

BASICS OF A GOOD GRAPH



ADD A LEGEND

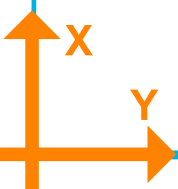
Ensure there is a legend to identify all data

DISPLAY CLEAR MEASURES



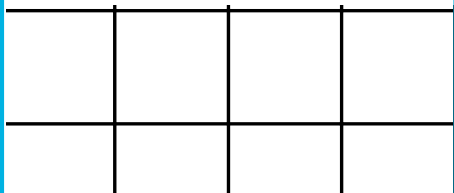
Ensure people understand the unit of measure you are using & if possible Systeme Internationale units of measure

TITLE ALL AXIS



USE GRID LINES

They can help the eye to link an axis value to the displayed value



FOLLOW LINE CONVENTIONS

Time series lines are solid with markers



Mean lines often dashed no markers



Control Chart limits are often red, will be dashed in learning phase & solid in operating phase



HELLO
my name is

WRITE MEANINGFUL TITLES

Include the type and purpose of the graph with unit of measure and indication what is good/bad

1

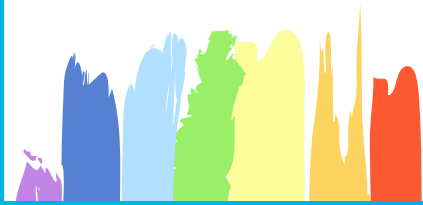
ROUND UP

2 3

DECIMALS

Consider whether it is ok to round numbers up to avoid unnecessary decimal places

KEEP COLOURS SIMPLE



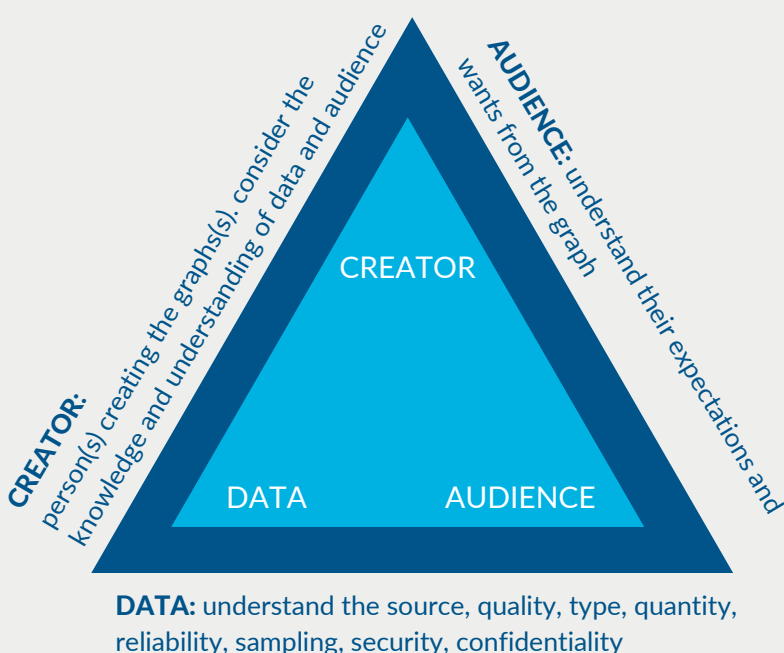
IF THE GRAPH IS SIMPLE, KEEP IT SIMPLE,
IF THE GRAPH IS COMPLEX, MAKE IT SIMPLE

ENSURE THE GRAPH TELLS A STORY

DESIGN PRINCIPLES

FOR THE LARGEST NUMBER OF PEOPLE,
PROVIDING THE GREATEST DEGREE OF UNDERSTANDING,
WITH THE LEAST AMOUNT OF EFFORT

DESIGN TRINITY



EXPLANATORY GRAPH

EXPLORATORY GRAPH

PURPOSE

EXPLORATORY GRAPH: you don't know the answer yet, the graph helps to explore and interpret the data together with the audience.

EXPLANATORY GRAPH: you know the answer you want to share and the graph helps to convey the message to the audience.

HYBRID: Exploratory Explanation - dual purpose, often used in dashboards.

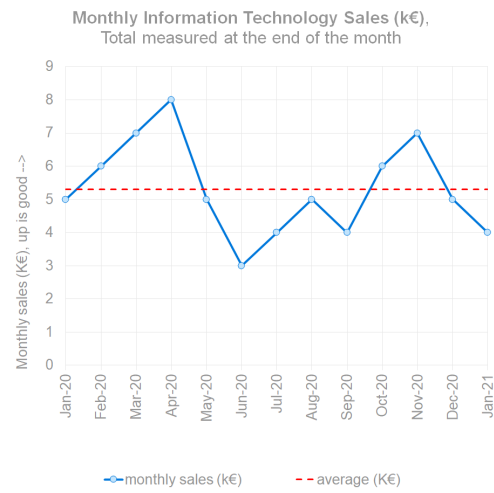
RUN CHART

HOW IS MY PROCESS PERFORMING OVER TIME?

X-AXIS time-series
Y-AXIS attributes or variables

BENEFITS
Great basic "let's have a first quick look" type of chart

CONCERNS
Subjective interpretation of the variation, the user may be tempted to react to extreme values (tampering), if people add a target line, there is a high risk of tampering



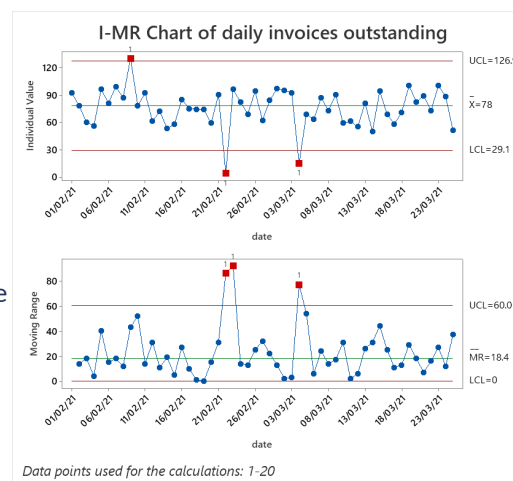
If data is time-series add an average line

IS MY PROCESS STABLE AND PREDICTABLE? DO I HAVE UNUSUAL VARIATION? ARE THE CHANGES AN IMPROVEMENT?

X-AXIS time-series
Y-AXIS attributes or variables

BENEFITS
Detecting common and assignable cause variation, ability to predict future performance

CONCERNS
Always use learning and operating phase, apply WE rules #1 & #4, start off with an Individuals and Moving Range chart



CONTROL CHART

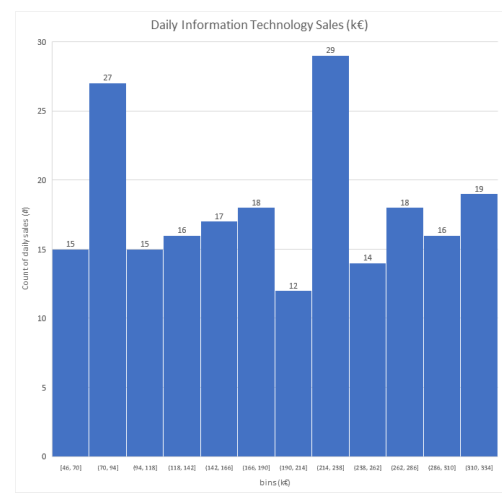
Always use learning and operating phase, apply "Western Electric" rules #1 & #4, start off with an Individuals and Moving Range chart

WHAT IS THE SHAPE, CENTRE AND SPREAD OF MY PROCESS?

X-AXIS bins with variables data
Y-AXIS counts of variables within bin

BENEFITS
Can show shape centre and spread in a clean way, e.g. left or right skewed, symmetrical or bimodal

CONCERNS
May need a lot of data to get a decent shape (>50), requires education in correct use and interpretation



HISTOGRAM

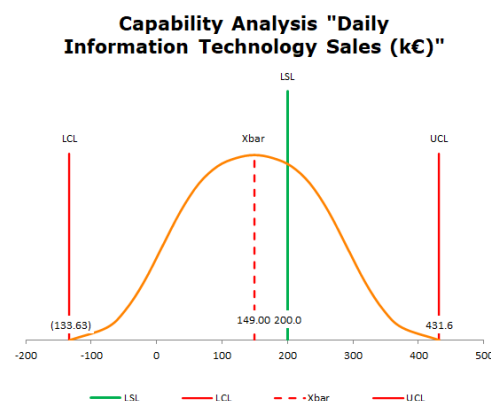
The more data, the smoother the profile, stratify if you see unusual bumps, add mean and median line the y-axis of the run or control chart this is the basis for the x-axis on a histogram

IS MY PROCESS CAPABLE OF MEETING THE CUSTOMER REQUIREMENTS?

X-AXIS variables, control limits & specifications
Y-AXIS N/A

BENEFITS
Determines whether the entire process is capable of meeting customer requirements

CONCERNS
Cannot be determined if underlying process is not stable & predictable



CAPABILITY ANALYSIS

Meaningful customer requirements are key, careful interpretation needed

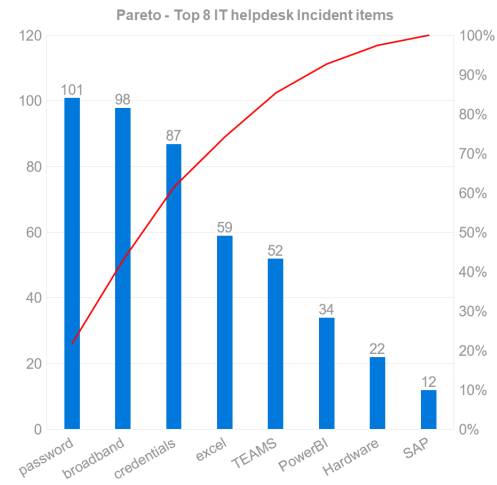
PARETO CHART

**WHICH IS THE BIGGEST/SMALLEST CATEGORY?
WHICH 20% CAUSES 80% OF THE OUTCOMES?**

X-AXIS attributes - categories
Y-AXIS (1) count per category
Y-AXIS (2) percentage contribution

BENEFITS
To quickly see which is the biggest and major contributor

CONCERNS
If there is no clear top category, if there are too many in the "other" category, if you cannot do address the causes of the top category



If there is no clear top set of categories, use different categories

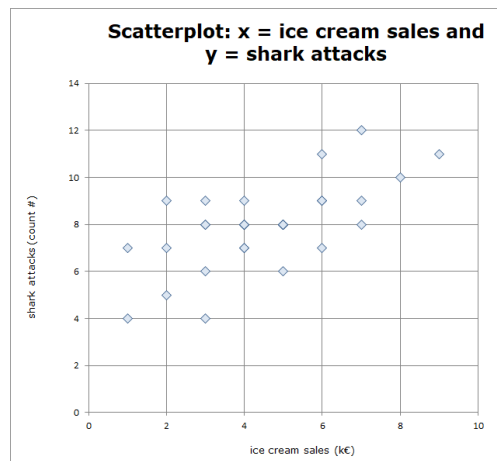
SCATTER PLOT

IS THERE A RELATIONSHIP BETWEEN A PREDICTOR AND A RESPONSE VARIABLE?

X-AXIS explanatory or predictor variable
Y-AXIS response variable

BENEFITS
Detecting patterns for subjective interpretation of relationships

CONCERNS
Subjective interpretation, predictor may be incorrect, relation may not indicate causation



Always use in-depth process knowledge to prove causality, move to regression analysis for better result

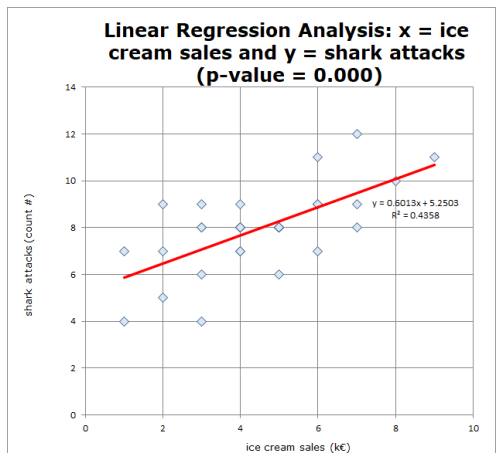
REGRESSION ANALYSIS

IS THERE A CORRELATION BETWEEN A PREDICTOR AND A RESPONSE VARIABLE?

X-AXIS explanatory or predictor variable
Y-AXIS response variable

BENEFITS
Statistical evidence of correlation

CONCERNS
Requires education in the correct use and interpretation (e.g. p-value & residuals analysis), correlation does not imply causation



Always look at the graph in conjunction with the statistical results. Process knowledge is key. Don't go fishing!

SOME ADDITIONAL CONTROL CHARTS

HOW IS MY PLAN VERSUS ACTUAL PERFORMANCE?

HOW OFTEN DO RARE EVENTS HAPPEN?

WHAT IS THE WITHIN / BETWEEN VARIATION?

DEVIATION FROM AIM

RARE EVENTS

X-BAR/R CHART

