Paul Hollingworth Presents Dr Deming's Experiment with Red Beads and "Why most management information is rubbish and what you can do to make it better"

Welcome

net² north of england transformation network

Paul Hollingworth

"Why most management information is rubbish and what you can do to make it better"

4GM consulting

You can't fatten a pig by weighing it!

Overview

- To manage effectively, it is essential to have a well developed appreciation for the importance of understanding variation.
- This theory dates back to 1920's, it was one of the most important messages Dr W Edwards Deming took to Japan.
- Today I am introducing basic principles, but none of this subject is 'rocket science'.
- This is not a lecture, I want dialogue, so ask questions and challenge me. Some of what you might learn today may go against what you already 'know'.

Overview

- Quick introduction
- Dr Deming's Experiment with Red Beads
- *Break*
- Discussion
- Targets and KPIs – some common misconceptions
- So why is most management information rubbish?
- *Lunch*

What do we know about snowflakes?

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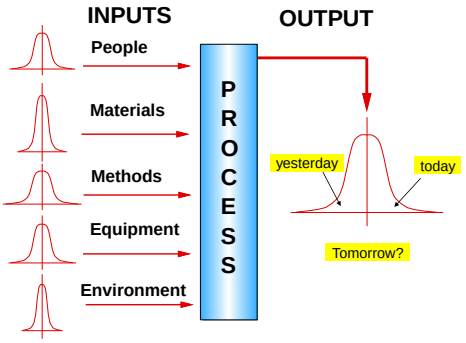
No two snail shells are the same

Everything varies



The question is…

- **Does the difference matter?**

What is "fit for purpose"?

- **7' 1" is good for a basketball player**
- **4' 11" is good for a jockey**

Specifications – all shapes and sizes

Technical Specs
Goals
Targets
Quotas

Where do they come from?

What are they *for?*

Specifications - 'this far and no further'

What effect do they have?

What might be the unintended consequences of managing by numbers?

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Dr W Edwards Deming 1900 - 1993

Japan c. 1949

London 1990

These ideas were born in USA but raised in Japan

"The right quality and uniformity are foundations of commerce, prosperity and peace"

Dr Deming's Experiment with Red Beads

- **Simple simulation**
- **I do the role playing**
- **All you have to do, is do as you are asked**
- **I need nine volunteers to take part**
- **Your chance to be a willing worker!**

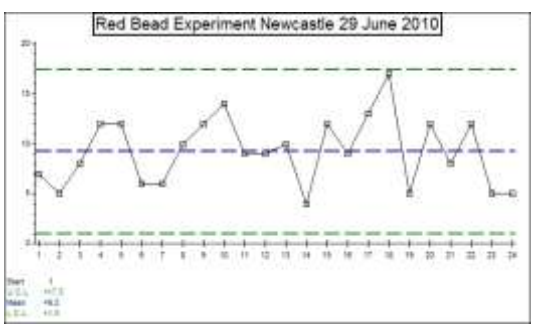
What did we learn?

- **Table discussion.**
- **What were the manager's underlying assumptions?**
- **What was the effect of these?**

Linda: My Worker Of The Week!

	Worker	Week One	Week Two	Week Three	Week Four A	Week Four B	Total	Ave.
1	Richard	7	6	10	5	12	40	8.00
2	Linda	5	10	4	12	5	36	7.20
3	Mark	8	12	12			32	10.67
4	Chris	12	14	9			35	11.67
5	Moira	12	9	13			34	11.33
6	Sue	6	9	17	8	5	45	9.00
	Total:	50	60	65		47	222	
	Average:	8.33	10.00	10.83		7.83	9.25	

Process Control Chart



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Some conclusions

- Some workers will always be above average and some below, they may be helpless to influence this
- Past performances can be a useful guide but cannot provide a definitive prediction of how things and people will perform
- "Trends" can be misleading. We can waste time searching for reasons for improvement or deterioration if we do not understand the system we are looking at
- Telling people to improve without giving them the means to, only achieves demotivation

Some conclusions

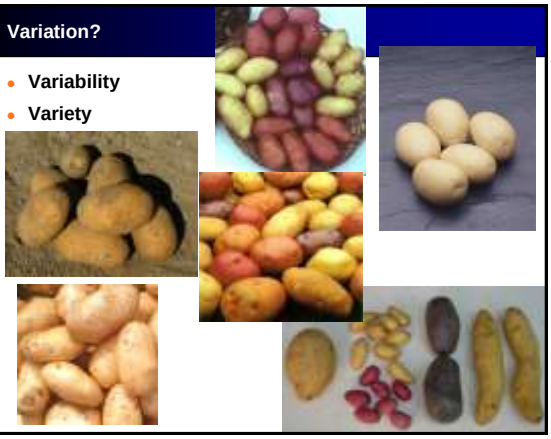
- Variation is a natural part of any process which can produce unbelievably large differences in performance
  - Day to day, person to person, batch to batch
- Workers work within a system over which they have little control
  - Raw materials or information
  - Tools, methods, software
  - Training, remuneration
    - Etc.
- Targets do not change the system
- Only management can change the system

When managers don't understand variation

- They see trends where there are none
- They tend to over react
- They blame (and give credit to) people for events which are beyond their control
- They are unable to to make effective plans
- Their ability to improve is limited
- They often make things worse by trying harder
- They judge using arbitrary targets
  - Which fosters Short Term Thinking

Variation?

- Variability
- Variety



Even the humble spud.

- Why might minimal variation in potato size be desirable?

Variation – not just in the natural world

- Variation is the difference in outputs which we might expect to be 'the same'.

"No worries – they're all in spec!"

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Where does the variation come from?

1. The process that created the output
2. The process of measurement

There is no absolute value for anything

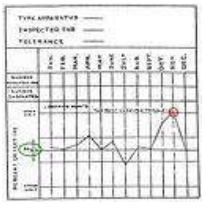
2 + 2 = ?

The Problem of Analysis and Insight

- When we have one measurement, we 'know' something
- When we have two, or more, measurements of the same thing we may be confused
  - Has the variation come from the underlying process or the measurement of it?
- How do we handle this uncertainty?
- How do we determine which are likely to be the controlling factors?

Dr Walter Shewhart - "hard boiled engineer"

Bell Labs 1923



- "It will not be profitable to seek out the cause of individual variations where variability is controlled."
- "It will be profitable to seek out and remove the causes of variation where variability is uncontrolled."

Deming applied Shewhart's theory to Agriculture in 1930's

Shewhart's Theory: Two Types of Variation

All data sets contain noise (common cause) some may contain signals (special cause).

COMMON

- Found in all results
- Stable processes & systems have only common cause variation
- Predictable (but not necessarily acceptable)
- Work on the system to ensure that process is always aligned to customer requirements

SPECIAL

- Assignable to something specific
- Unpredictable (but not necessarily unacceptable)
- Economic to investigate in order to avoid / replicate in the future

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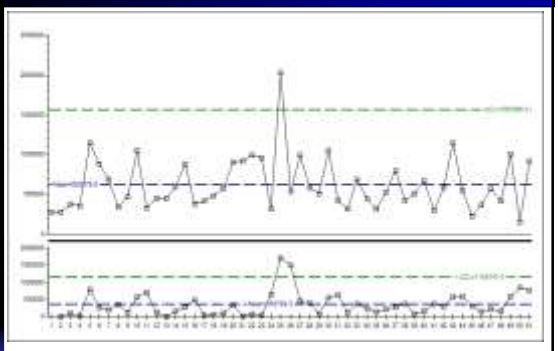
XmR Process Behaviour Chart



Shewhart's Theory: Two Types of Variation

- **Why would you listen to static on the radio?**
- **How do you 'tune in' to what you want to hear?**
- **Shewhart's technique of Statistical Process Control (SPC) enables probable background noise to be filtered out so that possible signals may be detected.**
- **WARNING – not all SPC (books, software even BS) is correct.**

The Best Kept Secret in The West

- **Shewhart's theory enables great insight into process performance**
- **Without it, we often just don't understand how to ask the right questions**
  - As Dr Deming would say "we are ruined by best efforts"

Comparing averages: an example

Monthly performance data from Dept. A, B and C. Could be reportable accidents, complaints, budget variance - anything of interest.

	Jan	Feb	Mar	Apr	May	*Total*	*Ave.*
A	2	3	4	5	6	*20*	*4*
B	4	4	4	4	4	*20*	*4*
C	0	6	4	7	3	*20*	*4*
tot	*6*	*13*	*12*	*16*	*13*	*60*	*12*

What does the average tell you on its own?
Are things getting better or worse? What will June be like?

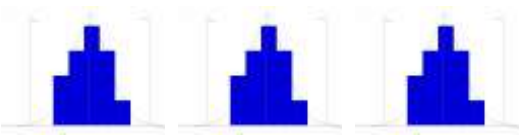
Comparing averages & histograms: Three Processes

- **Could be three machines doing identical work, three teams, three sales regions etc.**
- **The Key Performance Indicator could be anything important; breakdowns, sales volume, waiting times, test results etc.**
- **The time period is the same for all three.**
- **Process X Total = 216.1**
  - Average = 8.31
- **Process Y Total = 216.1**
  - Average = 8.31
- **Process Z Total = 216.1**
  - Average = 8.31

What is the difference between them?

Three Processes - Histogram

Process X **Process Y** **Process Z**



What is the difference between them?

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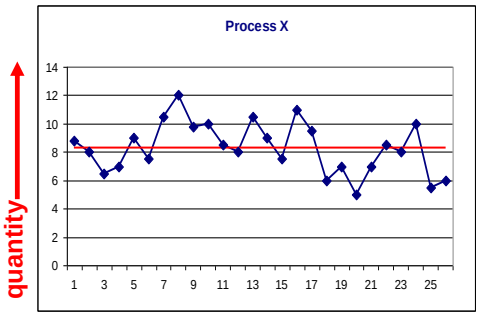
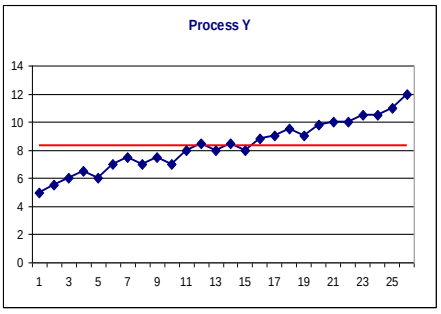
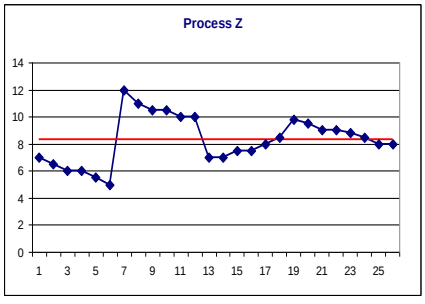
Run Chart X



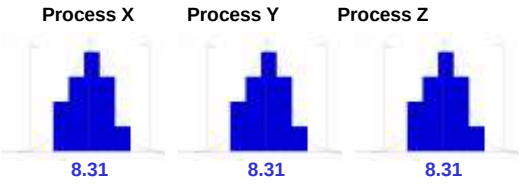
Run Chart Y



Run Chart Z



Three Processes - Histogram

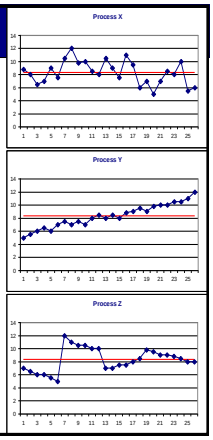


Averages and histograms only give you a small part of the full picture.

Run Charts

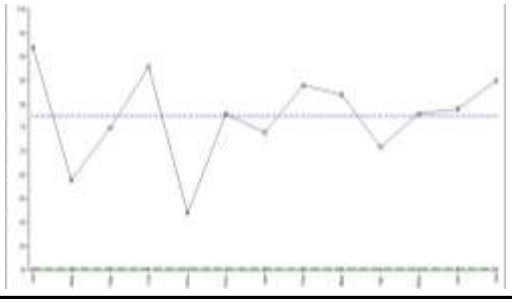
Possible signals

- a run of eight or more consecutive points on the same side of the average
- seven or more consecutive points steadily increasing or decreasing may indicate a trend
- look for significantly different values i.e. outliers
- other patterns



Comparing single data points: an example

Run chart of KPI percentages, could be on time delivery, client satisfaction, whatever. Shown over 13 months. Are things getting better or worse?



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Other Common Pitfalls

- **Assuming a result is due to some special or extraordinary cause, when it isn't. For example a large % change month to month or year to year. Some results are different even though the causal system is unchanged.**
- **Assuming something is the not the result of something special or extraordinary, when it is. For example small % changes month to month. Some results are the same, even though the causal system may be different.**

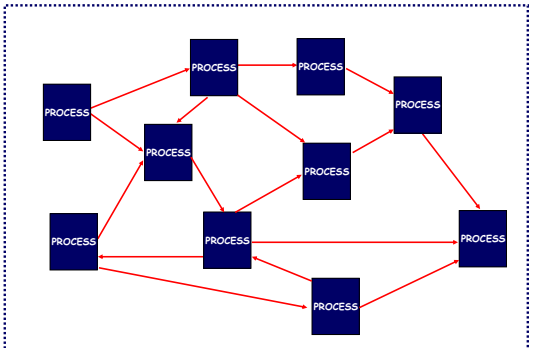
More Common Pitfalls

- **Using historical data without testing its validity for prediction. This has been likened to driving a car just by watching the rear view mirror.**
- **Misunderstanding 'area of opportunity'. For example, if we compare accident statistics from two businesses where the opportunity for having accidents is not the same, what can we conclude?**

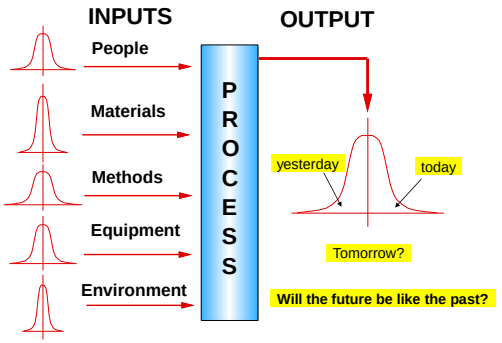
Yet More Common Pitfalls (abridged version)

- **Using league tables to create ranking, without understanding the causal system. In any league table one result will be top, one will be bottom. Roughly half will be below average. The important question 'what does the difference *mean*?' usually becomes lost in a league table.**
- **Giving blame or credit for results which are just chance (common cause) variation.**
- **Making things worse by trying to improve them.**
  - Of course, *you* have never been guilty of this. But I expect you have experienced it from your boss. What causes it?

The virus of variability



Everything varies



Prediction

- **Planning**
- **Forecasting**
- **Budgeting**
- **EVERY decision requires a prediction!**
- **Management is action based on prediction**
- **Continuous Improvement is about improving predictability**
  - Enables *flow*

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Why is most management information rubbish?

- **No concept of common and assignable causes**
  - Inability to differentiate between possible signals and probable noise
- **Variation is ignored or attenuated**
  - Indiscriminate use of averages
  - Simplistic comparisons e.g. This month – Last month – Same month last year
  - Inappropriate use of percentages which can mask or create signals
- **No operational definition**
  - Of measure
  - Or measurement process
- **Arbitrary targets, quotas, goals**

Today's Key Learning Point

- **The control of variation is the single most effective strategy for performance improvement.**
  - Reducing process variation increases the predictability of system performance
  - It makes effective planning and decision making much easier
  - It delivers waste elimination
  - It delivers higher quality / more value at *lower* cost
  - It improves *flow*

Most managers don't understand this and that is WHY most management information is rubbish.

Want to learn more?

How to Drive Sustainable Improvement Using Key Performance Indicators

One Day Workshop

£110 + VAT

The Quayside Exchange – Sunderland SR1 2AX

13th September 2010

Download info from www.4gm.com/KPI.pdf

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