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QL TechCon  
2020 online

# 50 ways to show your data

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- Application developer, consultant, accidental DBA, author
- Worked at consultancies, ISVs, end user companies
- SQL Server > 6.5, former „Navision“ > 3.0, R > 3.1.2
- Speaker at SQL events around Europe



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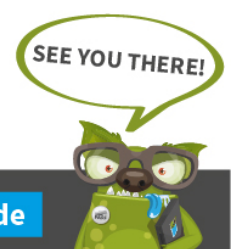
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# Agenda

- What's the fuzz about this R language?
  - The flow of your data:
    - import, manipulate, visualize, communicate
- A grammar of graphics: ggplot2
- Fancy ggplot2 graphs and some fancy friends:
  - from facets
  - via ridgelines and waterfalls
  - to animated plots and yet some extras
- Round-up, resources, Q&A



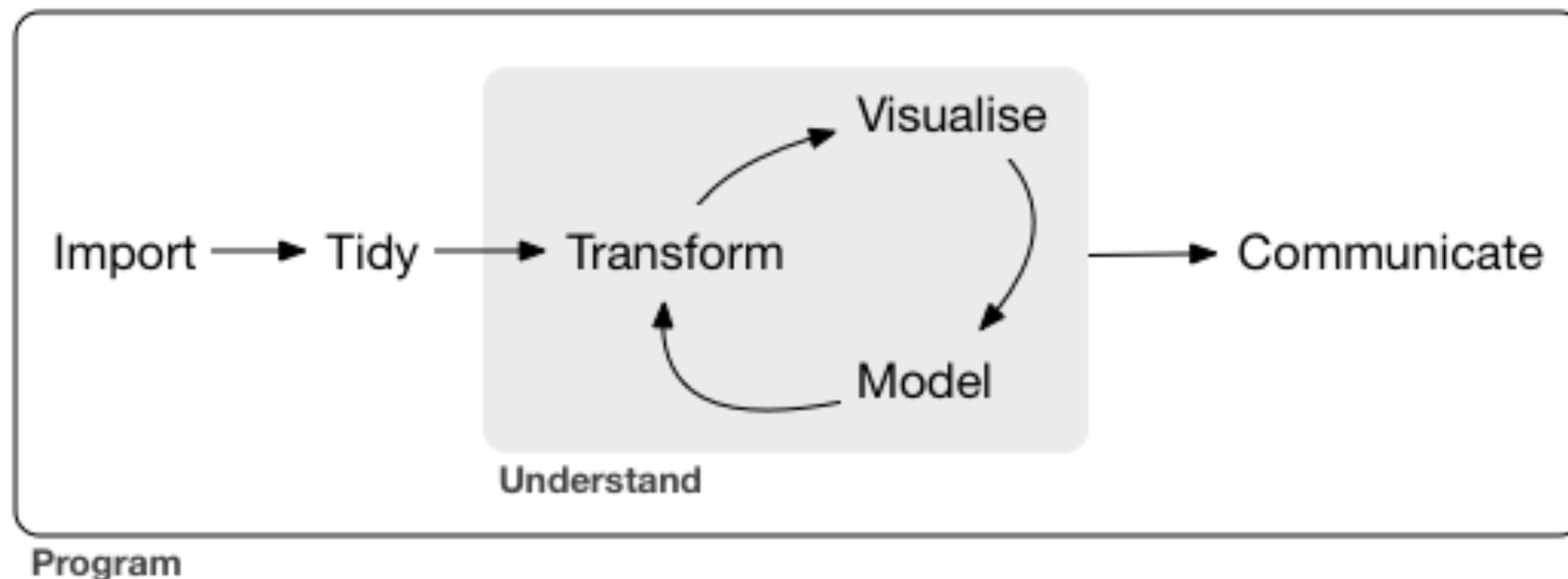
# What's the fuzz about this language?

- Programming language for statistical computing, analysis and visualization, widely used by statisticians, data miners, analysts, data scientists
- Created by **R**oss Ihaka and **R**obert Gentleman, Uni Auckland, in 1993 as an open source implementation of the (1970s) S language
- GNU project, maintained by the R Foundation for Statistical Computing, compiled builds für Mac OS, Linux, Windows, supported by R Consortium
- Extensible through user-created packages, > 16000 available on CRAN
- Commercial support, e.g. since 2007 by Revolution Analytics, acquired by Microsoft in 2015, now provide Microsoft R Open, R Server
- IDEs: R.App, RStudio, MS R Tools for Visual Studio (< version 2019)
- Support for R now in SQL Server, Power BI, Azure ML, Data science VM



# The flow of your data

What a typical data analysis/data science project may look like



The components of the Tidyverse (ggplot2 being one part) cover these tasks and can help you to accomplish them in a concise manner.

figure © 2017 Wickham/Grolemund: „R for Data Science“



# A grammar of graphics: ggplot2

- „The grammar of graphics“, a 2005 book by Leland Wilkinson et al. served as a foundation for implementing the R package ggplot2
- My simple approach to „what is needed to describe a graph“:
  - data: *what do you want to show*
  - aesthetic mappings: *which relations are there to show*
  - geometries: *how do you want to show it*
  - extras:
    - ▶ guides: axes, scales and legends
    - ▶ labels, annotations
    - ▶ facetting, coordinate systems
    - ▶ colours, themes
    - ▶ ...



# 50 ways to show your data

- facets  
show small multiples,  
apply the big picture to subsets of your data
- violins  
show more detail of the data distribution than a box plot
- lollipop charts [ggalt]  
alternative to bar charts with lots of nearly-similar-sized bars,  
on screen: reduce moiré, on paper: reduce waste of ink
- encircling areas [ggalt]  
draw attention to certain regions or groups of points,  
visualize clustering





# 50 ways to show your data

- jitter plots / counts charts  
show information otherwise hidden by overlapping points
- avoiding overlap of text labels [ggrepel]  
avoid overlap of text labels
- ridgeline plots [ggridges] (ex joyplots\*)  
compare distribution or timeline for a number of subgroups  
\* name deprecated, see <http://serialmentor.com/blog/2017/9/15/goodbye-joyplots>
- tree maps [treemap]  
display hierarchical data as nested rectangles





# 50 ways to show your data

- waterfall diagrams [waterfall(s)]  
show up- and down development of a single measure
- correlograms [(gg)corrplot]  
show correlation between several variables at once
- marginal histograms and boxplots [ggExtra]  
show distribution details for the dimensions of a scatter plot
- radar charts [ggradar]  
compare multiple measures for few items



# 50 ways to show your data

- maps [ggmap]  
include geospatial information
- animated plots [gganimate]  
automatically show development over time
- Chernoff faces [ggChernoff]  
everyone likes smilies, don't they?
- More extras:  
facet zooming [ggforce],  
diverse themes [ggthemes, ggTech],  
interactive: tooltips [ggiraph]



# Round-up / conclusions

- With R, a lot is possible in terms of analysis and especially visualizations
- With ggplot2 and its extensions, graphs can be constructed in a very concise manner, according to the grammar of graphics
- Don't overdo/overload your visualizations
- Careful with the number and choice of colours/shapes
- Consider the occasion of your presentation (Chernoff faces are not suitable for every audience)



# Credits & resources / inspired by:

- Selva Prabhakaran's [Top 50 ggplot2 Visualizations Master List](#) (use under [Creative commons license](#), referred to as „Top 50 list“)
- A list of ggplot2 extensions <https://exts.ggplot2.tidyverse.org/>
- The ggplot2 reference online <http://ggplot2.tidyverse.org/reference/>
- R Graphics Cookbook, by Winston Chang, O'Reilly, ISBN 978-1449316952
- R for Data Science, Hadley Wickham & Garrett Grolemund, O'Reilly, ISBN 978-1491910399, also online at <http://r4ds.had.co.nz>
- Formula 1 data set: [www.formel1.de](http://www.formel1.de)
- Cellphone subscriptions data: [data.worldbank.org](http://data.worldbank.org)
- Live parking data: [www.kleve.de](http://www.kleve.de)



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Thank you for your interest & keep in touch:

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This file and all demo scripts can be found at:  
<https://j.mp/DerFredoQLTechCon20>



# 50 ways to show your data

Do we have time for some Q & A?

