ONDERWIJSCONGRES 2017

ONDERWIJS IN DE TOEKOMST

DONDERDAG 19 JANUARI 2017

VERGADERCENTRUM DOMSTAD - UTRECHT

WORKSHOP 1W5

Onderwijs (en Onderzoek) Datawetenschappen in de Cloud?

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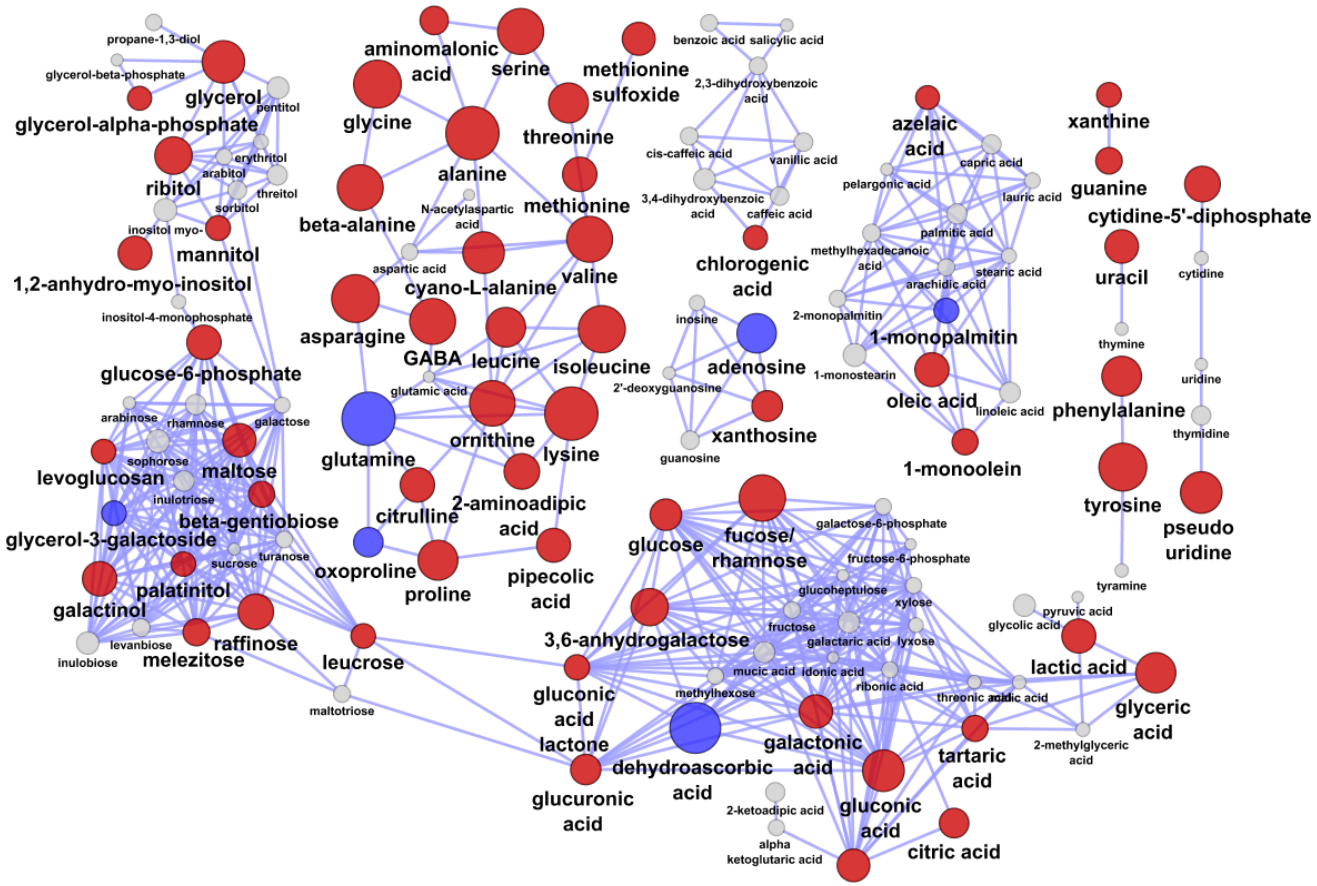
- **Mathijs van de Venne**, Webdeveloper, Everweb, Klimmer

innovativetesting.nl

everweb.nl

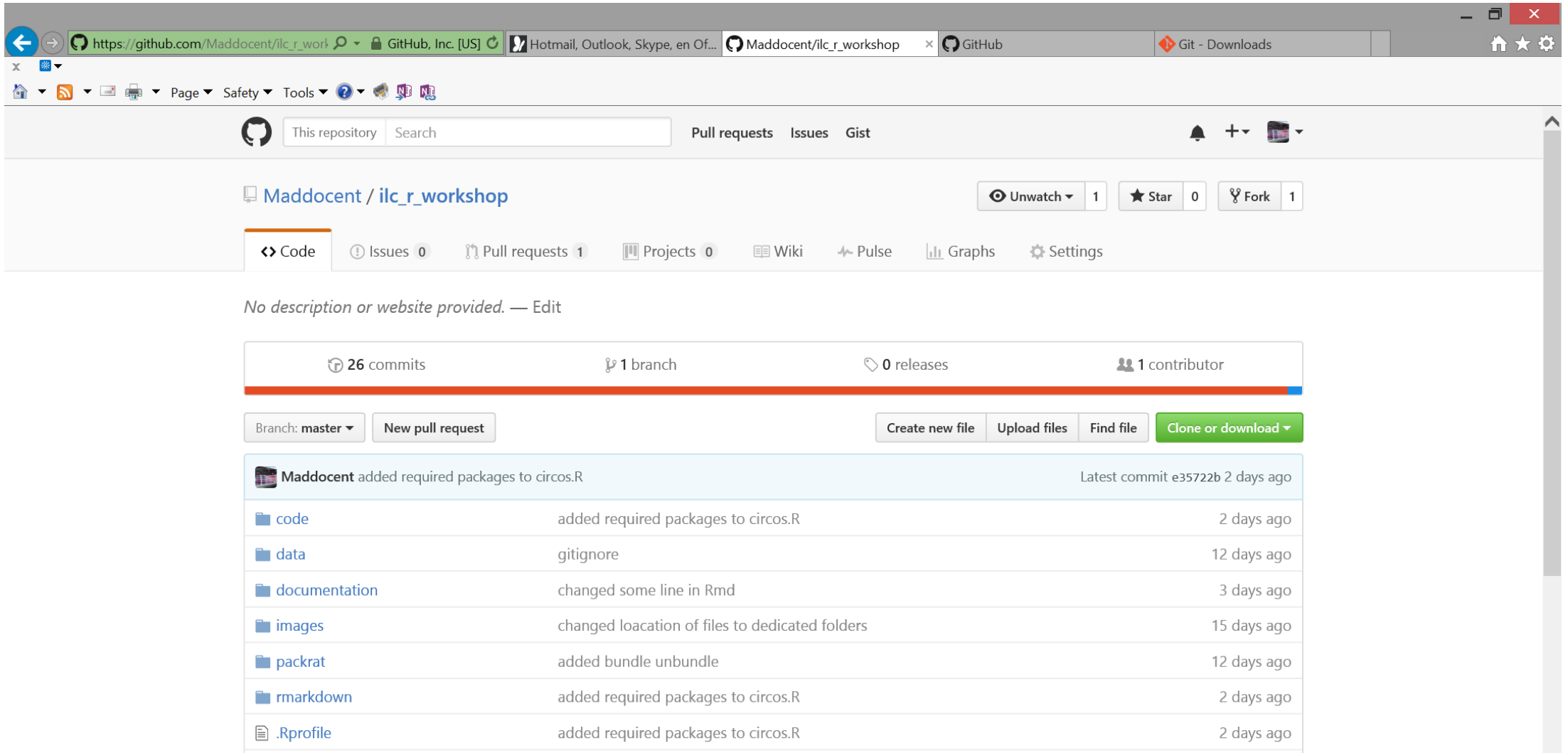
Doel van de workshop

1) Cloud computing voorbeeld
2) R in Data Science (Onderwijs
3) Een paar R basics:
- R graphics
- Exploratory data analysis
- Reproducible research

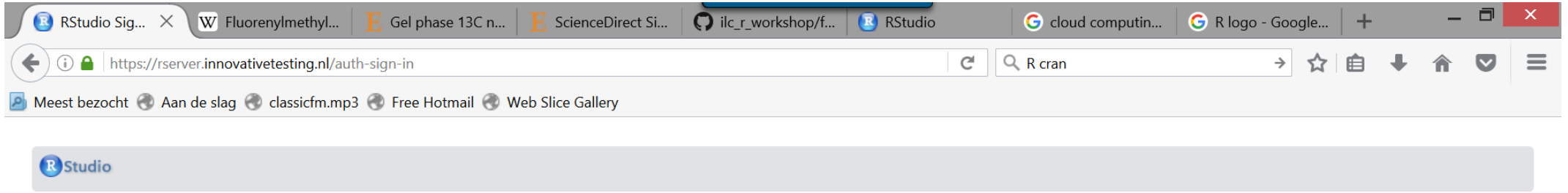


Git / Github

www.github.com create an account



https://rserver.innovativetesting.nl



Login gegevens: papiertje

FNT_ond_014
rprogramm#$*014

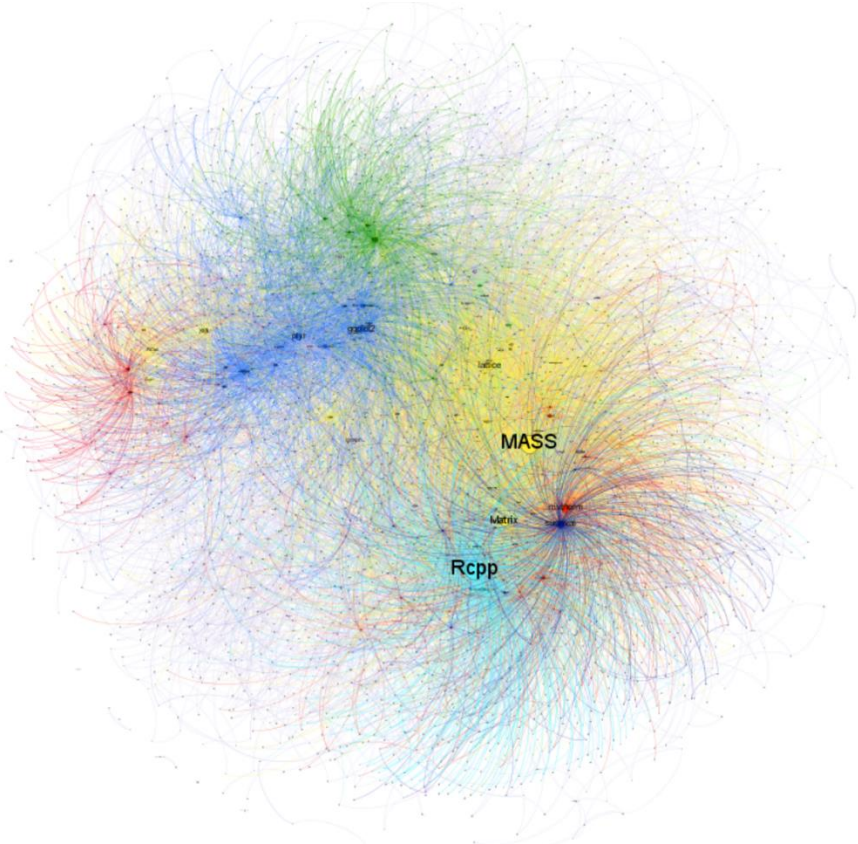
De oplossing?

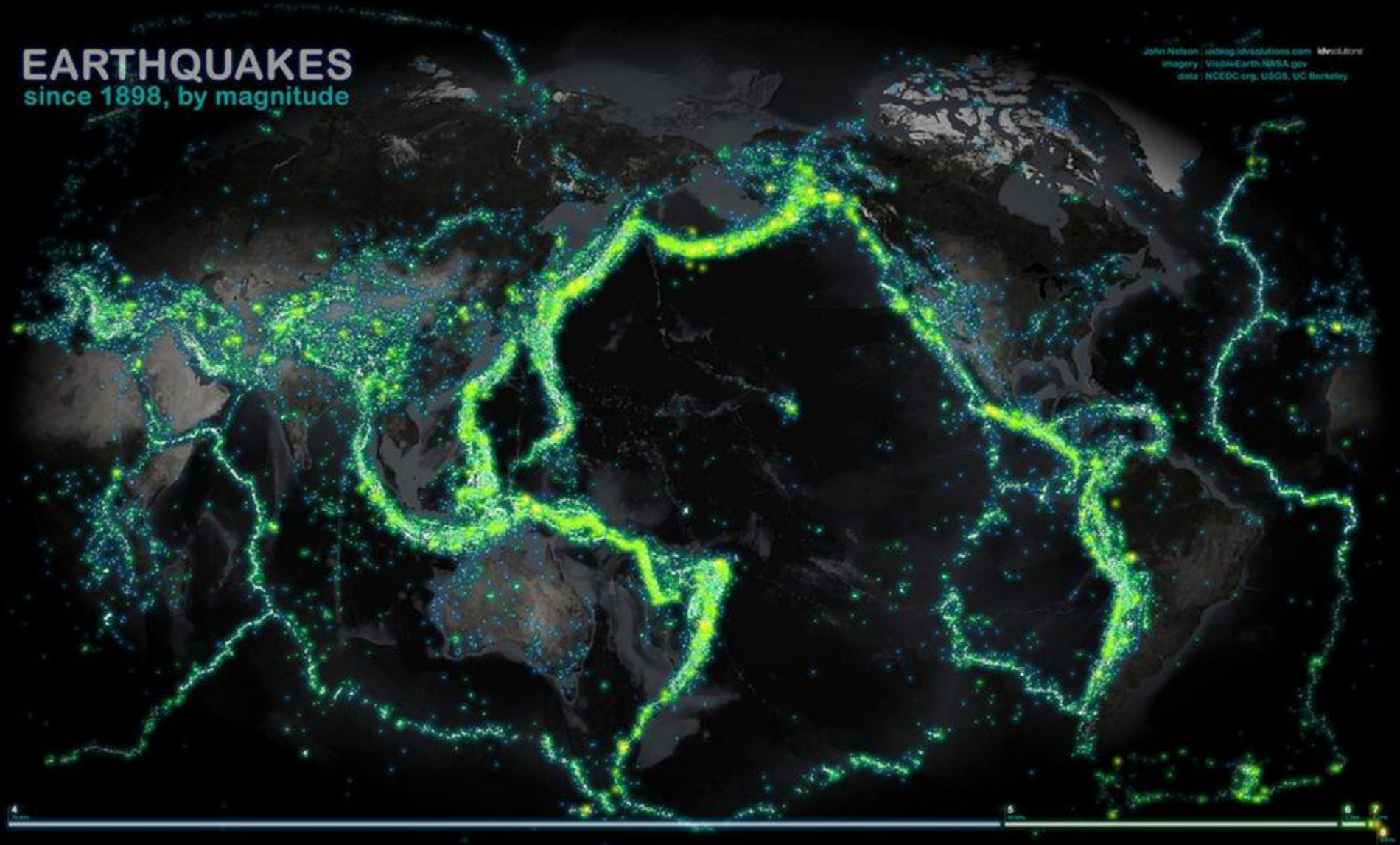
Waarom R?

- https://www.youtube.com/watch?v=ph7Eczs-nTI
- Reproduceerbaarheid
- Veel applicaties en add-ons
- Gratis documentatie en educatief materiaal (web, books, moocs, courses)
- Gratis!
- Open source!
- Grote R community
- Combinatie met andere talen en

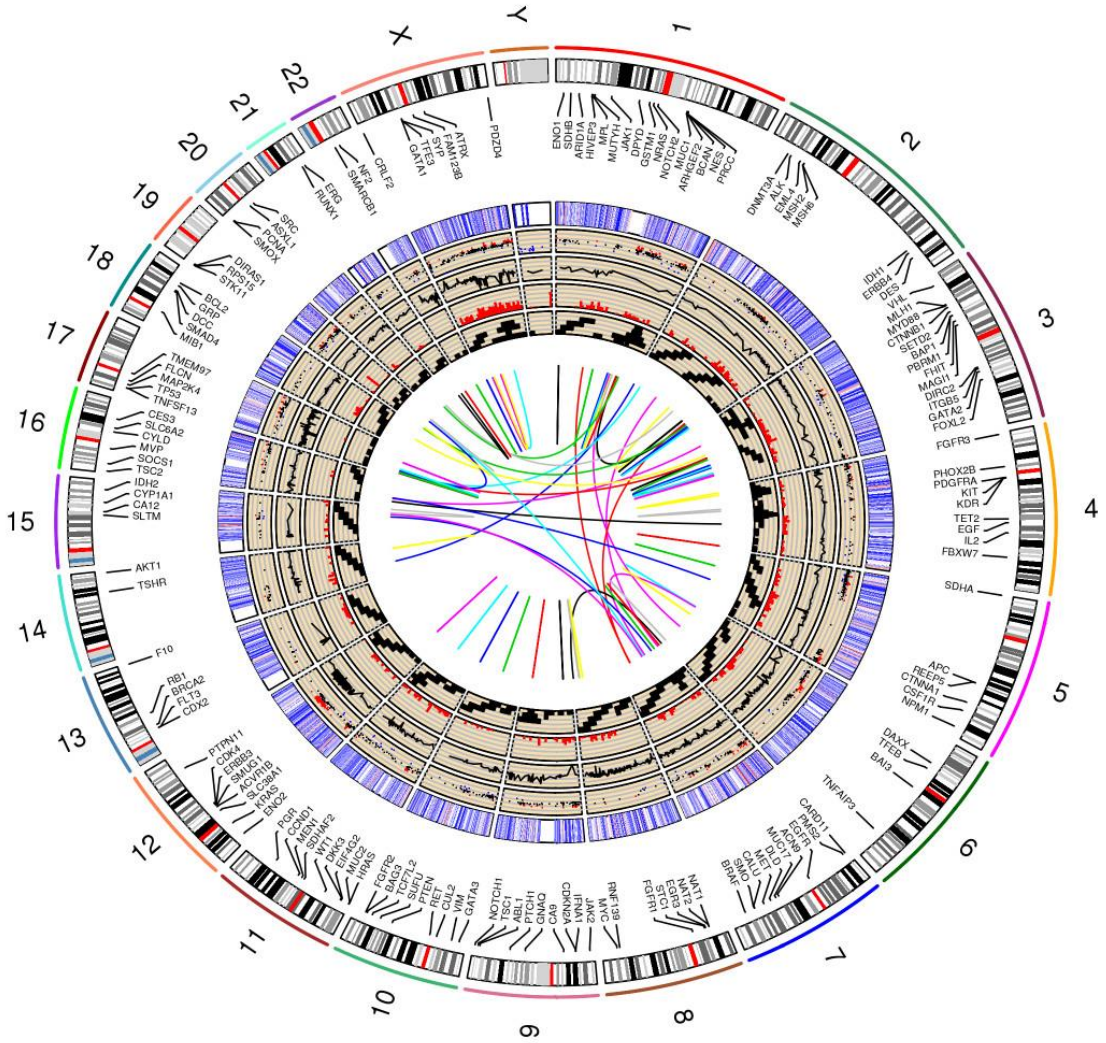
'literate programming'

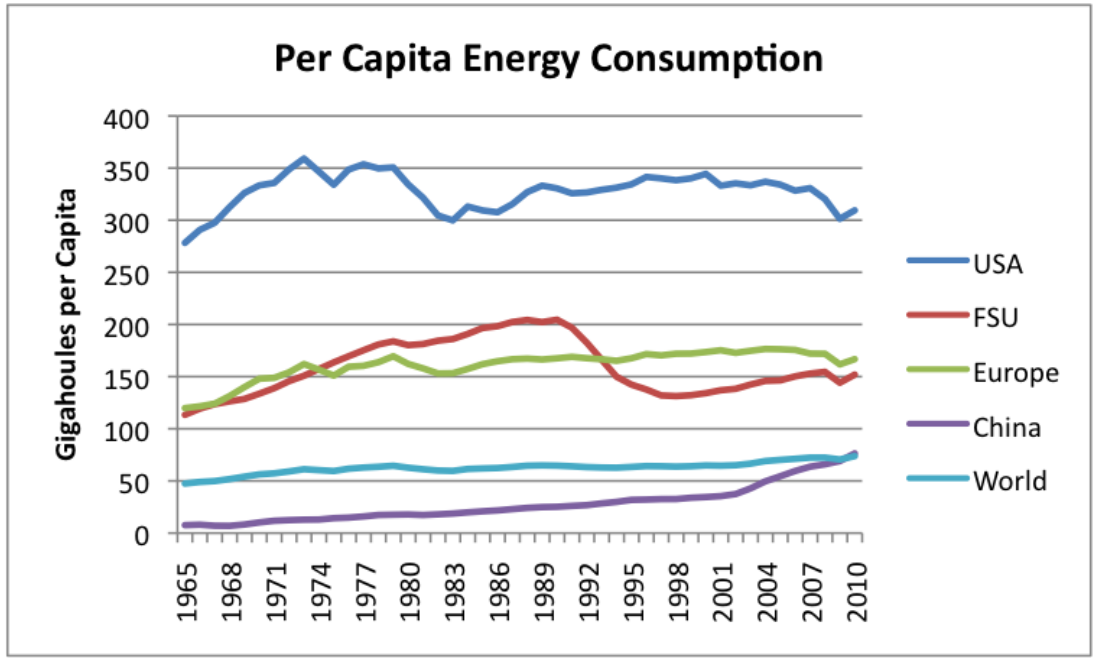
- Mooie graphics




EARTHQUAKES
since 1898, by magnitude
John Nelson : uxblog.idvsolutions.com
imagery : VisibleEarth.NASA.gov
data : NCEDC.org, USGS, UC Berkeley

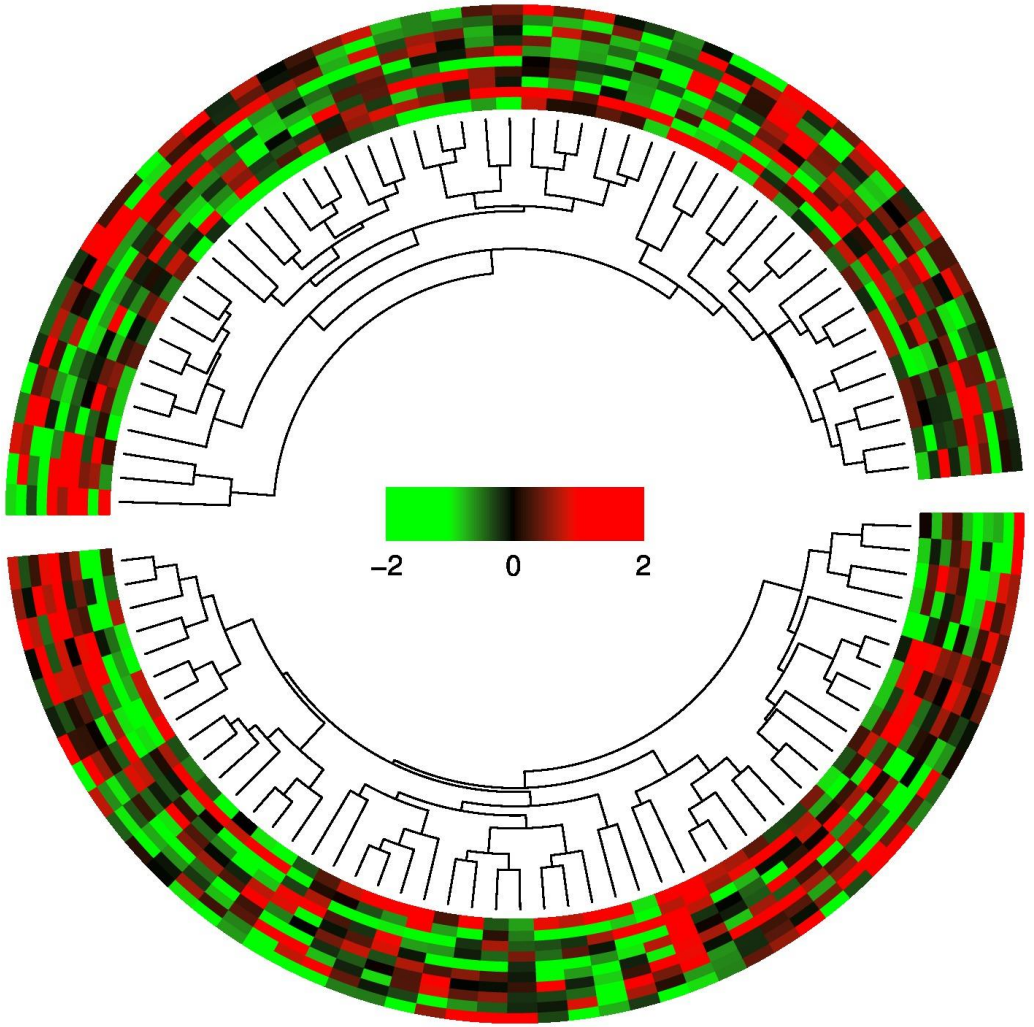
Complex data / Big Data



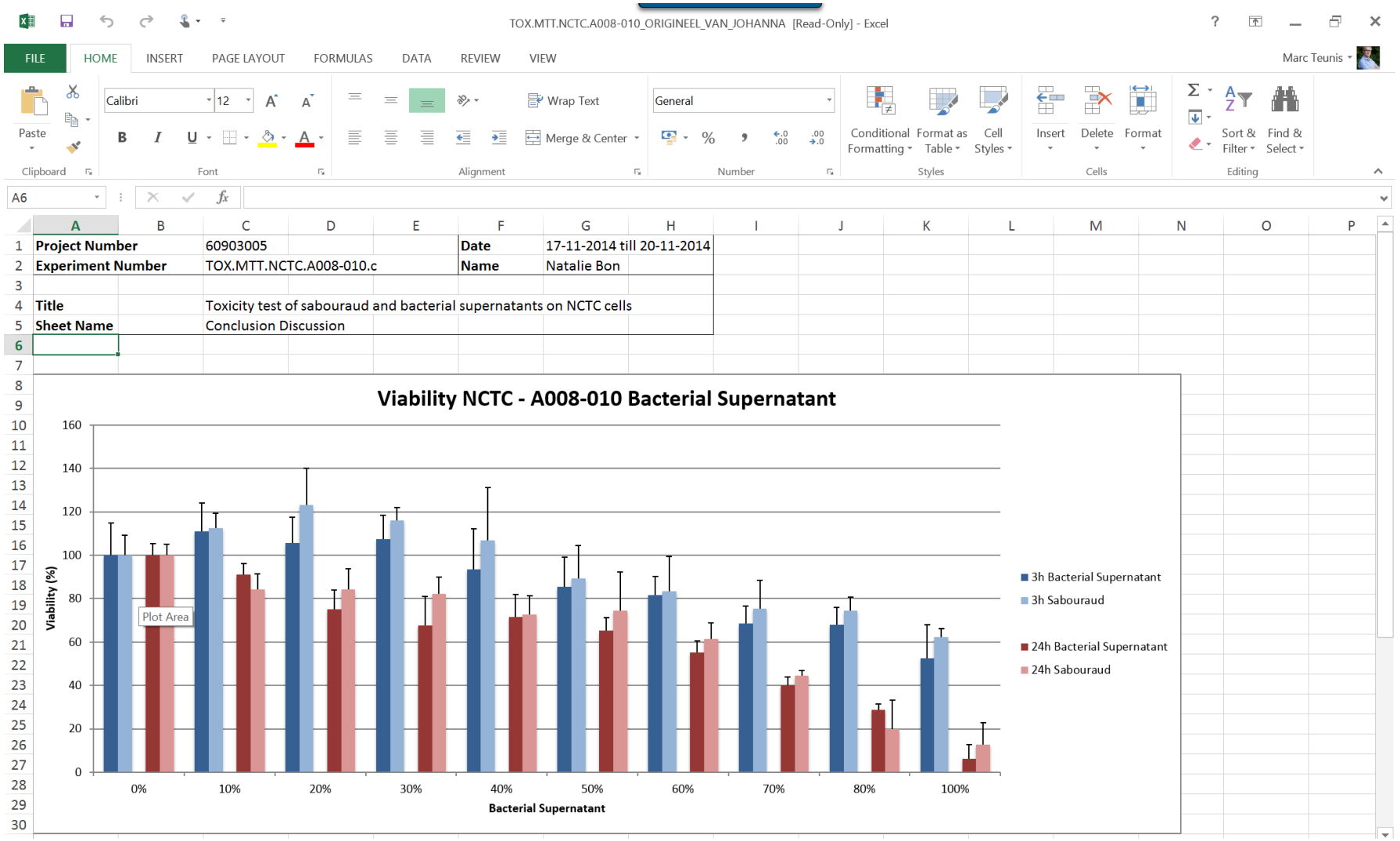


Reproduceren

```
library(circlize)

# dend: as dendrogram object, usually returned by hclust and as.dendrogram
# maxy: maximum height of the tree
circos.dendrogram = function(dend, maxy) {
  labels = as.character(labels(dend))
    x = seq_along(labels) - 0.5
    names(x) = labels
    is.leaf = function(object) (is.logical(L <- attr(object, "leaf"))) && L
        # recursive function to draw the tree
    draw.d = function(dend, maxy) {
        leaf = attr(dend, "leaf")
        d1 = dend[[1]]
        d2 = dend[[2]]
        height = attr(dend, 'height')
        midpoint = attr(dend, 'midpoint')
        if(is.leaf(d1)) {
            x1 = x[as.character(attr(d1, "label"))]
        } else {
            x1 = attr(d1, "midpoint") + x[as.character(labels(d1))[1]]
        }
        y1 = attr(d1, "height")
        if(is.leaf(d2)) {
            x2 = x[as.character(attr(d2, "label"))]
        } else {
            x2 = attr(d2, "midpoint") + x[as.character(labels(d2))[1]]
        }
        y2 = attr(d2, "height")
        circos.lines(c(x1, x1), maxy - c(y1, height), straight = TRUE)
        circos.lines(c(x1, x2), maxy - c(height, height))
        circos.lines(c(x2, x2), maxy - c(y2, height), straight = TRUE)

        if(!is.leaf(d1)) {
            draw.d(d1, maxy)
        }
        if(!is.leaf(d2)) {
            draw.d(d2, maxy)
        }
    }

    draw.d(dend, maxy)
}
mat = matrix(rnorm(100*10), nrow = 10, ncol = 100)
factors = rep(letters[1:2], 50)
par(mar = c(1, 1, 1, 1))
circos.par(cell.padding = c(0, 0, 0, 0), gap.degree = 5)
circos.initialize(factors, xlim = c(0, 50))
maxy = 0

f = colorRamp2(breaks = c(-1, 0, 1), colors = c("green", "black", "red"))

circos.trackPlotRegion(ylim = c(0, 10), bg.border = NA, panel.fun = function(x, y) {
  sector.index = get.cell.meta.data("sector.index")
    m = mat[, factors == sector.index]

    dend.col = as.dendrogram(hclust(dist(t(m))))

    maxy = ifelse(maxy > attr(dend.col, "height"), maxy, attr(dend.col, "height"))
    assign("maxy", maxy, envir = .GlobalEnv)

    m2 = m[, labels(dend.col)]
    nr = nrow(m2)
    nc = ncol(m2)
```

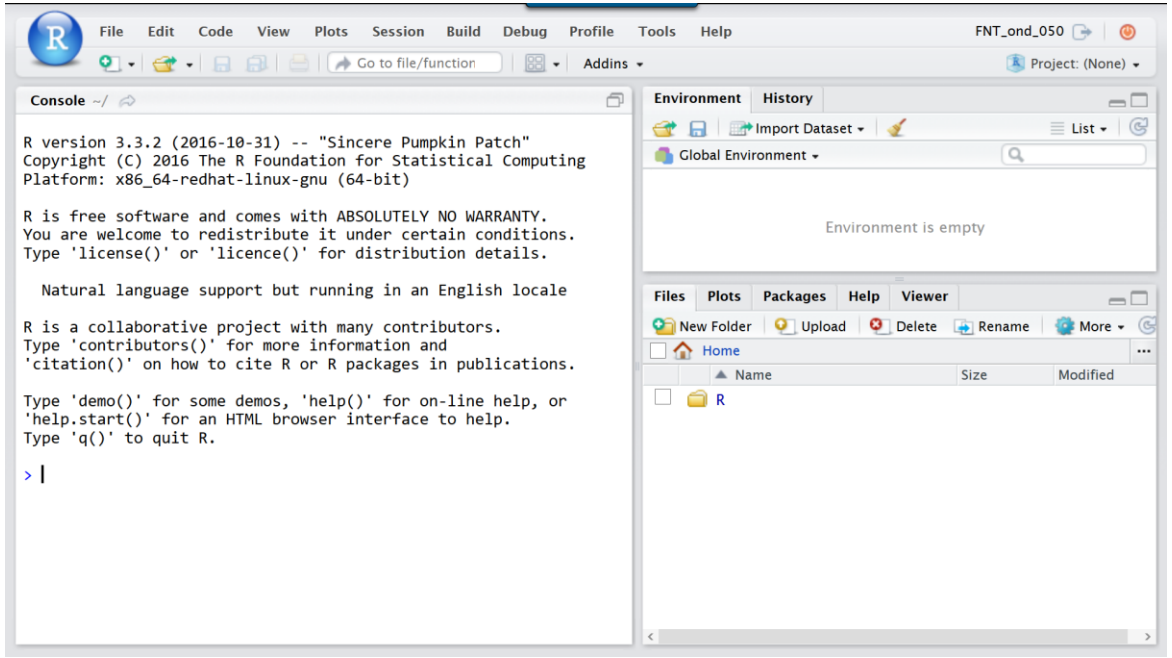


MS Excel Grafieken namaken?

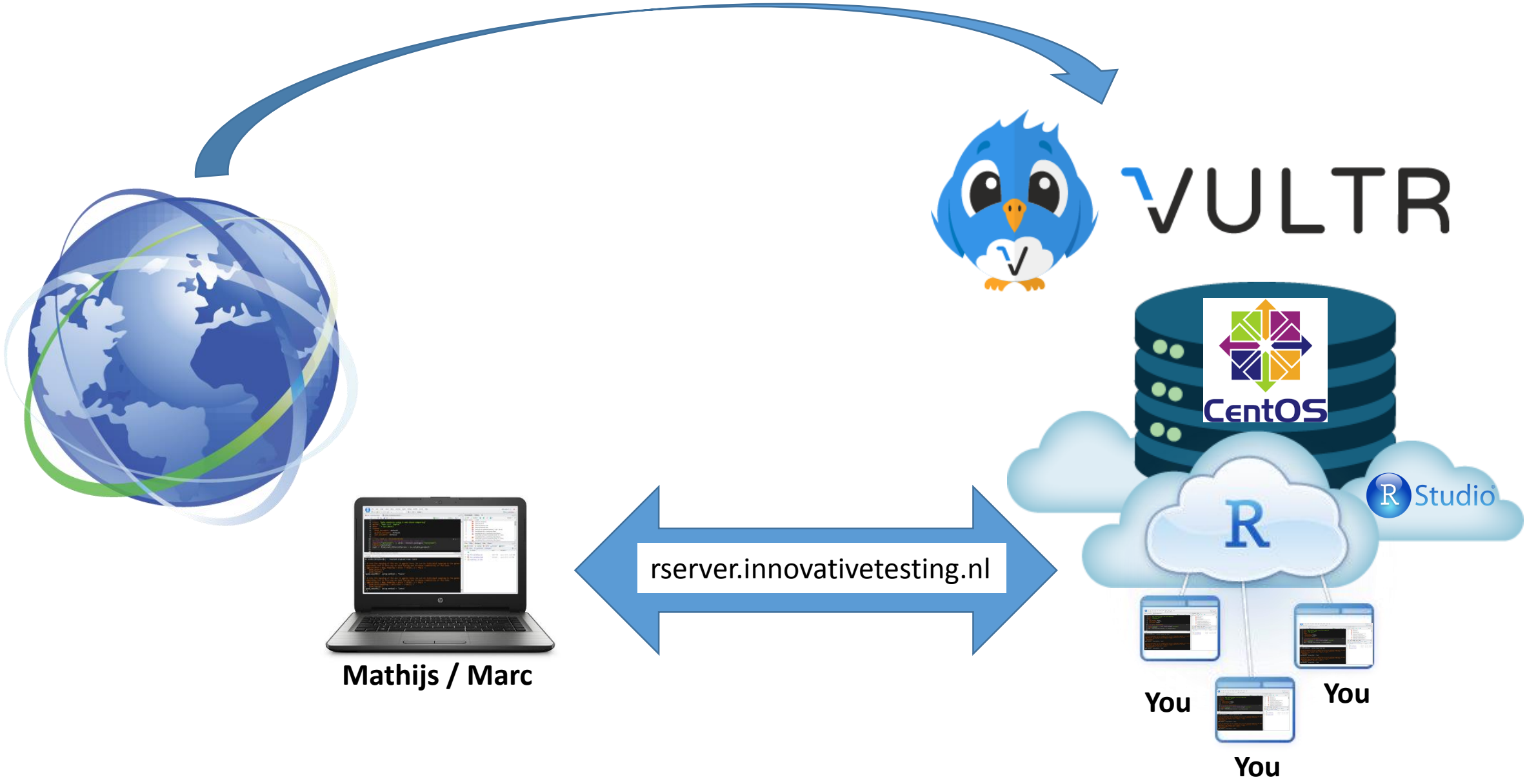
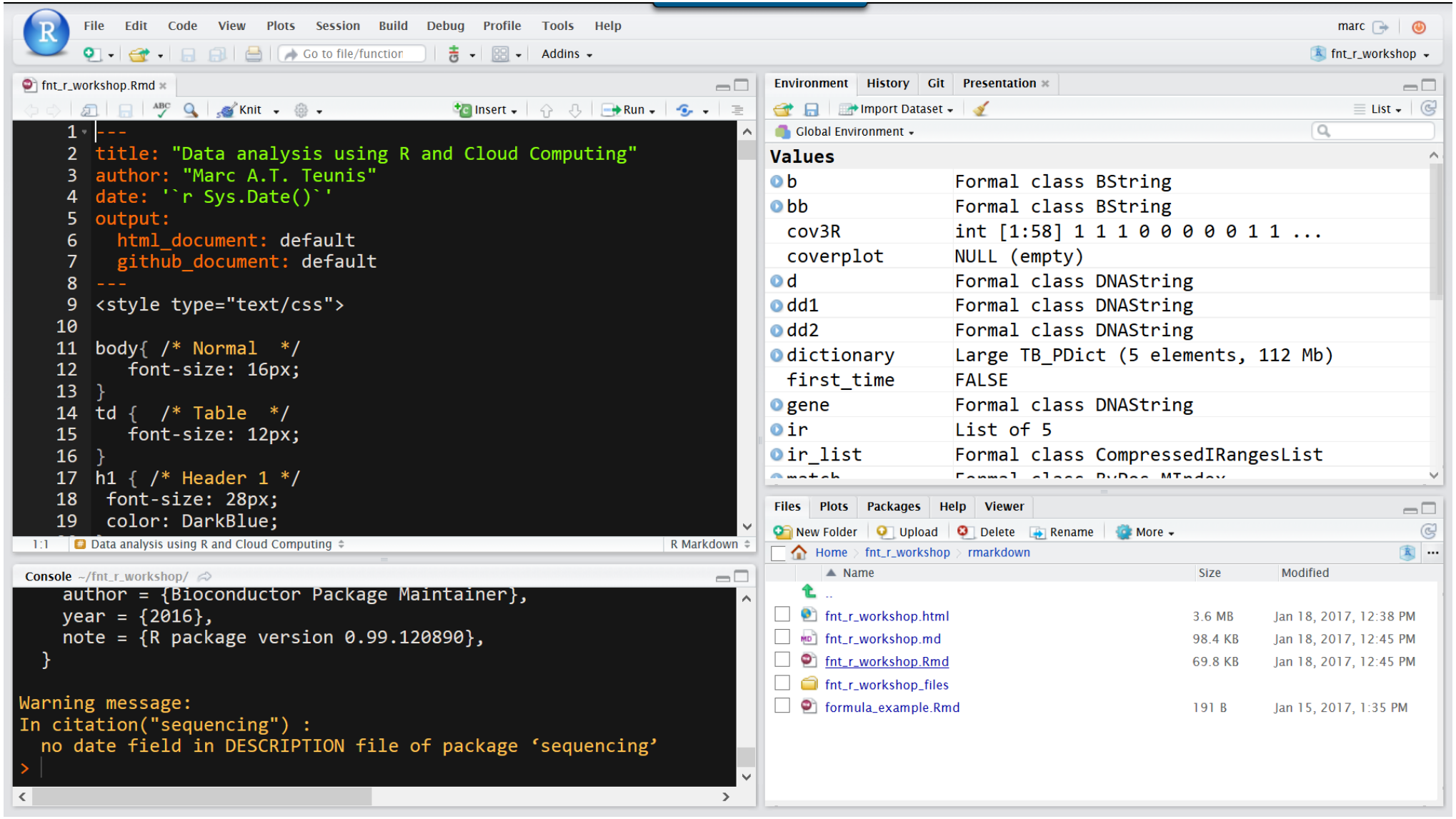


Cursus Tools: Programmeren in R

- Jupyter Notebooks on Amazon's AWS (EC2 - Nano) instances
- Stand alone installaties van R en R's IDE RStudio
- **Github/Bitbucket repositories (`git clone`, `git pull`, `git push`)**
- Vagrant box - Oracle VM
- RStudio AMI on Amazon AWS
- RStudio Server corporate
- Docker images
- **VULTR RStudio Cloud server**



RStudio Cloud server



Interactive demo