Knowledge through bioinformatics

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Hej och välkomna!

Matthias heter jag
och
jag jobbar som *forskare*
på
Karolinska Institutet.

Bioinformatics

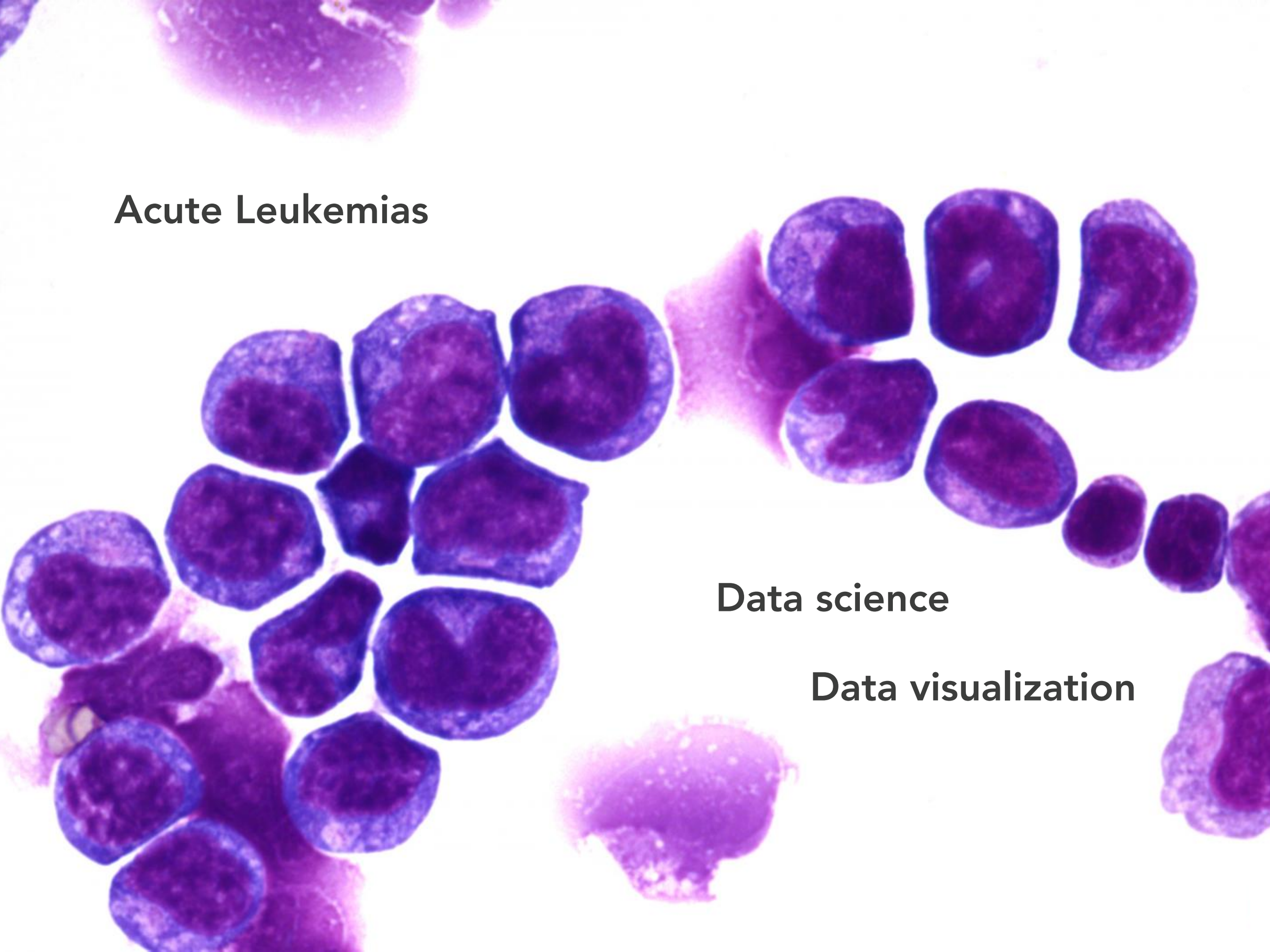
Data visualization

School

Informatics

Biochemistry & proteomics

Acute Leukemias



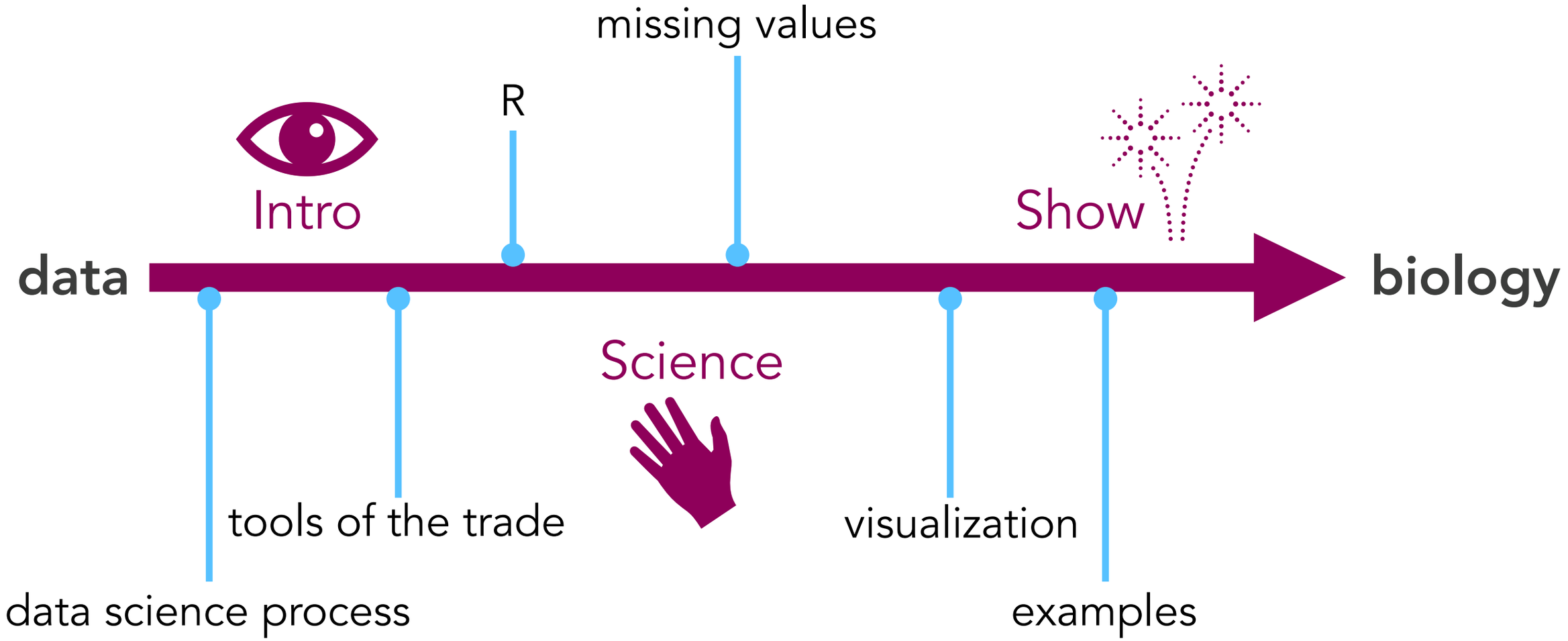
Data science

Data visualization

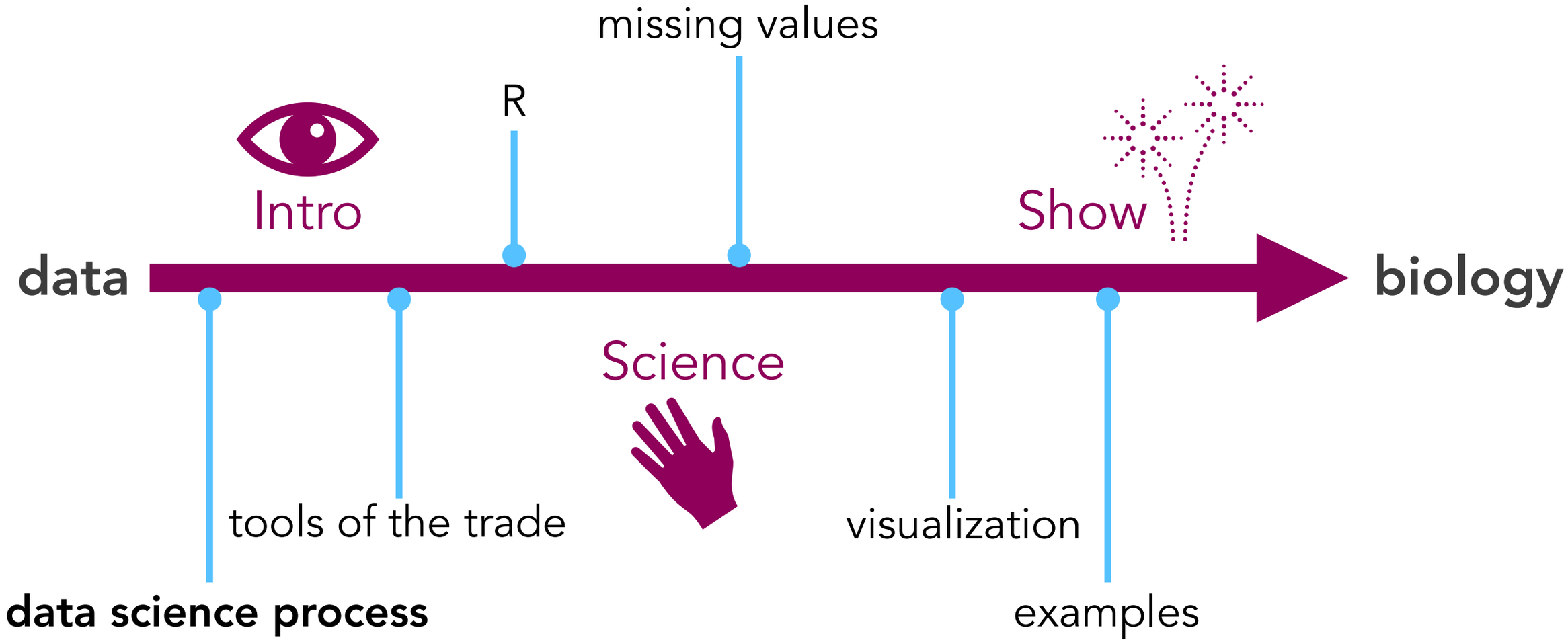
From data to biology

Setting the stage

for today



https://github.com/higsch/bioinfo-workshop



Why bioinformatics?

Data

e.g. from an experiment

We intuitively make inferences.

Statistics

A tool to formalize inferences within a mathematical framework.

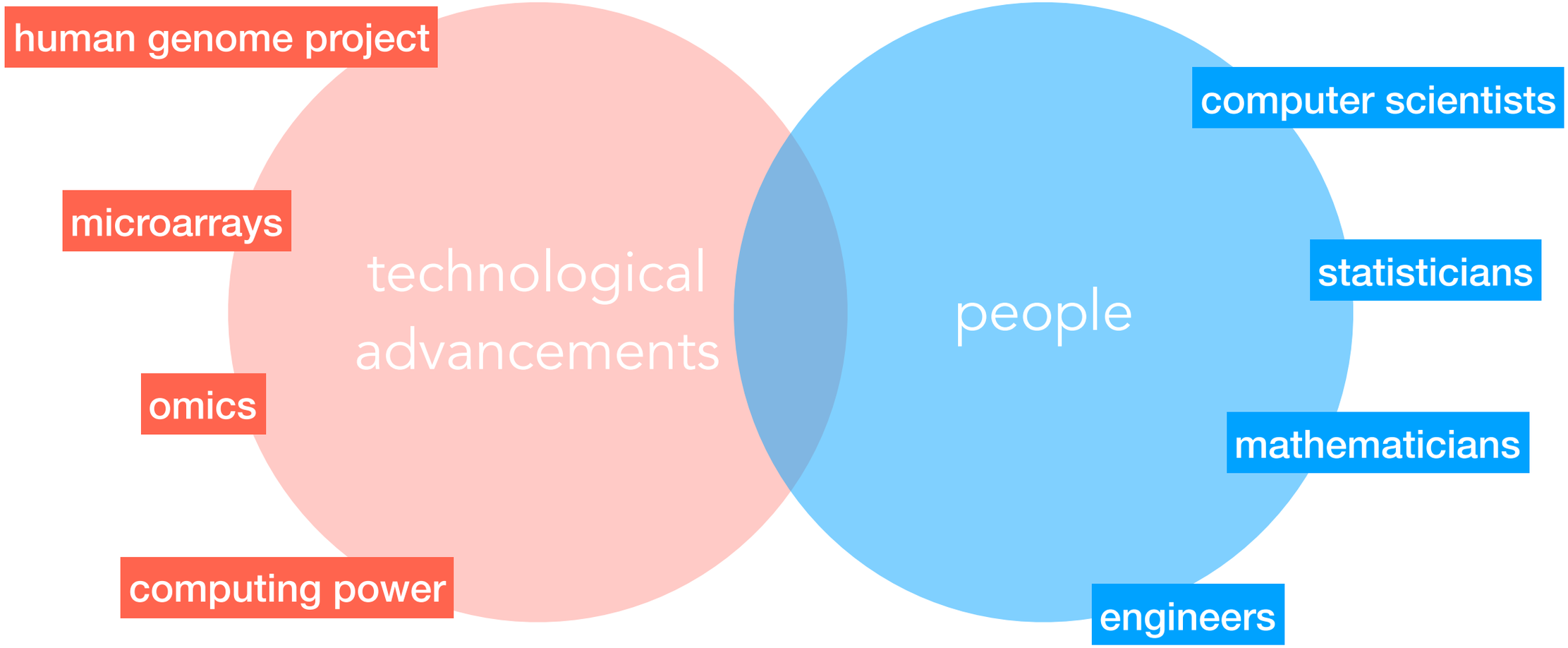
Bioinformatics

Statistics at scale.

“People don’t want data, they want answers.

— David Hand, Prof. em. Mathematics, Imperial College, London

Where does bioinformatics come from?



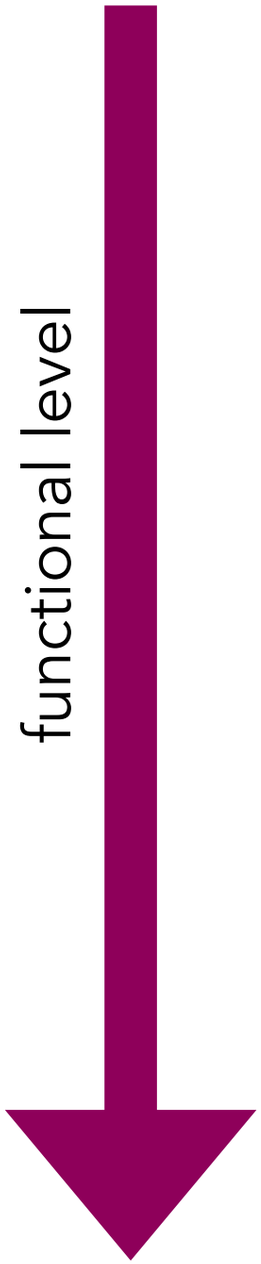
Genomics drove the field

15/02 – 2001

16/02 – 2001

Proteomics can learn a lot from genomics!

We live in the era of big data



genomics

~ 20,000 genes

transcriptomics

~ 100,000 transcripts (splicing, editing, …)

proteomics

> 1,000,000 proteins (proteoforms of all kinds)

> 10,000,000 peptides

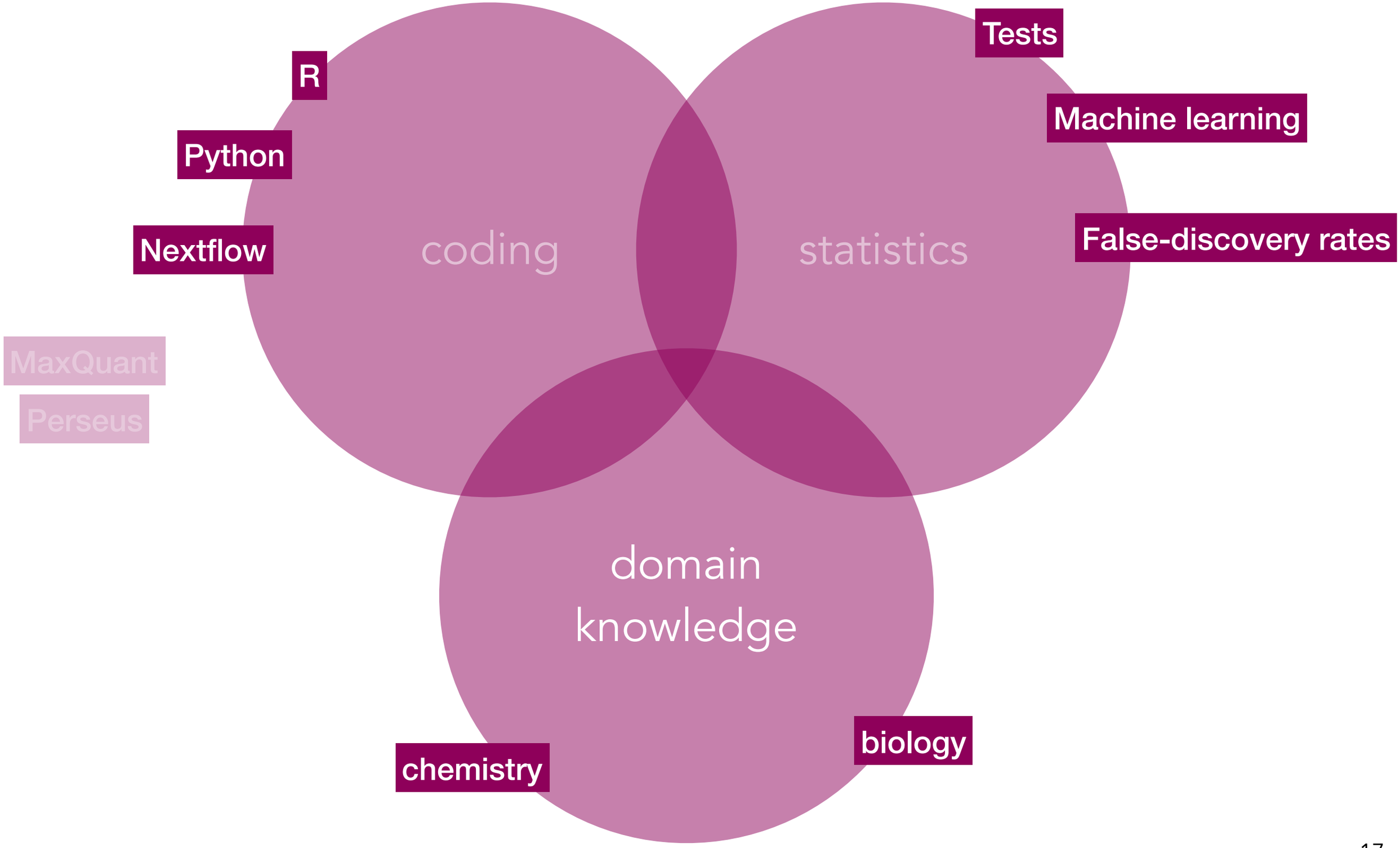
multiomics

You are all *bioinformaticians*

But are you sure about what you are doing?

Please answer a few questions.

What is bioinformatics?



Bioinformatics

is a *toolset*

but also a mindset

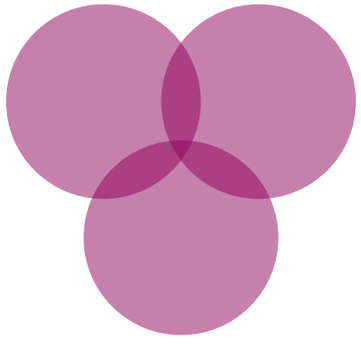
Bioinformatics is...

… not statistics.

… not computer programming.

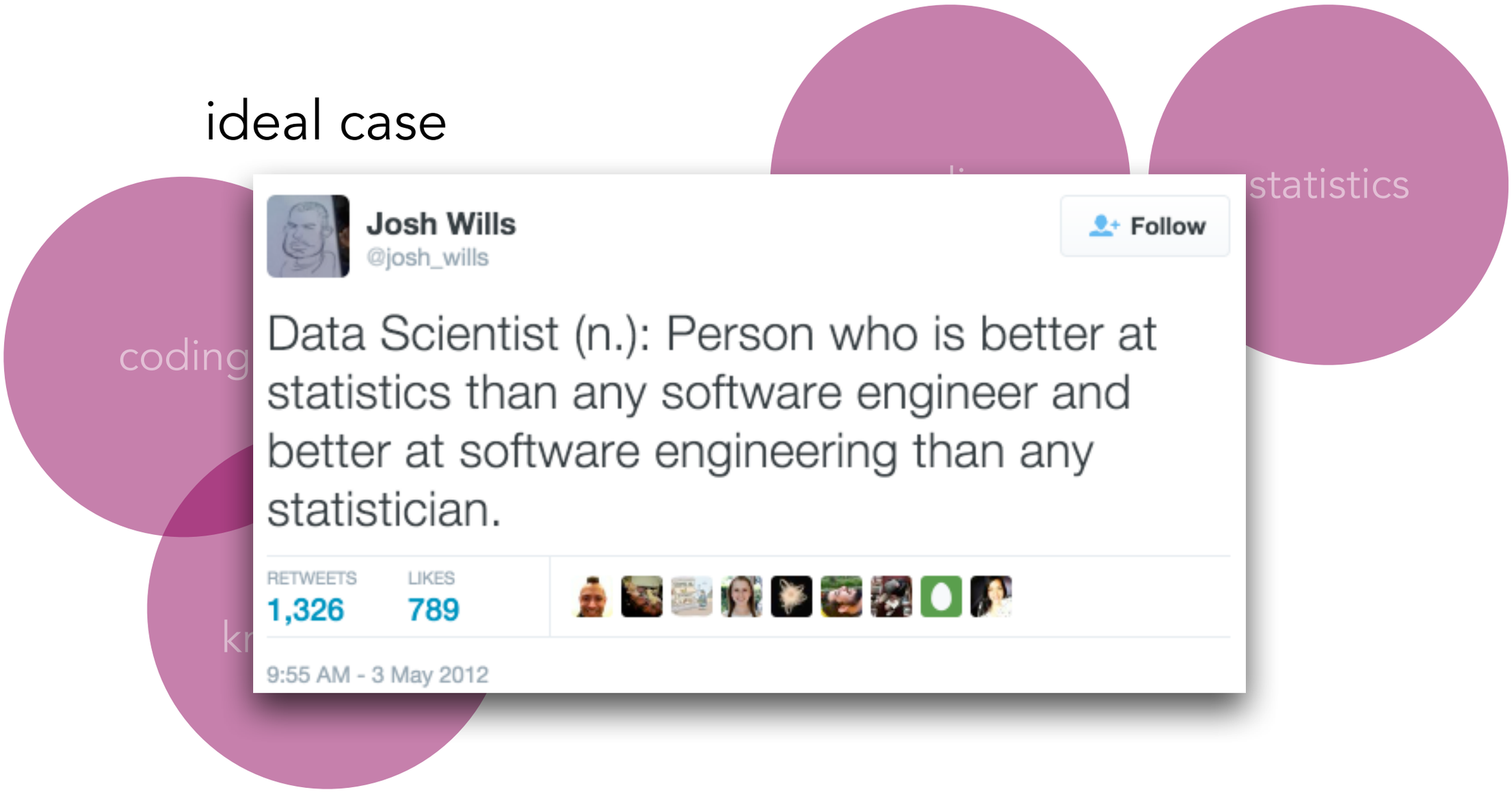
… not biology.

It is biology *at scale*.



And it has a big problem

ideal case

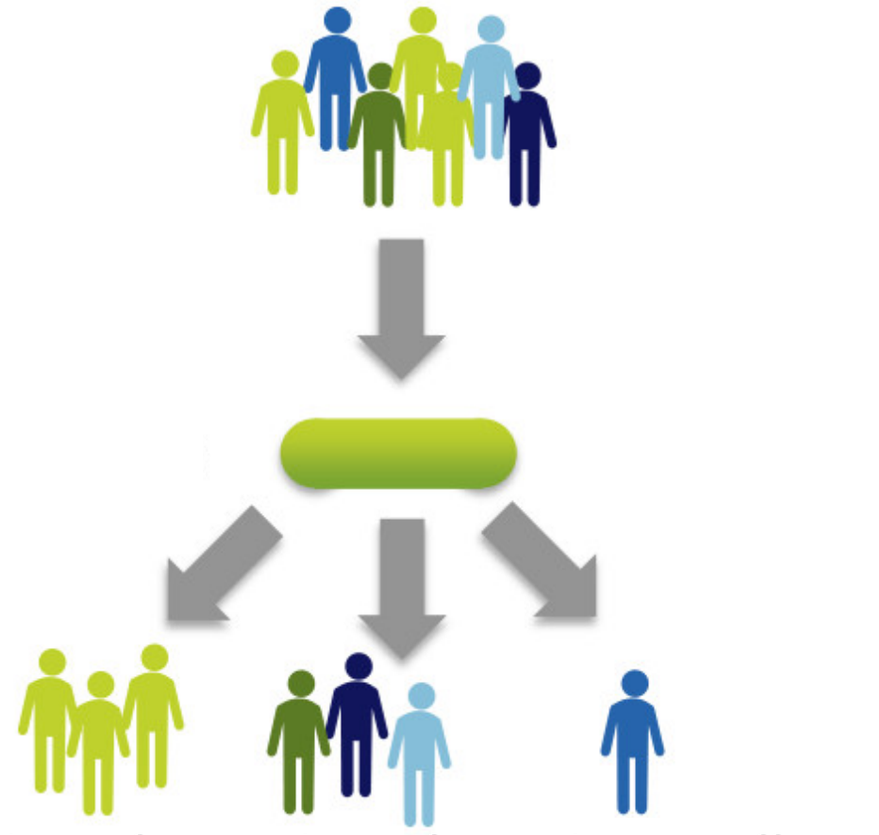


Let’s bridge the gap!

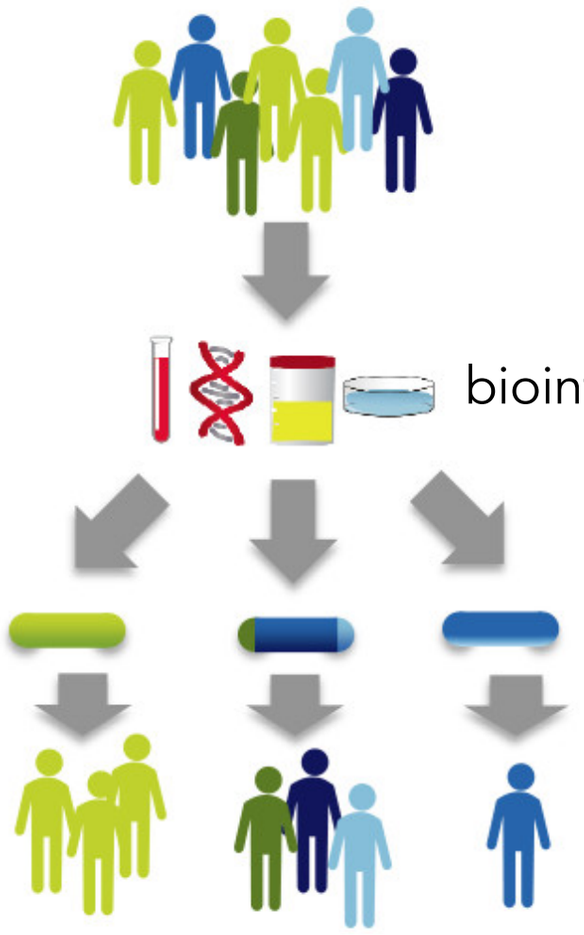
Motivation, please!

Personalized medicine

ensemble

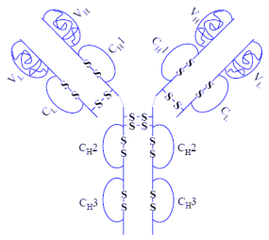


personalized

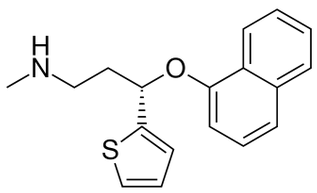


personalized benefits
(ideal case)

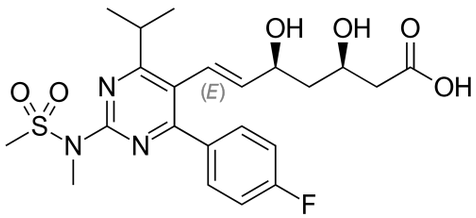
We urgently need personalized medicine!



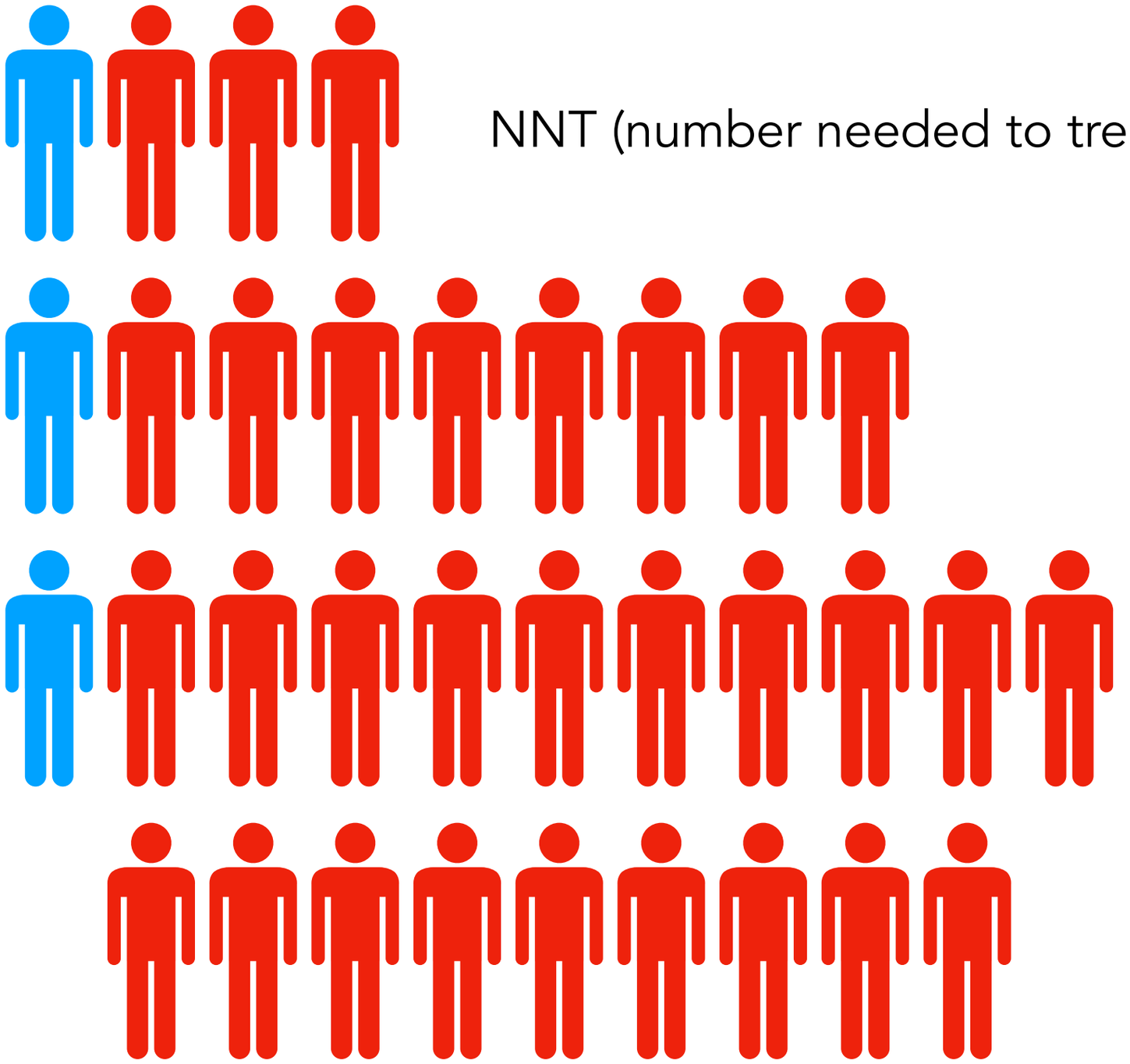
Humira
Arthritis



Cymbalta
Depression



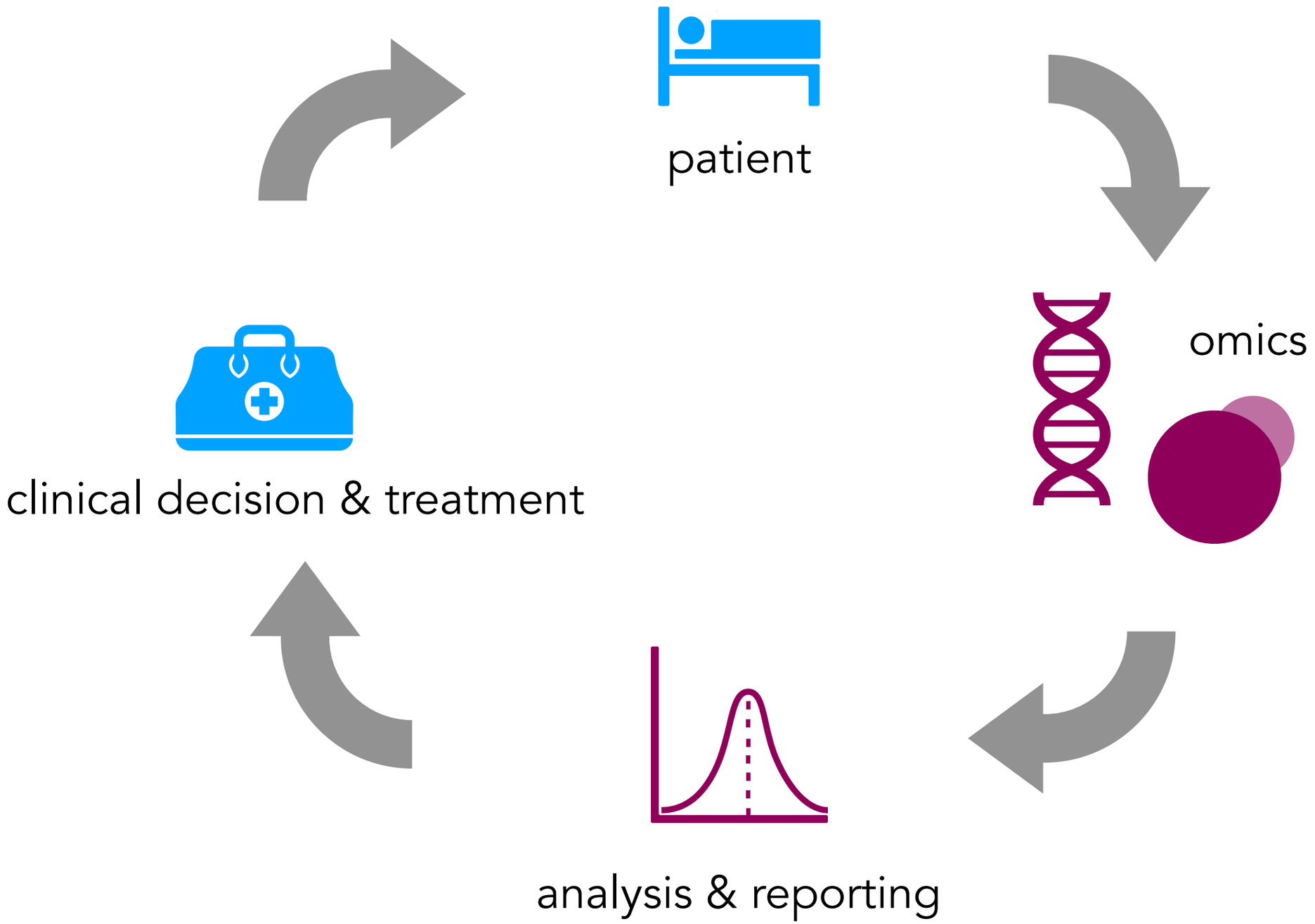
Crestor
High cholesterol

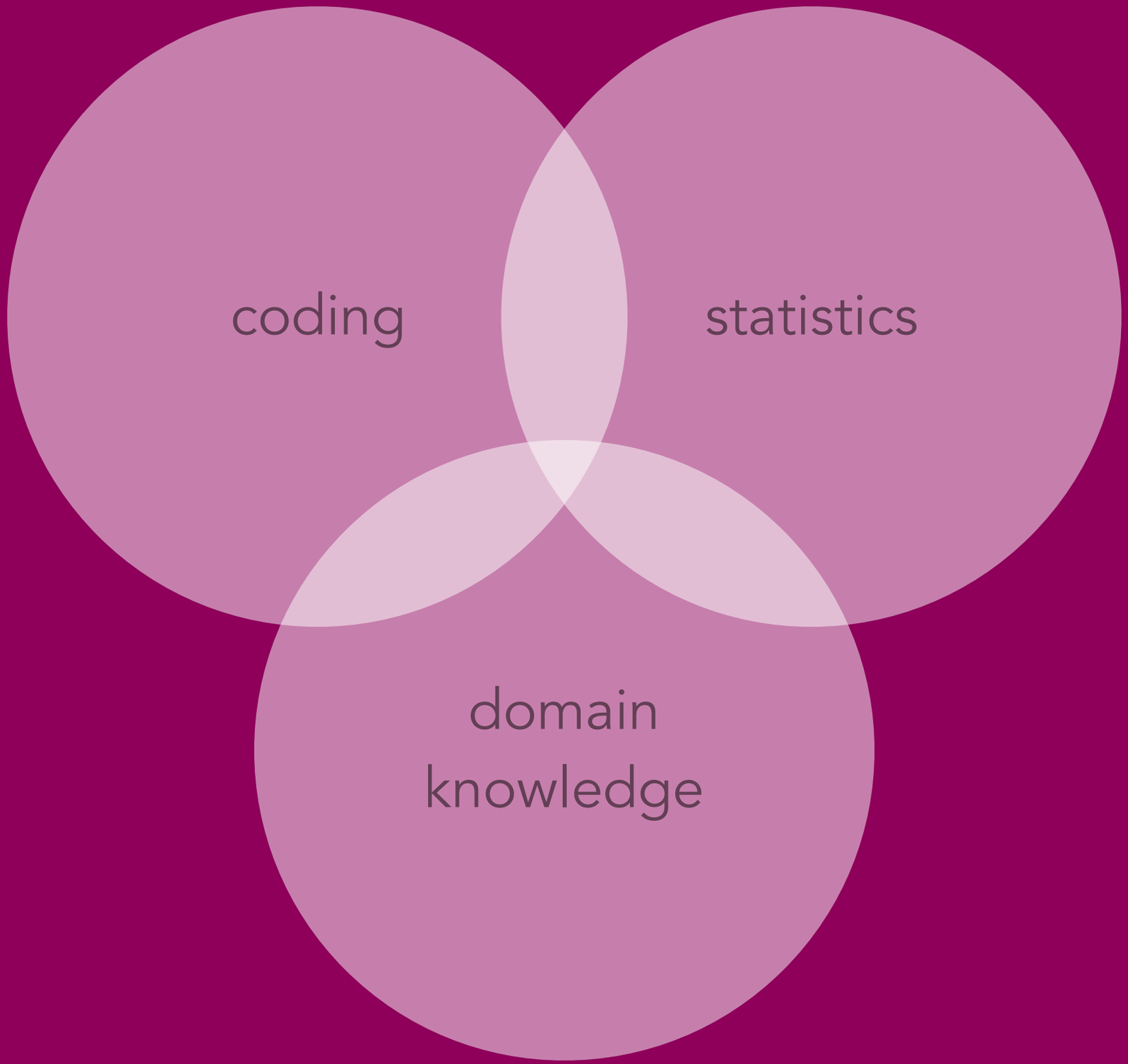


NNT (number needed to treat)

adapted from Schork, Nature, 2015

Molecular Tumor Boards




coding
statistics
domain
knowledge

Excel, Perseus, …

“Do you want to sell sugar water for the rest of your life?

Or do you want to change the world?

— Steve Jobs when recruiting Pepsi CEO John Sculley

R, Python, JavaScript, …