

GreenBelt SixSigma

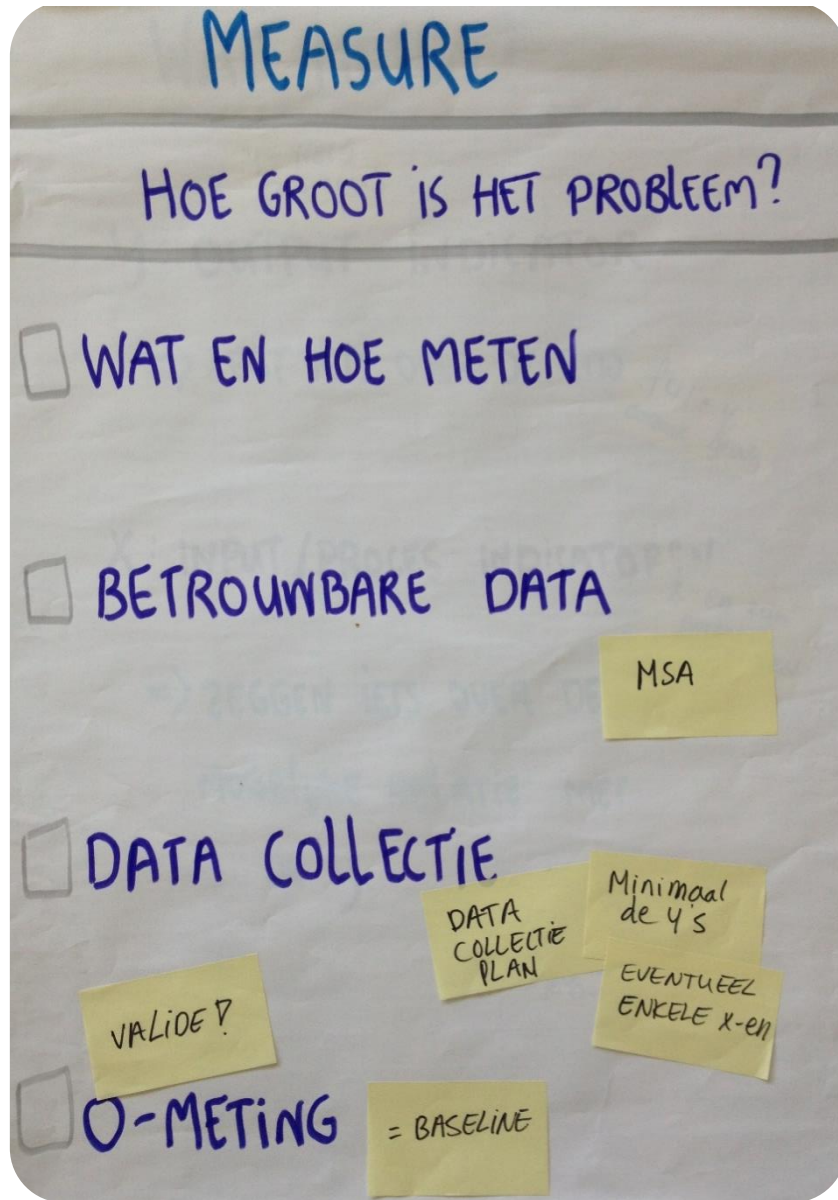
 Minitab **Minitab** wegwijzer

ADVIES

COACHING

TRAINING

INTERIM

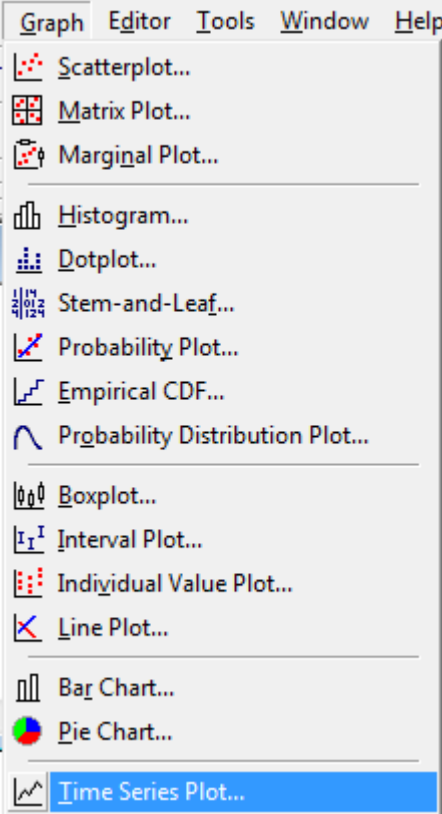
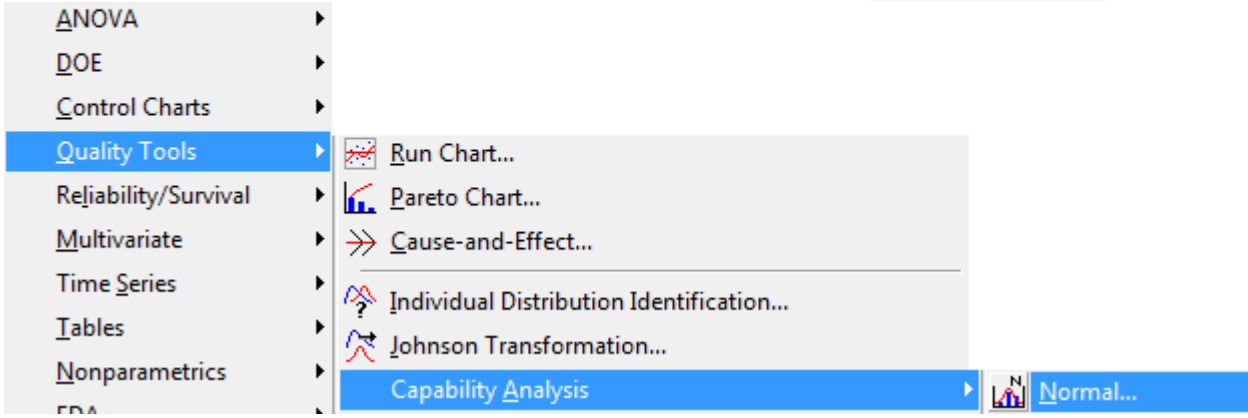
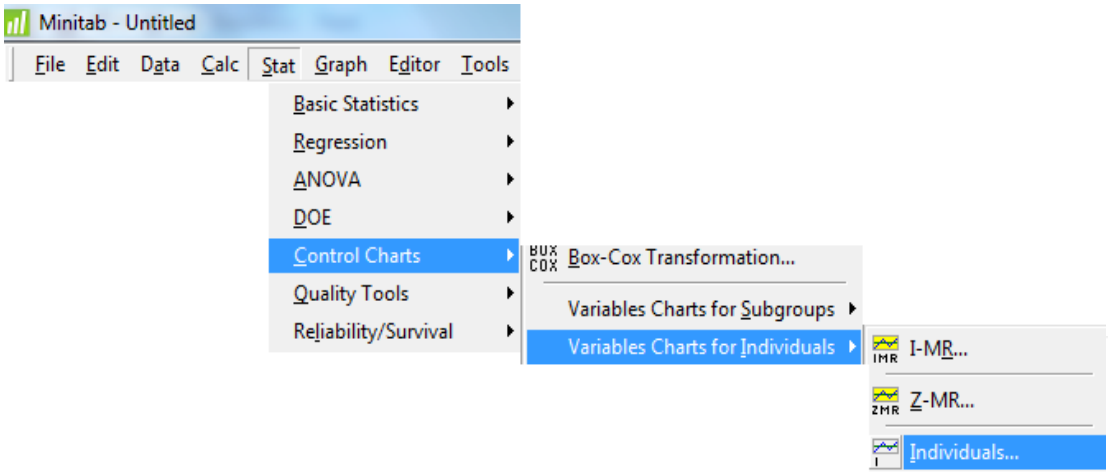
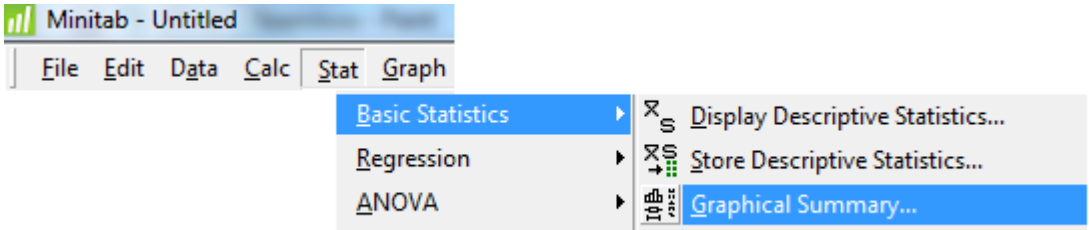


OH JA ... Hoe ging de Meetfase ook al weer?

OH JA ... Hoe ging een Nulmeting (0-meting) bij de GB?

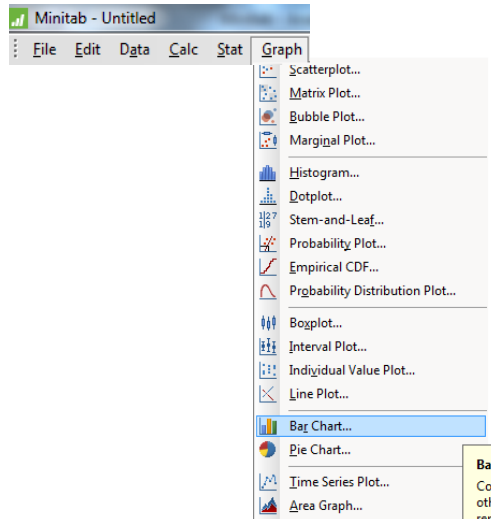
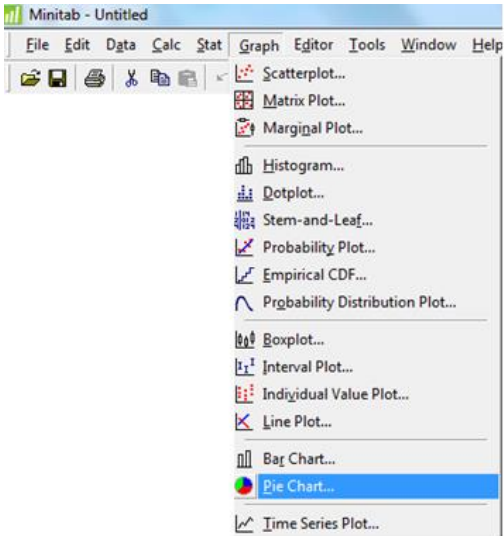
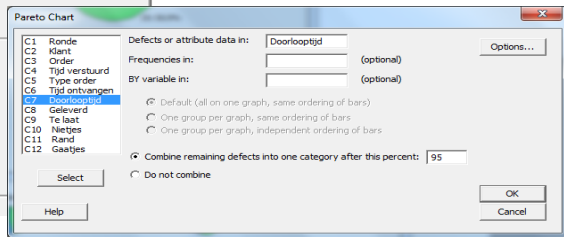
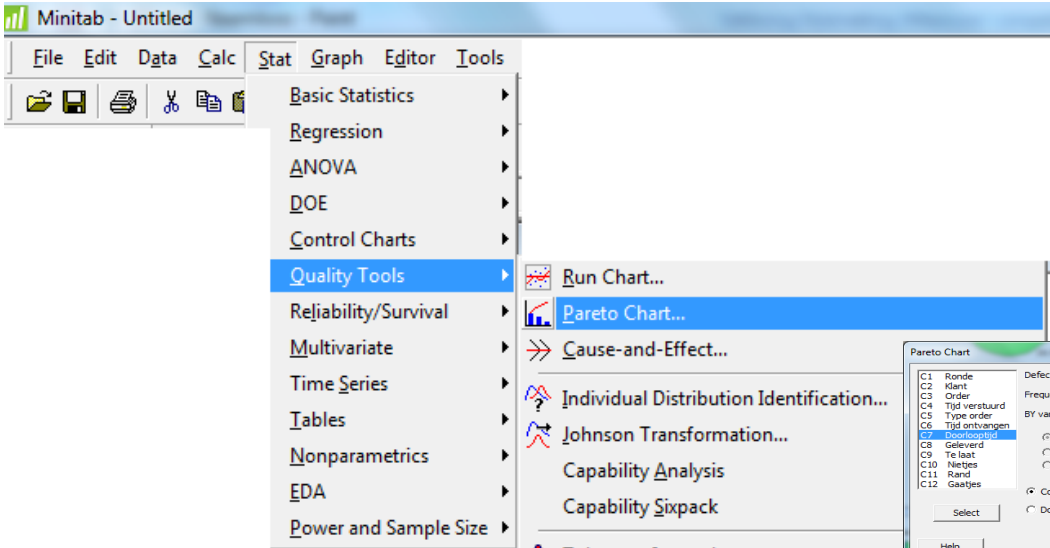
Continue Y

OH JA ... Hoe ging een Nulmeting bij de GB?

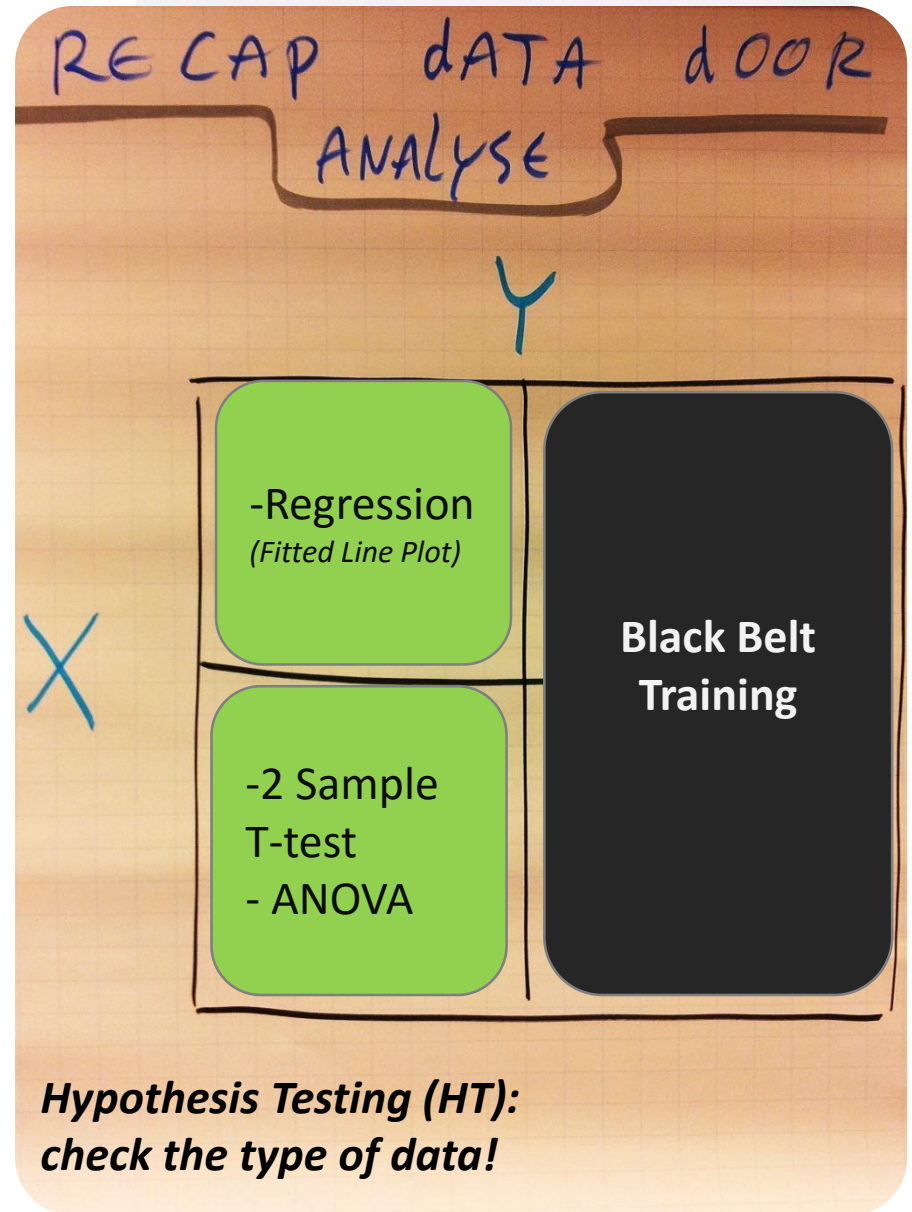
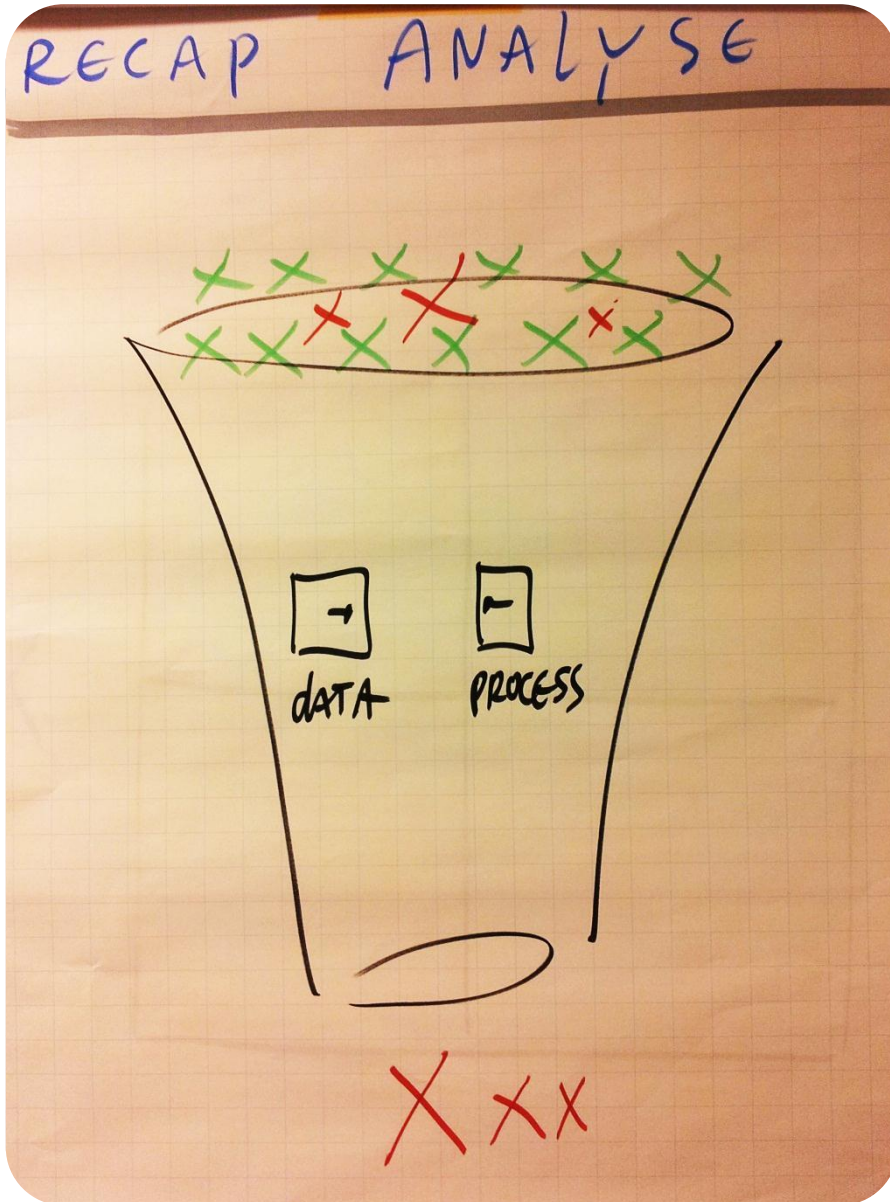


Discrete Y

OH JA ... Hoe ging een Nulmeting bij de GB?



Bar Chart
Compare the counts, the means, or other summary statistics using bars to represent different groups.



M.T. Y-X RELATIES

BOUWING

ROADMAP

H_0 : ER IS GEEN RELATIE

H_a : ——— WEL EEN Y-X RELATIE

GRAFIEK MAKEN

SCATTER

BOX

IUP

STAAFDIAGRAM

PARETO

VOER M.T. UIT

$\rightarrow p < 0,05 ? \Rightarrow H_0$

BEPAAAL IMPACT Y-X (& "KILL THE PROBLEM")

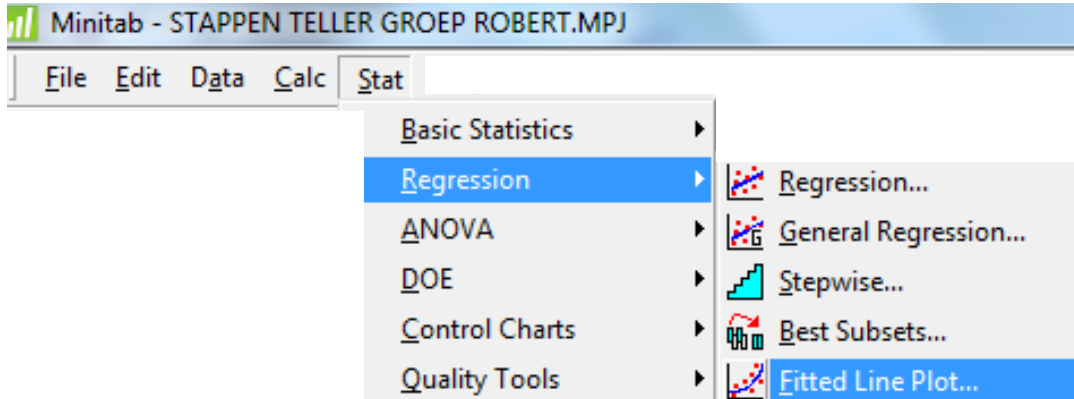
$\rightarrow R^2 \Delta \bar{x} \Delta x_{0,5} / \Delta \bar{x} \dots$

Het Hypothesetoetsen stappenplan:

- 1) Bepaal de hypothesen
- 2) Visualiseer (maak een grafiek)
- 3) Voer de toets uit (p-waarde?)
- 4) Vertaal significantie in praktische, getalsmatige impact

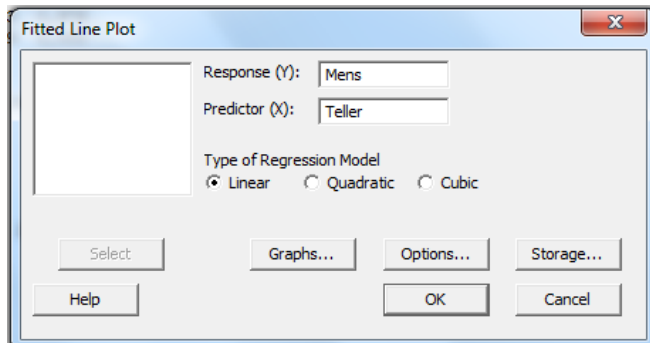
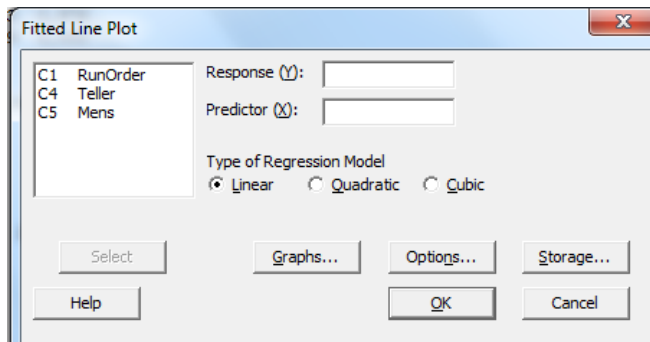
Aannames:

- Data is steekproef (anders beschrijvende statistiek voldoende)
- H_0 is altijd 'saai' ofwel 'onschuldig' ofwel geen afwijking



INPUT
Regressie

Continue Y
Continue X



Continue data** testen op relaties kan met behulp van de **Regressie / Fitted Line Plot

OUTPUT

Minitab - Untitled

File Edit Data Calc Stat S

Session

Regression Analysis: Mens versus Teller

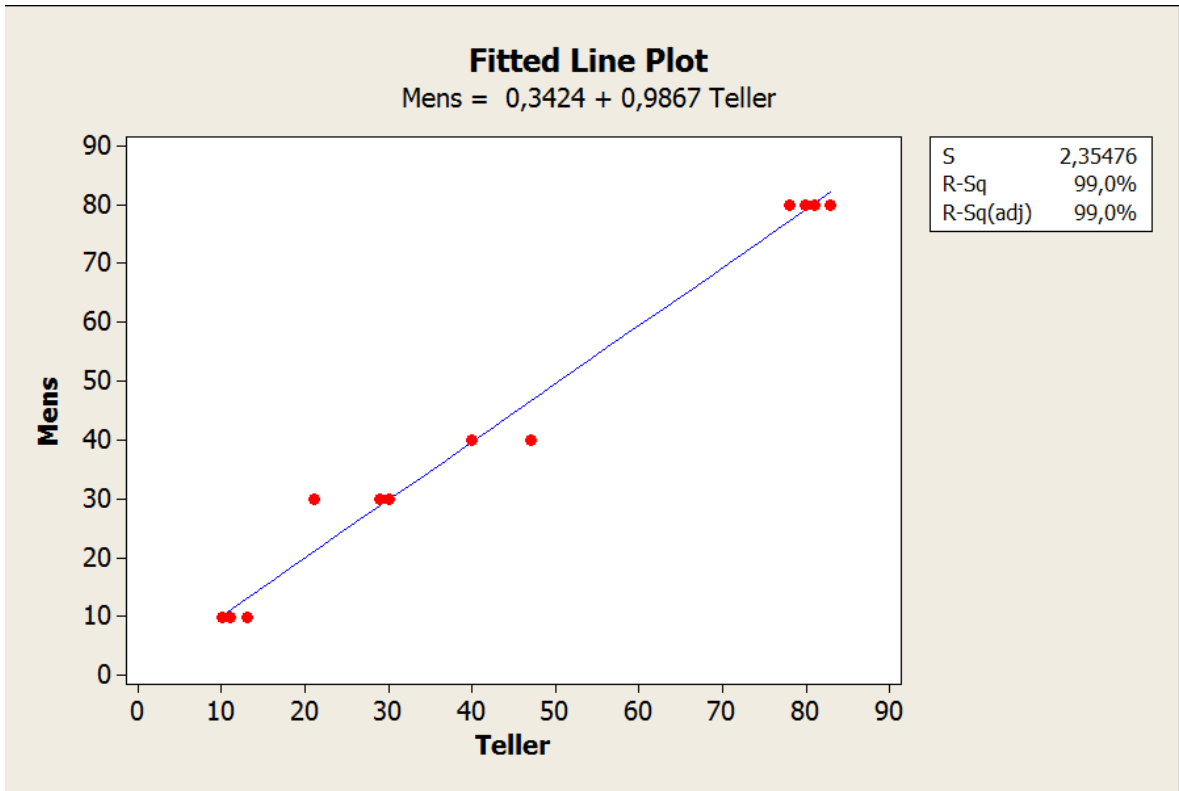
The regression equation is
Mens = 0,3424 + 0,9867 Teller

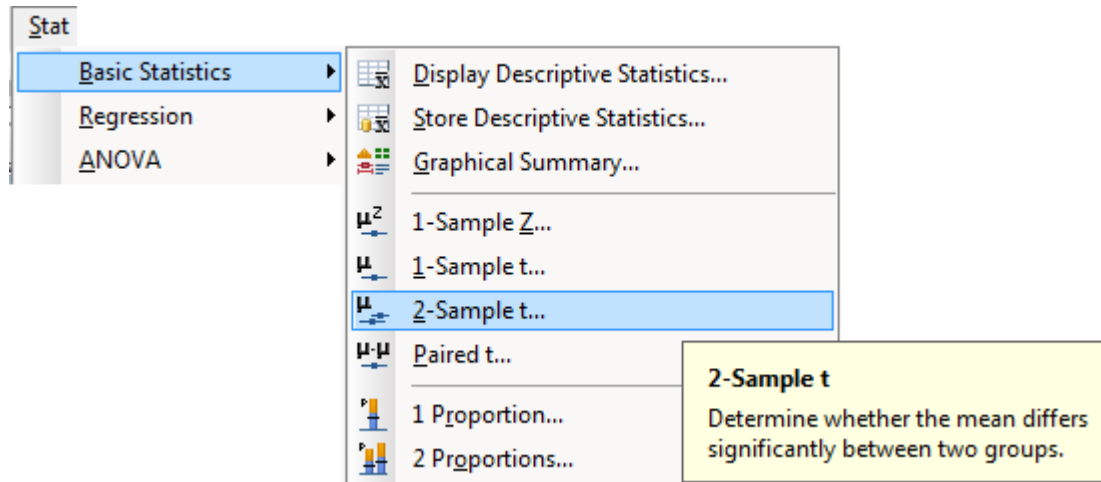
S = 2,35476 R-Sq = 99,0% R-Sq(adj) = 99,0%

Analysis of Variance

| Source | DF | SS | MS | F | P |
|------------|----|---------|---------|---------|-------|
| Regression | 1 | 15924,7 | 15924,7 | 2871,97 | 0,000 |
| Error | 28 | 155,3 | 5,5 | | |
| Total | 29 | 16080,0 | | | |

Fitted Line: Mens versus Teller



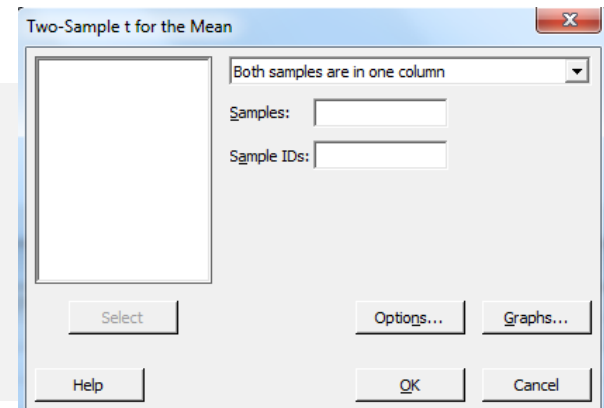


INPUT
2 Sample
T- Test

Continue Y
Discrete X

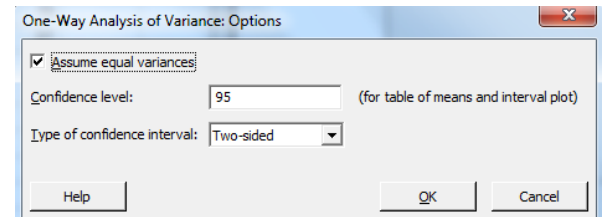
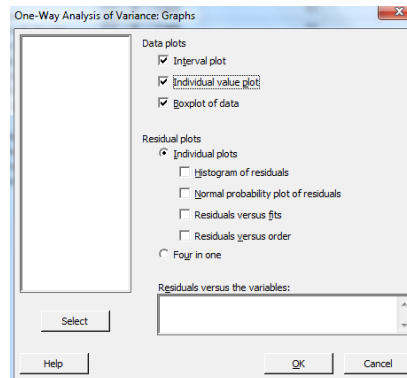
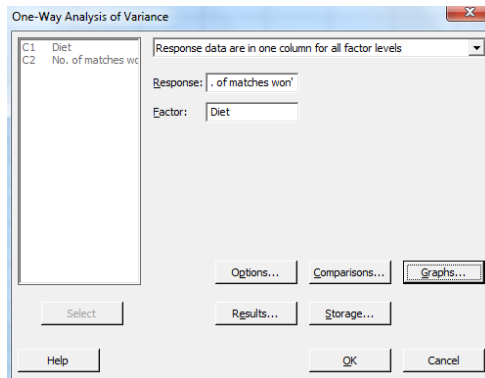
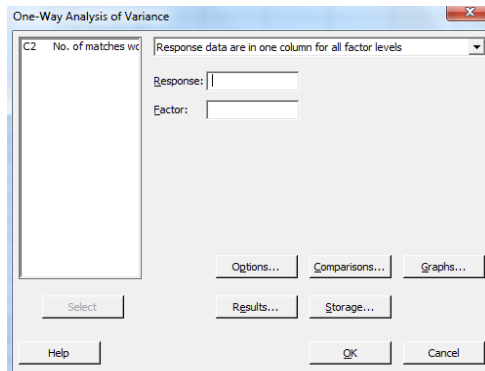
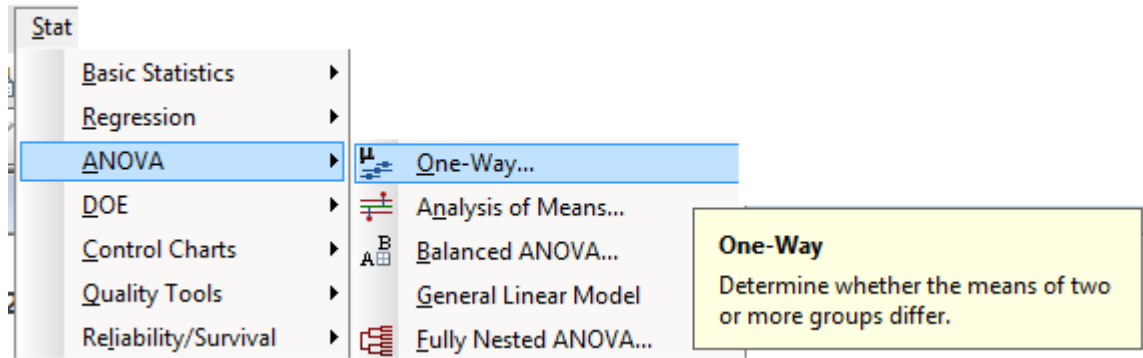
Noot: enkel indien variabele X maar 2 uitkomsten (2 groepen) telt.

Tip: wordt vaak in de **Control-fase** gebruikt (verschil tussen nul- en nameting Y van DMAIC)

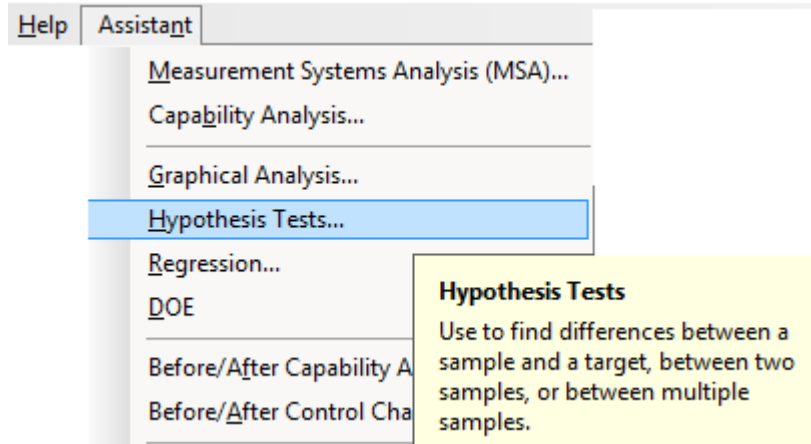


INPUT ANOVA Test

*Continue Y
Discrete X*

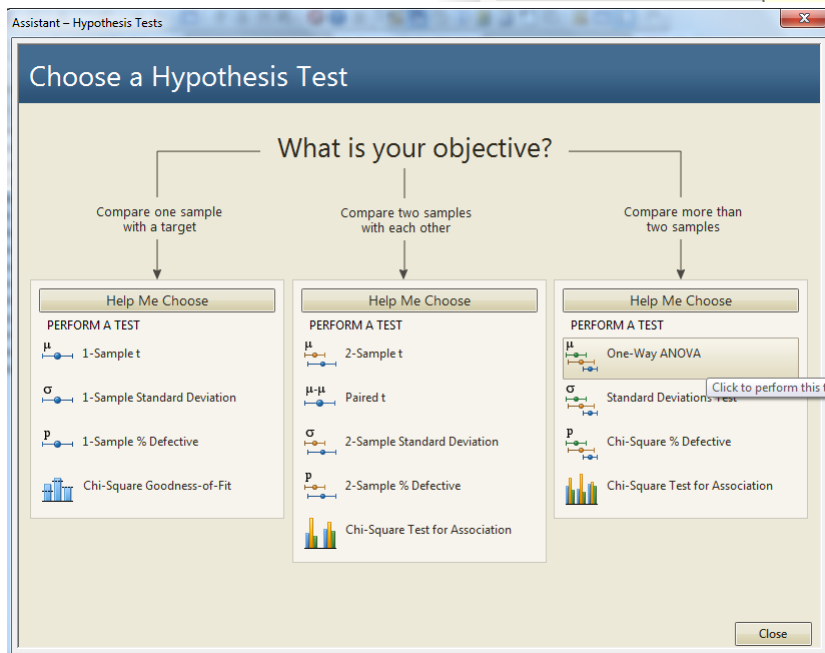


Alternative Minitab-route



INPUT ANOVA Test

Continue Y
Discrete X



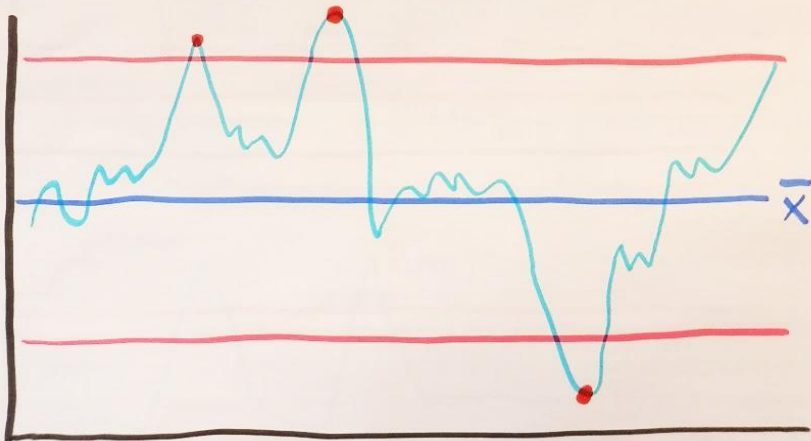
AGI SPC DAY 30

ADVANCES OF 'VISUAL MGT'

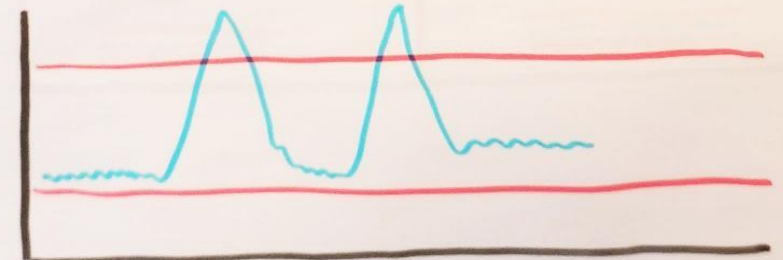
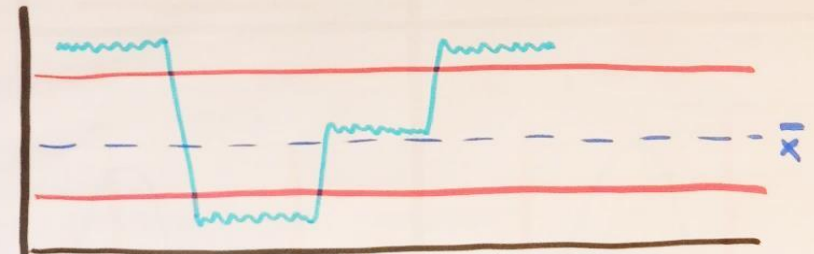
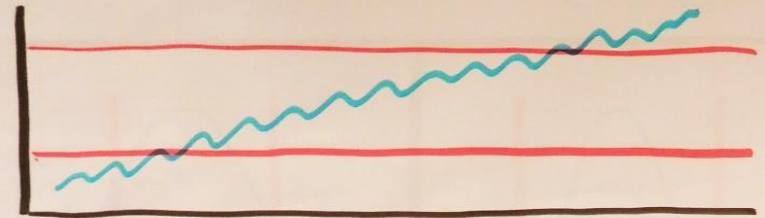
CONTROL CHARTS

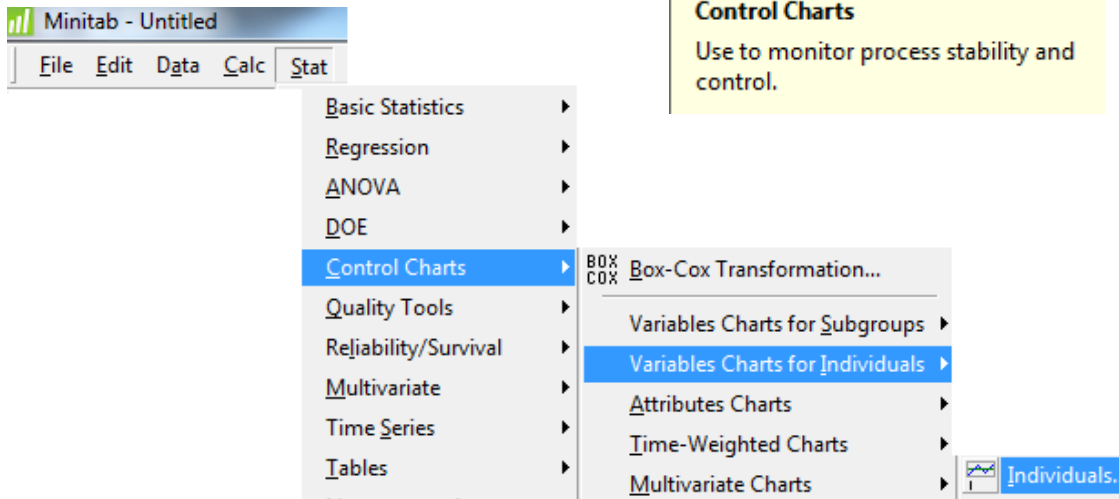
□ ONDERSCHIED MAKEN IN:

- EIGEN RUIS PROCES
- BIJZONDERE SIGNALEN



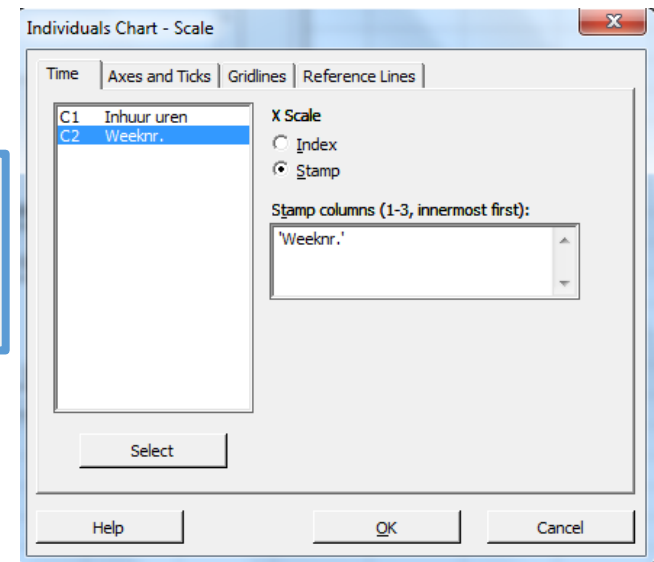
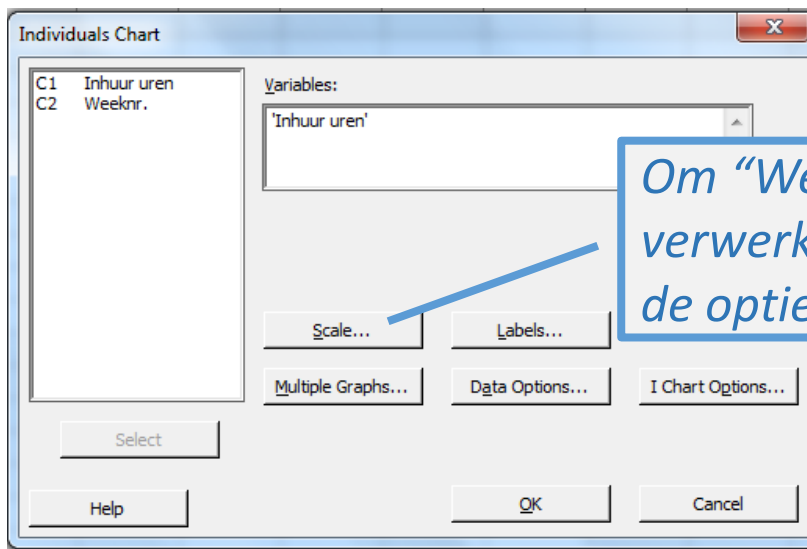
STABILITEIT





INPUT
Control Chart
(de "I Chart")

De route van de 'standaard' Control Chart (Individual Chart van Shewhart) in Minitab ...

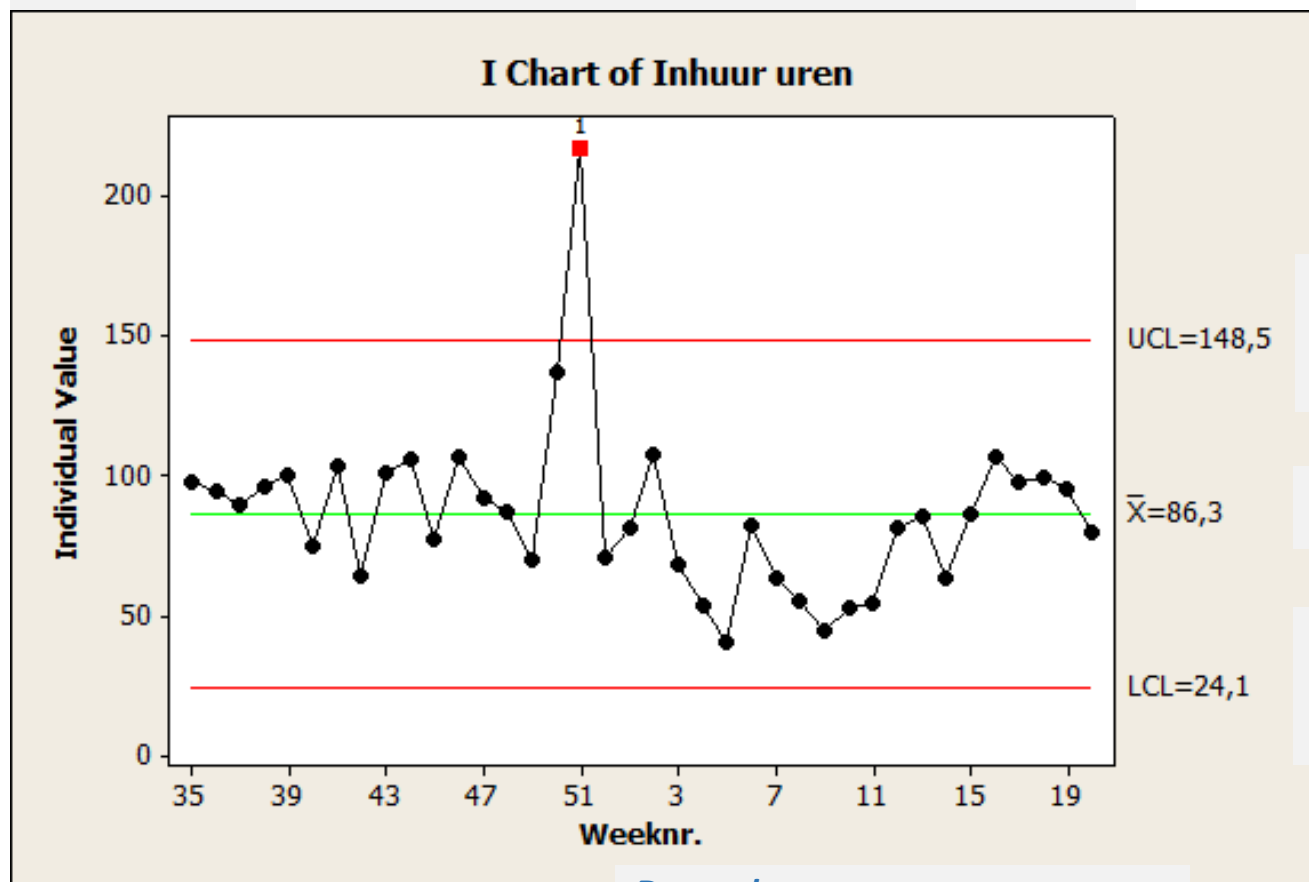


Control Charts

Use to monitor process stability and control.

OUTPUT Control Chart (de "I Chart")

- *Wat zien we in de tijd? Stabiel? Is het beheerst?*
- *Zijn er incidenten / out-of-control situaties?*

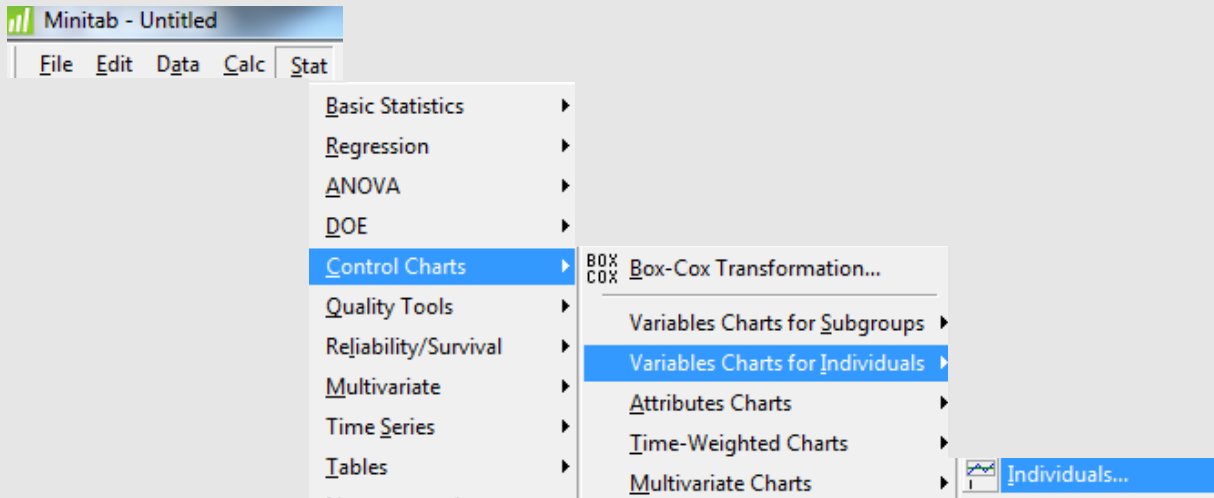


UCL = Upper Control Limit
*UCL = $Xbar + 3 * S_{within}$*

\bar{X} = Xbar = Gemiddelde

LCL = Lower Control Limit
*LCL = $Xbar - 3 * S_{within}$*

*De weeknummer weergegeven
(i.p.v. standaard "Observation")*



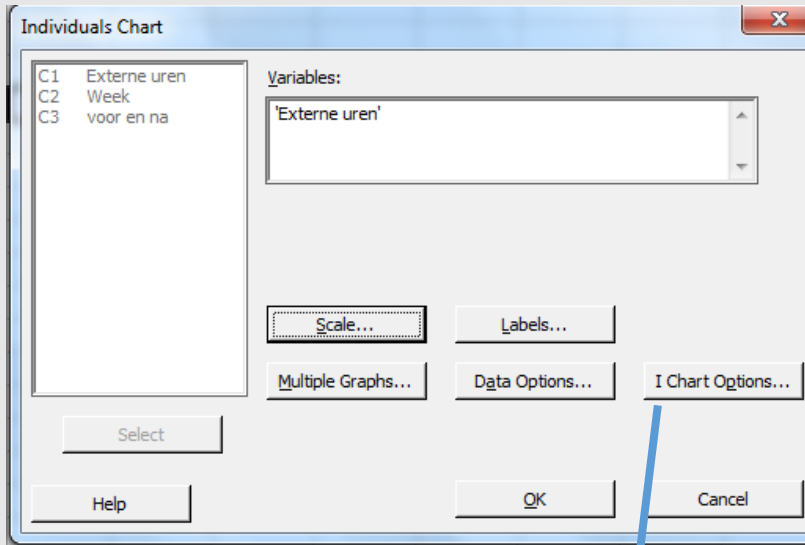
INPUT
“Management-samenvatting”

The screenshot shows a Minitab worksheet with the following data:

| | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 |
|----|--------------|------|------------|----|----|----|----|----|----|-----|-----|
| | Externe uren | Week | voor en na | | | | | | | | |
| 23 | 40,00 | 5 | 0 | | | | | | | | |
| 24 | 82,25 | 6 | 0 | | | | | | | | |
| 25 | 63,50 | 7 | 0 | | | | | | | | |
| 26 | 55,00 | 8 | 0 | | | | | | | | |
| 27 | 44,50 | 9 | 0 | | | | | | | | |
| 28 | 53,00 | 10 | 0 | | | | | | | | |
| 29 | 54,00 | 11 | 0 | | | | | | | | |
| 30 | 81,50 | 12 | 0 | | | | | | | | |
| 31 | 85,50 | 13 | 0 | | | | | | | | |
| 32 | 63,00 | 14 | 0 | | | | | | | | |
| 33 | 86,00 | 15 | 0 | | | | | | | | |
| 34 | 107,00 | 16 | 0 | | | | | | | | |
| 35 | 98,00 | 17 | 0 | | | | | | | | |
| 36 | 99,50 | 18 | 0 | | | | | | | | |
| 37 | 95,00 | 19 | 0 | | | | | | | | |
| 38 | 80,00 | 20 | 0 | | | | | | | | |
| 39 | 43,00 | 21 | 1 | | | | | | | | |
| 40 | 36,00 | 22 | 1 | | | | | | | | |
| 41 | 32,00 | 23 | 1 | | | | | | | | |
| 42 | 40,00 | 24 | 1 | | | | | | | | |
| 43 | 46,00 | 25 | 1 | | | | | | | | |

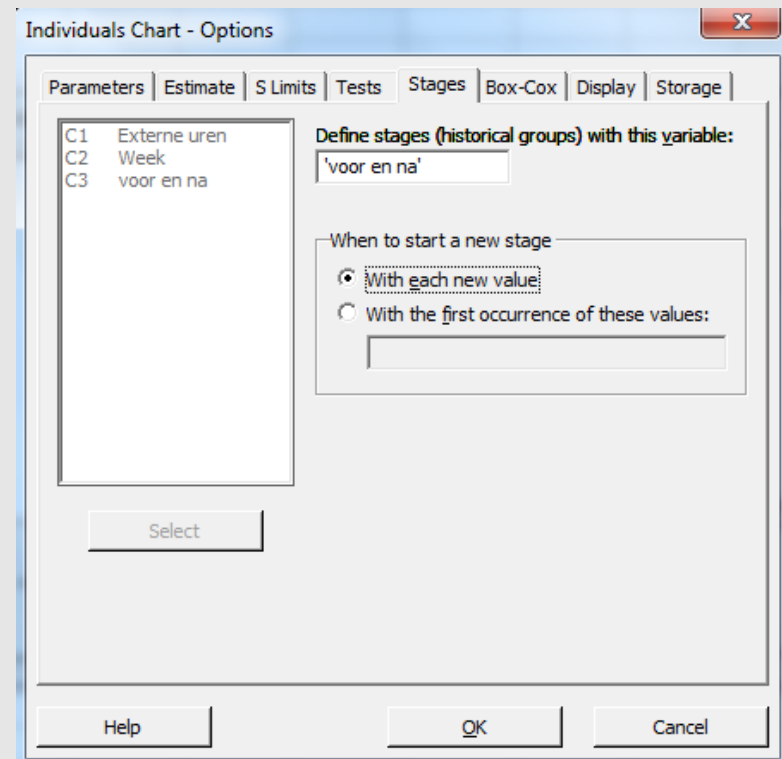
Gebruik dataset inclusief

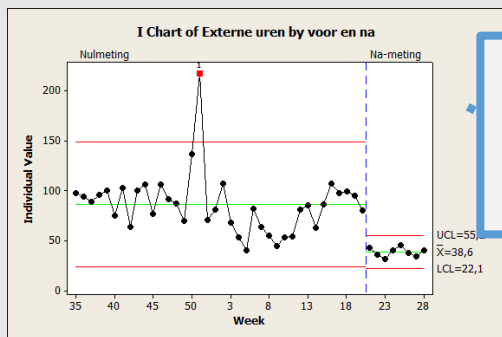
- **“Externe uren” (Y)**
- **“Week” (tijdsfactor X1)**
- **“voor en na” (factor X2)**



INPUT
**“Management-
samenvatting”**

*Om ‘nulmeting’ en ‘na-meting’
in 1 Control Chart te laten
zien, gebruik de optie
“I Chart Options/ Stages”*

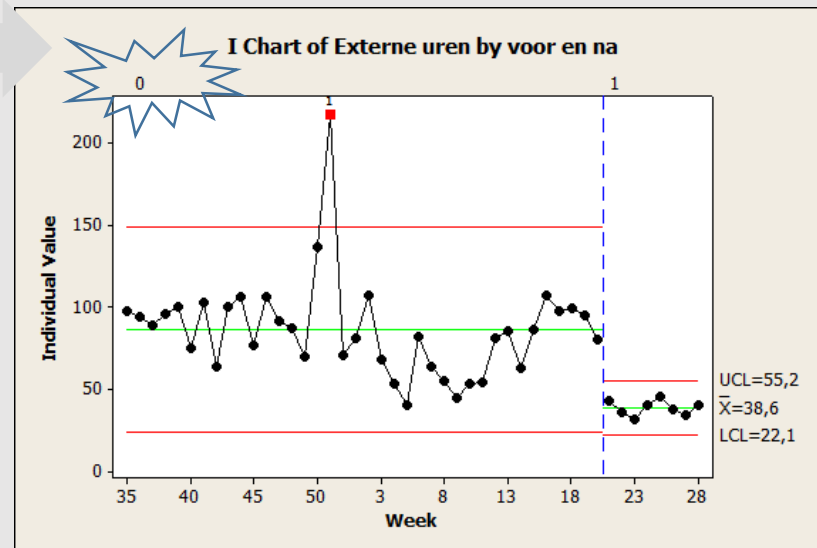
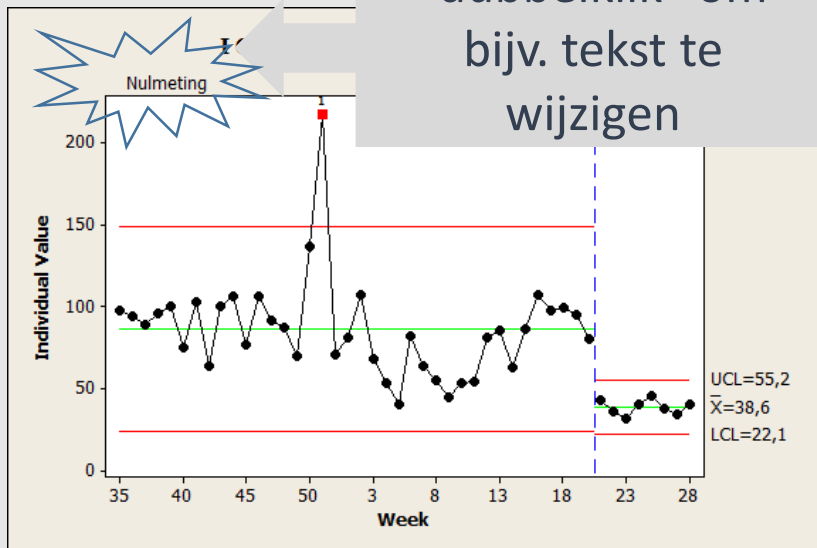




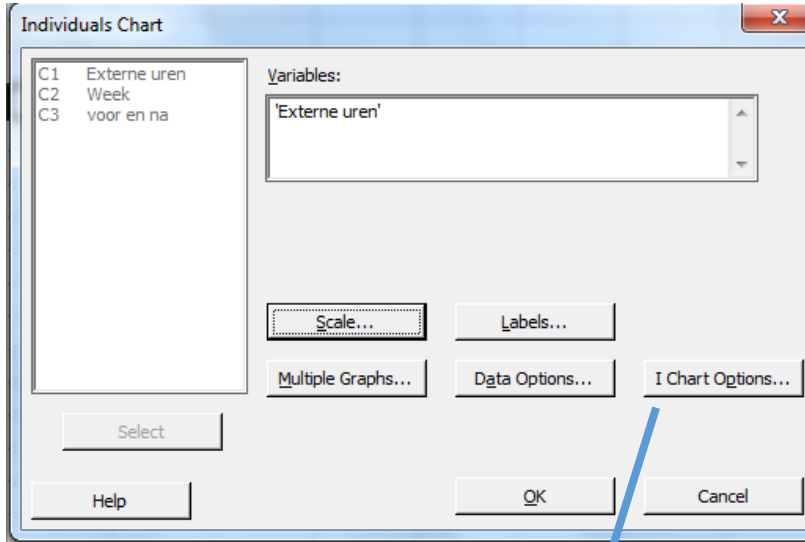
Om de verbetering samenvattend te visualiseren!

OUTPUT
"Management-samenvatting"

"dubbelklik" om bijv. tekst te wijzigen

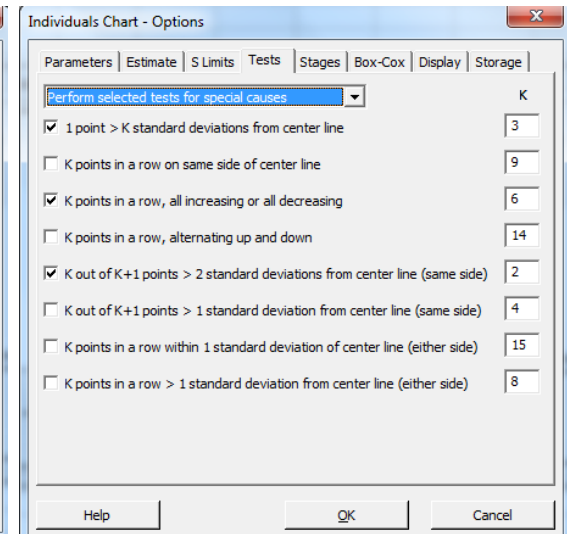
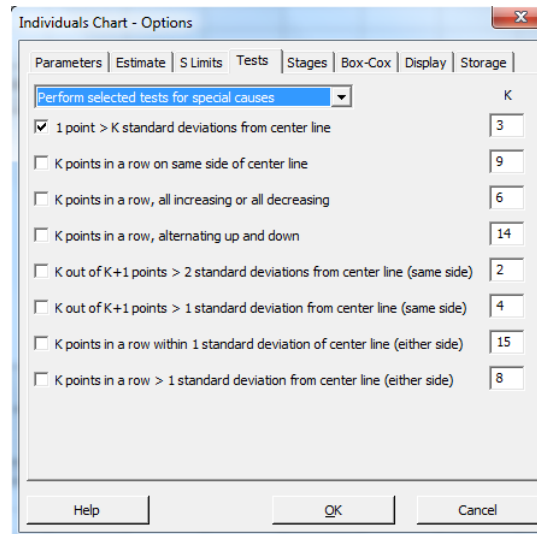


INPUT Tests I Chart

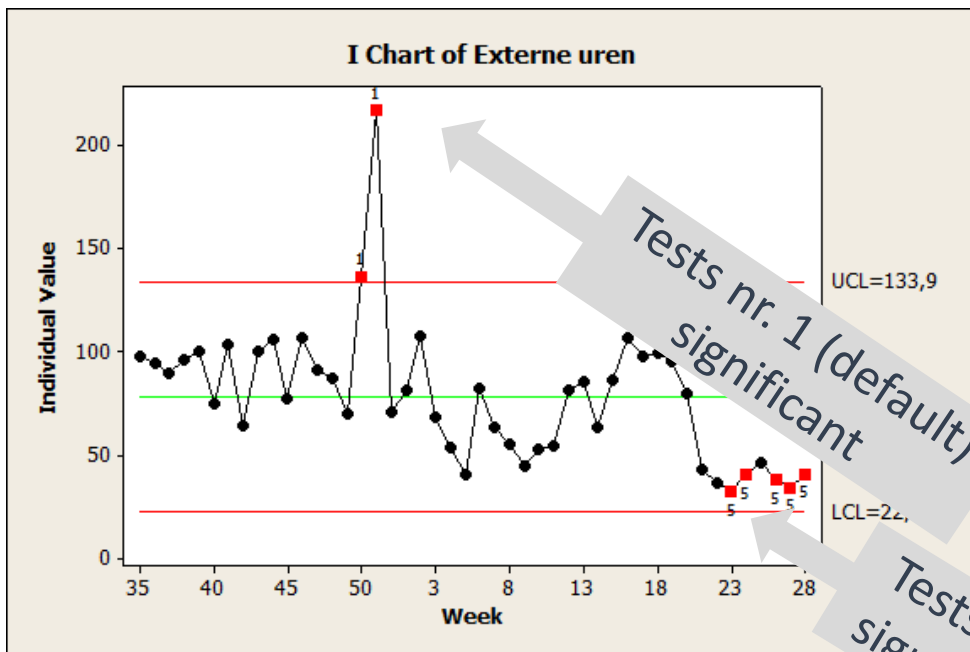


*‘Vink’ de gewenste, extra toetsen (“tests”) aan.
Tip: niet teveel!*

*Om meer te toetsen dan enkel de ‘default’ van ‘buiten de regelgrenzen’ (test nr. 1), gebruik de optie **“I Chart Options/ Tests”**.*



OUTPUT Tests I Chart



Tests nr. 1 (default) significant

Tests nr. 5 significant

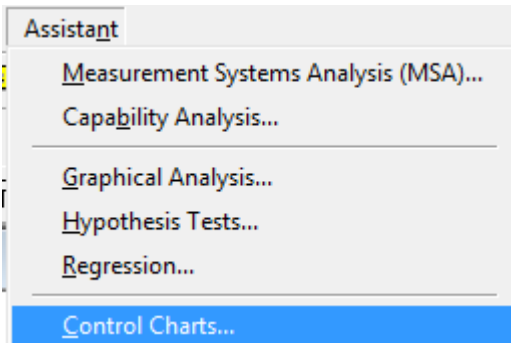
Individuals Chart - Options

Parameters | Estimate | S Limits | Tests | Stages | Box-Cox | Display | Storage

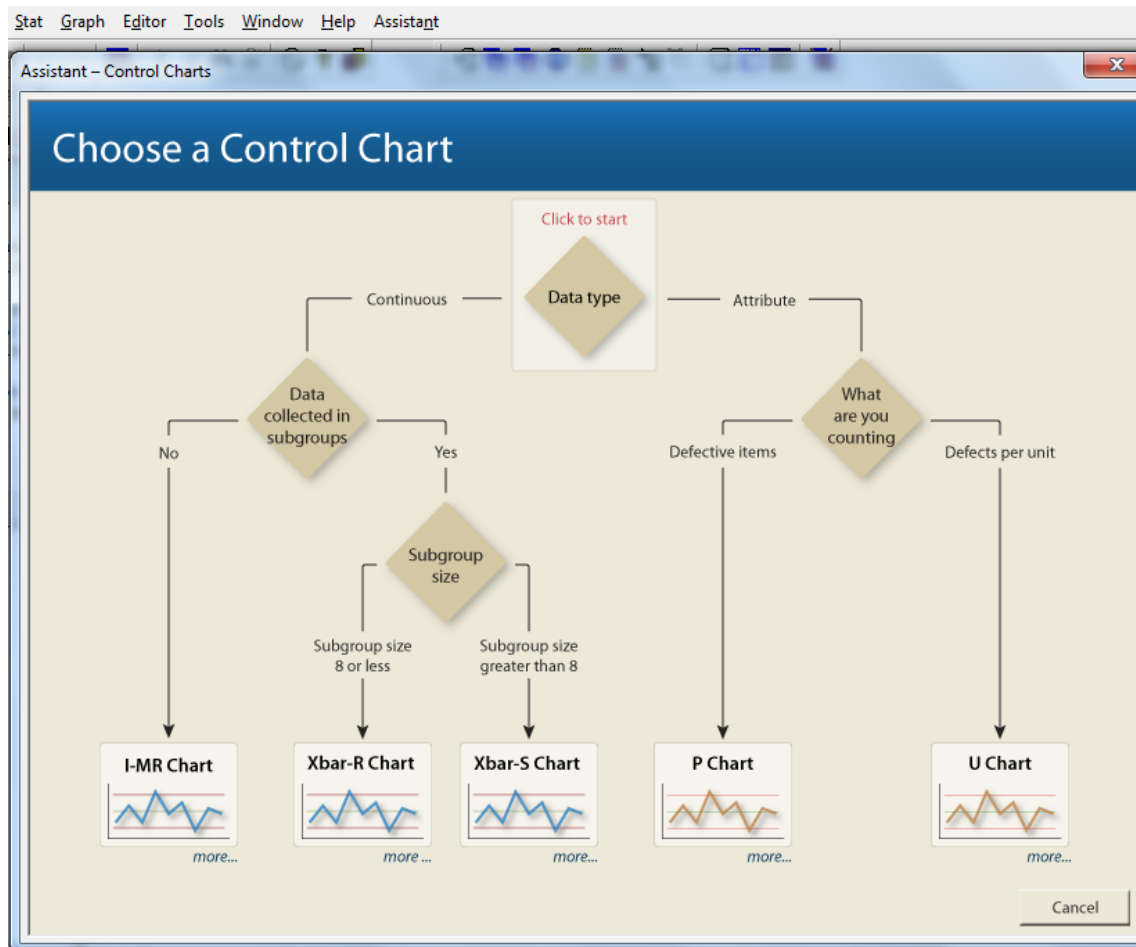
Perform selected tests for special causes

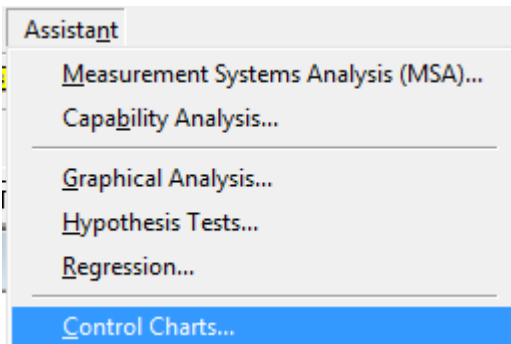
| Test | K |
|--|----|
| <input checked="" type="checkbox"/> 1 point > K standard deviations from center line | 3 |
| <input type="checkbox"/> K points in a row on same side of center line | 9 |
| <input checked="" type="checkbox"/> K points in a row, all increasing or all decreasing | 6 |
| <input type="checkbox"/> K points in a row, alternating up and down | 14 |
| <input checked="" type="checkbox"/> K out of K+1 points > 2 standard deviations from center line (same side) | 2 |
| <input type="checkbox"/> K out of K+1 points > 1 standard deviation from center line (same side) | 4 |
| <input type="checkbox"/> K points in a row within 1 standard deviation of center line (either side) | 15 |
| <input type="checkbox"/> K points in a row > 1 standard deviation from center line (either side) | 8 |

Help OK Cancel

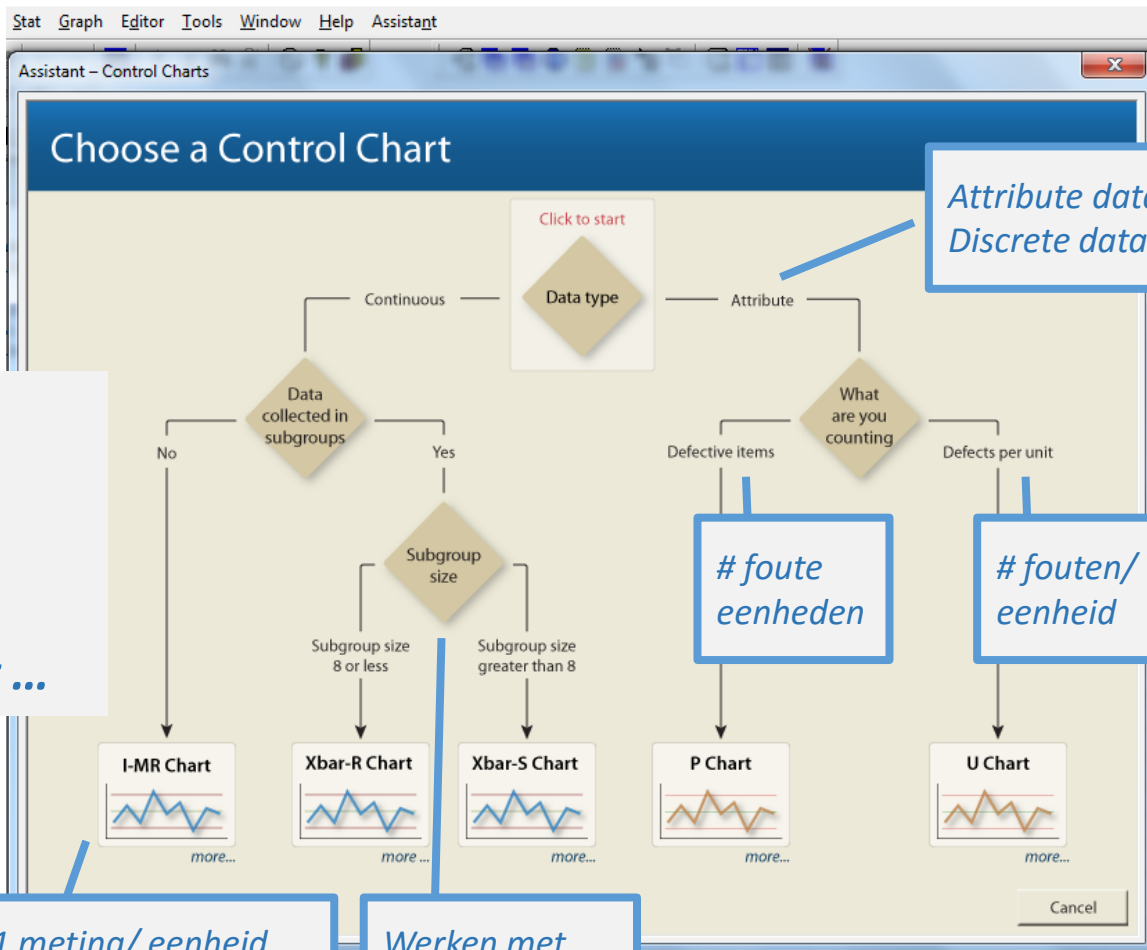


Selectie type Control Chart





Selectie type Control Chart



Attribute data = Discrete data

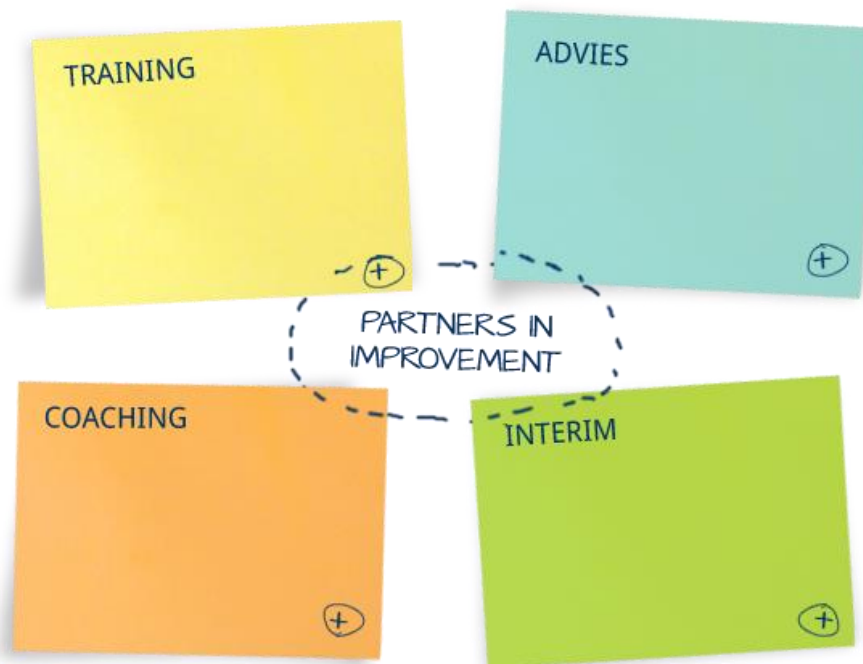
De 'standaard' Control Chart (I Chart) is via de "Assistent" in Minitab vervangen door de complexere I-MR Chart ...

1 meting/ eenheid (géén gemiddelden!)

Werken met gemiddelden!

Over LSSP

- Facts & Figures



| | |
|--|--|
| Lean Six Sigma Ervaring | Meer dan 50 jaar |
| # mensen getraind | Meer dan 5000 |
| # mensen gecoacht | Meer dan 400 |
| # verbeterprogramma's begeleid | Meer dan 70 |
| # verbeterprojecten begeleid | Meer dan 400 |
| Gemiddelde ROI | Meer dan factor 10 |
| Verbeteringen | Meer dan € 400 mln op jaarbasis |
| Aantal Managing Partners | 4 |
| Aantal Master Black Belts en Black Belts | 8 |
| Aantal Associates en medewerkers | 10+ |