

# TSACE WEBINAR, UPDATED IN MARCH 2023



## Using JDemetra+ in R: from version 2 to version 3 Presentation 3: Wrangling workspaces in R

ANNA SMYK AND TANGUY BARTHELEMY  
With the collaboration of Alain Quartier-la-tente

# Contents

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## 1. Introduction

### 1.1 Context

## 2. Using workspaces and R packages in conjunction

## 3. Instant reading

## 4. Automating operations

## 5. Conclusion

# Context

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- in R we don't need a workspace structure to run an SA process (cf P2)
- we could think SA processing with JD+ algorithms can happen in two distinct worlds
  - graphical user interface (GUI) and cruncher using workspaces

OR

- R functions (without workspaces, TS object or numeric vectors for HF)

Still there are benefits in using workspaces and R packages in conjunction

We will highlight them in the remaining of this presentation

# Workspace structure

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- a workspace is a JD+ specific data structure (XML files) which allows to use the GUI and cruncher

Workspaces have two diserable properties:

- reading by GUI (1)
- refreshing (with new raw data for example) by GUI or cruncher (2)

If a workspace doesn't contain the sufficient metadata (path to the raw data), only the first property (1) will be available.

# SA-item in XML files

```

10 <item name="sal">
11   <subset>
12     <item name="ts">
13       <ts name="RF0610">
14         <freq>12</freq>
15         <firstYear>1990</firstYear>
16         <firstPeriod>1</firstPeriod>
17         <data>395.8926090299 343.7928207085 395.4631480891 ...</data>
18         <metaData>
19           <property name="@timestamp" value="Fri Dec 09 17:11:16 CET 2022"/>
20           <property name="@source" value="Txt"/>
21           <property name="@id" value="demetra://tsprovider/Txt/20111201/SERIES?cleanMissing=true&
22             datePattern=dd%2FMM%2Fyyyy&
23             delimiter=SEMICOLON&
24             file=C%3A%5CUsers%5C5Cdata%5Craw_data.csv&
25             locale=en&numberPattern=#seriesIndex=0"/>
26         </metaData>
27       </ts>
28     </item>
29     <item name="domainspec">
30     <item name="pointspec">
153 <item name="estimationspec">
238 <item name="quality">
241 <item name="policy">
244 </subset>
245 </item>

```

# Contents

---

## 1. Introduction

## 2. Using workspaces and R packages in conjunction

## 3. Instant reading

## 4. Automating operations

## 5. Conclusion

## Using workspaces and R packages in conjunction

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Two principal classes of benefits:

- instant reading: immersing results in the R world (functions, plots..)
- automating potential manual operations for large datasets

## Packages operating on workspaces

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We will use the packages **RJDemetra**, **rjdemetra3** and **rjdworkspace**.

The packages are available here:

- **RJDemetra** on CRAN or <https://github.com/jdemetra/rjdemetra>
- **rjdemetra3** on <https://github.com/rjdemetra/rjdemetra3>
- **rjdworkspace** on <https://github.com/InseeFrLab/rjdworkspace>.

To install it use the following code:

```
# If devtools is not installed
# install.packages("devtools")
library("devtools")

install.packages("RJDemetra")
install_github("https://github.com/rjdemetra/rjdemetra3")
install_github("https://github.com/InseeFrLab/rjdworkspace")
```



# Contents

---

1. Introduction
2. Using workspaces and R packages in conjunction
- 3. Instant reading**
4. Automating operations
5. Conclusion

# Instant reading of workspaces

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In a workspace, we read:

- output series
- parameters
- diagnostics

Thanks to R packages, no export + import but directly:

- import in R physical workspaces
- automatic and chain reading → many series and quickly
- make faster comparisons

## Instant reading in v2

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In **RJDemetra** (v2), the function `RJDemetra::load_workspace()` creates a connection between a physical workspace and a R object and allows to read every multiprocessing and SA-items.

Code example:

```
ws <- RJDemetra::load_workspace("./WS_input/WS_simple.xml")
RJDemetra::compute(ws)

mp_1 <- RJDemetra::get_object(ws, pos = 1)
sa_item_1 <- RJDemetra::get_object(mp_1, pos = 1)
model_sa_1 <- RJDemetra::get_model(sa_item_1, workspace = ws)
```

Later we will produce the same workspace result with **RJDemetra** in the **Reproduce workspace** section.

## Instant reading in v3

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In **rjdemetra3** (v3), the function `rjdemetra3::load_workspace` imports directly in our R working directory all the informations (multiprocessing, SA-item...) in a R object (list).

Code example:

```
ws <- rjdemetra3::load_workspace("./WS_input/WS_simple.xml")
```

This single line does the same job as the previous 5 of version 2.

Today, the connection between R packages v3 and the workspace structure is under construction.

There are no functions yet to navigate this object. So from now on, I will only present the functions of version 2.

# Contents

---

## 1. Introduction

## 2. Using workspaces and R packages in conjunction

## 3. Instant reading

## 4. Automating operations

### 4.1 Creation

### 4.2 Export

### 4.3 Handling SA-item

### 4.4 Handling several workspaces

## 5. Conclusion

# Automating operations on workspaces

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Goals:

- produce and reproduce the workspace structure without the JDemetra+ GUI but with R
- keep the reading, writing and refreshing properties both by the GUI and by the cruncher
- enable dynamic updates of physical workspaces with R

# Outline of the automation

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Different kind of operations possible in R:

- creation of workspaces, multiprocessing and SA-item
- export and write a workspace (physical XML files)
- modification / dynamic update with one or several workspaces

## Creation of a workspace

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**RJDemetra** has a collection of functions to create a workspace and each element (multiprocessing, SA-item...) and to bring it together:

- create a *virtual* workspace: `RJDemetra::new_workspace()`
- create a *virtual* multiprocessing: `RJDemetra::new_multiprocessing()`
- create a specification, there are several functions depending on the method:  
`RJDemetra::x13_spec()`, `RJDemetra::tramoseats_spec()`...
- create an SA-item, there are several functions depending on the chosen specification:  
`RJDemetra::x13()`, `RJDemetra::tramoseats()`...
- Finally to bring the elements together, you can use `RJDemetra::add_sa_item()` to add the created SA-item to a multiprocessing in your workspace

*virtual object = composed of R object*



# Reproduce workspace

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Here we reproduce the SA-item read in the **Instant reading in v2** section

```
# Data preparation
raw_data <- read.csv2("../data/raw_data.csv", dec = ".") |>
  ts(start = 1990, frequency = 12)

# Create WS
ws <- RJDemetra::new_workspace()
mp_1 <- RJDemetra::new_multiprocessing(workspace = ws,
                                       name = "SAProcessing-1")

spec_x13 <- RJDemetra::x13_spec(spec = "RSA3")
model_sa_1 <- RJDemetra::x13(raw_data, spec = spec_x13)
```

# Export

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For the export part, the function `RJDemetra::save_workspace()` exports and creates a workspace (XML files).

Warning: if the workspace has been created by `RJDemetra::new_workspace()`, he won't contain sufficient metadata to be refreshable by the GUI or the cruncher.

## rjdworkspace and dynamic update

**rjdworkspace** is a package developed by Insee to fill in the gaps between the workspace structure and R.

It relies on **RJDemetra** (v2) but will be soon added to the new package **rjdemetra3**. **rjdworkspace** only works with physical workspaces (XML files).

## rjdworkspace features

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The features offered by this package are:

- Modification on 1 workspace:
  - handle SA-object
  - handle metadata
- Modification on 2 workspaces:
  - update a workspace with the informations contained in another one
  - transfert SA-object from a workspace to another

$SA-object = \{SA-item, multiprocessing... \}$

**rjdworkspace** operations always keep workspaces readable by GUI and refreshable with the GUI and the cruncher.

# Handling SA-item

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To handle SA-item, it is possible to:

- add new SA-item: `rjdworkspace::add_new_sa_item()`
- remove a SA-item: `rjdworkspace::remove_sa_item()`
- replace a SA-item by another: `rjdworkspace::replace_sa_item()`
- modify a SA-item: `rjdworkspace::set_name()`, `rjdworkspace::set_spec()` and `rjdworkspace::set_ts()`

# Handling metadata

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- handling comments: `rjdworkspace::get_comment()` and `rjdworkspace::set_comment()`
- handling raw data path: `rjdworkspace::update_path()`

# Handling several workspaces

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- update SA-item: `rjdworkspace::replace_series()`,  
`rjdworkspace::transfer_series()`
- handling all metadata: `rjdworkspace::update_metadata()`

# Contents

---

1. Introduction
2. Using workspaces and R packages in conjunction
3. Instant reading
4. Automating operations
5. Conclusion



## Summary of available functionalities

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With the combination of **RJDemetra** and **rjdworkspace**, there are a lot of features to handle workspaces with R.

In an annual review, it makes it easier to:

- copy, merge and update workspaces
- update and select SA-item

than doing it by hand with the GUI.

## Missing functionalities and future developement

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Unfortunately, the creation of workspace hasn't been fully developed yet.

Version 2 using RJDemetra doesn't allow to create from scratch workspaces which are readable and refreshable by the GUI.

Version 3 is under construction. In the future, it will contain the functions of **rjdworkspace** and will be further expanded.