

HOW TO BUILD A MID-SIZED ANALYTICAL APPLICATION WITH R + SHINY

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AGENDA

- ❑ About me
- ❑ The context / Why R + shiny
- ❑ Editors & IDEs
- ❑ Client vs. Server-side coding & data-driven UIs
- ❑ Reactivity
- ❑ Advanced Visualisation & Htmlwidgets
- ❑ Debugging
- ❑ The developing environment
- ❑ The Development team
- ❑ Summary



ABOUT ME

- ❑ Principal Consultant at SopraSteria since 2010
- ❑ Focusing on: NoSQL Architectures - Data Science & Data Visualization
 - +18 years experience in business analytics / data warehousing
 - +3 years experience in R & data science
 - +1 year experience in shiny
- ❑ Github page: [smartinsightsfromdata](#)

- ❑ Web:
 - www.smartinsightsfromdata.com (under construction!)
- ❑ Contact email :
 - enzo.martoglio@soprasteria.com work
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THE CONTEXT / WHY R + SHINY

□ Requirements

- Data entry
- Quick prototyping
- 9 business areas (more in the future)
- Extensible without coding
- >20 users
- Need for:
 - advanced visualisation
 - Montecarlo simulation / forecasting (future phases)



EDITORS & IDEs

❑ RStudio

- Data analysis
- Project management (project folder)
- Debugging

❑ Not enough!

❑ SublimeText

- Coding page-wide / side-by-side
- compatible with Rstudio project folder
- Syntax checking

❑ SublimeText Extensions

- Bracket highlighter
- R-box
- SublimeREPL



CLIENT VS. SERVER-SIDE CODING & DATA-DRIVEN UIS

- ❑ Html / JS code on the client

- ❑ Data sent to the client

- ❑ Example (ui.R)

```
sliderInput(inputId, label, min, max,  
value, step = NULL, round = FALSE,  
format = NULL, locale = NULL, ticks =  
TRUE, animate = FALSE, width =  
NULL, sep = ",", pre = NULL, post =  
NULL)
```

- ❑ Html / JS code sent to the client

- ❑ Data sent to the client

- ❑ Example (server.R)

```
lapply(1:iter, function(i) {  
  sliderInput(inputId =  
    paste0(cidRes$LPA[i], "_v1"), label =  
    paste0(cidRes$LPA[i], "headcount", "" )  
    , min = round(cidRes$head[i]*0.2),  
    max = round(cidRes$head[i]*1.8),  
    value = cidRes$head[i], ticks = FALSE,  
    animate = FALSE) })
```

- ❑ Using renderUI



REACTIVITY

□ Wikipedia

- In computing, reactive programming is a programming paradigm oriented around data flows and the propagation of change.
- For example, in an imperative programming setting, $a := b + c$ would mean that a is being assigned the result of $b + c$ in the instant the expression is evaluated. Later, the values of b and c can be changed with no effect on the value of a .
- In reactive programming, the value of a would be automatically updated based on the new values.

□ Features

- Fat client / single page
- a publish–subscribe pattern to automatically propagate data changes to clients in real-time without requiring the developer to write any synchronization code



REACTIVITY EXAMPLE

```
observe({  
  if(input$saveButtn == 0) return()
```



```
isolate({
```



```
  if(is.null(rmod() ) ) return()  
  if(is.null(input$inSubDep)) return()
```



```
[...]
```

```
status<- fSave(...)  
}) # end of isolate  
})
```



ADVANCED VISUALISATION & HTMLWIDGETS

- ❑ Today the most advanced visualisations are coded in Javascript in libraries like:
 - D3
 - C3
 - NVD3
 - And many many others

- ❑ Htmlwidgets is a wrapper of Javascript libraries
 - Use JavaScript visualization libraries at the R console, just like plots
 - Embed widgets in R Markdown documents and Shiny web applications
 - Develop new widgets using a framework that seamlessly bridges R and JavaScript

- ❑ My htmlwidgets (available on my github pages, on Cran in the future)
 - rpivotTable
 - Rdatamaps
 - Rd3pie
 - Everybody is welcome to download them and use them!!



DEBUGGING

- ❑ Print
- ❑ `Browser()` (wrapper of `debug()`)
- ❑ `options(shiny.trace = T)`
- ❑ `options(shiny.reactlog=TRUE)`
- ❑ Learn to use the javascript console!



THE DEVELOPING ENVIRONMENT

- ❑ Need to bridge different environments
- ❑ Client (browser choice: IE)
- ❑ Shiny Pro Server(Linux)
- ❑ Development in Windows and OSX

- ❑ (Why we didn't use dockers?!?s)



CONCLUSIONS

- ❑ R + shiny are fit for complex analytical applications
- ❑ You *mainly* need R + shiny skills (but html, css, JS, D3, chrome dev. Etc. are useful!)
- ❑ Today interactivity and advanced visualization are a must for collaborative data analysis
- ❑ Plan your widgets carefully
- ❑ Work at the bleeding edge, but use your wisdom...



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