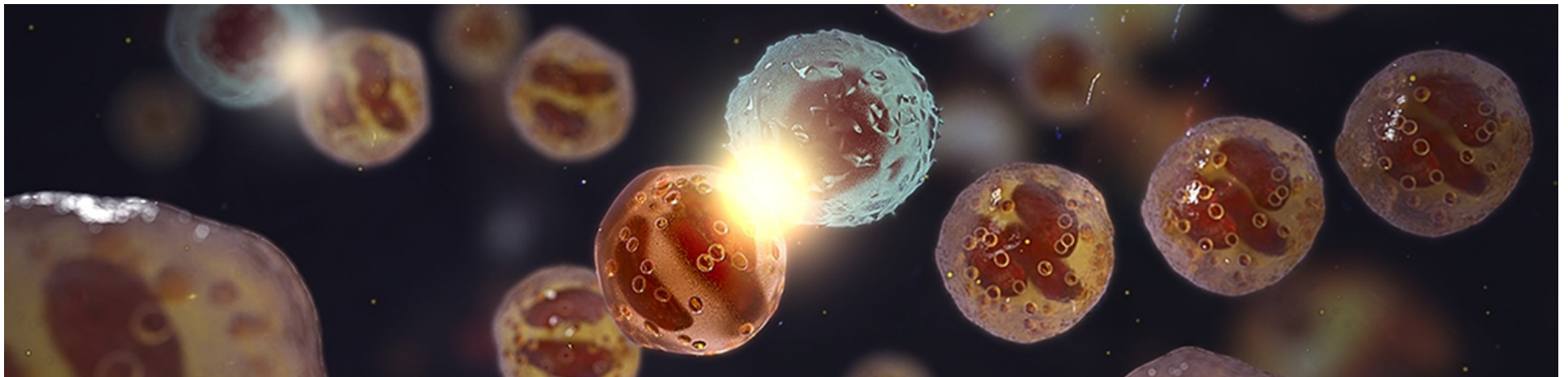


Making Your Graphs Come To Life

Monika Huhn, Jesper Havsol, Daniel Goude, Volker Schneck, Christoffer Stedt, Martin Karpefors

monika.huhn@astrazeneca.com

2nd of July, 2015

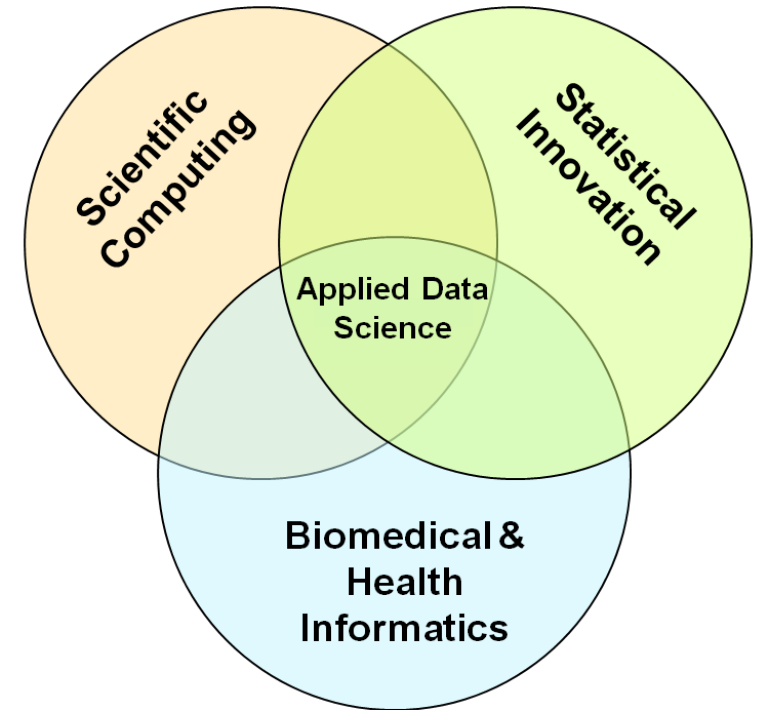


Introduction - AstraZeneca

Pharmaceutical company with research spanning from discovery to late stage clinical research

Advanced Analytics Centre

- ~25 people
- Different skills coming together to provide novel solutions to data-driven clinical research problems in drug development, through applied data science.



Introduction - Making Your Graphs Come To Life

Animation application using D3 and R Shiny, in use at AstraZeneca to explore clinical data.

Structure:

- Motivation
- Tools
- Implementation
- Demo
- Conclusions

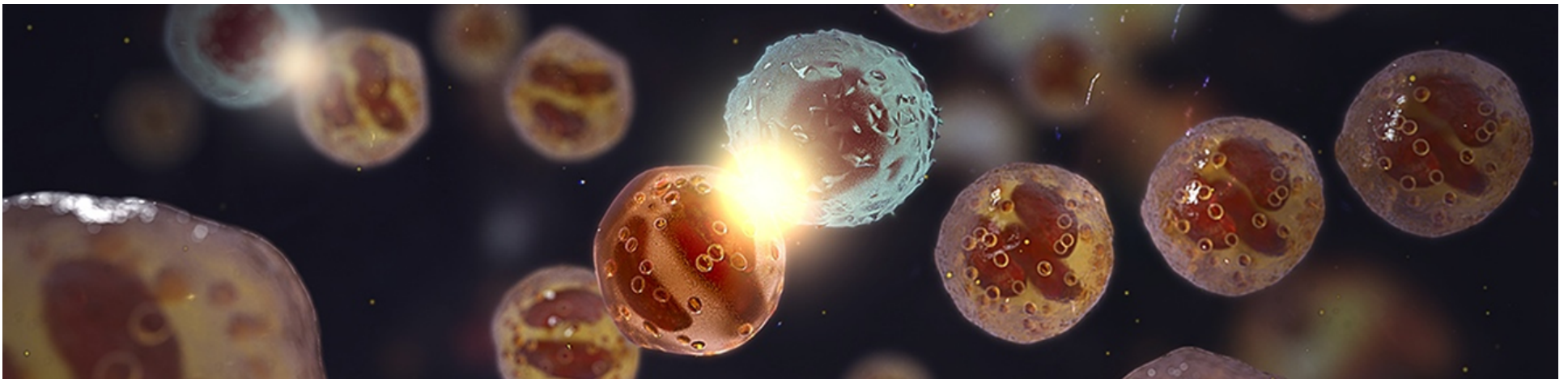
Motivation

Tools

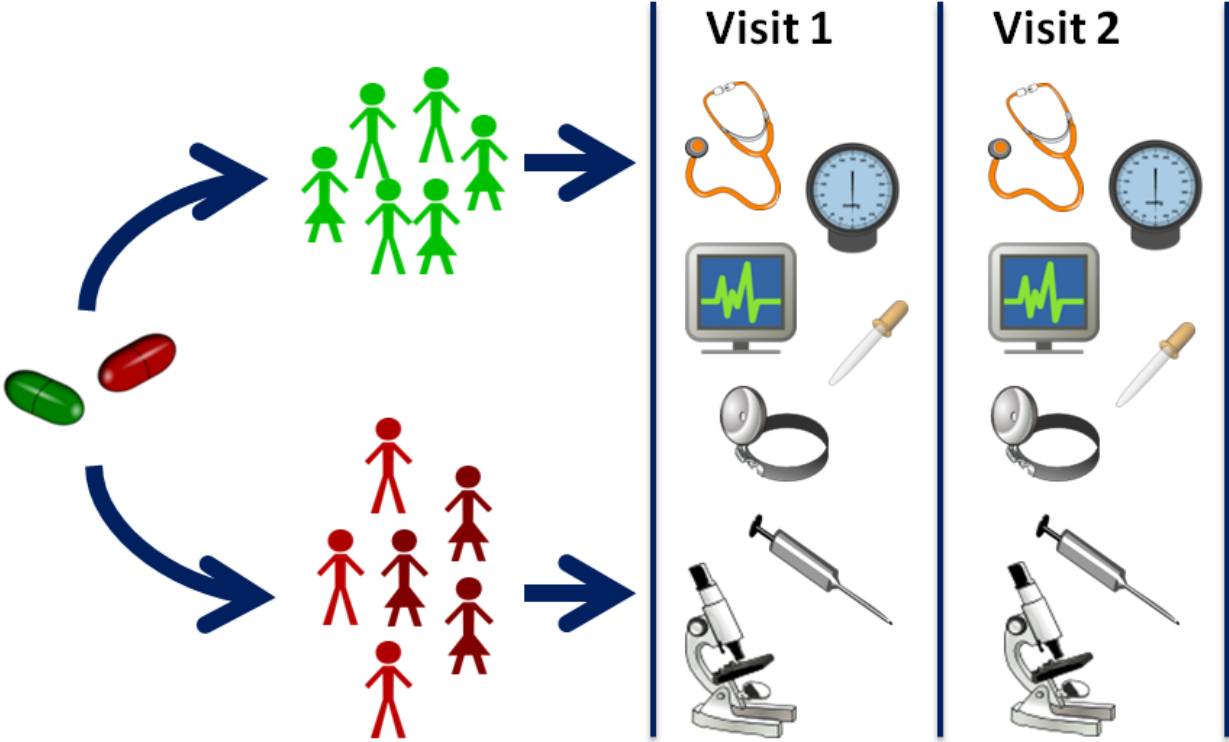
Implementation

Demo

Conclusions



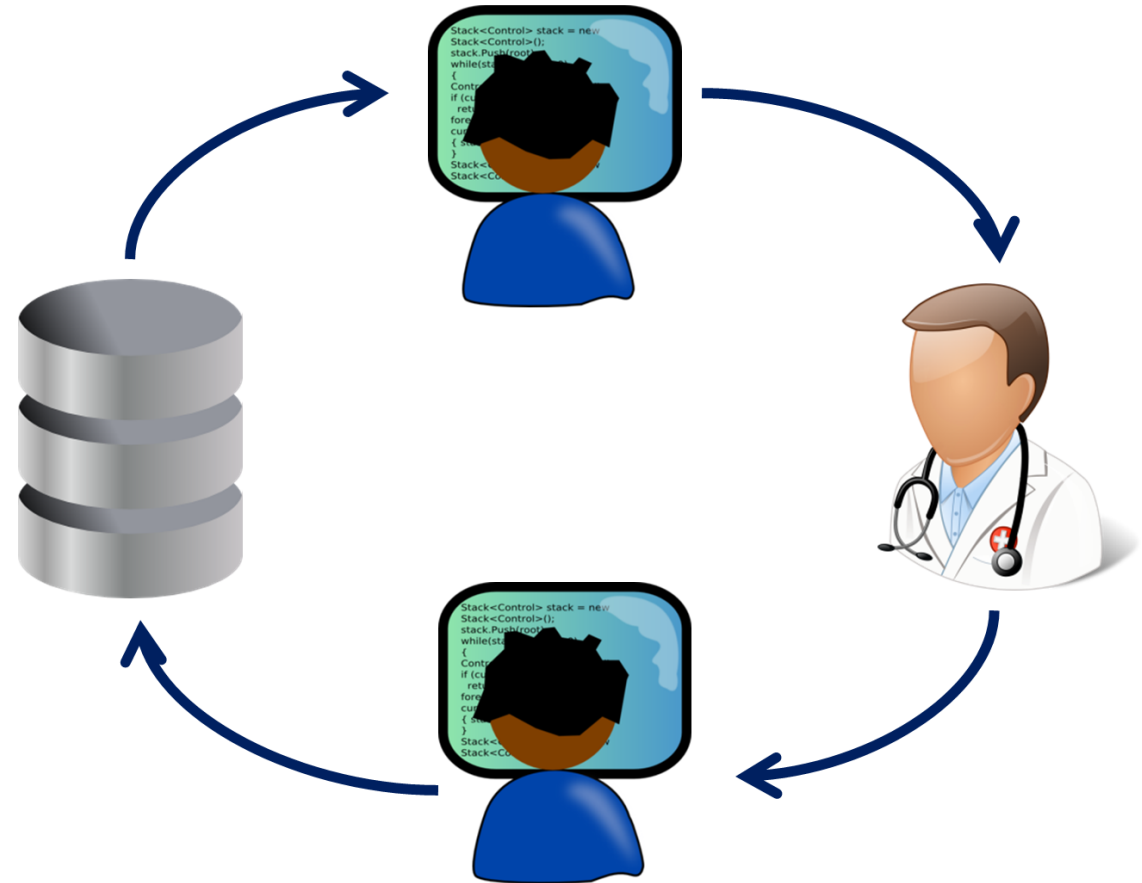
Clinical Data



- Many different variables
- Recorded over time

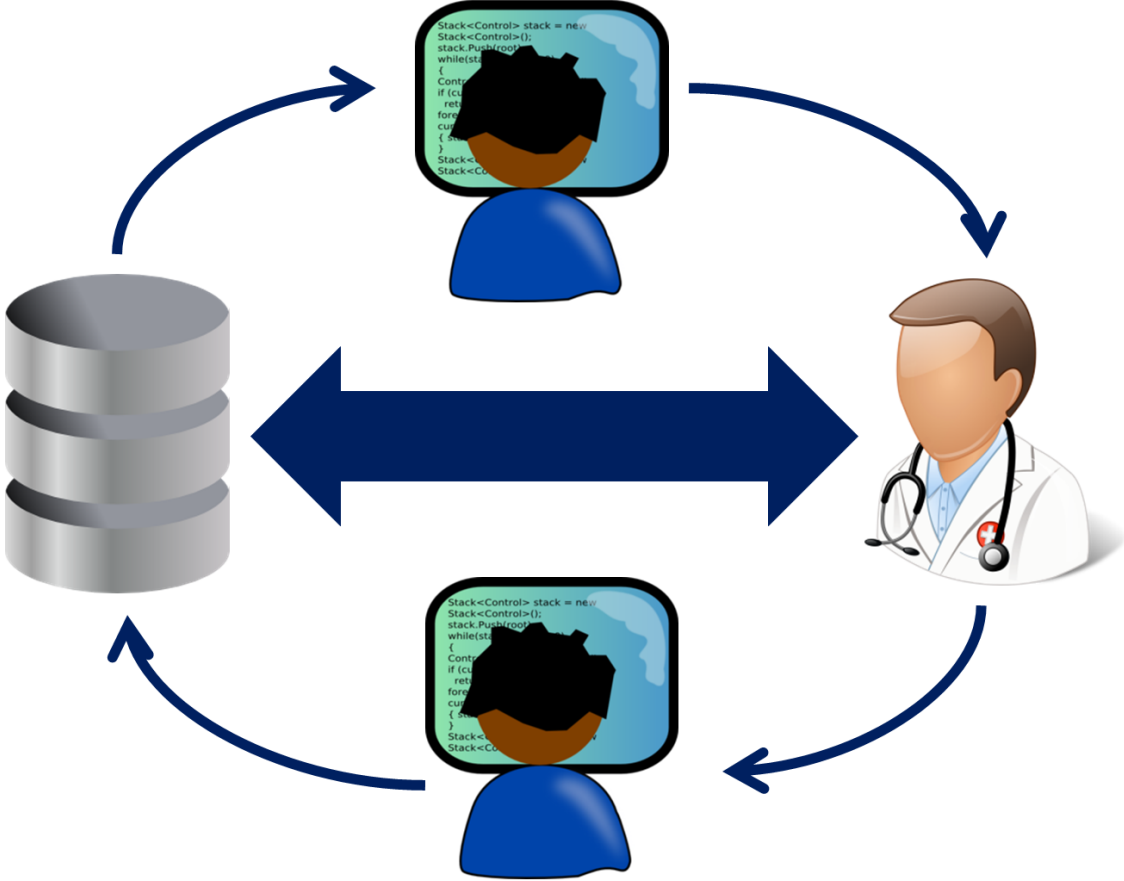
Problem

Technical hurdle:
Data not easily and directly accessible for medical experts.



Solution

Interactivity:
Applications that enable
easy data exploration.



Benefits & risks of animated data

Inspired by Hans Roslings famous Gapminder example

Benefits:

- Additional variable can be displayed in a meaningful way
- Allows spotting of temporal patterns

Risks:

- Can distract from data
- User has to be able to follow the individual data points over time
- Can it be interactive enough for exploratory research?

→ We tried to take these points into account in the design

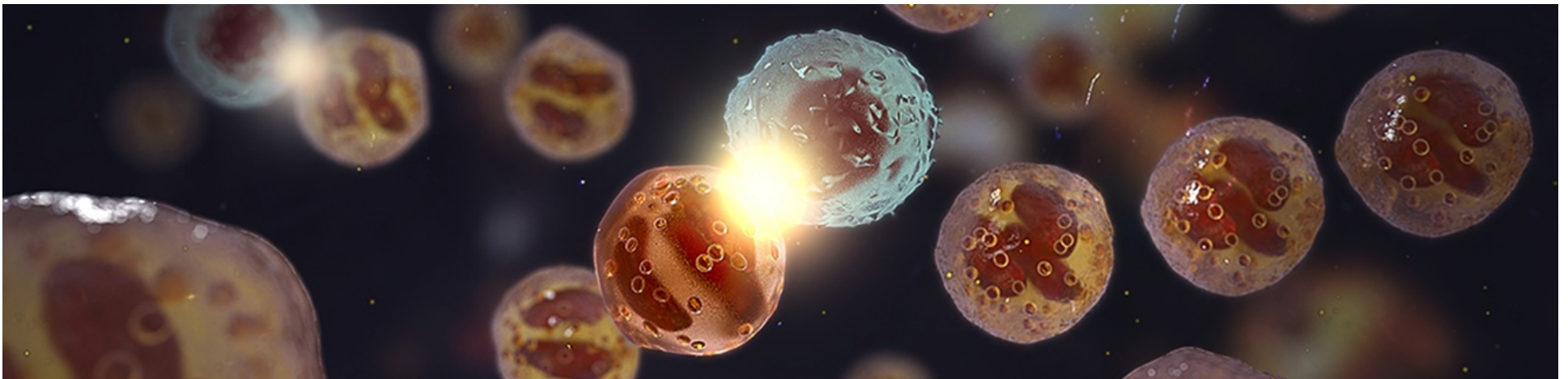
Motivation

Tools

Implementation

Demo

Conclusions





- Web Application Framework for R
- Developed by RStudio team
- Allows web development using R but can also be extended using HTML/css/javascript

shiny.rstudio.com

Data-Driven Documents

- **Javascript library** developed by Mike Bostock
- Manipulate documents based on **data** by **binding** to DOM elements
- Beautiful visualizations when used in connection with **svg** elements
- Very advanced **transition** capabilities
- Advantage: absolute **flexibility**
- Disadvantage: longer learning process

d3js.org

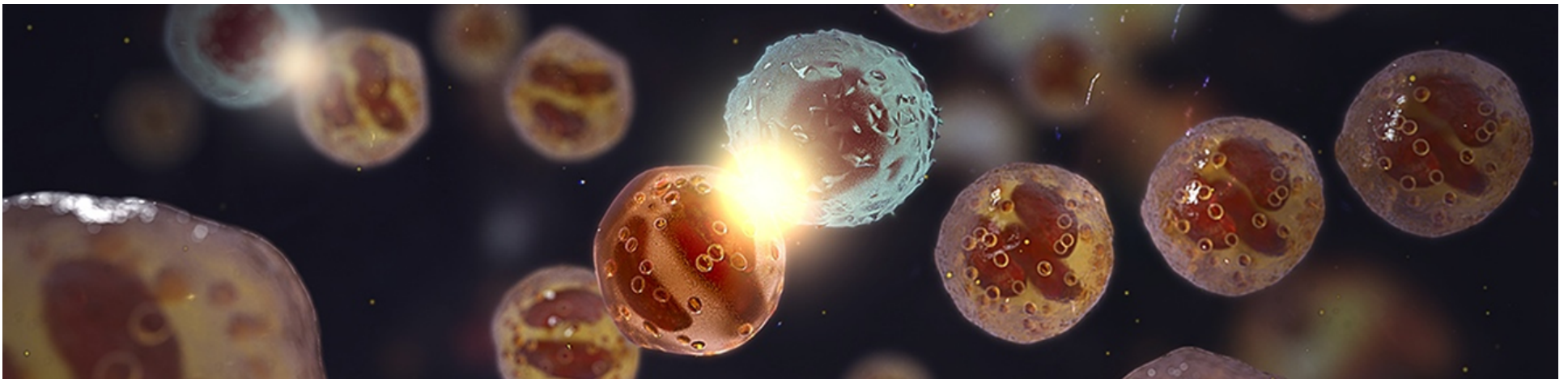
Motivation

Tools

Implementation




Demo

Conclusions



Combination of tools with different strengths

Pure javascript implementation run into trouble with data manipulations
→ use different tools and focus on their strengths:

- : Data manipulation
- : Easily creating a web page frame with reactive elements
- : Beautiful graphics and transitions

Implementation

Main question: How to connect D3 and Shiny?



Server side:
Data preparation
using R

Send data
using handler
function

Client side:
D3 animation
updated

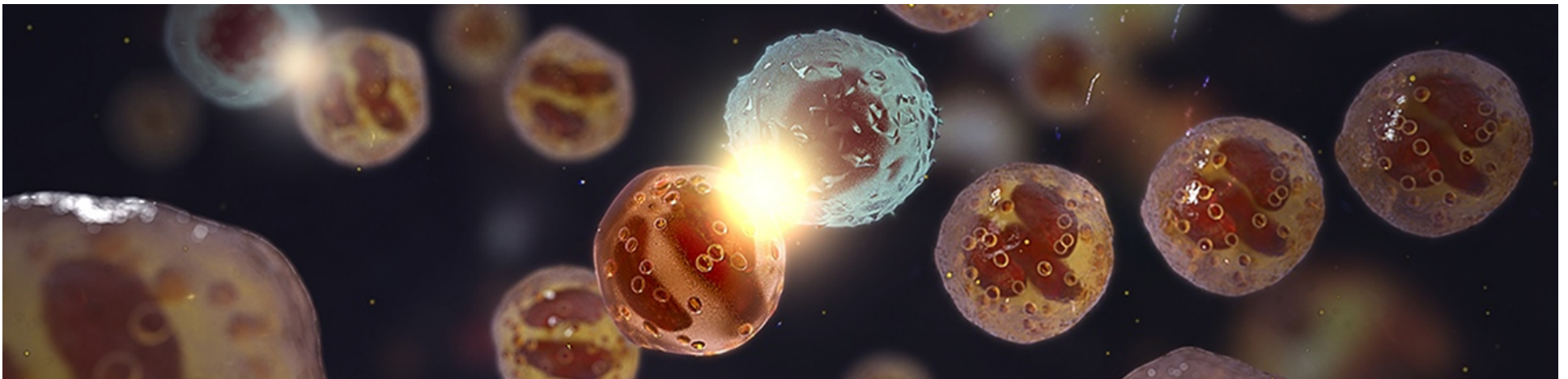
Motivation

Tools

Implementation

Demo

Conclusions



Start page

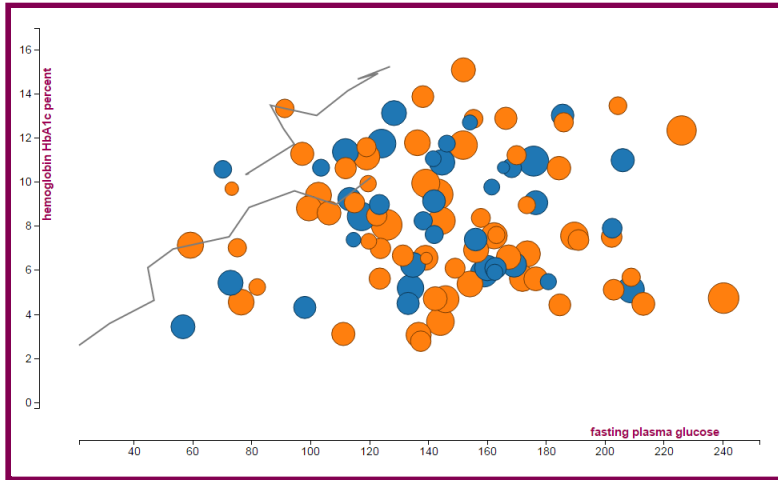
The screenshot shows the start page of a Shiny application. At the top, there are three tabs: 'Make your graphs come to life' (selected), 'Upload data', and 'Animate'. Below the tabs, the main heading is 'Animate your data!' with a subtext 'Just upload your data and then animate it in the next tab.' The interface includes several controls: a 'Separator' dropdown set to 'Comma', a 'Choose CSV File' section with a 'Choose File' button and a file named 'simulatedData.csv' (with an 'Upload complete' status), an 'Identify ID variable' dropdown set to 'subject', and an 'Identify time variable' dropdown with a list of options including 'day', 'X', 'subject', 'visit', 'age', 'daily_insulin_dose', 'weight', and 'hmi'. The background features a stylized plot area with the text 'AstraZeneca D3' and 'Shiny Animate your data!' repeated in various colors and sizes. The AstraZeneca logo is visible on the right side of the plot area.

Animation



2nd of July, 2015: Making Your Graphs Come To Life

Follow individuals and filter



- Click marker to trace



- Click legend to filter

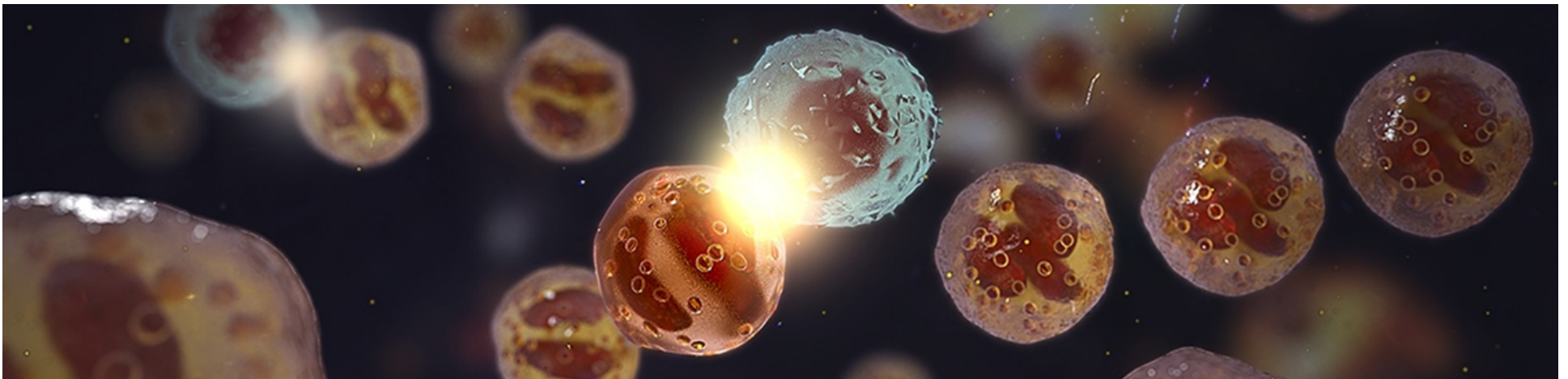
Motivation

Tools

Implementation

Demo

Conclusions



Conclusions

- Great potential in connecting the different tools
- Interactive features enable non-technical users to explore data
- Animation conveys a more powerful message than static plots could
- Enables temporal pattern detection
→ supported findings about relation between HbA1c and weight change that are currently being published

References and further reading:

[AstraZeneca \(http://www.astrazeneca.com/\)](http://www.astrazeneca.com/)

[Gapminder \(http://www.gapminder.org/\)](http://www.gapminder.org/)

[Research paper by Danyel Fisher \(Microsoft Research\):
Animation for Visualization: Opportunities and Drawbacks
\(http://research.microsoft.com/pubs/130998/bv_ch19.pdf\)](http://research.microsoft.com/pubs/130998/bv_ch19.pdf)

[R Shiny \(http://shiny.rstudio.com/\)](http://shiny.rstudio.com/)

[D3 \(http://d3js.org/\)](http://d3js.org/)

Confidentiality Notice

This file is private and may contain confidential and proprietary information. If you have received this file in error, please notify us and remove it from your system and note that you must not copy, distribute or take any action in reliance on it. Any unauthorized use or disclosure of the contents of this file is not permitted and may be unlawful. AstraZeneca PLC, 2 Kingdom Street, London, W2 6BD, UK, T: +44(0)20 7604 8000, F: +44 (0)20 7604 8151, www.astrazeneca.com

2nd of July, 2015: Making Your Graphs Come To Life



