

SIX SIGMA

Ina S Timan

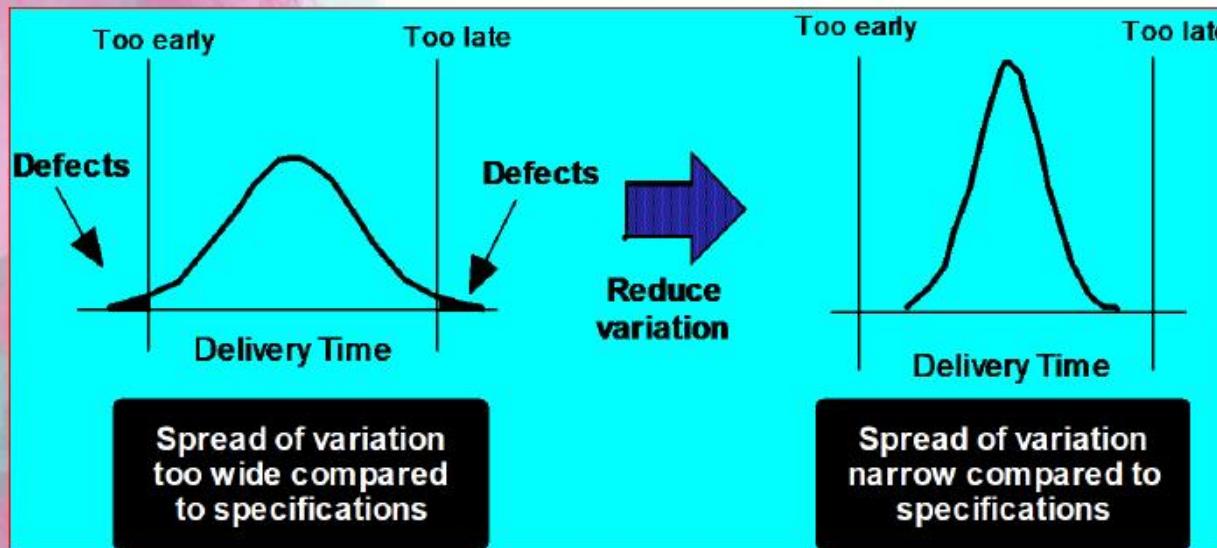
LPMLKI

10-11 Desember 2021

SIX SIGMA

- Diperkenalkan 1986 Motorola : kurangi defek di industri
- Article 1998 : “bagaimana dg bidang kesehatan?”
- 2004 : Six Sigma di adopsi RS/ sarana kesehatan
- Six Sigma berguna utk pemantauan
- Six Sigma : better quality, better staff & patient safety, revenue

Six Sigma



Variasi harus dikurangi

- Less waste & pengulangan, lowers costs
- Products & services membaik

Six Sigma

- Laboratorium kesehatan : no mistakes
- Mirip industri
- Six sigma : metoda pemantauan kurangi kesalahan & lakukan perbaikan
- Laboratorium : sisi manajerial & teknis analitik
- Beda perhitungan six sigma, tujuan sama

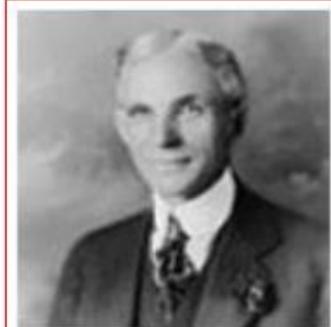


Lean History

A 100-Year-Old Strategy

- The word “Lean” was derived from the **Toyota Production System (TPS)** or **Just In Time (JIT) Production**
- Henry Ford** is considered by many to be the **first Lean practitioner** when he integrated an entire production process in **1910's**
- Kiichiro Toyoda, Taiichi Ohno** and others at Toyota revisited Ford’s original thinking in 1930’s, and **invented the TPS**
- The thought process of lean was thoroughly described in the book **The Machine That Changed the World (1990)** by James P. Womack, Daniel Roos, and Daniel T. Jones.

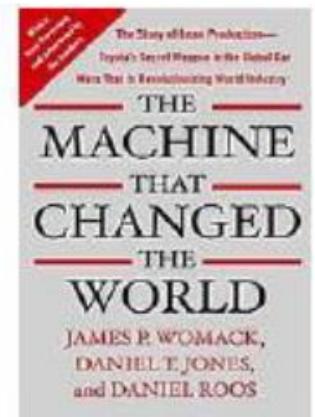
Source : www.lean.org



Henry Ford



Kiichiro Toyoda



Lean Six Sigma

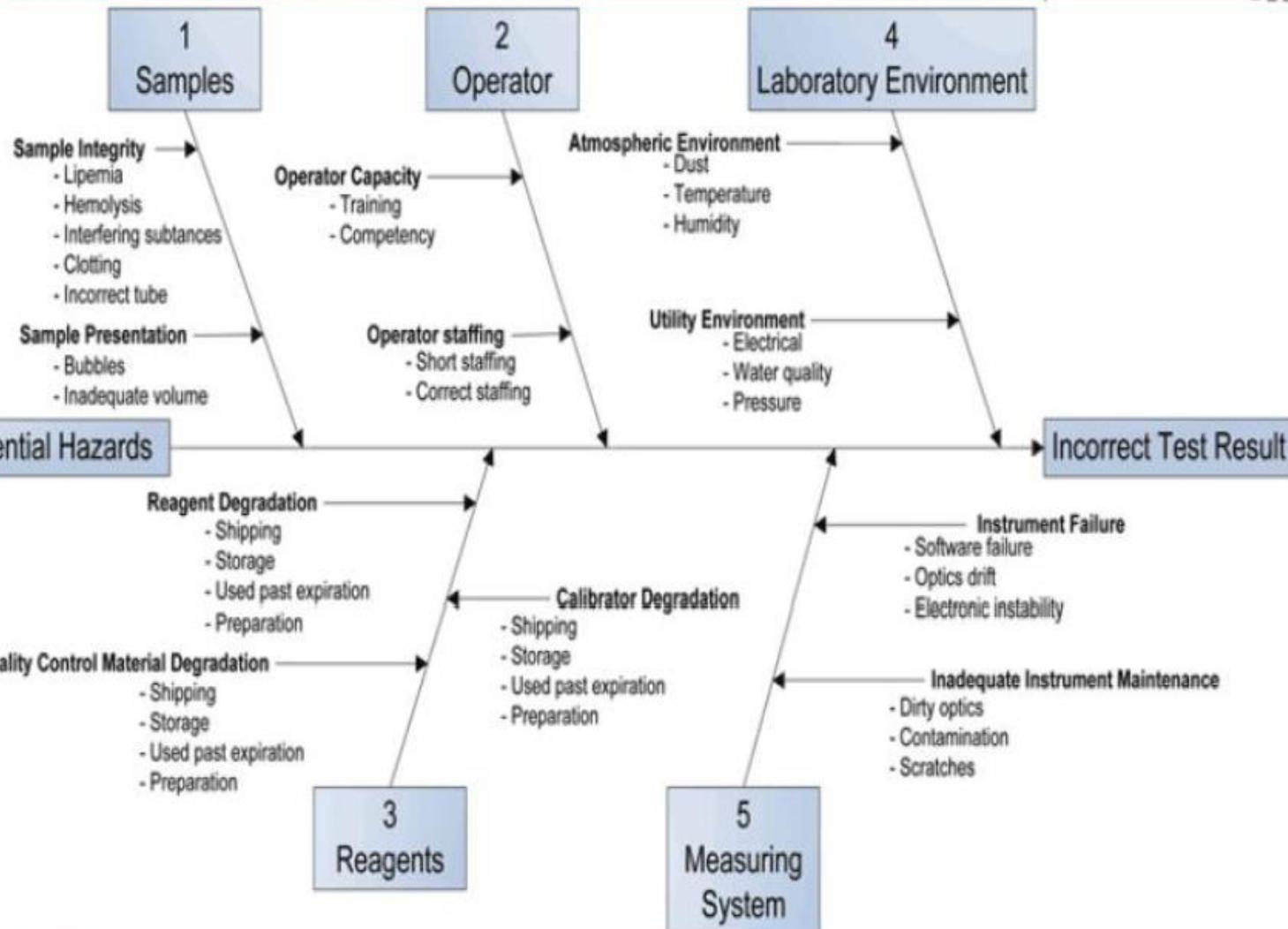
Combination of Lean thinking & Six Sigma approaches

- **Lean** : Improving **flow** in the value stream and eliminating **waste**
- **Six Sigma** : Eliminating **defects** and reducing **variation** in processes

DMAIC

- DMAIC (Define, Measure, Analyze, Improve and Control)
- Siklus : kenali kesalahan, perbaikan, optimasi, stabilisasi, ciptakan perbaikan baru
- Digunakan di six sigma

FISH BONE ANALYSIS



Sigma Manajemen

Perhitungan sigma metric manajerial :

Dari pencatatan yang ada dilakukan tabulasi dan dihitung jumlah DPMO dan dilakukan konversi menggunakan tabel six sigma untuk mendapatkan nilai sigma metric nya.

$$DPMO = \frac{\text{Jumlah defek}}{\text{Jumlah } opportunity \times \text{Jumlah unit}} \times 10^6$$

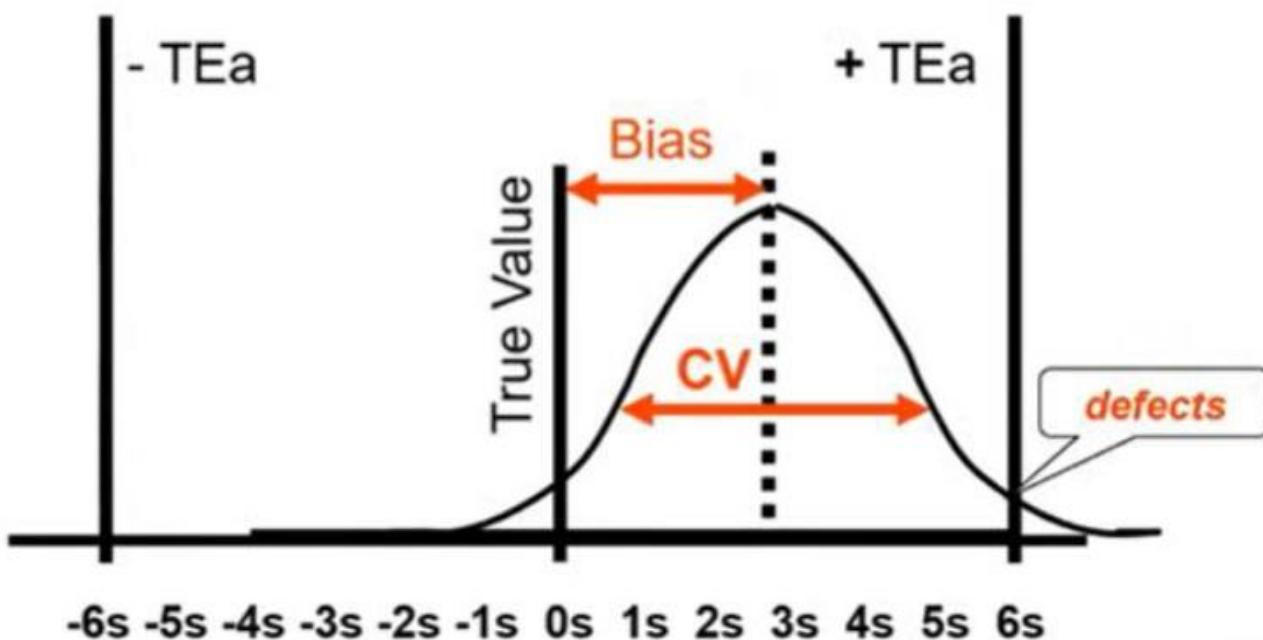
Tabel 4. Tabel konversi sigma metric

| Sigma | Defek per 1.000.000 | Keterangan |
|-------|---------------------|--------------|
| 1σ | 308.539 - 691.462 | Poor |
| 2σ | 66.808 - 308.538 | Poor |
| 3σ | 6211 - 66.807 | Average |
| 4σ | 2834 - 6210 | High quality |
| 5σ | 3.5 - 2833 | World class |
| 6σ | 3.4 | World class |



SIGMA METRIC EQUATION FOR ANALYTICAL PROCESS PERFORMANCE

$$\text{Sigma-metric} = (\text{TE}_a - \text{Bias})/\text{CV}$$



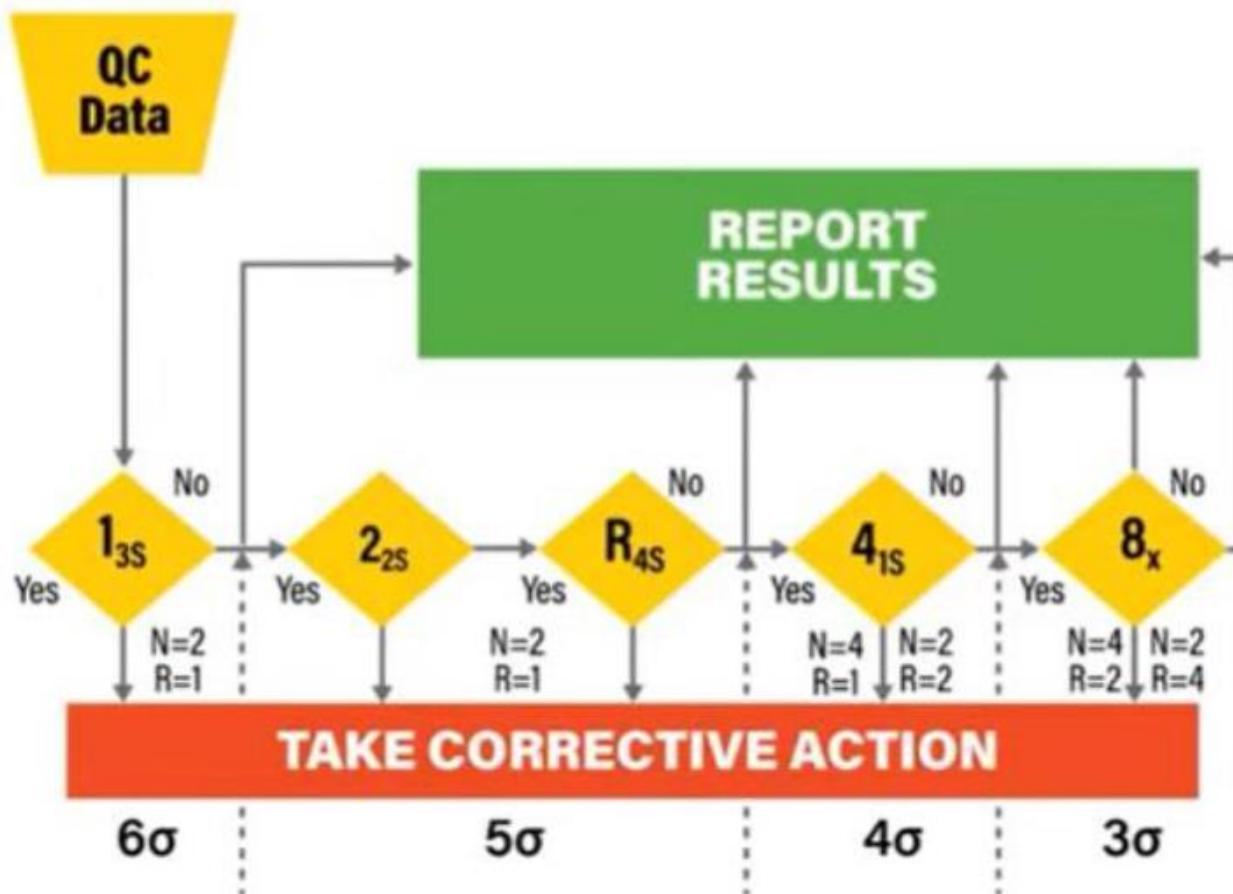
Impresisi : CV
Inaccuracy : Bias

| Variabel | Keterangan |
|----------|---|
| Bias | <p>Perbedaan sistematis antara nilai target dengan hasil laboratorium</p> <p>$\text{Bias (\%)} = ((\text{mean target} - \text{mean lab}) : \text{mean target}) \times 100$</p> |
| CV | <p>Variasi analitik dari metoda yang digunakan</p> <p>$\text{CV (\%)} = (\text{SD} : \text{mean lab}) \times 100\%$</p> |
| SD | |
| TEa | <p>Besarnya penyimpangan yang masih dapat diterima CLIA 88, Westgard (dr. Ricos), RilibAk</p> <p>$\text{Sigma} = (\text{TEa} - \text{bias}) : \text{CV}$</p> |

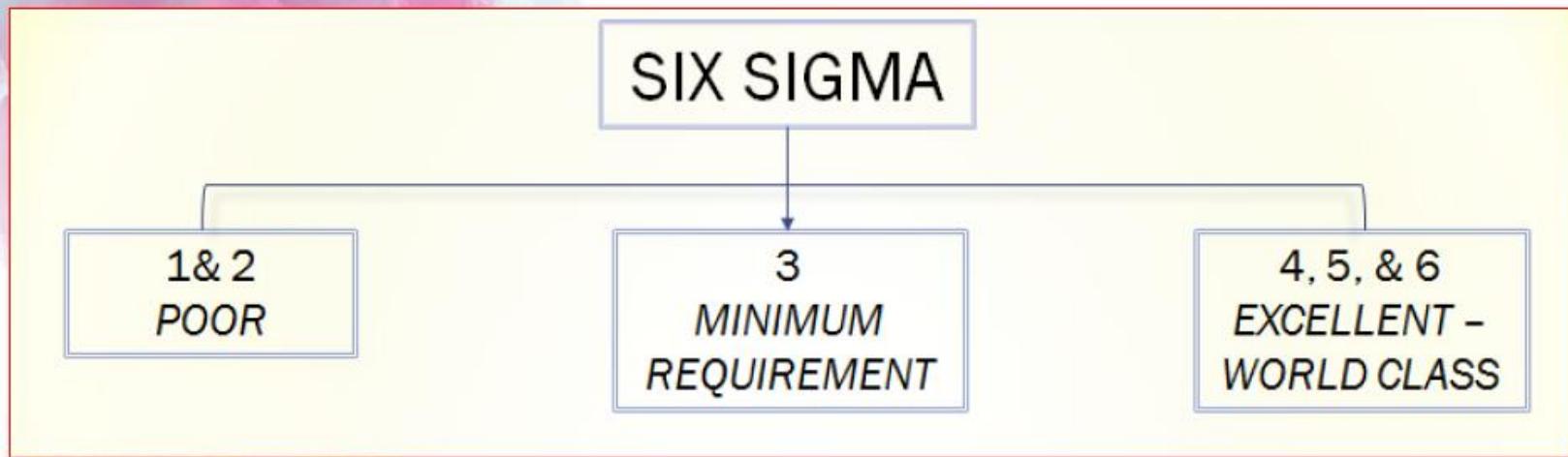
WESTGARD

QC

THE PATH TO FEWER RULES, FEWER CONTROLS, AND FEWER OUTLIERS



EFEK SIX SIGMA



| Nilai sigma | Jumlah kontrol (N) | Aturan kontrol |
|-------------|--------------------|---|
| 6 | 2 | 3.0s atau 3.5s |
| 5 | 2 | 2.5s atau 3.0s |
| 4 | 4 | Multirules atau 2.5s <i>single rule</i> |
| <4 sigma | | Gunakan aturan QC maksimal yang mampu laksana. Maksimalkan tindakan preventif: <i>maintenance</i> alat secara berkala, tenaga analis yang terampil |

Sigma Manajerial di Laboratorium Klinik

- kesalahan analitik akibat malfungsi alat & prosedur kerja tak diikuti.
- SDM , bukan hanya SDM lab
- Efek : keterlambatan hasil, LOS >>
- Kritis, kesalahan interpretasi hasil.
- Kesalahan sebagian besar krn tidak tertatanya sistem manajemen yang baik

SIX SIGMA: SAVING US FROM BAD QC AND BAD METHODS

Six Sigma is the goal of Six Sigma

- It means essentially almost defect free. 3.4 Defects per million
- At this level, the process achieves nearly defect-free operation, highest efficiency, highest reliability, highest customer satisfaction, all of this leading to maximum profitability



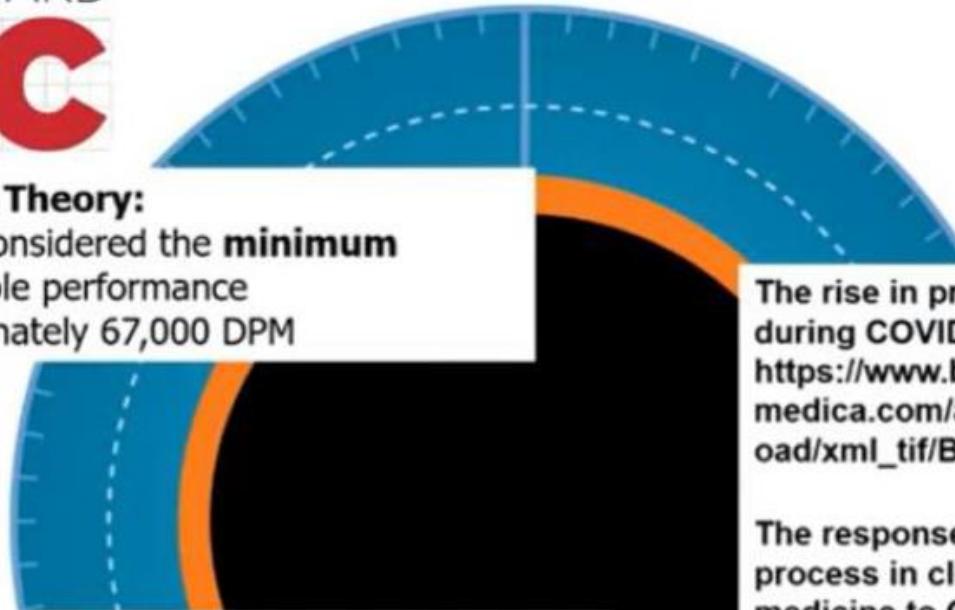
6σ

Common Benchmarks

- Airline safety is better than Six Sigma (about 2.9 crashes per million departures)
- Number of Samples damaged in transport
- Number of Samples not stored properly before analysis

Six Sigma Theory:

- This is considered the **minimum** acceptable performance
- Approximately 67,000 DPM



The rise in preanalytical errors during COVID-19 pandemic
https://www.biochemia-medica.com/assets/images/upload/xml_tif/BM31_2_020710.pdf

The response of total testing process in clinical laboratory medicine to COVID-19 pandemic

https://www.biochemia-medica.com/assets/images/upload/xml_tif/BM31_2_020713.pdf

Common benchmarks

- Contaminated microbiology samples
- 2021 blood specimen rejection rate, AIIMS
- 2021 Clotted samples rate, Turkey

3 σ

have been a rise in certain kinds of errors. So here,

ZQ
22



HOW TO REACH EXCELLENCE?



Six Sigma provides a way to identify, optimize and perfect laboratory testing. It's a combination of (product) instrumentation, (people) training, and (tools) implementation.

Six Sigma tools allow the laboratory to

- Identify the **RIGHT** method
- Select the **RIGHT** rules
- Run the **RIGHT** number of controls
- (*Even... Run controls at the **RIGHT** frequency*)
- **Most importantly, enable the **RIGHT** patient outcomes**



Take Home Message

- Six sigma : manajemen & Tehnis analitik
- Manajemen : Defect per Million (DPMO)
- Analitik : $SIGMA = (TEa - Bias) : CV$
- Sinergistik
- DMAIC (Define, Measure, Analyze, Improve, Control)
- Continous improvement
- Efek sigma terhadap penggunaan jumlah kontrol
- Menghemat biaya (reagen, control), SDM



THANK YOU