M5 Fun in Learning Measurement for Improvement

BMJ-IHI International Forum, Taipei 18-20th Sept 2019

Adj Assoc Prof TAI Hwei Yee
Ms Debbie WILD

"By healthcare institutions for healthcare institutions – Towards better patient outcomes"

Who Are We?

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SHINe

"By healthcare institutions for healthcare institutions – Towards better patient outcomes"

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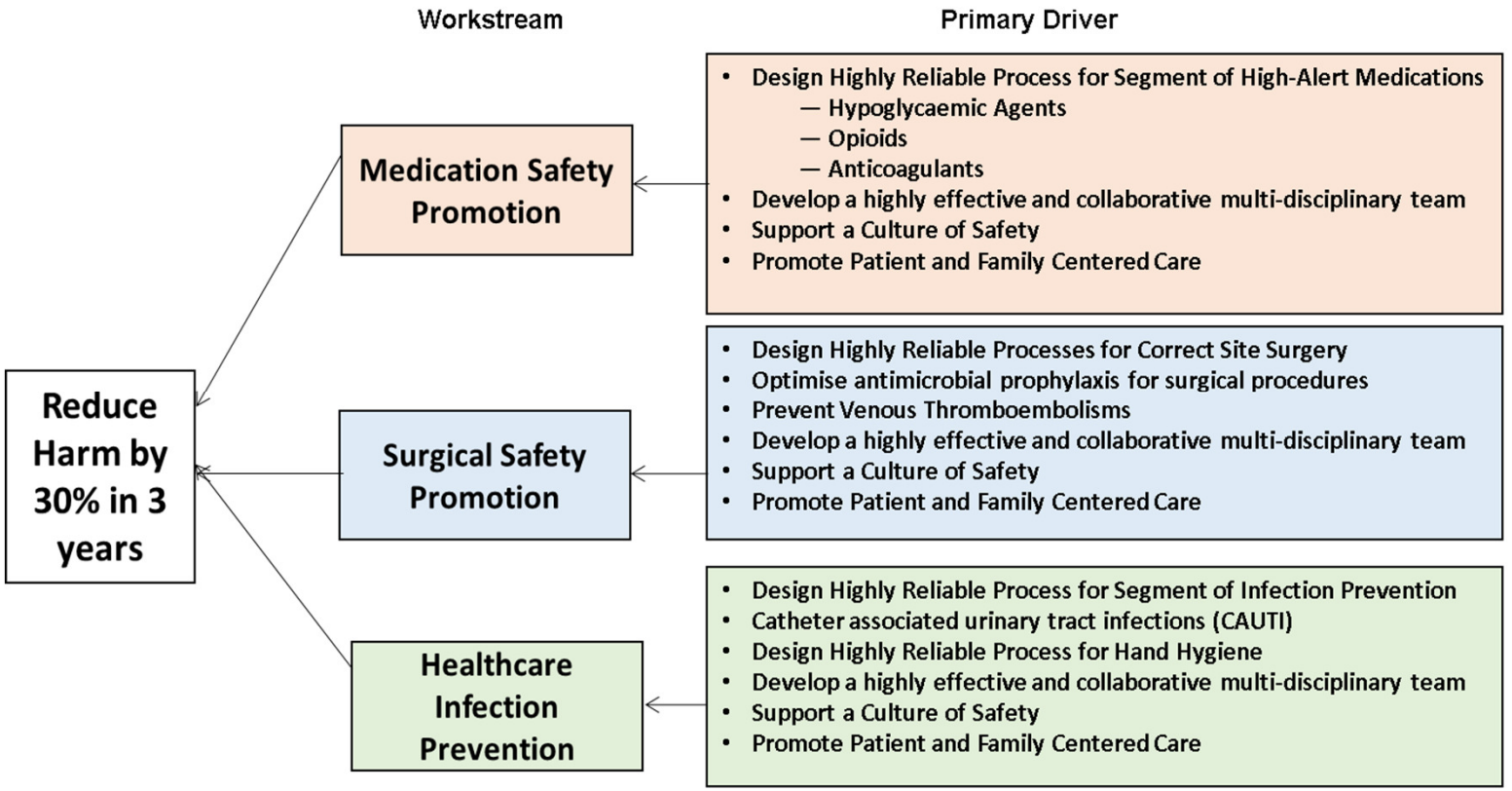
Singapore Healthcare Improvement Network

45 healthcare organisations across the care continuum
Accelerate the pace and scale of improvement in Singapore
A Bias to Action using "All Share, All Teach, All Learn"

SHINe's Large Scale Initiative

Reduce Harm in Patients



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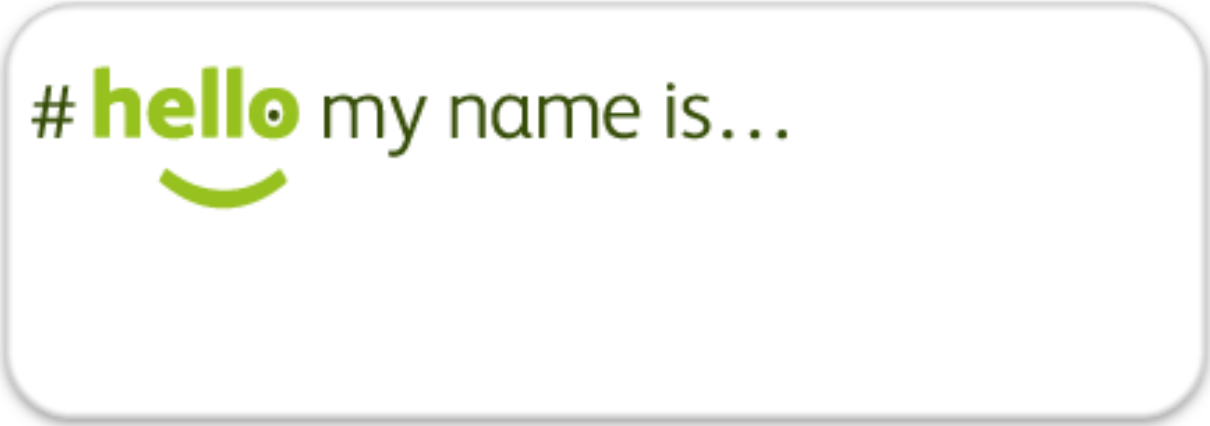
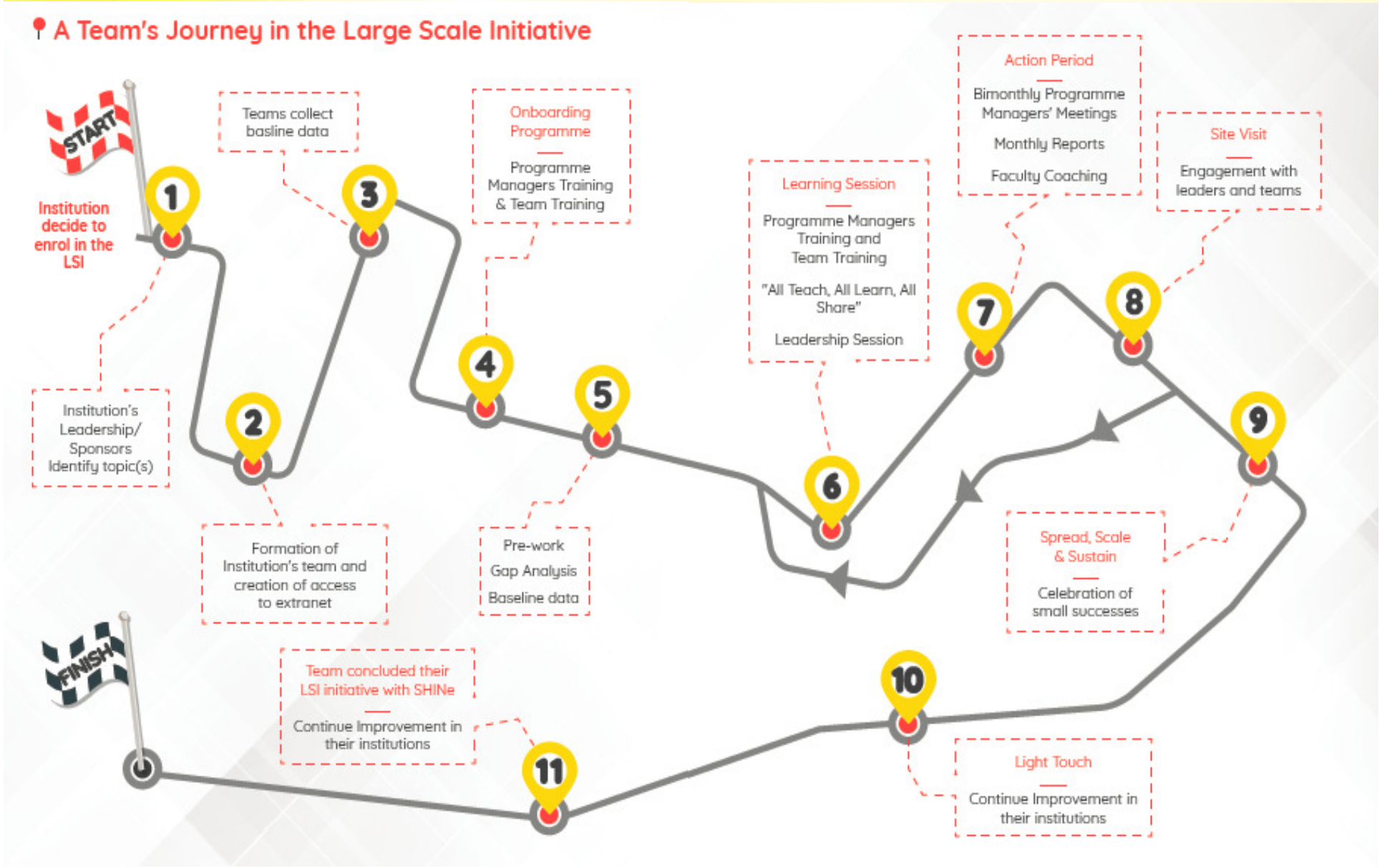
Who is in Today's Workshop? Introductions

Add an adjective to your name that starts with the same letter as your first name e.g. Jovial Jade ….



A Team's Journey in the Large Scale Initiative



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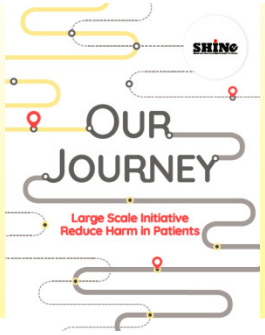
LSI – Reduce Harm in Patients Outcomes



Workstream	# of Teams	Outcomes	Cost Savings
Healthcare Infection Prevention :CAUTI Prevention	10	• 804 CAUTIs Prevented • 3,345 Bed Days Saved	$3.6 Million
Medication Safety Promotion: Hypoglycaemia Prevention	13	• 108 Admissions for Hypoglycaemia Prevented • 2,523 Episodes Prevented	$1.99 Million
Surgical Safety Promotion	7	• 23 Incidents Prevented	$360 Thousand

From Oct 2014 to 30 Sep 2018

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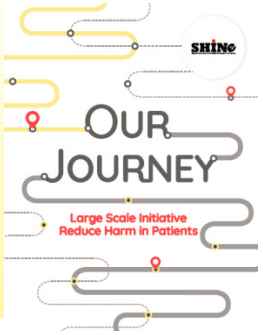
Other LSI Achievements



Train at least 1 program manager in each institution to support and facilitate improvement work within their institutions	**More than 90 program managers trained in 24 institutions.**
Train at least 50 improvement teams in improvement methodology	**Trained 55 teams in 24 institutions**
Train 9 local faculty to plan, coach and support multi-institution collaborative improvement work	**Trained 16 Faculty members**
Create or standardise Quality outcome or process measures	**Standardised national definition for hypoglycaemia;** **Modified coding rules for inpatient hypoglycaemia**

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Why Measure?

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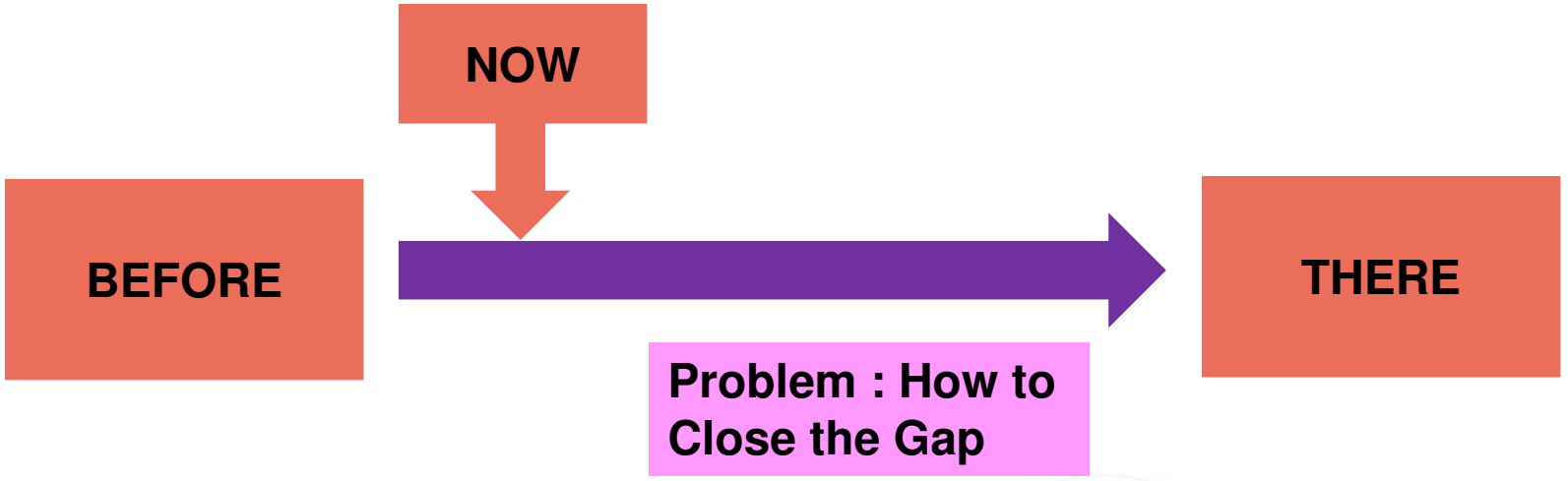
What's the Role of Measurement?

Describe something
Make comparisons
For learning



Model for Improvement: Basic Approach to Problem Solving

The 3 Guiding Questions + PDSA

1. AIM

What are we trying to accomplish?

The quality improvement goals, scope and team are defined

2. MEASURES

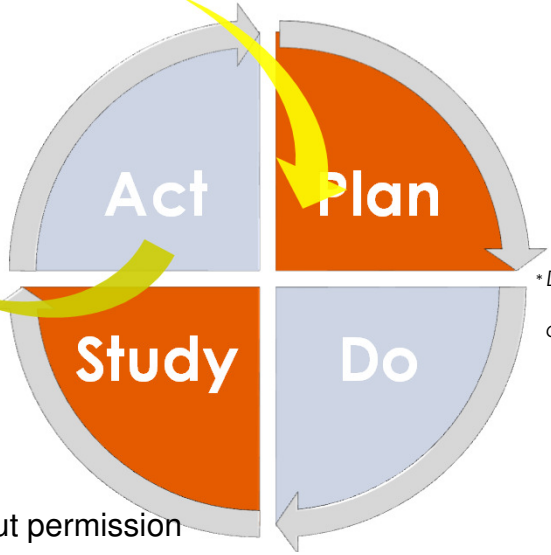
How will we know a change is an improvement?

Specific quantitative measures are established to measure the impact of the improvement

3. CHANGES

What changes can we make that will result in improvement?

Potential interventions are identified and developed for testing



- ✓ To plan test of change and be systematic
- ✓ To be based on reliable evidence and accurate analysis
- ✓ To be carried out with effective teamwork and communication

Developed by the Associates in Process Improvement. Building on the work of W.E.Deming and Walter Shewhart Langley et al, The Improvement Guide, 2009

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Model for Improvement: The 3 Guiding Questions

1. AIM

What are we trying to accomplish?

- *What process did you select and why is it problem?*
- *What are we going to do about it and by when?*

2. MEASURES

How will we know a change is an improvement?

- *What specific measure(s) will you select?*
- *How will you operationally define the measure(s)?*

3. CHANGES

What changes can we make that will result in improvement?

- *How will they help achieve the Aim?*
- *What theories and predictions can you make about how these change concepts will cause improvement?*

Questions are the fuel for learning

* Developed by the Associates in Process Improvement. Building on the work of W.E.Deming and Walter Shewhart
Langley et al, The Improvement Guide, 2009

Understand WHY Data is Needed

Data for Improvement, Accountability and Research in Health Care

Aspect	Improvement	Accountability	Research
Aim	Improvement of care	Comparison, choice, reassurance, spur for change	New knowledge
Methods: • Test Observability	Test observable	No test, evaluate current performance	Test blinded or controlled
• Bias	Accept consistent bias	Measure and adjust to reduce bias	Design to eliminate bias
• Sample Size	"Just enough" data, small sequential samples	Obtain 100% of available, relevant data	"Just in case" data
• Flexibility of Hypothesis	Hypothesis flexible, changes as learning takes place	No hypothesis	Fixed hypothesis
• Testing Strategy	Sequential tests	No tests	One large test
• Determining if a change is an improvement	Run charts or Shewhart control charts	No change focus	Hypothesis, statistical tests (t-test, F-test, chi square), p-values
• Confidentiality of the data	Data used only by those involved with improvement	Data available for public consumption and review	Research subjects' identities protected

"The Three Faces of Performance Measurement: Improvement, Accountability and Research." Solberg, Leif I., Mosser, Gordon and McDonald, Susan *Journal on Quality Improvement.* March 1997, Vol.23, No. 3.

Spend 3 minutes at your table discussing 4 or 5 attributes of:

a) Indicators for judgement

b) Indicators for improvement

Characteristics of indicators used for judgement and improvement

Indicators for judgement	Indicators for improvement
Unambiguous interpretation	Variable interpretation possible
Unambiguous attribution	Ambiguity tolerable
Definitive marker of quality	Screening tool
Good data quality	Poor data quality tolerable
Good risk-adjustment	Partial risk-adjustment tolerable
Statistical reliability necessary	Statistical reliability preferred
Cross-sectional	Time trends
Used for punishment/reward	Used for learning/changing practice
For external use	Mainly for internal use
Data for public use	Data for internal use
Stand-alone	Allowance for context possible
Risk of unintended consequences	Lower risk of unintended consequences

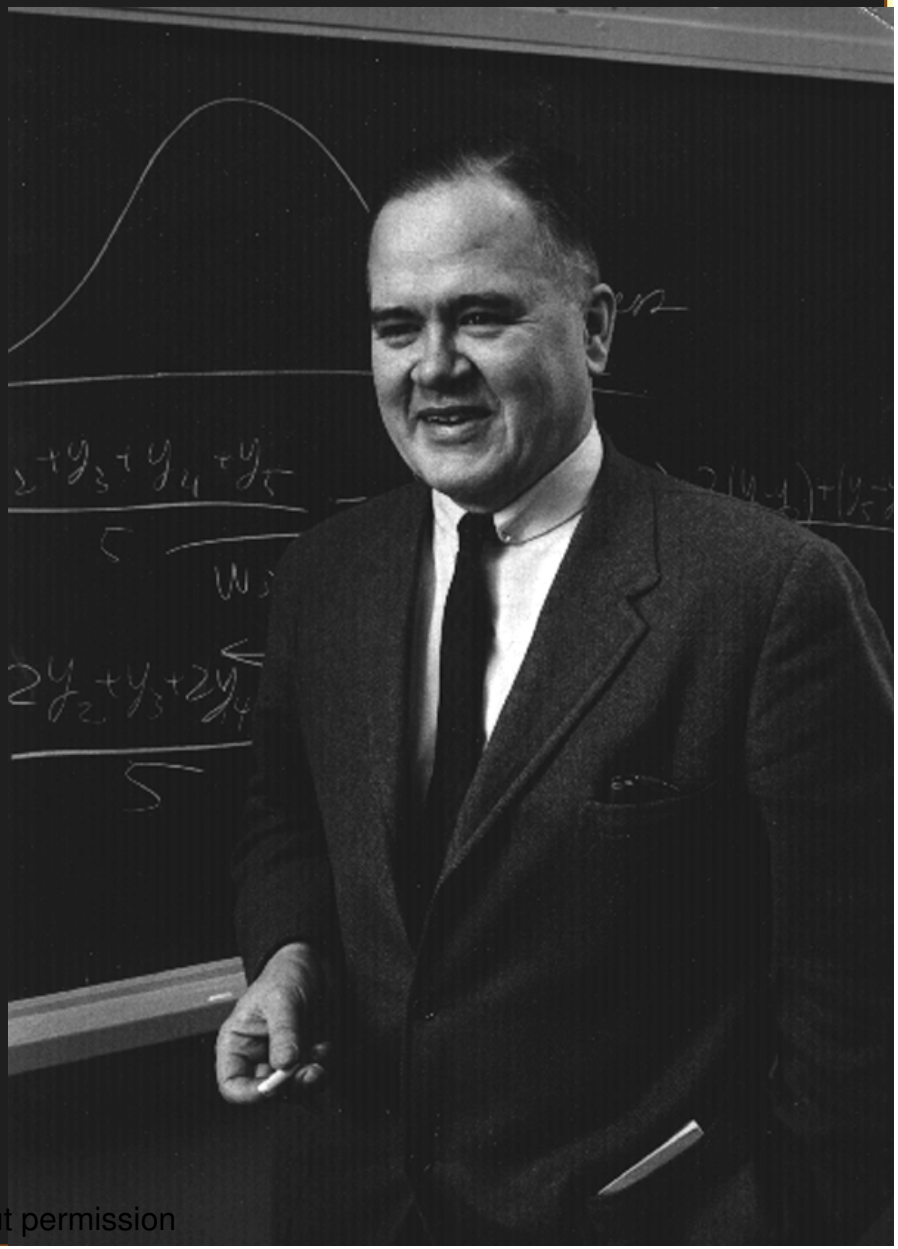
Role of Measurement in the Improvement Process

- To better understand the extent and nature of the problem
- To provide motivation to change by documenting the extent of the problem
- To provide points of comparison with re-measurements obtained after changes are made

Identifying the RIGHT problem

An approximate answer to the right problem is worth a good deal more than an exact answer to an approximate problem

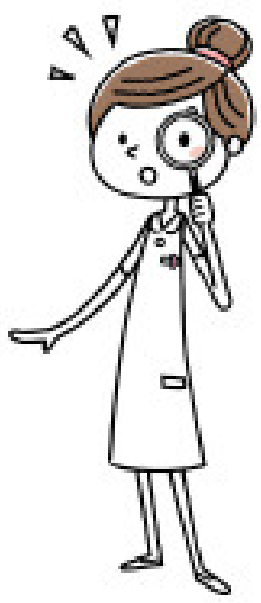
- John Tukey, Mathematician



Identifying the RIGHT problem

- Correctly defining the problem can be the most challenging part of improvement but also the most important

- Need to really understand the **process** and **its problems** so that the right solutions can be designed
  - Also anticipate potential side-effects of proposed solutions



Sources of Data

- Data from key performance indicators
- Incident/voluntary reports, serious incidents
- Recommended changes from professional organisations/literature
- Focus groups
- Processes that are unreliable

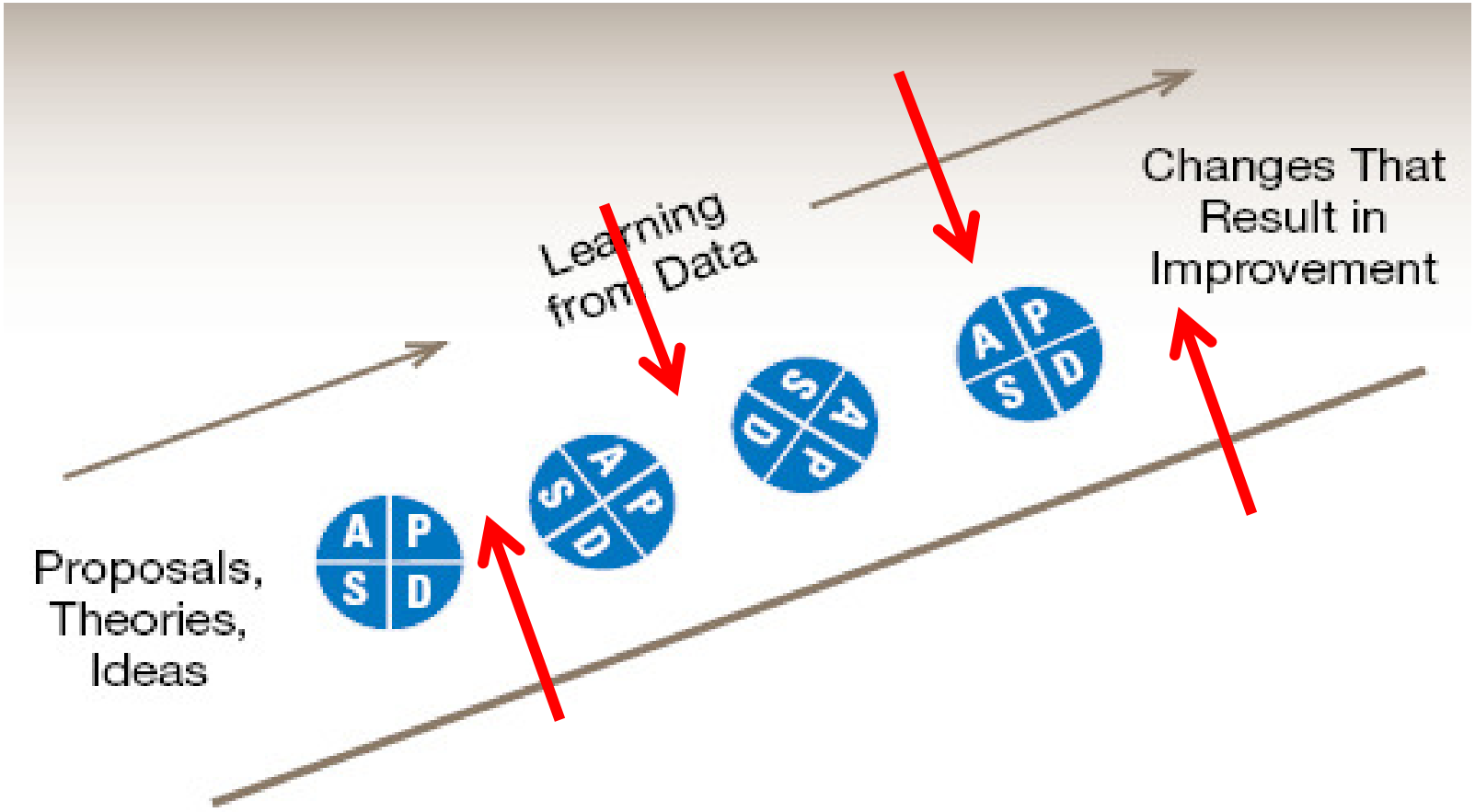
Pitfalls in Measurement

- Too little measurement
- Measure, measure, measure …….

We want

- “Do, measure, learn”
- Measurement triggering conversations

Measurement for Learning



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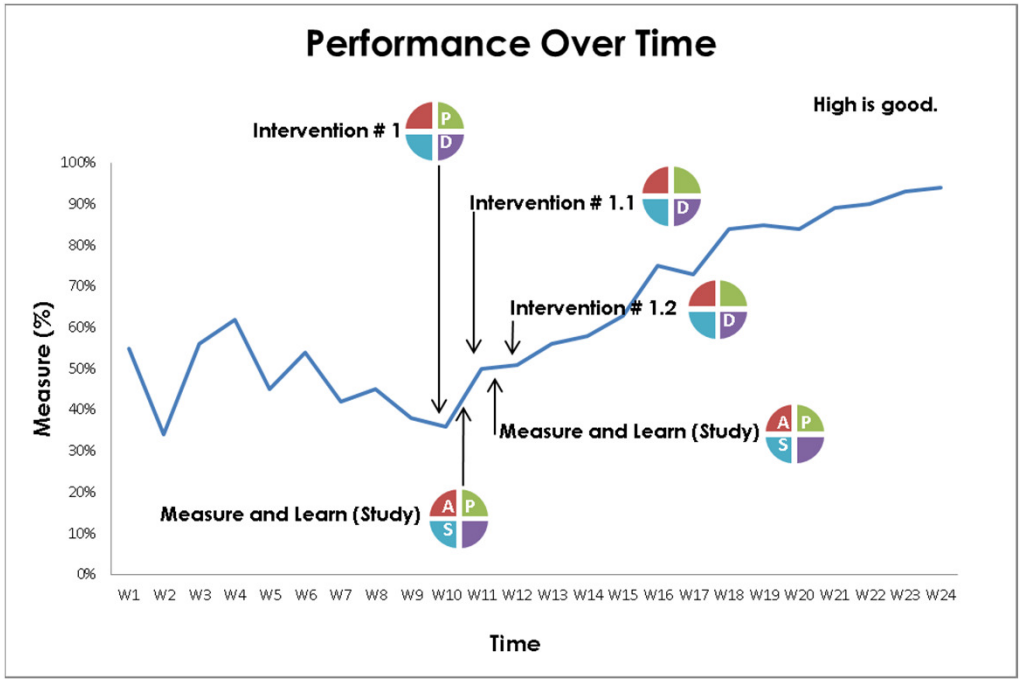
How to Display Data: Run Charts

- Graphs of data over time
- One of the single most important tools in performance improvement



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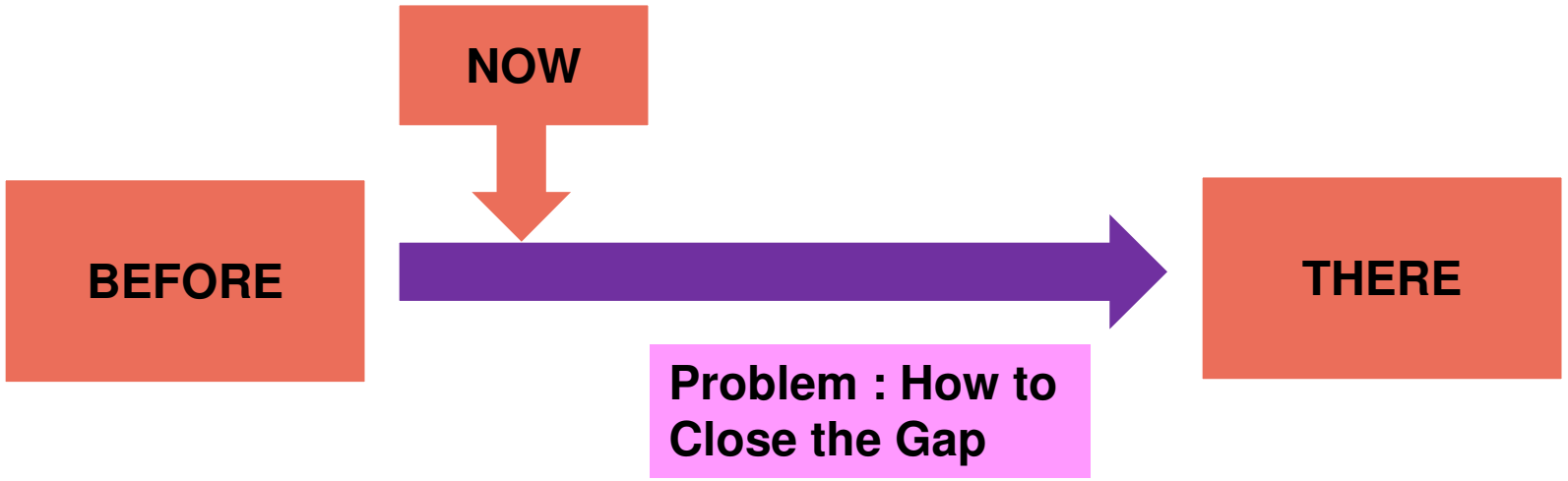
What's the Role of Measurement?



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Selecting a Measure

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Selecting and Defining a Measure

“Collecting data is much like collecting Garbage ……..

You must know in advance what you are gonna do with the stuff.”

Mark Twain

Exercise : Anthropological measure for Hands

(10 mins)

Instructions for an anthropological measure for hands

1. Decide on the indicator
2. Work out how to collect the data
3. Perform 8 to 10 measurements amongst members at your table
4. Report on your activity

List of Tools

A4 paper

Pen

Ruler

String

Tape

Anthropology :Study of human biological and physiological characteristics and their evolution

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SHARING

1. Please share what indicator your group chose

2. What were the reasons for choosing this indicator

3. How did you collect the data

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Selecting a Measure

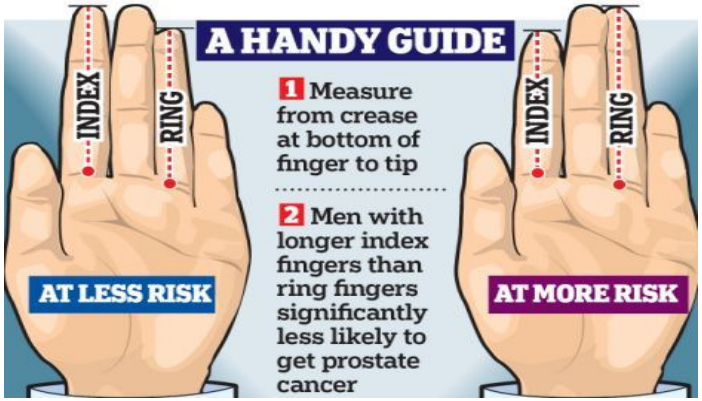
Concept or Focus is important.
A concept is a vision, end result or goal.

<u>Guiding Questions :</u>

1. What is the reason for the measurement?
2. How is the data going to be organised?
3. Who is going to receive the data?
4. What is the action that the data is going to drive?

Based on Goal, Choose the Indicator

Assessing Risk for Prostate Cancer in Men



Selection of Glove Size to place order for gloves

Size Chart	
Size	Inches
XS	7
S	8
M	9
L	10
XL	11
2XL	12

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Criteria for Selecting an Indicator

Direct : linked to the result that you are trying to achieve

Objective : no ambiguity, operationally precise

Adequate : balance resources and information needed

Quantitative : numbers facilitate agreement

Disaggregated : for sub-populations / specific groups

Practical : timely and at reasonable cost

Reliable : sufficient quality of data for decision making

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Defining an Indicator

a.Title : brief description of the focus of the indicator

b.Purpose : what is this indicator for

c.Definition : clear and concise description of the indicator

d.Method of Measurement : defined steps to collect data

e.Numerator: Top number for calculation of a common fraction

f. Denominator : Bottom number of a common fraction

g.Calculation : specific steps to derive the indicator value

h.Data Collection Method & Tools : specific approach and tools to collect data

i. Data Collection Frequency : intervals at which the data is collected

j. Data Collection Sample size : how many observations each interval

k.Disaggregation : relevant sub-groups that data can be divided into

l. References : sources of information relating to the indicator

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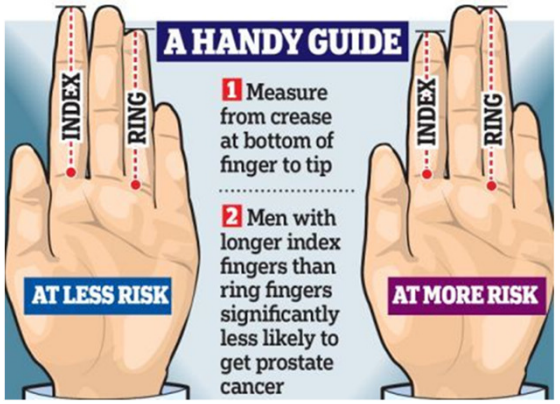
Exercise : Develop Indicator Definition (5 mins)

Assessing Risk for Prostate Cancer in Men



a. Name of Indicator

b.Purpose

c.Method of Measurement :

- *How to measure*
- *Calculation e.g Numerator / denominator*
- *Tools to be used or data source*
- *Data Collection Frequency*
- *Data Collection Sample size*
- *Data disaggregation, if any*

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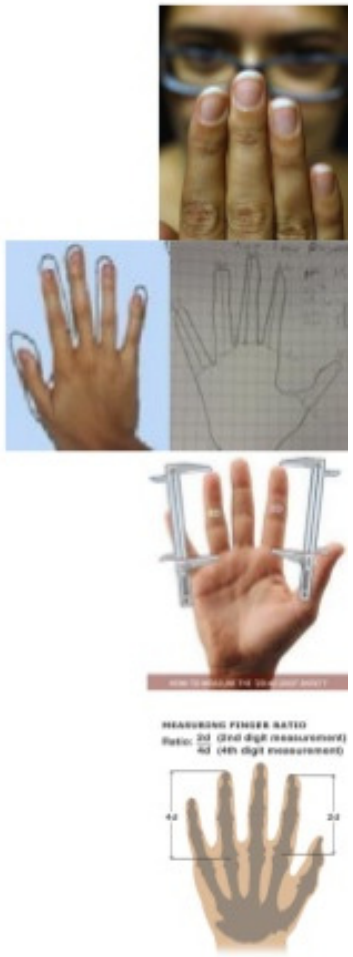
Define indicator and data collection method

2D:4D ratio is the ratio of the length of the index finger to the ring finger of the right hand



How to Measure (5 ways)

1. Measure from crease at the bottom of finger to tip with tape
2. Measure from crease at bottom of finger to tip with calipers
3. Photocopy right hand and measure from lowest crease at bottom to tip
4. Trace right hand outline and measure from bottom of finger to tip
5. Measure on X-ray of right hand – from base of proximal phalanx to tip of distal phalanx

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Selecting and Defining a Measure

What have we learnt ?

1. Clarity about the goal and reason for measurement

2. Need for precise and clear indicator definitions and data collection methods

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Implementing a Measure

Let's move on to steps 4, 5 and 6
AFTER Tea Break

1. Goal
2. Select
3. Definition
4. Collect
5. Baseline
6. Learn

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Collecting Data and Learning

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Exercise： Measures for Falls Prevention QI Project

Mary, your friend confides to you that she has been arrowed by her supervisor to reduce falls in her ward.

She is unsure how to start. You suggest to her that she should collect some data to validate the situation.

How should she start? Any suggestions?

Example : Measures for Falls Prevention QI project

Indicator Name :
Falls per 1000 bed days per month

Definition :

- Numerator : number of falls per ward per month
- Denominator : total bed days per ward per month

How is the data collected ?

- Medical records of all patients are audited to find incidences of falls .
- Total bed days is based on multiplying patient counts with ALOS

Exercise : Data Collection

Each table is going to do a Falls Prevention Improvement Project. You will be collecting data on falls as part of your project. This will be done through retrospective review of patients admitted.

Each table has 1 cloth bag with **paper clips** – different colours, shapes and sizes. Paper clips represent of patients admitted to Mary's ward.

An **ORANGE** paper clip is a medical record of a patient with a **FALL**

Exercise : Data Collection (6 mins)

Calculation (# falls per 1000 bed days)

$$\frac{\text{\# of orange clips}}{\text{Total \# clips x 6.32 (ALOS)}} \times 1000$$

Data collection plan

1. Shake the bag vigorously and **without looking into the bag**, scoop out 1 handful of paper clips. This represents patients admitted within 1 week.
2. Count the total number of clips and the number of orange clips (Falls)
3. Calculate fall rate and return the clips to the bag
4. Do this for a total of **6** data points
5. Display the data you have collected (chart or table)

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SHARING

Were there problems during the process of data collection?

Which helped you to understand the data?
Chart or Table of numbers

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Why Do You Use Charts and Graphs?

1. Help to simplify complicated relations that may be difficult to observe
2. Tables can be boring and difficult to perceive.
3. Most people need a visual shortcut, can only pay attention to general outlines (5 min rule)
4. Graphics attract the eye, improve understanding of relations and quantities.
5. Graphic method aids in understanding structures and relations.

Exercise : Data Collection (1)

How confident are you after these 6 points, that you understand how the system behaves

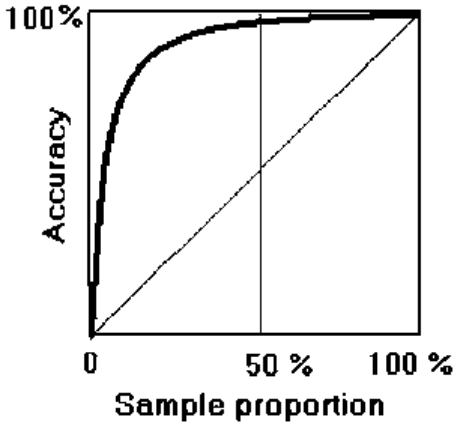
If you do nothing else, can you predict the fall rate for the next month in Mary's ward ?

How much Data to Collect ?

The data collection program should be designed to limit the statistical error and, hence risk, to an acceptable level.

Considerations :

1. Reasons and objectives for data and sampling
2. Relationship between accuracy and precision (non-linear)
3. Reliability of estimates with sample sizes
4. The variability of data
5. Cost of data collection



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Exercise: Making Changes (2)

We are now going to make a change to the system. This PDSA is predicted to reduce fall rates. Let find out if this actually worked?

Data collection plan

1. Shake the bag vigorously and without looking into the bag, scoop out 1 handful of paper clips.
2. Count the total number of clips, as well as the number of orange clips (Falls)
3. After counting, return the clips to the bag
4. Calculate Fall rate as before
5. Continue to plot the data on your chart.

SHARING

1. What did you learn from the chart ? Was there any improvement?

2. How many data points do you need to be convinced that a change has occurred?

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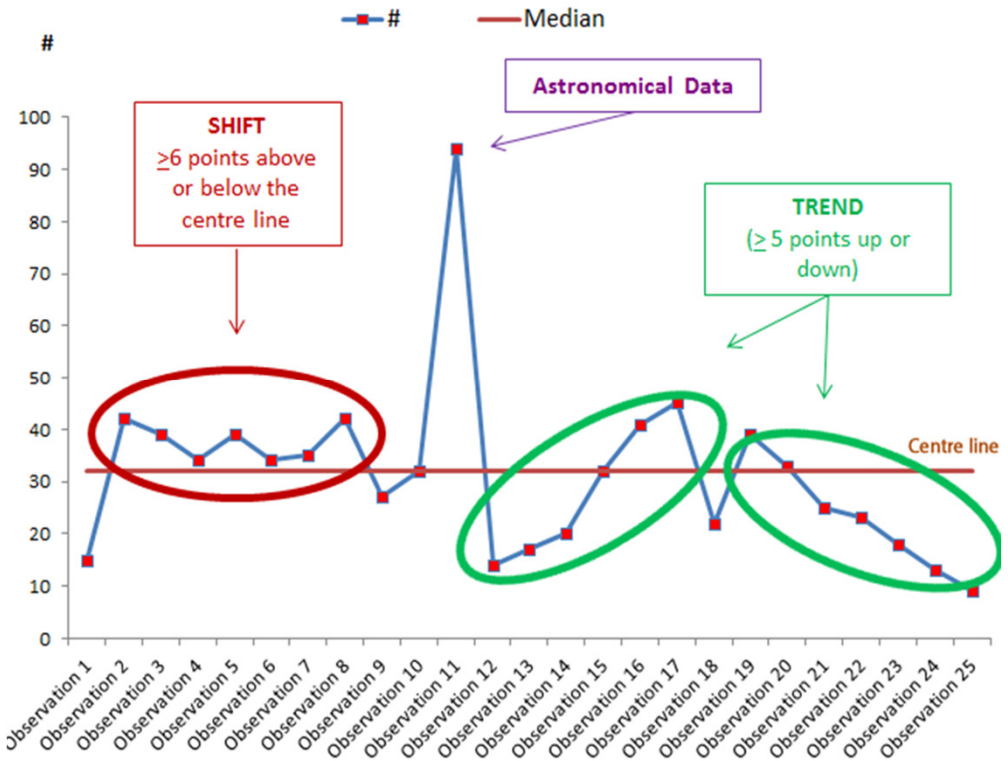
Signals for Non-random Change

1. Shift
2. Trend
3. Astronomical Point
4. Too many or Too Few Runs



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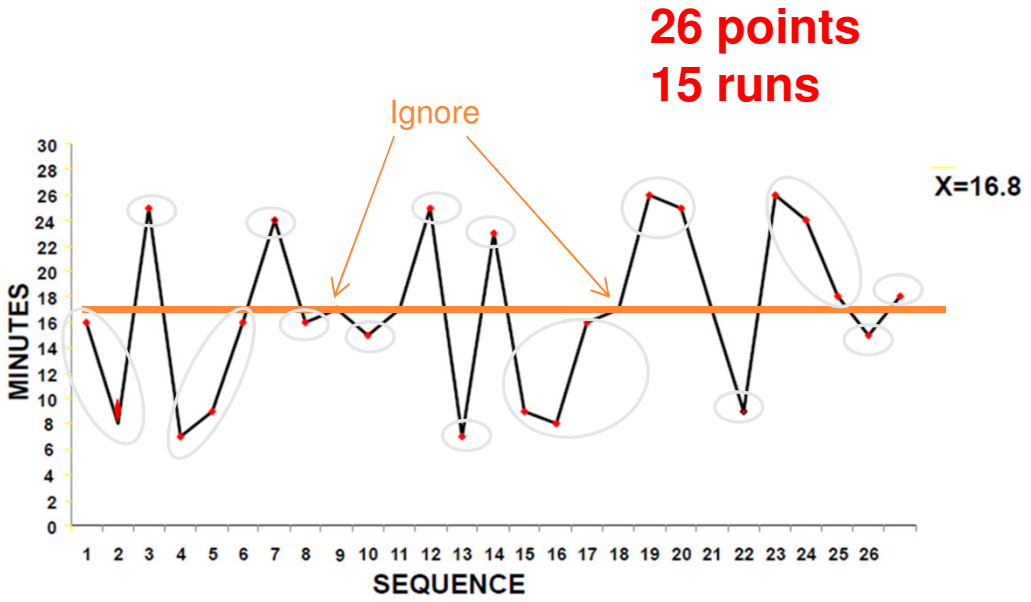
Signals for Non-random Change

A run is a sequence of consecutive points which lie on the same side of the median line. Points on the line are ignored.

number of observations	lower limit for run count	upper limit for run count
14	4	11
15	4	12
16	5	12
17	5	13
18	6	13
19	6	14
20	6	15
21	7	15
22	7	16
23	8	16
24	8	17
25	9	17
26	9	18
27	9	19
28	10	19
29	10	20
30	11	21



Check against look-up table. If there are fewer or more runs than expected, our change has made a difference in the process.

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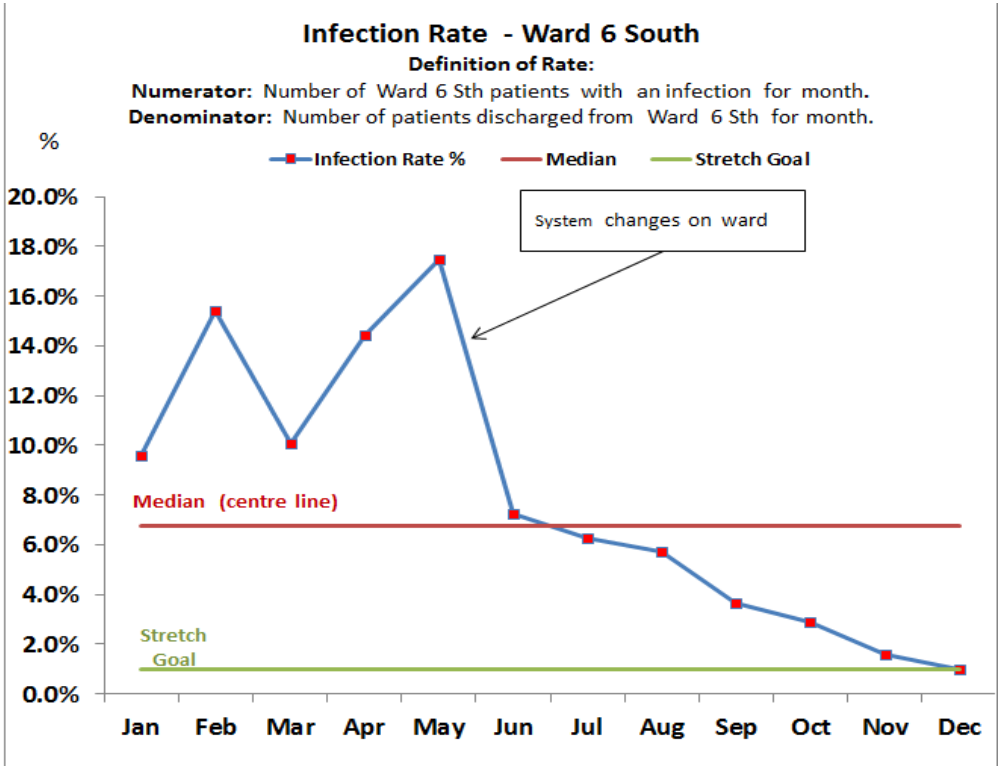
Run Chart Example

What does this chart tell you ?



1. Is there a change?
2. Positive or negative?
3. When did the change occur?
4. Is it special cause variation

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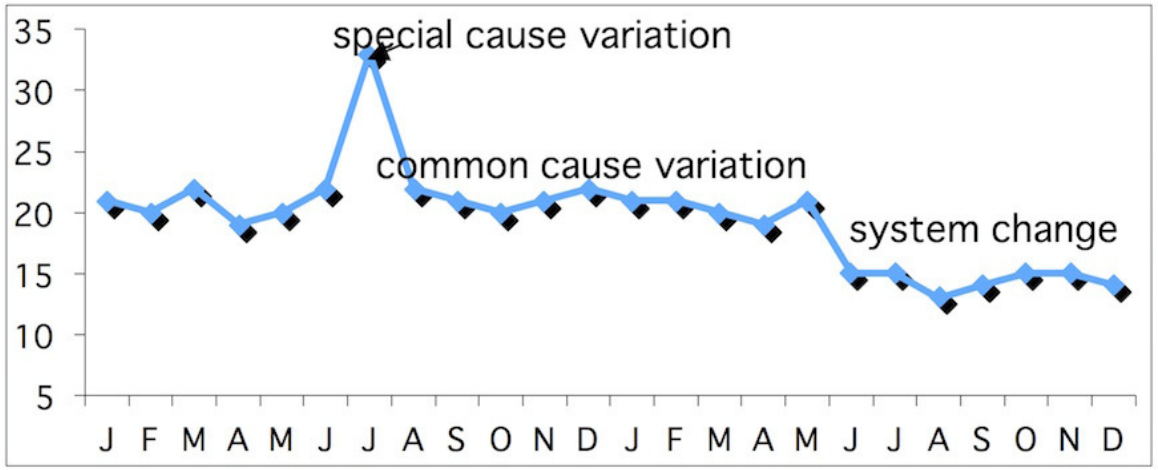
Understanding Process Variation



Worse

Better

- **Common Cause Variation** (usu 85%)
  Stable, consistent variability inherent in processes

- **Special Cause Variation** (usu 15%)
  Specific cause that usually can be isolated

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Summary

Select and Define your Indicator
Develop a Data Collection plan

Understand the data you are collecting

- What are the characteristics of this process
- Has the change made any difference to the process ?

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Using Data for Improvement

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Model for Improvement: Basic Approach to Problem Solving

The 3 Guiding Questions + PDSA

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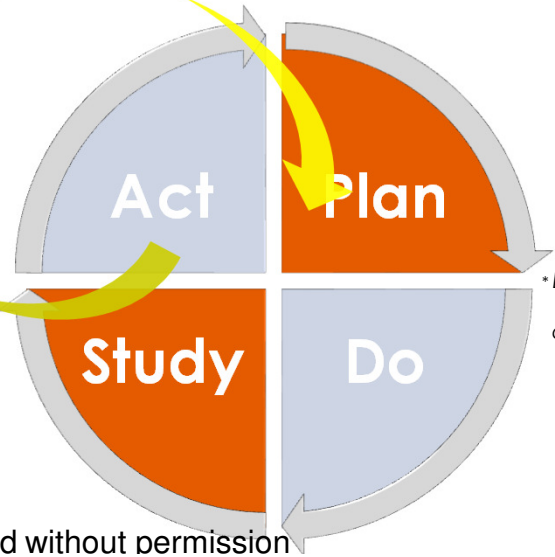

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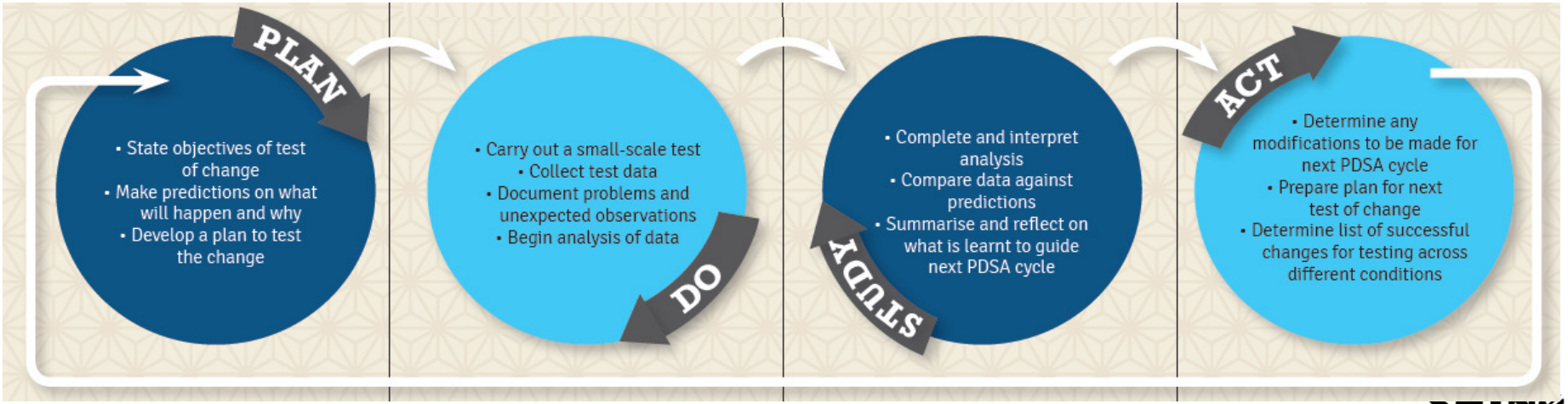
PDSA Cycle

The PDSA (Plan, Do, Study, Act) is used to conduct tests of change in disciplined rapid iterations.

Based on four steps, the cycle can:-

- Lead to early measurable successes,
- Be completed quickly with minimal time and resources
- Offer the team an active means of gaining new information about the system
- Stimulate new and richer change ideas.



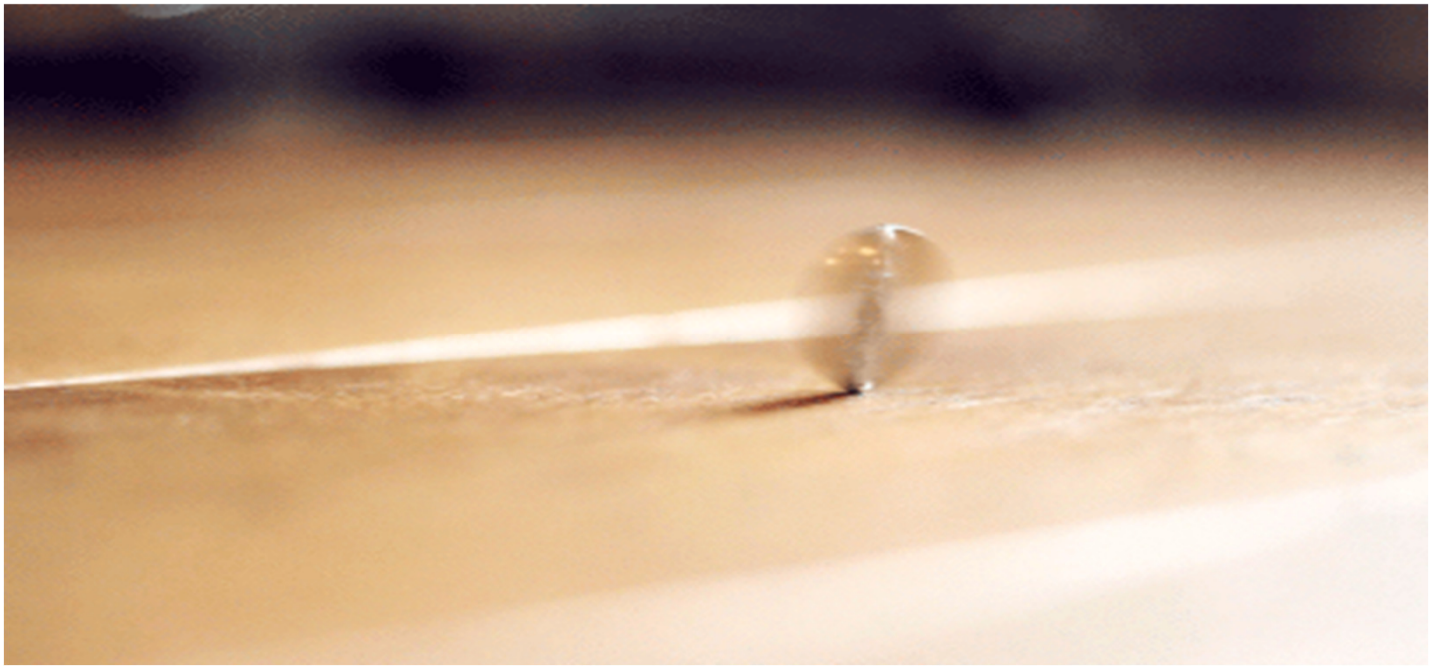
The Next 35 minutes!

1. Practise rapid cycle PDSAs
2. Understand how theory and prediction help you learn
3. Collect real time data for measurement and produce a run chart
4. Practise learning as a team

Activity: Spin the coins

Aim:

To spin a coin for the longest amount of time over a 10 minute period of testing



Activity: Spin the coins

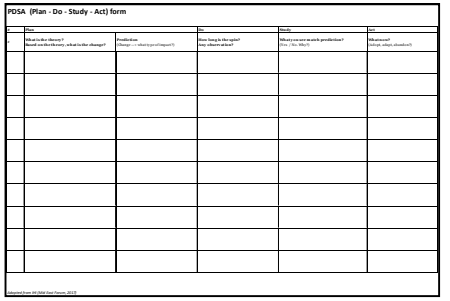
Aim:

To spin a coin for the longest amount of time over a 10 minute period of testing

Measures:

Duration of the coin spin (seconds)

4 coins of different sizes



PDSA Form

Smartphone timer

Team size

1 table = 1team

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Debrief: Spin the coins

- What was your experience?
- What were your key learning points?

Final Reflections

- What would you change in your current practice as a result of today's workshop?

Recap of the Day

- Why measure?
- Selecting the correct measure
- Run charts and data over time
- Learning from the data

Thank you