নয়।

- 1 . প্রোডাকশন ফ্লোর বিকাল ৭ টা পর্যন্ত খোলা থেকে কিন্তু ওয়ারহাউসে লোক বিকাল ৫ টা পর্যন্ত থাকে।
- 2 . সকাল ৭ টায় প্রোডাকশন ফ্লোর চালু হয় কিন্তু ওয়ারহাউসের লোক আসে সকাল ৮ টায়।
- 3 . ওয়ারহাউসের লোকের অনুপস্থিতিতে পন্য নেয়া।
- 4 . শুক্রবার ওভারটাইম থাকে প্রোডাকশন ফ্লোরে এবং ওয়ারহাউস খোলা থাকে কিন্তু ওয়ারহাউসের কোন লোক থাকে না।

২.১ চেকিং গোট নাই

- 1 . পন্য চেক করে ডেলিভারী দেয়ার জন্য কোন গোট নাই।

৩. ডেলিভারির সময় গননায় ভুল

৩.১ চেকিং এর জন্য সময় কম

- 1 . তারাতারি গননা করার সময় ভুলে যাওয়া।
- 2 . তারাতারি করতে গিয়ে ক্যালকুলেটরে ভুল ইনপুট দেয়া।
- 3 . অনেক সময় তারাতারি করতে গিয়ে গননা না করেই ইনপুট দেয়া।

৩.১ হিসাব ভুল করা

- 1 . ইনপুট এবং আউটপুটের ক্ষেত্রে হাতে লেখার সময় ভুল করা।
- 2 . ক্যালকুলেটরে হিসাব করার সময় ভুল করা।

৪. নিজে ডেলিভারির না দেওয়ায় সমস্যা

৪.১ জনবল / দক্ষ জনবল সংকট

- 1 . অনেক ম্যাটেরিয়ালস একসাথে আসার ফলে গননা করা কিংবা পন্যের গুনাগুন নির্ণয় সম্ভব হয় না।
- 2 . শ্রমিকদের দক্ষতা বাড়ানোর জন্য ট্রেনিং এর ব্যবস্থা নেই।
- 3 . ভালভাবে গুনে ডেলিভারি না দেয়া।

৪.২ BD-PM এর লোক নিজে পন্য গুনে নেয়া

- 1 . BD-PM এর লোক নিজেরাই পন্য গুনে নেয়।
- 2 . কিছু কিছু পন্য বক্স হিসেবে নিয়ে যায় এবং বক্সে পন্য কম হলে আবার এসে নিয়ে যায়।

৪.৩ ভিন্ন ভিন্ন জায়গায় ওয়ারহাউস

- 1 . ওয়ারহাউস ভিন্ন ভিন্ন জায়গায় হওয়ার কারণে অনেক সময় নিজে ডেলিভারি দেয়া সম্ভব হয় না।

৫. রিকুইজিশন সমস্যা

৫.১ ভুল রিকুইজিশন

- 1 . ভুল রিকুইজিশন দেয়া
- 2 . রিকুইজিশন লিখতে গিয়ে ভুল করা

৫.২ রিকুইজিশন না দেয়া

- 1 . রিকুইজিশন না দিয়ে পন্য ওয়ারহাউস থেকে বের করা।

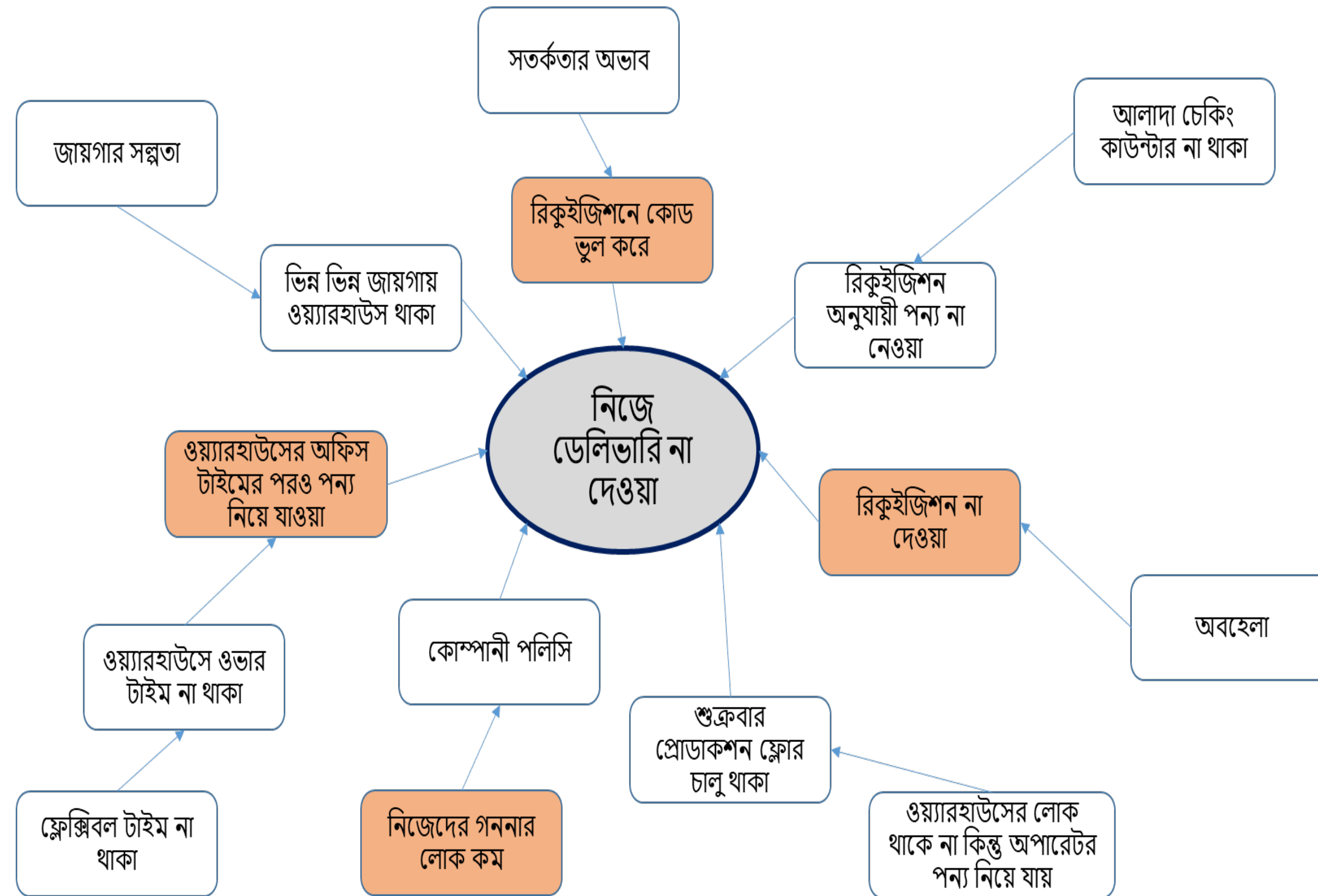
৬. কালার সমস্যা

৬.১ প্রিন্টিং সমস্যা

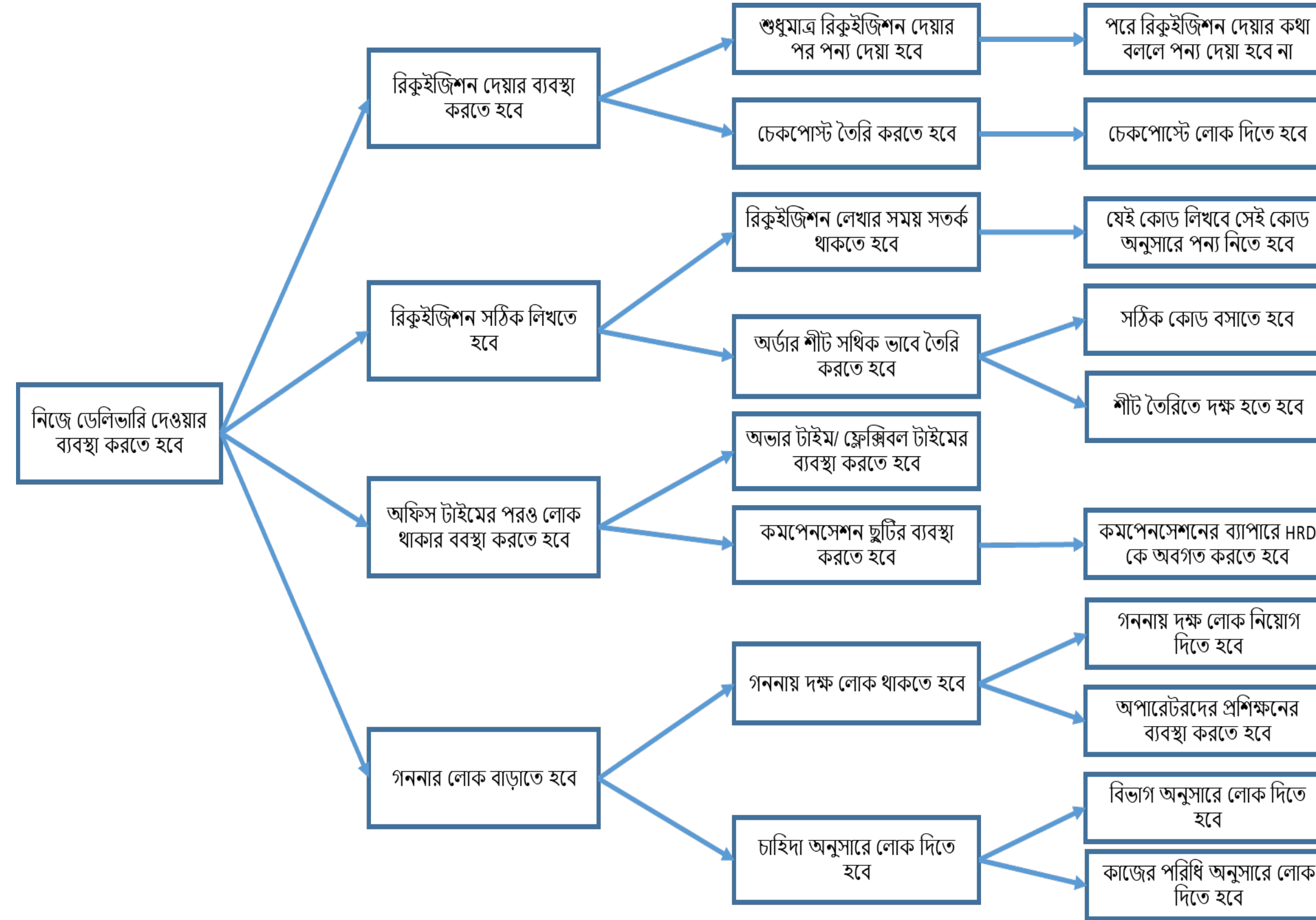
- 1 . ভুল কালার প্রিন্টিং
- 2 . নতুন পন্যের সাথে পুরাতন পন্যের কালার মিলে না।
- 3 . কালার কোড একই কিন্তু দেখতে আলাদা।

Relation diagram

Relation Diagram: Team 2



Tree diagram





Project example 2 Using Basic 7 QC tools

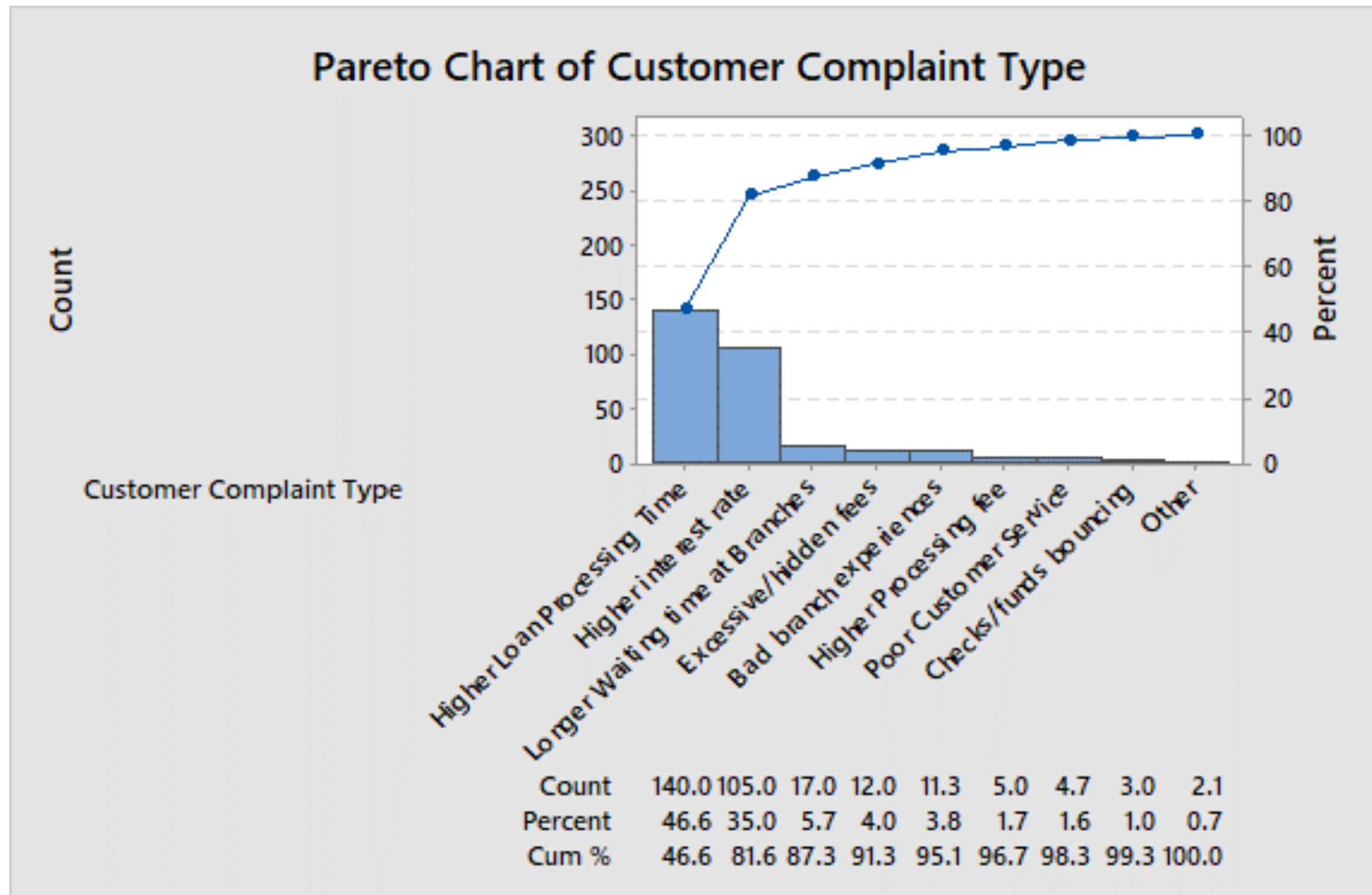




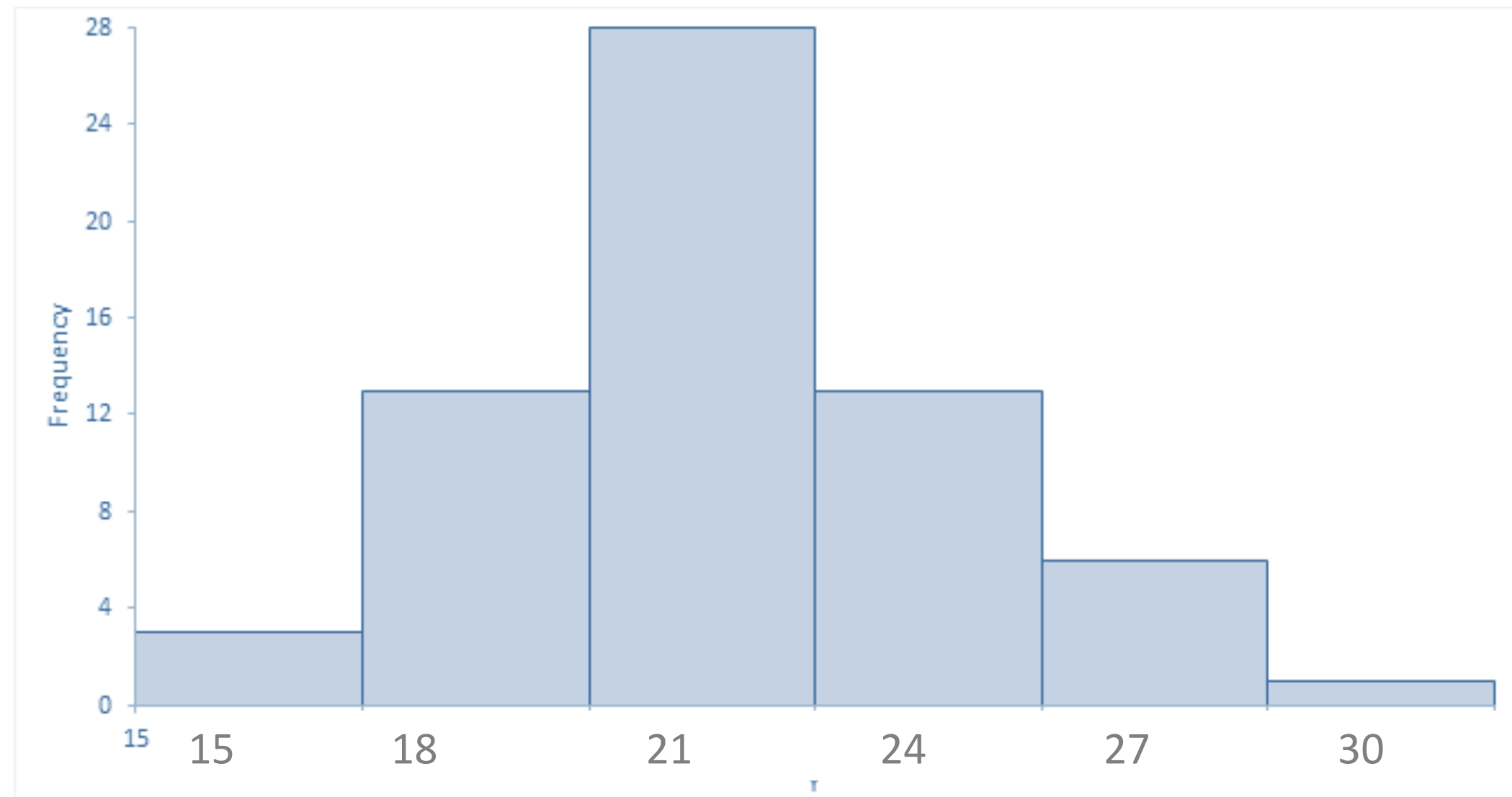
Reduction of Mortgage Loan Processing Time



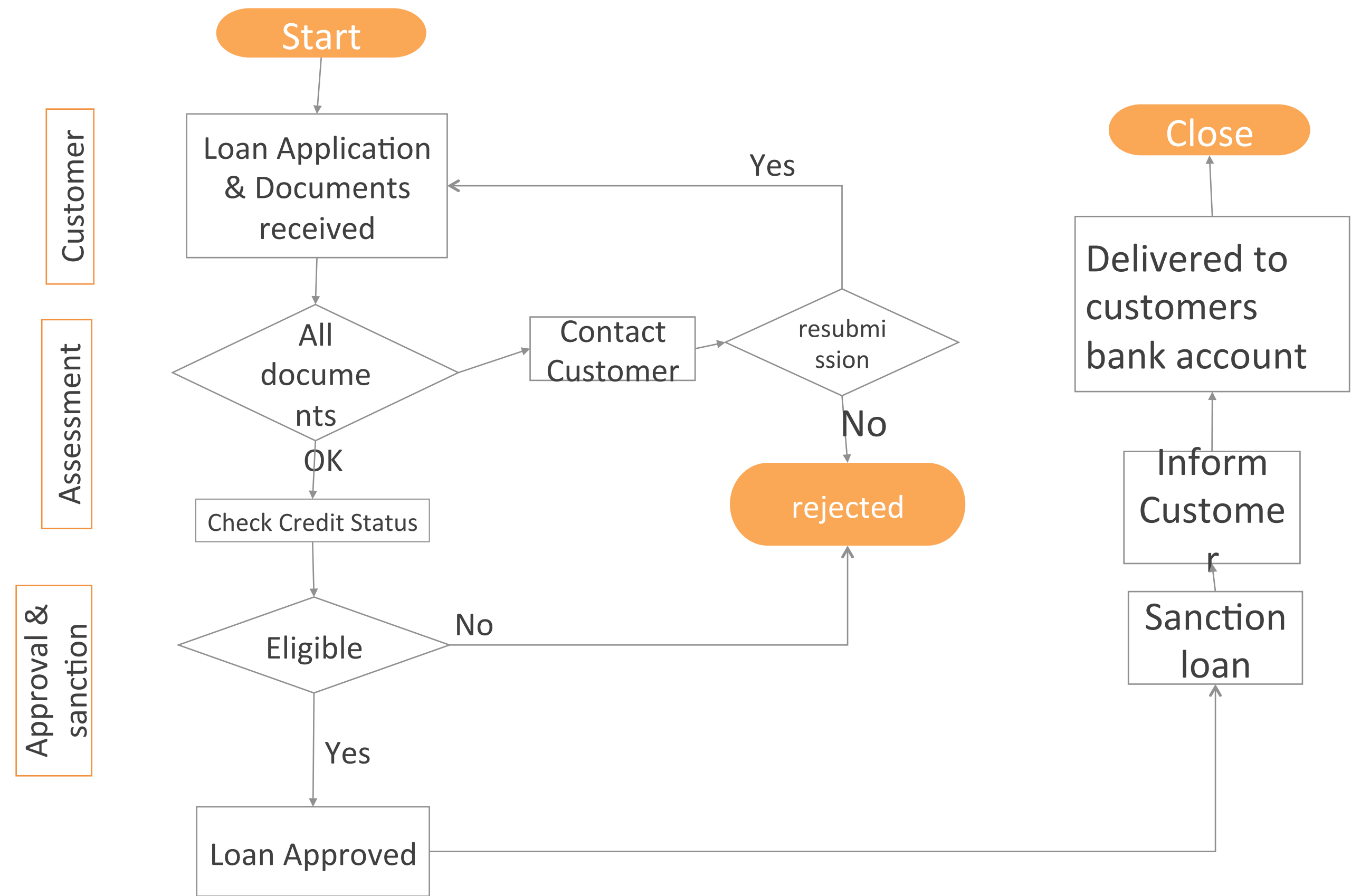
Pareto chart



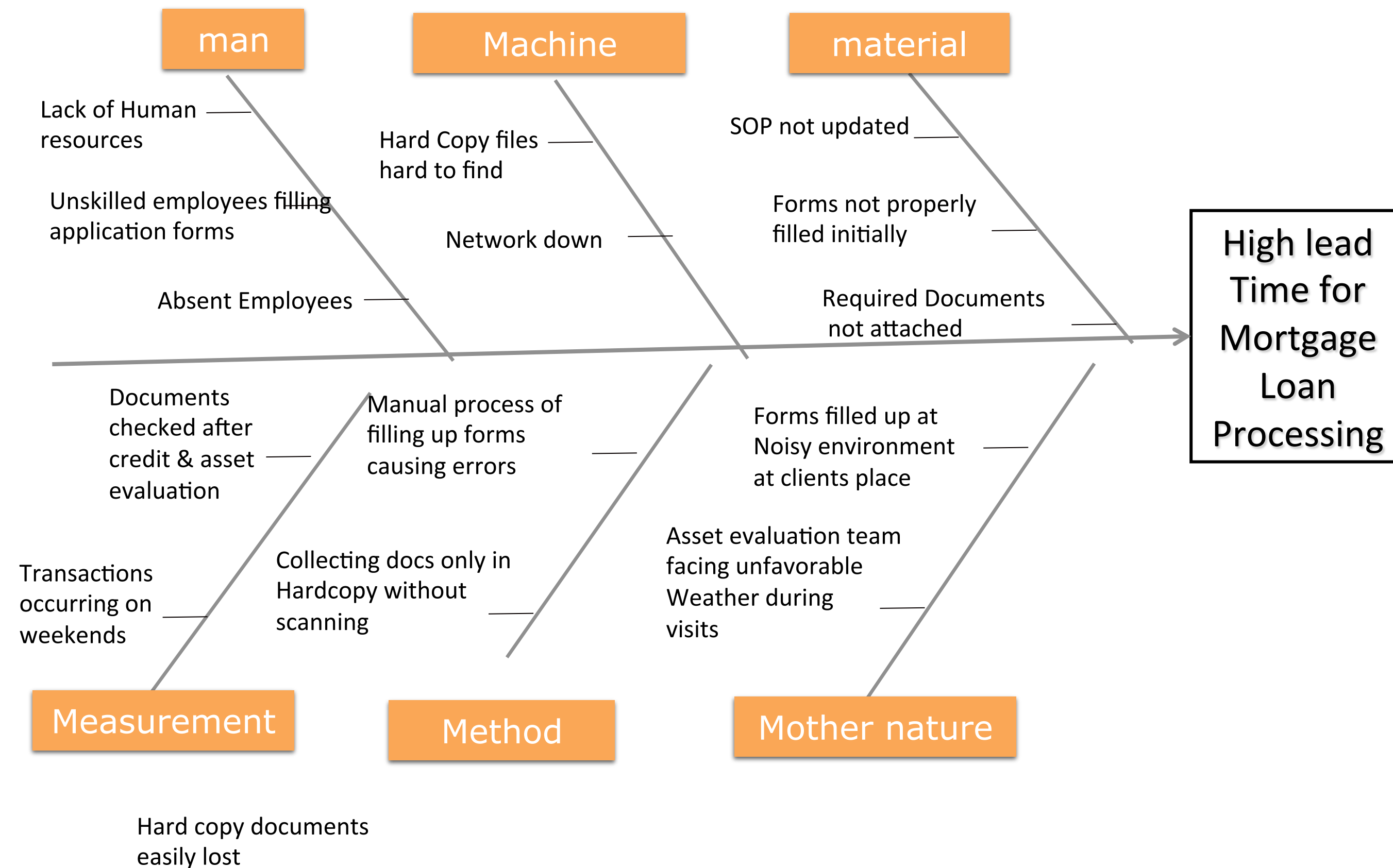
Histogram-baseline



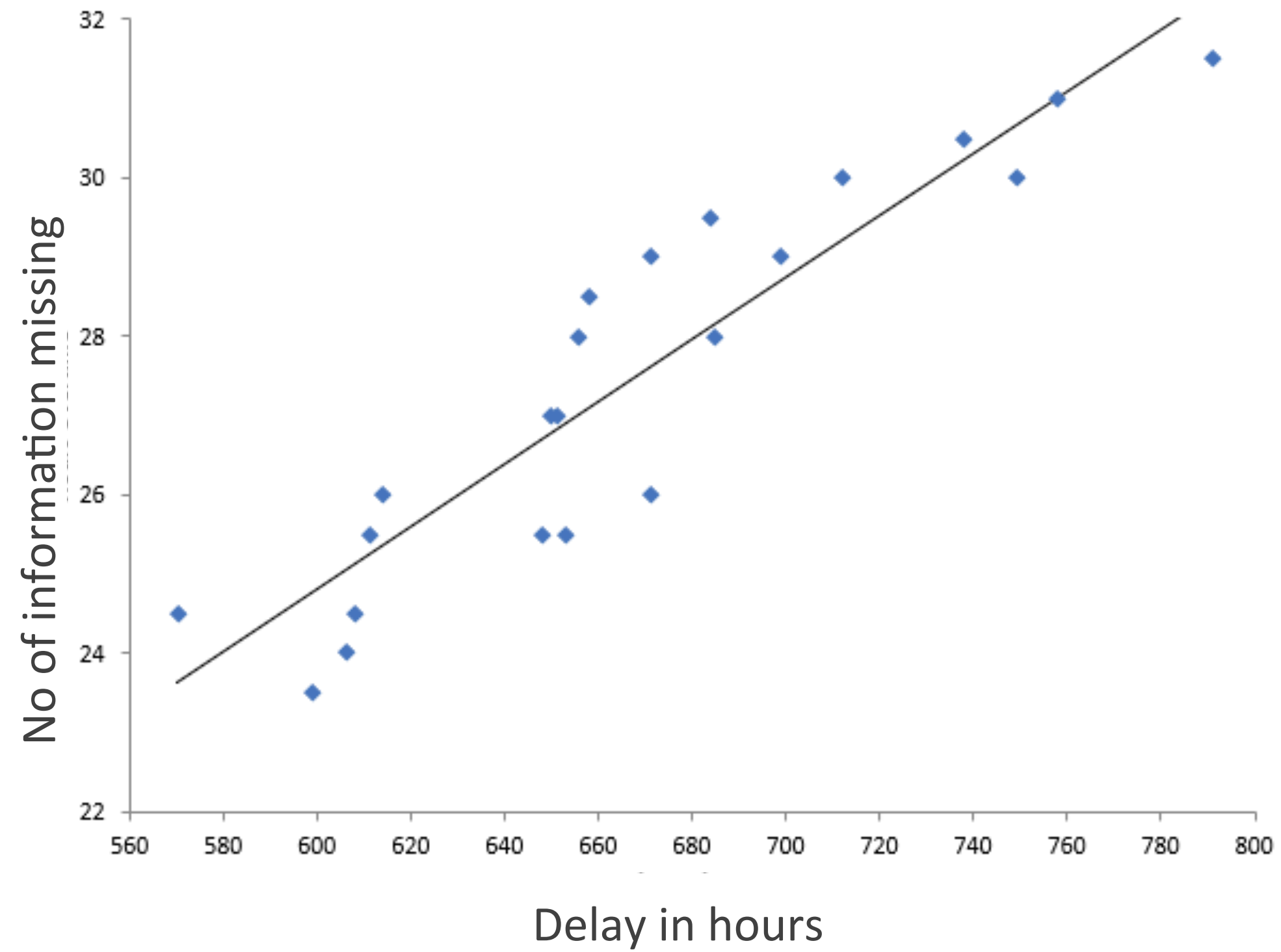
Flowchart



Fishbone diagram



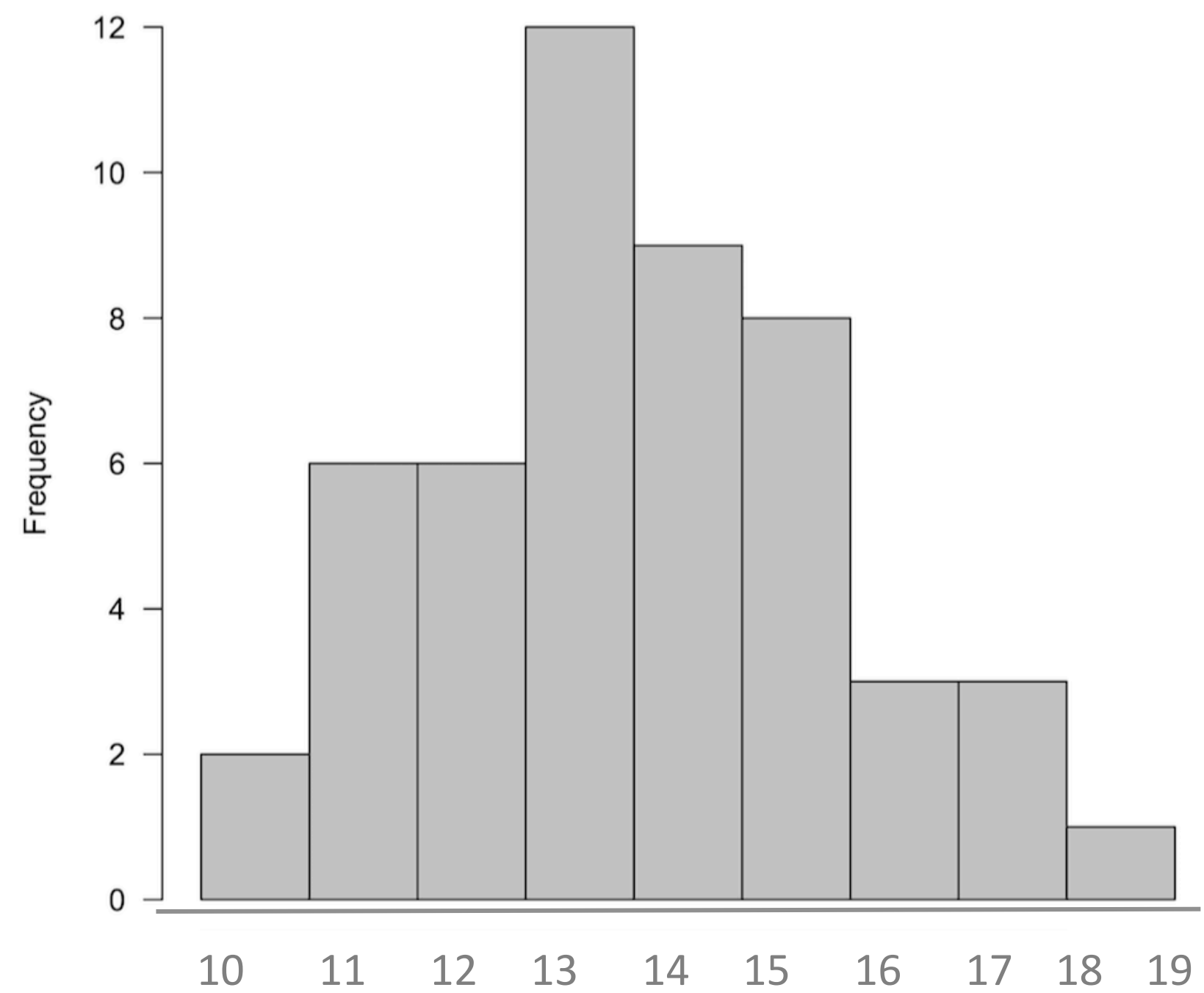
Scatter diagram



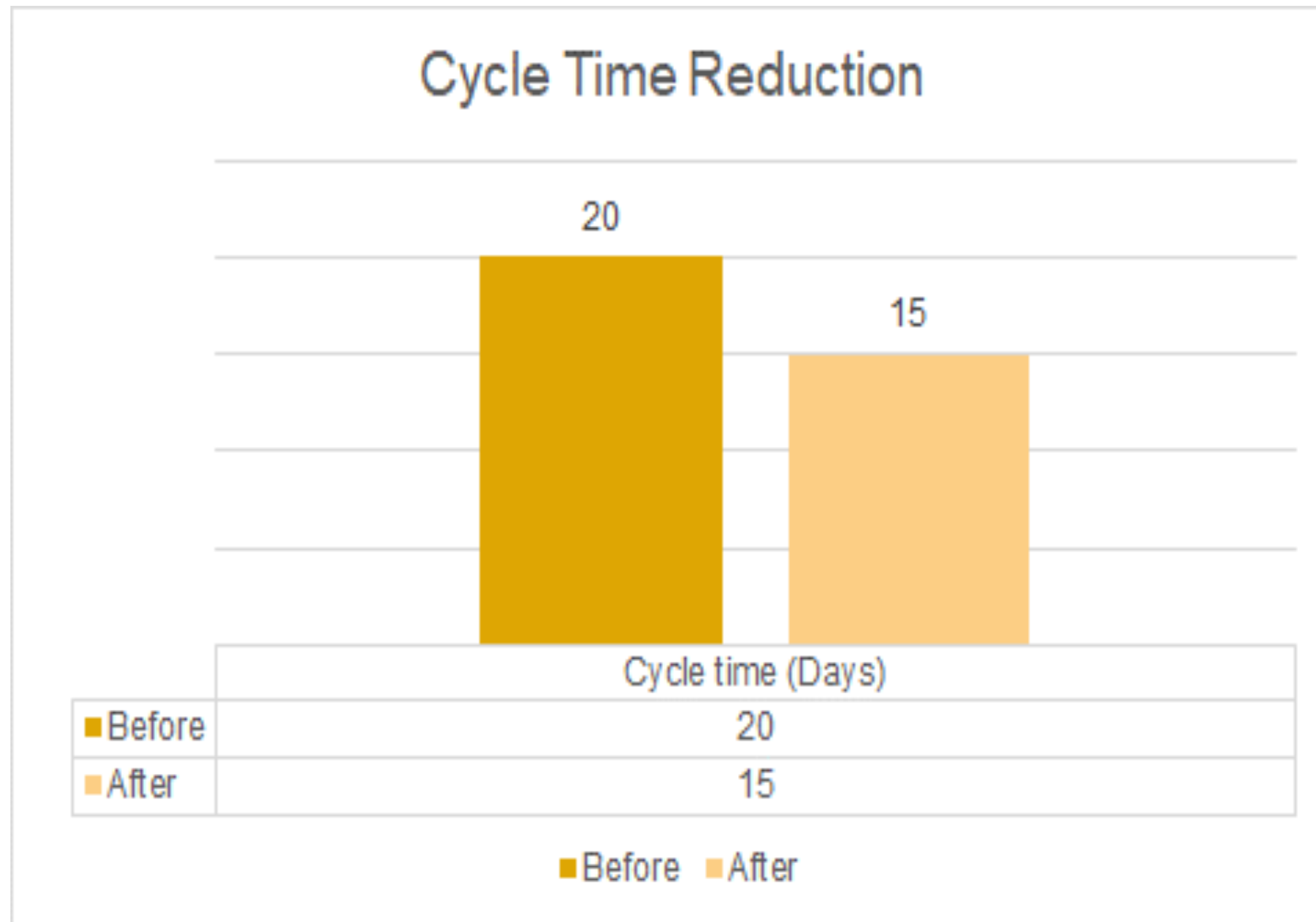
Prioritization & Gantt chart

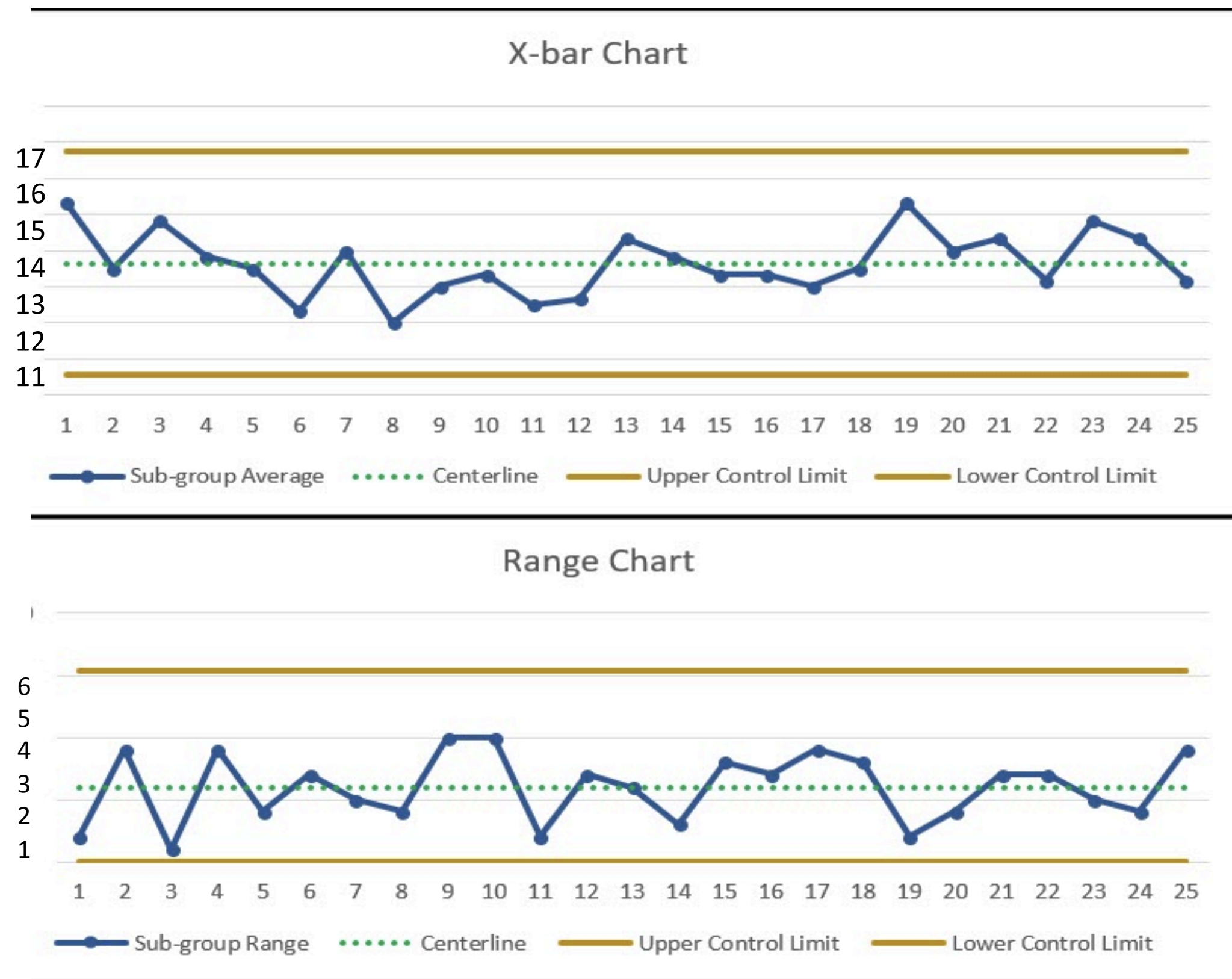
ACTION ITEM (WHAT)	RANKING (WHY)					TIMELINE (WHEN)						WHERE	
	Importance	Expected Effect	Possibility	Evaluation	Rank/Priority	July	August	September	October	November	December	Internal	External
Means to reduce cycle time of Loan processing													
IT team for creating Online Loan application form	☼	☼	●	13	1	■	■					√	
Develop Video tutorial	●	☼	●	11	2	■							√
Incorporate required Description in each field	●	●	●	9	3		■					√	
24/7 Online Chat support	☼	●	◇	9	3		■	■	■	■	■	√	
Sending Documentation reminders via sms	☼	●	●	11	2	■	■	■	■	■	■	√	
Sending documentation reminder via Phone calls	☼	●	◇	9	3	■	■	■	■	■	■	√	
Scan previous loan clients files and documents	☼	●	◇	9	3	■	■	■	■	■	■	√	
New clients' documentation download from web application form and backup	☼	●	◇	11	2			■	■	■	■	√	

Histogram –after improve



result





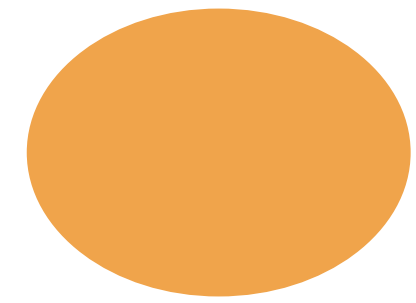
Transactional project management vs. six sigma project management

	Transactional project	Six sigma project
Criteria	Problem known, solution unknown	Problem known, solution known
Methodology	DMAIC	Waterfall, agile
Common certifications	ASQ, Motorola, STC Global	PMI, Scrum Alliance, Agile,



Module 4: Six Sigma Roles






Six Sigma roles



Six Sigma roles



LSSWB


- ✓ Understand the structure and goal of Lean Six Sigma.
- ✓ Uses basic LSS vocabulary terms
- ✓ Reports process issues to Green Belts or Black Belts.



LSSYB


- ✓ Participates in problem solving projects as Subject Matter Expert (SME)s
- ✓ Have training on Total Quality Management (TQM) and elementary level of LSS tools.
- ✓ Reports to GB, BB or champion on problem solving projects

Six Sigma roles



LSSGB

- ✓ Has LSS technical knowledge.
- ✓ Has less leadership skills than LSSBB
- ✓ Provides LSSWB and LSSWB trainings.
- ✓ Reports to LSSBB on BB project or manage GB projects independently



LSSBB

- ✓ Has advanced LSS expertise.
- ✓ Can manage BB projects
- ✓ Possess leadership skills.
- ✓ Functions as coach, mentor for WB or GB project leaders.

Six Sigma roles



MBB

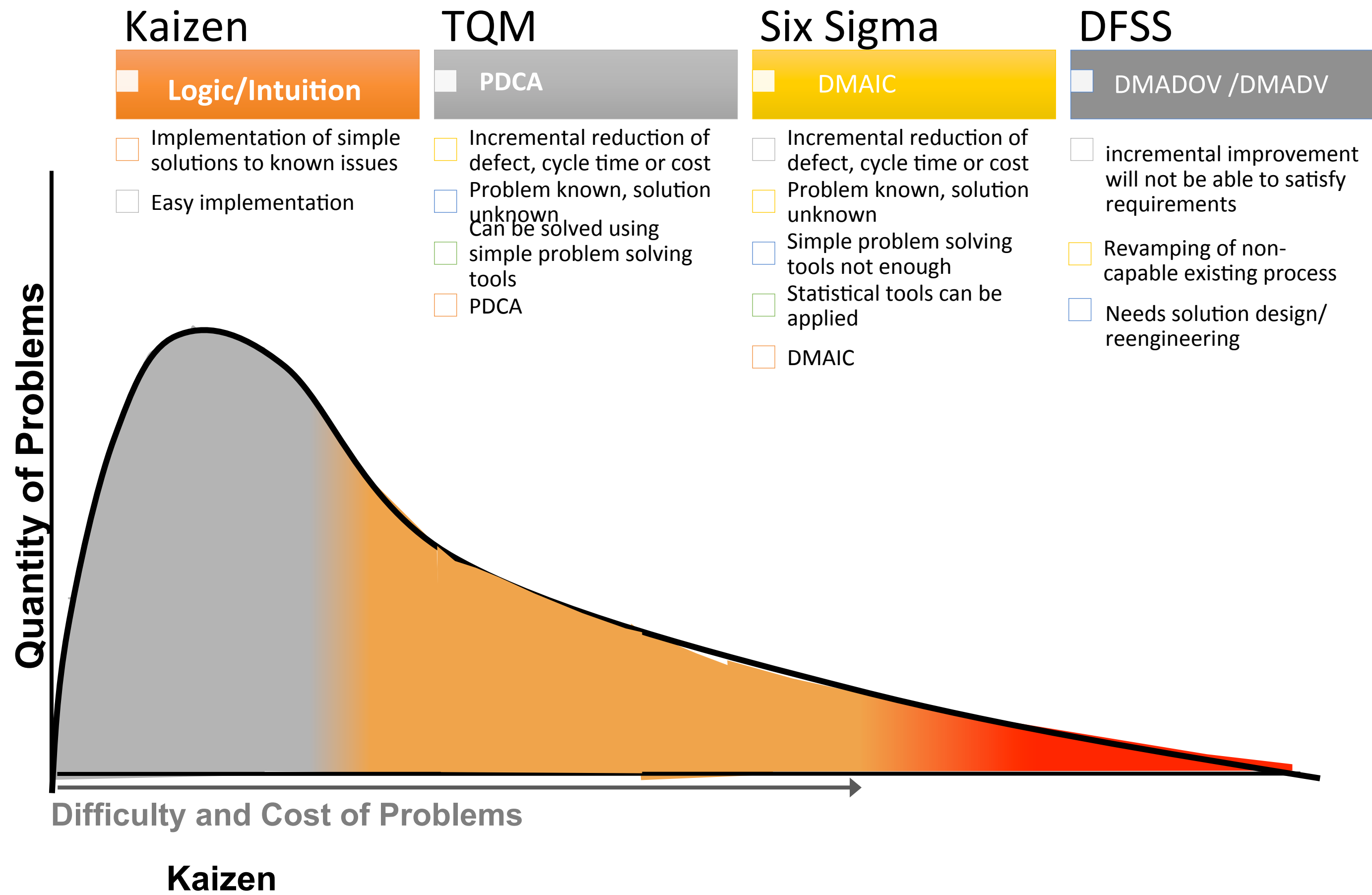
- ✓ Has experience in managing at least more than 10 LSSBB projects.
- ✓ Up to date with LSS new tools
- ✓ Coaches, mentors, teaches LSSBBs
- ✓ Responsible for LSS implementation, goal achievements and cultural change



Champion

- ✓ In most of the cases, member of top leadership team who drives the initiative.
- ✓ Helps projects managers by allocating required resources
- ✓ Removes barriers of project implementation.
- ✓ Responsible for developing Lean Six Sigma culture

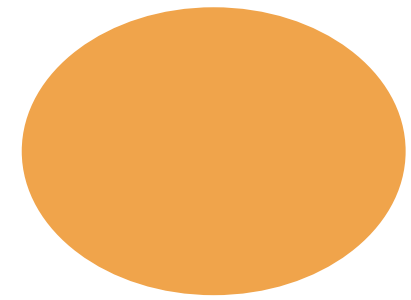
Problem types and available management systems



Common Six Sigma Project Areas

- Manufacturing Defect Reduction
- Cycle Time Reduction
- Cost Reduction
- Inventory Reduction
- Product Development and Introduction
- Labor Reduction
- Increased Utilization of Resources
- Product Sales Improvement
- Capacity Improvements
- Delivery Improvements





DMAIC Demystified with simulation







Thank you

