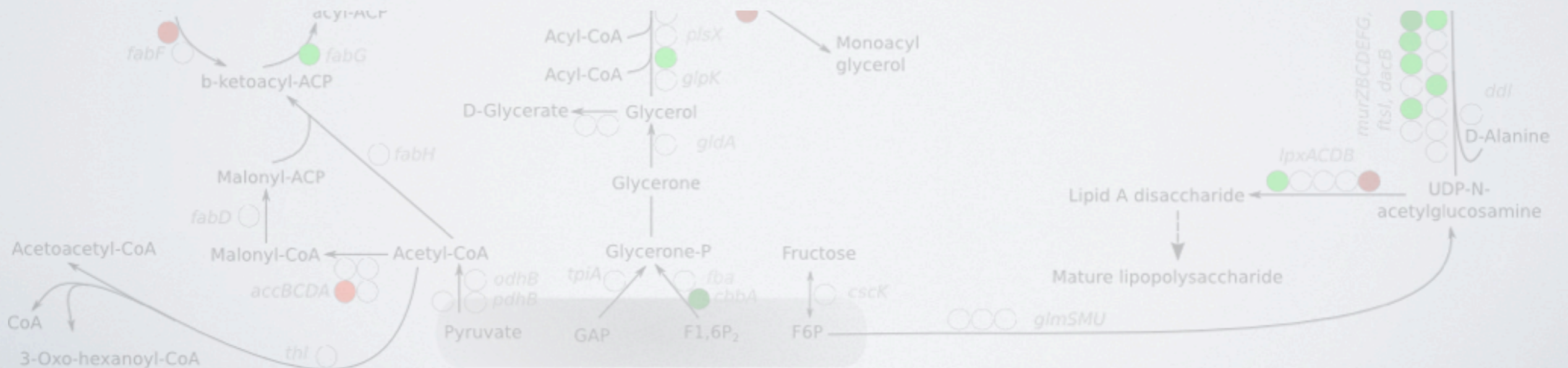


# SVGMAPPING 2

AN **R** PACKAGE TO MAP OMIC DATA SETS ONTO PATHWAYS TEMPLATES

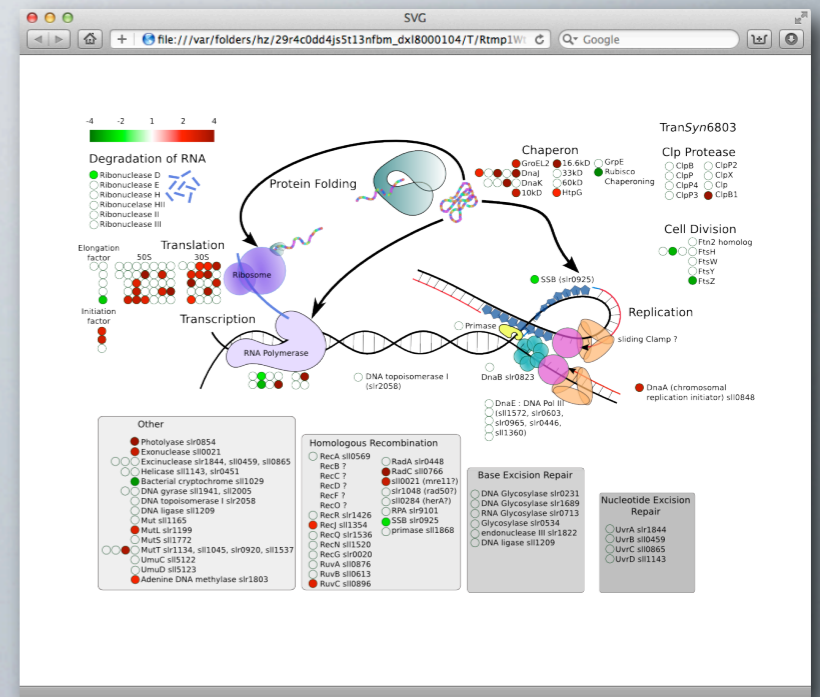
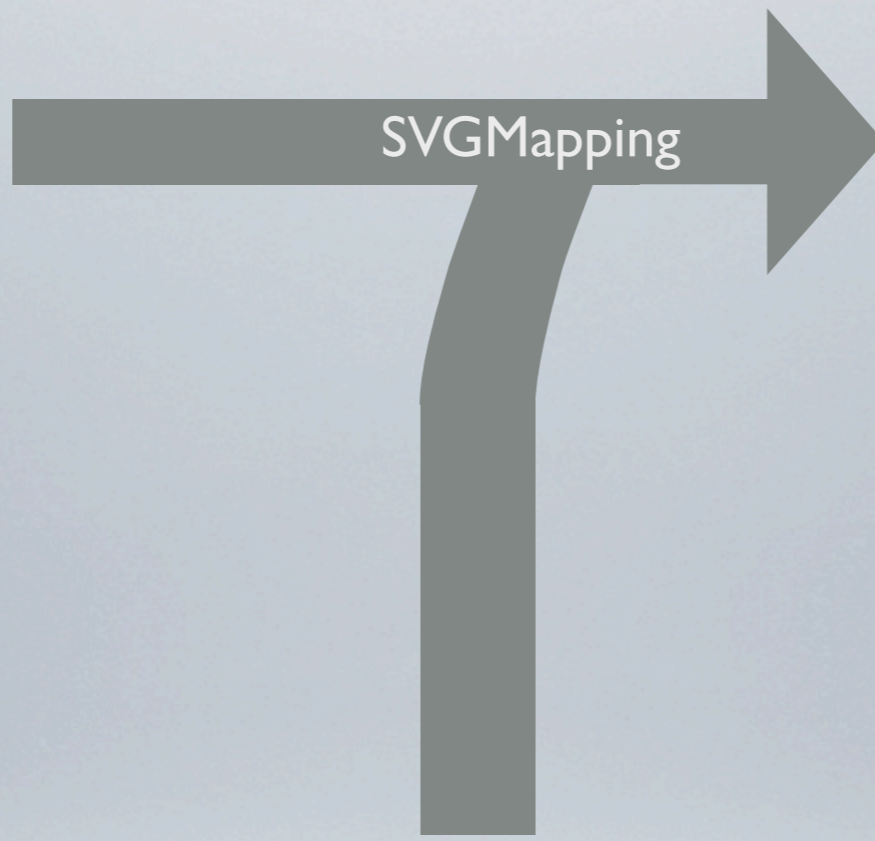
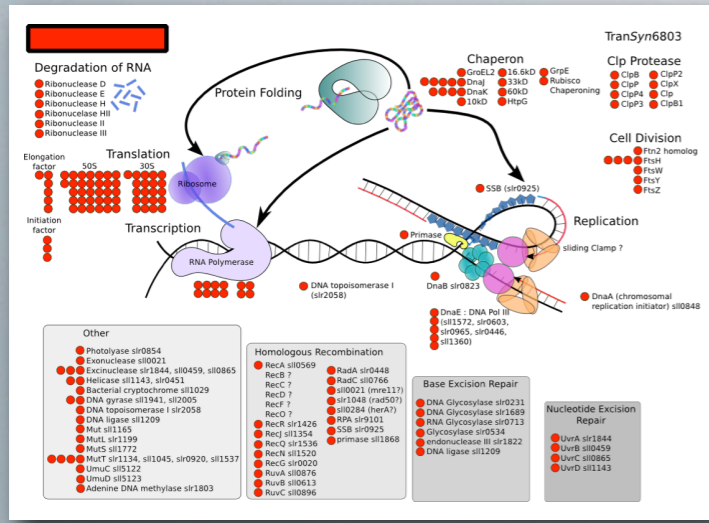
Jean-Christophe Aude, CEA







# Pathway Template

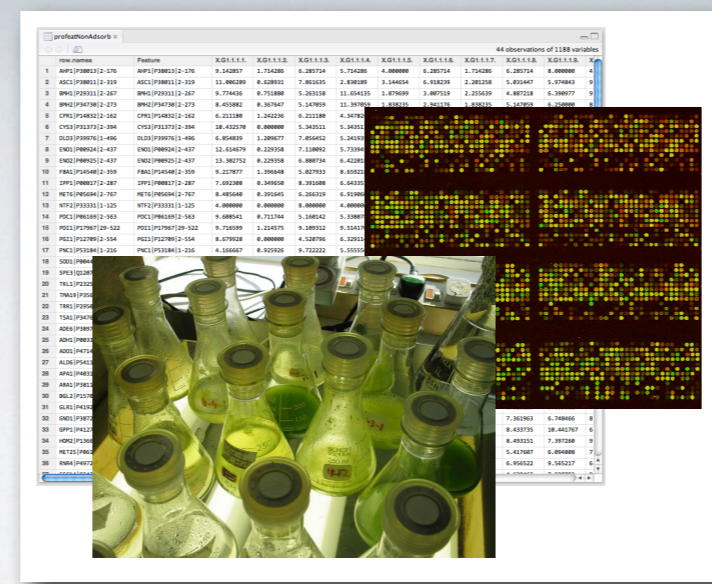


design

Pathway Experiment Map  
(dots are colored according to a gene expression measurement)



conduct



Experimental data:  
(microarrays, ngs, ...)

# Template Editing using Inkscape

**Detoxification System**

$H^+$   $O_2^-$   $H_2O_2$   $H_2O$

sodB (slr1516)

katG (slr1987)

Arsenate

arsl1 (slr5104)

arsl2 (slr6037)

Arsenite

arsC (slr0946)

Glutar

Glutaredox

$H_2O$

gpx1 (slr1171)

gpx2 (slr1992) 2 GST

Object Properties (Shift+Ctrl+O)

Id: slr1987

Label: [ ]

Title: [ ]

Description: [ ]

Hide  Lock

Interactivity

Fill: [Yellow] Stroke: [Black] 0,314

•Calque 1 Ellipse in layer Calque 1. Click selection to toggle scale/rotation handles.

X: 377,18 Y: 735,05 Z: 274%

ID (or Label) are used to identify visual shapes that will be modified (colors, stroke, ...)



SVG MAPPING = SVG + MAPPING

- **SVG** key features

- easy to use getter/setter
- pseudo-devices
- (basic) grid layout

- **Mapping** key features

- **Data = Values + Targets**
- **Transformation** function applied on values, before the mapping operation
- **Operations** used transformed values to alter target shapes or document

# (basic) grid-layout

- Creates **fixed** and **variable** grids one the whole document or within a rectangle:

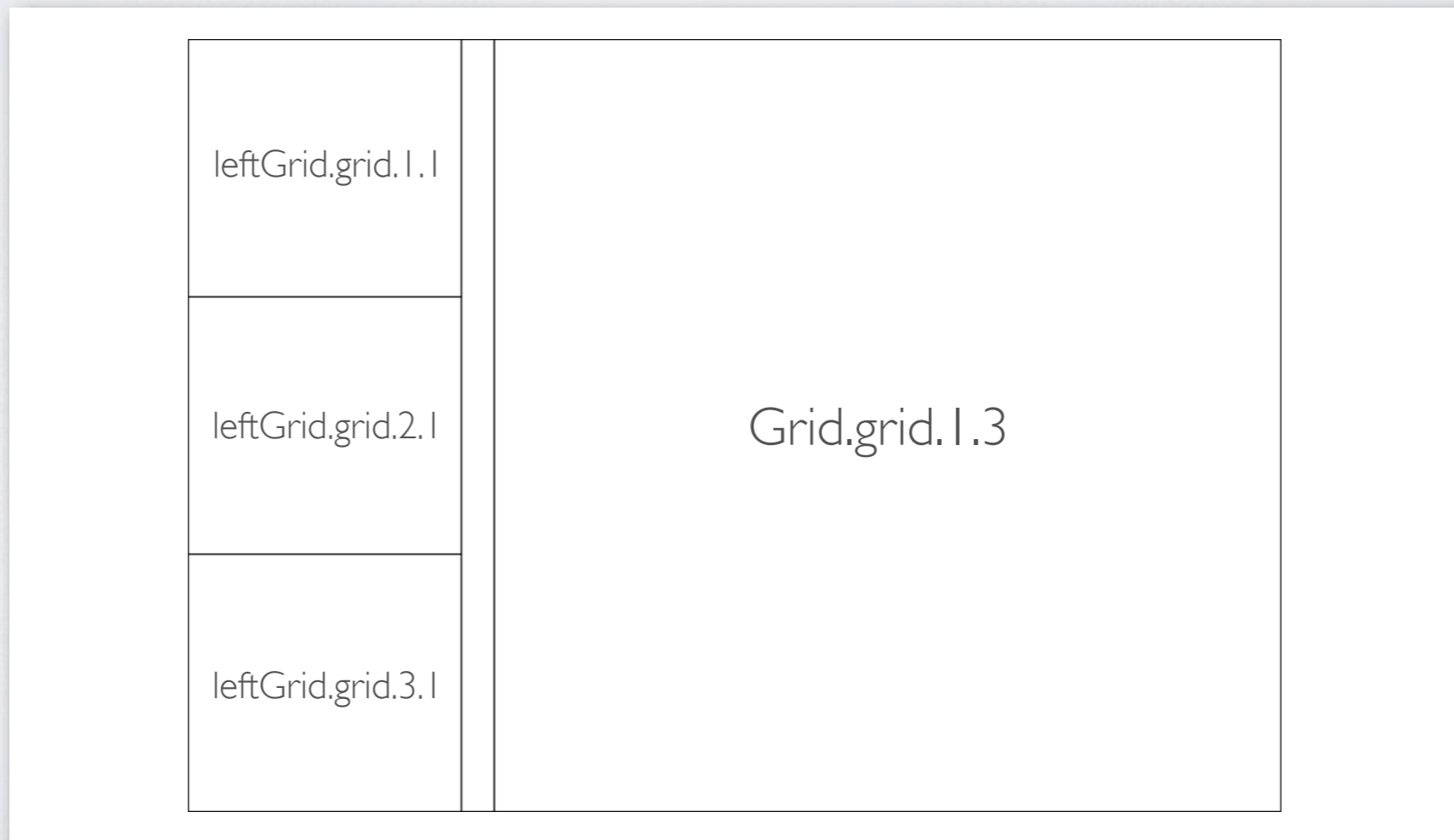
```
>blank <- SVG.factory(dims="a4", landscape=TRUE)
```

```
>vgrid <- VarGrid.factory(cols=c(0,0.25,0.28,1.0),opacity=1.0,prefix="Grid")
```

```
>layout(blank) <- vgrid
```

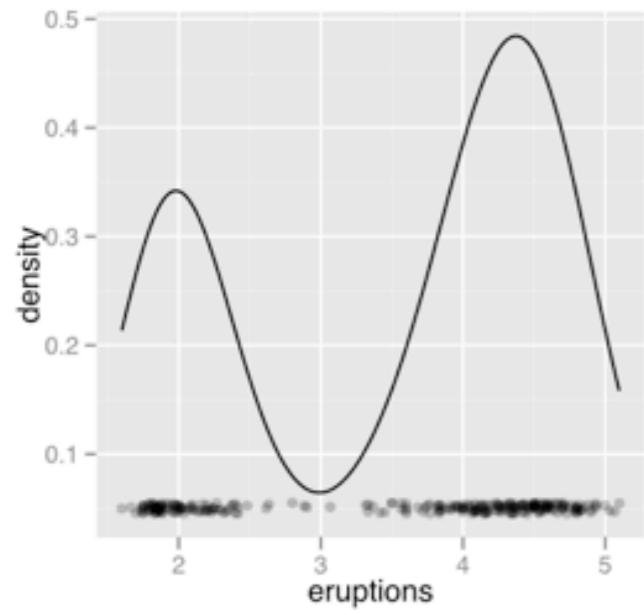
```
>lgrid <- FixGrid.factory(nrows=3,opacity=1.0,prefix="leftGrid")
```

```
>layout(blank,blank["Grid.grid.1.1"][[1]]) <- lgrid
```

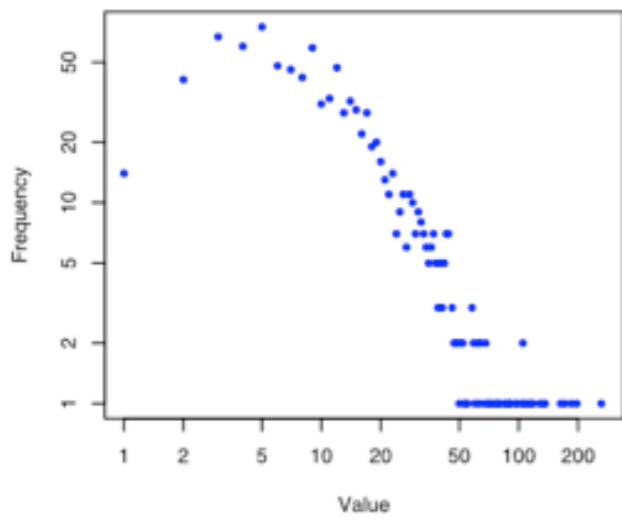




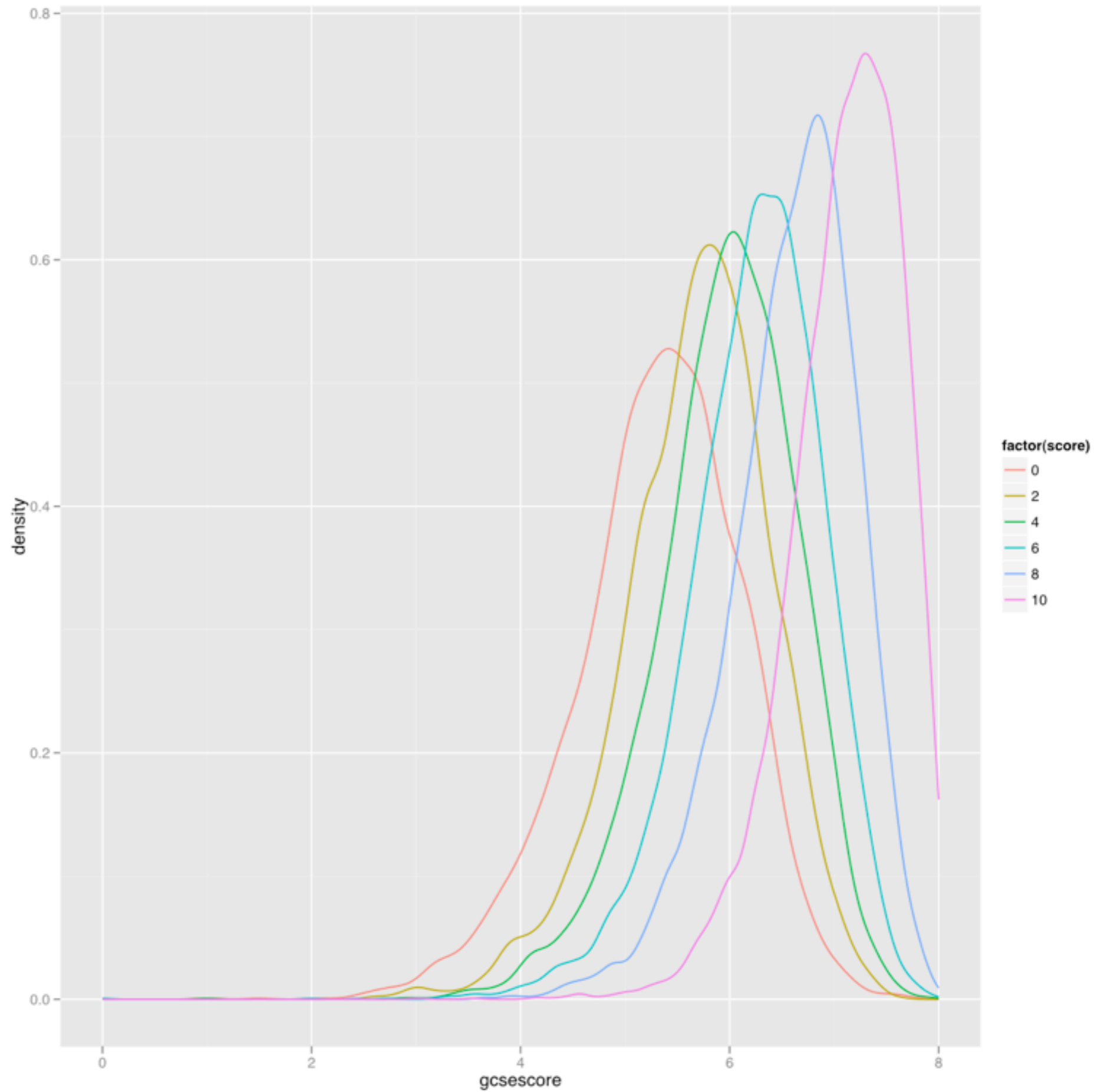
# (basic) grid-layout



Log-normal distribution



Cars



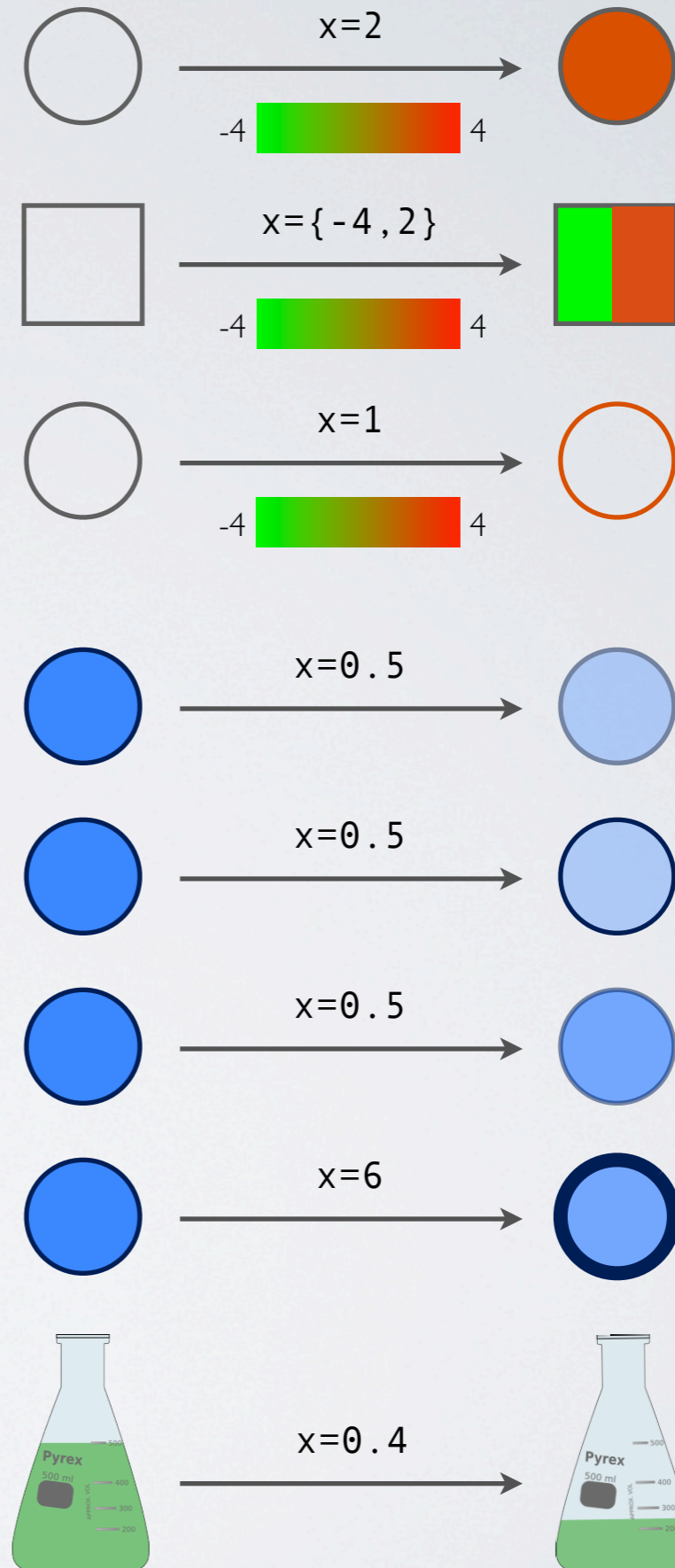
# Transformations

- Transformations are R function with the following prototype `function(x,p)`
  - `x` is a single data row (of a data-frame or vector) argument
  - `p` is the function parameter argument
- We provide a set of built-in functions:
  - `random(x,p={min,max})`, `identity(x)`,
  - `linear(x,p={a,b})`, `range-linear(x,p={a,b,min,max})`
  - `logistic(x,p={K,a,r})`, `sigmoid(x,p={r})`
  - `log2FC(x)` for microarrays log<sub>2</sub> ratios to fold-change conversions
- One can also used its own function:

```
id2url ← function(x,params) {  
  return(paste('http://uniprot.org/query.pl?geneid=',x,sep=' '))  
}
```

# Operations

- **MappingFillColor**: convert a numeric value to a fill color given a list of colors or a gradient
  - it also works with vectors....
- **MappingStrokeColor**: same as above for the stroke color
- **MappingOpacity**: set global shape opacity (input is in the range  $[0,1]$ )
- **MappingFillOpacity**: set the fill opacity
- **MappingStrokeOpacity**: set the stroke opacity
- **MappingStrokeWidth**: convert numeric values to a stroke width
- **MappingMasks**: apply a mask to partially hide a shape. The hidden fraction of the shape depends on the input value



TITLE

88:88

30.0 C  
25.0 C  
20.0 C  
15.0 C  
10.0 C  
5.0 C  
0.0 C  
-5.0 C  
-10.0 C  
-15.0 C  
-20.0 C

TEMP

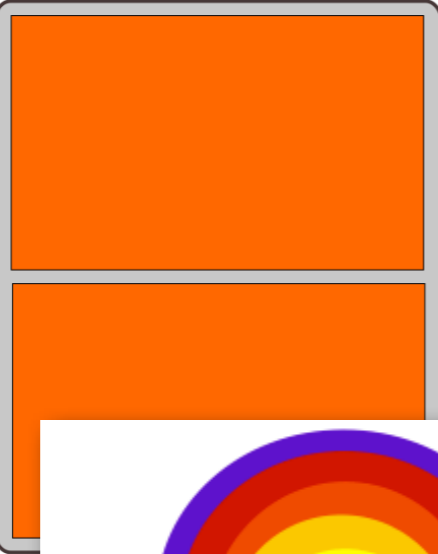
WIND

GAUGE

GAUGE

VALUE

VALUE



We can map other data as well...

Template

# Weather in Orsay Today..

16:22

30.0 C  
25.0 C  
20.0 C  
15.0 C  
10.0 C  
5.0 C  
0.0 C  
-5.0 C  
-10.0 C  
-15.0 C  
-20.0 C

16.8 °C

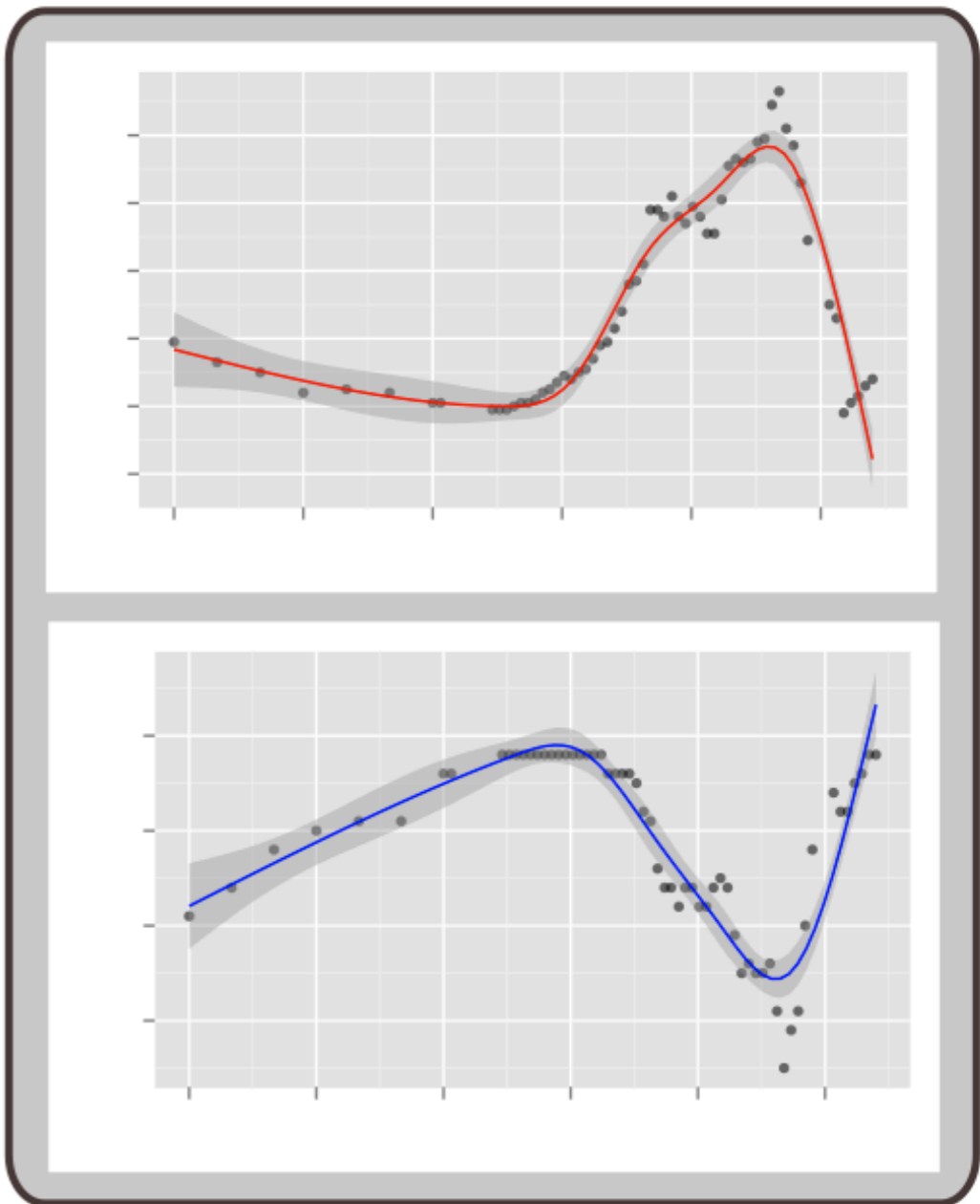
9.3 Km/h

ATM. Pressure

1007.3 hPa

Rel. Humidity

98 %



# CONCLUSION

- SVGMapping aims to map *omic* experimental data onto SVG template for visualization purposes
- What I have not talked about:
  - Geometric transformations (rotation, scaling ...)
  - Animations
- Complementary/Alternative packages:
  - SVGAnnotation (omegahat), RSVGTipsDevice, gridSVG
- Contributors:
  - Raphaël Champeimont, version 1.x main contributor
  - Christophe Leplat, *synechocystis sp.* pathway designer
  - Franck Chauvat, for the financial support
- Project hosted here <https://github.com/jcaude/SVGMapping/tree/V2> , please contact me before at [jean-christophe.aude@cea.fr](mailto:jean-christophe.aude@cea.fr)