EJ Reproducibility Checks: Workflow

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ROYAL ECONOMIC SOCIETY

Version History:

v1: The bulk of this was the work of Joan Llull.
v1.1: Minor additions by Florian Oswald.
v1.2: Updates and comments from Brooke Sperry

Purpose of this document

This document describes the current workflow for reproducibility checks at `EJ`.

Input: Replication package provided by the authors of accepted papers.

Outputs:

1. Email interactions with the authors during the process (via Editorial Express, `EE`),
2. clearance with authors after the checks are successfully completed (via `EE`),
3. metadata collection on each article at in spreadsheet `SS` (via Google Docs, see below).

Interested Parties:

1. EJ Data Editor: Florian Oswald
2. EJ Editorial Office.
    1. RES Publications Manager, Brooke Sperry
    2. Editorial Office London, Nicky Cotterill and colleagues.
3. RES Replicators

Glossary:

Abbreviation	Meaning	comments
EJ	The Economic Journal	website.
EO	EJ Editorial Office	Team in London which manages overall publication process
ME	Managing Editor	Person in charge of accepting/rejecting papers at EJ
DE	Data Editor	Person in charge of managing reproducibility checks at EJ
EE	Editorial Express	online platform to handle journal publications. login
HT	EE Holding Tank	place on EE where all submitted/conditionally accepted papers are visible.
SS	Shared Spreadsheet	Main google docs spreadsheet to log all operations, Replicator availability and time use. Restricted access.
DB	Shared Dropbox folder	Dropbox folder storing all replication packages. Florian place package there, replicators download from here. *Read-only* access for everyone.

Workflow in Detail

Let us proceed chronologically. The paper has just been *conditionally accepted* by the managing author (ME).

Step 1. Editorial Office: Author communication

1. After conditional acceptance by the ME, EO communicates with the authors of the paper, sending them instructions about how to produce the replication package and the checklist that authors should submit.
2. EO also refers the authors to the Data Editor's website at https://ejdataeditor.github.io for detailed instructions on how to prepare and upload the package.

Step 2. Data Editor (Florian): Acquisition of package

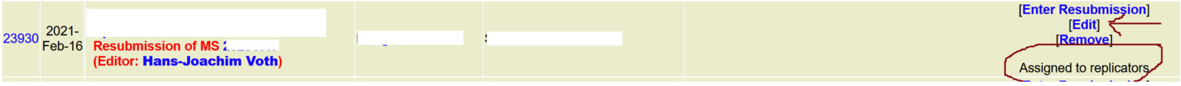
When the authors (re-)submit the package via EE, Florian sees and downloads the paper from EE's Holding Tank (HT). The HT includes papers which are

1. initial submissions,
2. revisions, and
3. conditionally accepted articles.

EO handles the first two types, Florian downloads the third type. Nicky checks the HT frequently for conditionally accepted papers, downloads their replication package and places it into folder `2. Submitted replication packages` of the shared dropbox DB, which has the following layout:

```
1 Key documents
2. Submitted replication packages
3. Replication reports
4. Background documents
5. Back office Data Editor
```

He then leaves a note on EE as shown in figure Figure 1. Notice that this happens *after the article has been assigned to replicators*!



23930 2021-Feb-16 [redacted] Resubmission of MS [redacted] (Editor: Hans-Joachim Voth) [redacted] [redacted]

[Enter Resubmission]
[Edit]
[Remove]

Assigned to replicators

Figure 1: Acquisition of Replication Package from EE HT on behalf of the DE. Notice manual addition of comment.

Step 3. Data Editor: Logging of Metadata and Replicator Assignment

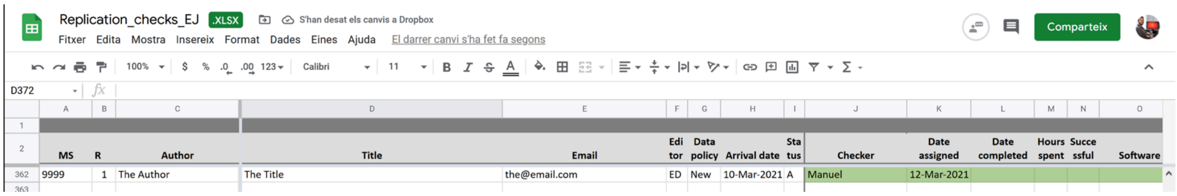
Florian creates a new entry (*a new row*) in SS (shared via link on google sheets) including all the relevant meta-data for the article, and assigning it to a replicator.

The relevant columns to be filled by Florian include:

1. MS: Manuscript number
2. R: Current round of the reproducibility checks (1,2,3,...)
3. Author, Title, Email from the authors, ME's initials, Data Policy
4. Arrival date: the date at which paper arrive in HT (Feb 16 in the example above).
5. Status: when assigning it to replicators, status should be A (for assigned).
6. Checker: pick one of the available replicators

7. Date assigned: the date at which this Replicator Assignment is performed.

After those fields have been entered, the Data Editor section of the spreadsheet turns white, and the replicator's part turns green. Florian usually sends a short email to the replicator indicating that a new paper has been assigned, but it is the job of the replicators to regularly check whether they have papers assigned. This is illustrated in figure Figure 2.


Replication_checks_EJ
.XLSX
S'han desat els canvis a Dropbox
Fitxer Edita Mostra Insereix Format Dades Eines Ajuda
El darrer canvi s'ha fet fa segons
Comparteix
100%
Calibri
11
D372

MS	R	Author	Title	Email	Editor	Data policy	Arrival date	Status	Checker	Date assigned	Date completed	Hours spent	Successful	Software
9999	1	The Author	The Title	the@email.com	ED	New	10-Mar-2021	A	Manuel	12-Mar-2021				

Figure 2: DE logs meta data of replication package.

Step 4. Replicators

Replicator Availability

- The replicators declare their *current* availability to handle papers in the corresponding section of the SS, by modifying column Availab. in this part of the spreadsheet, with the understanding that Availab. = 2 would mean that the replicator can handle 2 packages *starting today*:

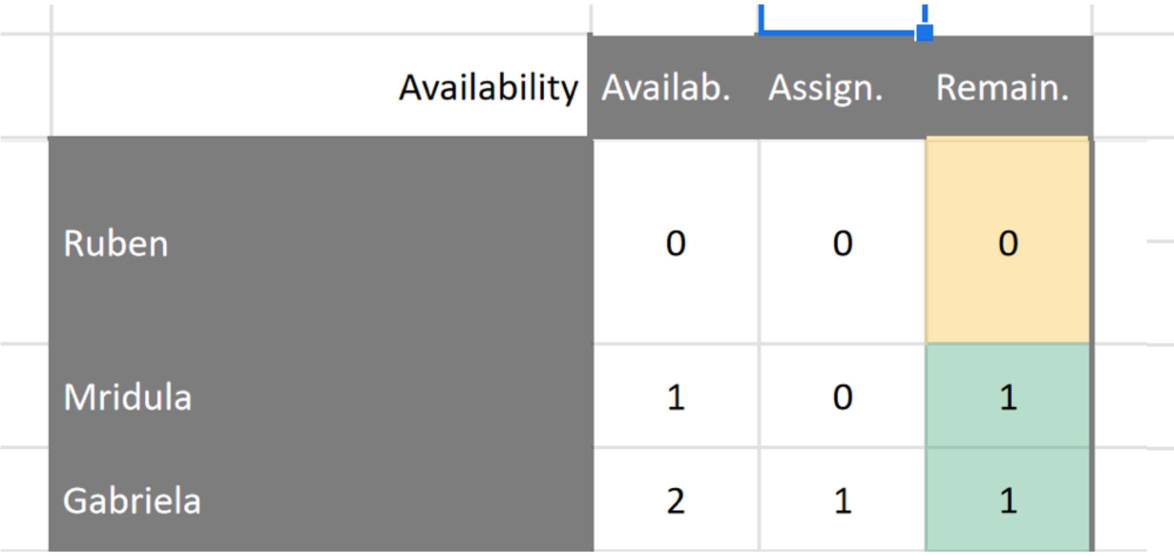
The spreadsheet fills in the second and third columns and determines the color of the third column. This helps Florian assigning replicators efficiently, and allows replicators to be idle if they need to be so.

Replicator Timeline

- As noted above, the day a paper is assigned to a replicator, their section of the google sheet becomes green. Five days after the paper has been assigned to the replicator, it automatically turns yellow, and 10 days after assignment it turns red.
- Our target is for the replicator to **complete any given package within 7 days**. The color scheme is supposed to help replicators manage this deadline, see figure Figure 4.

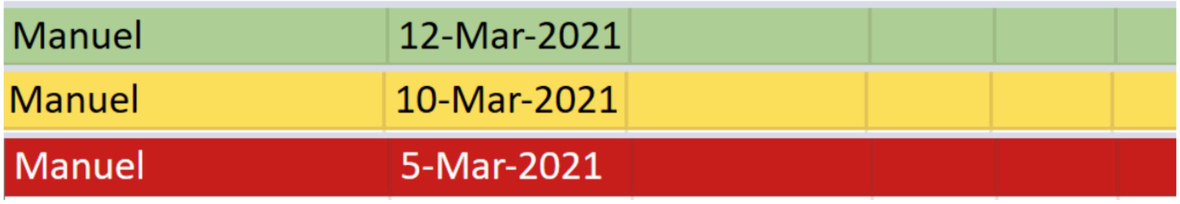
Replicator Workflow

Notice that this section is close to identical whether the replicator uses their own machine or the cloud based ***nuvolos*** *system*



Availability	Availab.	Assign.	Remain.
Ruben	0	0	0
Mridula	1	0	1
Gabriela	2	1	1

Figure 3: Replicator availability section in `SS`. Replicators edit column `Availab`.



Manuel	12-Mar-2021
Manuel	10-Mar-2021
Manuel	5-Mar-2021

Figure 4: Replicator Timing indicator

1. Navigates to shared `DB` folder `2. Submitted replication packages`, and looks for the correct submission number and Author names.
2. From that folder, downloads a copy of package from `3. Replication Package` of the corresponding paper in the shared dropbox to their local drive. Notice that `3. Replication Package` is *read-only* on the dropbox, so replicators are **forced** to do their work outside of it.
3. Replicator starts clock.
4. Replicator studies the package.

    1. This will involve a very close reading of the `README` file.
    2. It will also involve a quick reading of paper and appendices:
        1. To get an overview of what the required outputs of the replication package are. This includes all figures, tables and other numerical results.
        2. To carefully check the data citation practice. All datasets need to be cited like any other reference (i.e. like a cited paper).
    3. Next, follows contained instructions, and tries to reproduce all results in the paper. If the contained instructions are insufficiently precise so that after 60 minutes the replicator has not gained an understanding of how certain results can be reproduced, we abort and go to the next step. This does *not* include actual runtime, which can be significantly longer.

5. Replicator stops clock. (If program requires significant runtime, this is not billed as replicator time.)
6. Fills in reproducibility report, a template for which is stored in shared `DB` at `3. Replication reports`
7. Fills in corresponding section of `SS` with relevant data:

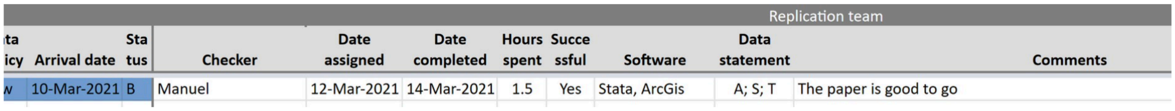
    - Completion date
    - Time spent (in hours. 1.9 hours is 1h 54min): *This information will determine the replicators payment.*
    - Whether the checks were successful or not (Y/N)
    - List the software used. Multiple softwares in comma separated list like `stata,fortran,matlab`. Do not include versions, like `stata 18 (MP2)`.
    - The type of Data Statement that should be published with the paper. This can be one of `A,S,T,P` or the combinations `A;T`, `A;S`, `A;S;T`. The meaning of each is explained in tab *Codes* of `SS`.

8. Replicator turns switch `Status` from *A* (assigned) to *B* (back to DE)

In short, the Replicator fills out the part of the `SS` shown in figure Figure 5.

Replicator: Precise Guidelines

This section provides some guidelines for what a replicator should look out for in a package, and things which may be included in their report to the `DE`.



Replication team

ta icy	Arrival date	Status	Checker	Date assigned	Date completed	Hours spent	Successful	Software	Data statement	Comments
w	10-Mar-2021	B	Manuel	12-Mar-2021	14-Mar-2021	1.5	Yes	Stata, ArcGis	A; S; T	The paper is good to go

Figure 5: Replicator fills out spreadsheet after completion of checks.

Any of those conditions not met means that the replicator can comment on it in their report. All conditions go under the common heading *making replication less cumbersome*.

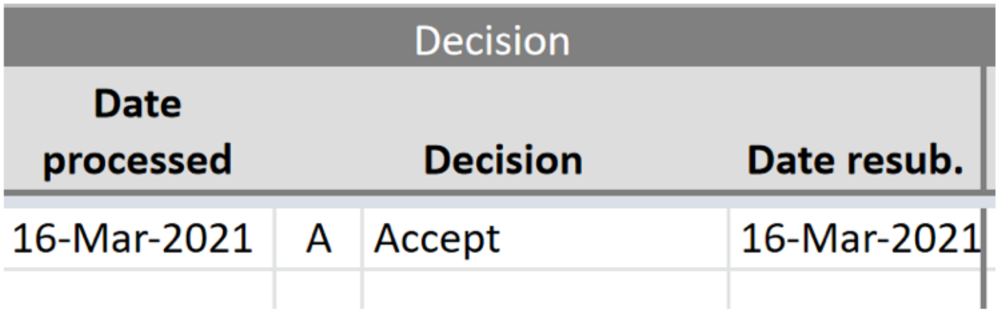
1. The `README` needs to contain *all necessary information* to reproduce the findings in the paper. It should not be required to read the actual source code in order to find out which part of the code produces with part of the output.
2. The produced output should appear in a clearly designated location, ideally a separate folder called `output`.
3. The produced output should be easy to identify via filename. For example, figure 1 in the paper should correspond to `output/figure1.pdf` in the package.
4. The package *must contain* all primary data sources. This is particularly important for cases like *we downloaded the data from www.xyz.com couple of years ago*. The data might no longer be available at this location, or it may be hard to find.
5. The `README` should contain a clear description of the full data processing pipeline, starting with reading the primary data sources, processing codes and intermediate results, ending in final outputs.
6. The replication package should save produced output to files, and not only display results on screen, because this makes it very cumbersome to find and verify single outputs in the paper.
7. The `README` should contain a clear description of the steps one needs to perform to replicate *each result in the paper/appendix*. A single driver script (for example `master.do` or `run.m`) is convienient, however, the gold standard is a table like the following:

Output in Paper	Output in Package	Script/Program to execute
Table 1	`output/tables/table1.tex`	`code/table1.do`
Figure 1	`output/plots/figure1.pdf`	`code/figure1.do`
Figure 2	`output/plots/figure2.pdf`	`code/figure2.do`

Step 5. Data Editor Decision

Florian reviews the replicator's report, sends a final decision to the authors, including the report, and, if revisions are needed, summarizes the content of the report. If further revisions are needed, Florian changes the status to “R” (Revision) or “M” (Minor changes), depending on whether the revisions will require sending the package back to the replicators ("R") or not ("M"), and fills the corresponding information on the decision section:

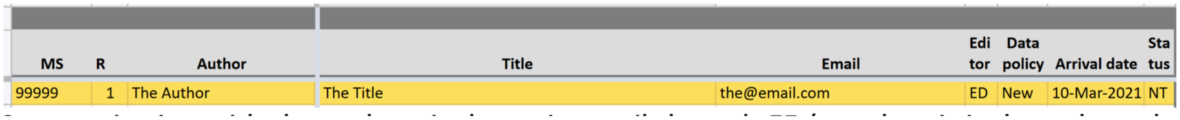
- Date Decision taken
- Decision Code: `A` Accept, `R` Major Revision, `M` Minor revision and short description
- In case a package is resubmitted for the first time, the date of re-submission will be included to close this entry, and a new entry (*row*) will be created with revision number equal 2. If the re-submission is a minor comment, Florian changes the Status as described below but do not change the code of the Decision section. If the initial outcome of this iteration is already accept, mark the code as "A", and introduce the current date also as re-submission date, as in figure Figure 6.



Decision			
Date processed		Decision	Date resub.
16-Mar-2021	A	Accept	16-Mar-2021

Figure 6: Acceptance Decisions of the `DE` upon resubmission.

- If no further revisions are needed, Florian notifies the authors accordingly and changes the status of the google sheet to "AP" (acceptable package), at which point it returns to the `EO` for plagiarism checks and final communications with the authors. After this, `EO` sets the status field to `NT` (meaning ready for publication but **N**ot **T**ransferred yet). At that point, the first section of the google sheet turns yellow:



MS	R	Author	Title	Email	Editor	Data policy	Arrival date	Status
99999	1	The Author	The Title	the@email.com	ED	New	10-Mar-2021	NT

Figure 7: `EO` sets status to *Not Transferred* Status

Step 6. Editorial Office: Request `Zenodo` Upload

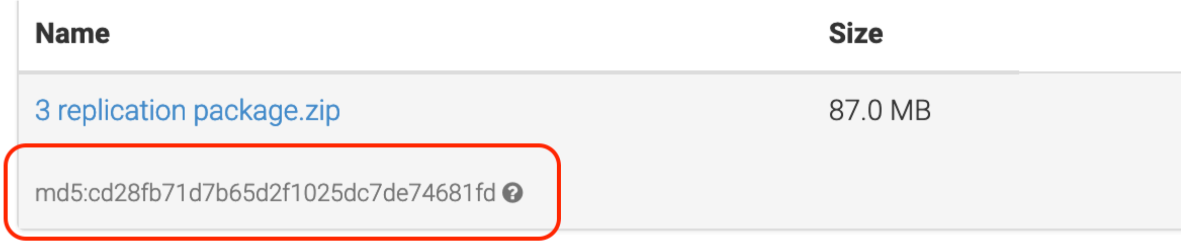
`EO` sends an email to the authors via `EE` (copying Florian and Brooke) with a request to upload the package to the `EJ` community at Zenodo, as indicated on the DE's website.

`EO` adds an important reminder for the authors in their message:

> ⚠ Important Reminder: No Further Modifications of Replication Package!
>
> It is *very important* that you do no longer modify the contents of your replication package. This includes adding, removing, or editing contained files and folders. The EJ Data Editor team will compare the digital fingerprint of the files you publish on `zenodo.org` against the fingerprint of the final version of your package, which the Data Editor accepted. Those digital fingerprints need to match.

This reminder is also on the `DE`'s website.

This *digital fingerprint* is the so-called `md5sum`, which can be used to compute a unique *checksum* of a set of data. This technology is widely used in (open source) software distribution, in order to certify integrity of downloaded software. For example, each `R` package has an associated `md5 checksum`. On `zenodo`, this is displayed as follows:



Name	Size
3 replication package.zip	87.0 MB
md5:cd28fb71d7b65d2f1025dc7de74681fd ?	

We will compute our version of the `md5` string on the finally accepted version of the replication package, located here in the shared `DB`:

```
  2. Submitted replication packages
      MS_NUMBER_OF_PAPER
          3. Replication Package
```

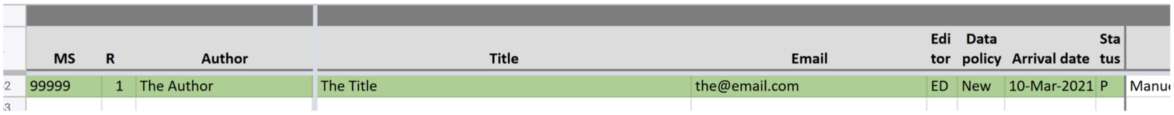
The computation of the `md5` on our side is straightfoward. In `R`, for example, one would run command

```
# Assume we navigated into the above directory in `DB`
# can run this on command line or directly in `R`
$ Rscript -e 'tools::md5sum("3 Replication package.zip")'
         3 Replication package.zip
"93b6634a97954d6cbfefa56f9dff315e"
```

The string `"93b6634a97954d6cbfefa56f9dff315e"` needs to match the string on zenodo, or the paper will not be released for publication.

Step 7. Editorial Office: Return to ME

After the EO completes the plagiarism checks, as per agreement with the MEs, the EO makes the final acceptance of the paper (unless the authors have changed the content of the paper during replication checks, in which case it is sent back to the ME for approval before final acceptance). After which it is transferred to Oxford University Press (OUP) for publication by the EO. When the file is transferred to OUP, it is marked in the system with a status of “P”, after which the entry turns green:



	MS	R	Author	Title	Email	Editor	Data policy	Arrival date	Status	
2	99999	1	The Author	The Title	the@email.com	ED	New	10-Mar-2021	P	Manu
3										

Figure 8: Setting of Status to *P* (published) after transfer to the publisher OUP by EO