

# TRE-FX

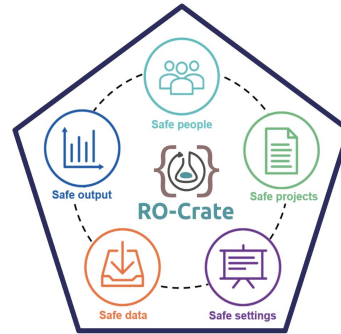
DELIVERING A FEDERATED NETWORK OF  
TRES TO ENABLE SAFE ANALYTICS

## Using a Digital Box for Safe and Secure Data Sharing

A guide by TRE-FX

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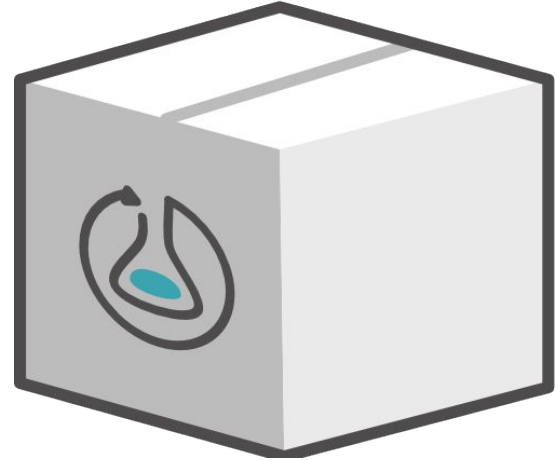


# Digital box – RO Crate

The digital box being used by TRE-FX is called an RO-Crate.

So, what is an RO-Crate?

- RO Crate is like a digital box that holds both data and a guidebook about that data.
- It helps people understand and use the data when it's shared.

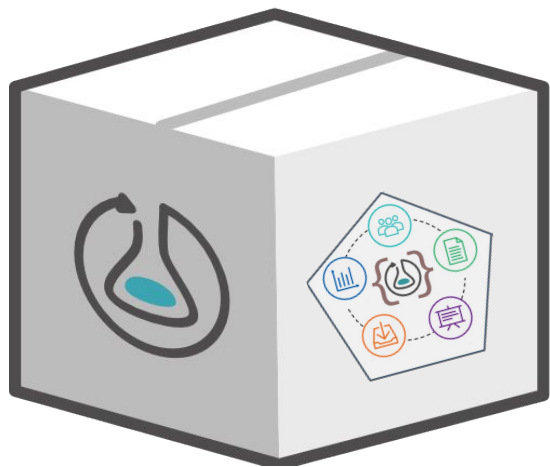


<https://www.researchobject.org/ro-crate/>



# What is a Five Safes RO-Crate?

“a workflow run refers to the execution or operation of a series of steps or tasks in a predefined order to accomplish a specific goal or outcome. It is like following a set of instructions or a recipe”



## The Five Safes



In the world of data, security is paramount.

Enter the Five Safes RO-Crate, a fortress for sensitive information, and a champion of privacy.

Your personal data is precious. When used for research, its safety is paramount. That's why the 'Five Safes' framework was created. Developed by the UK Data Service, it ensures data is used responsibly.

It covers appropriate project use, trustworthy researchers, secure storage, ensuring results don't reveal identities, and minimising risks of data recognition. It's about balancing breakthrough research with utmost privacy.



## Stage 1 – Publicly Accessible Submission Layer

Just as a parcel is carefully labelled and placed into a submission box, the RO-Crate is delivered by the submitting user and stored in an area outside of the TRE(s).



Initial checks are run to make sure that a user is allowed to run an analysis in the context of a project.

Similar to a delivery driver verifying the identity and credentials of the sender and recipient when collecting a parcel.

Once an RO-CRATE has passed all of these initial checks, it is presented in a queue ready for collection by the TRE(s).





## Stage 2 – Authentication of users & projects within TRE's



Upon arrival in a TRE, the RO-Crate undergoes further meticulous checking to ensure that a user is authorised to run the requested analysis on a requested data source.

The referenced workflow is retrieved and checked against a list of approved analyses for the given TRE.

The workflow and the RO-Crate is also checked for integrity using a system of checksums. This phase can be extended for cryptographic controls.



## Stage 3 – Analysis Execution

Once an RO-Crate has successfully cleared the checking process, it is pulled into a project specific area near the data, unpacked and the analysis is executed.



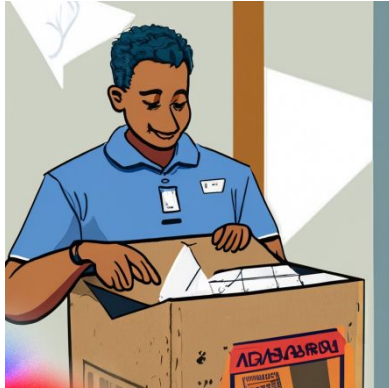
ANALYSIS  
STAGE



As the analysis concludes, the Five Safes RO-Crate is augmented with information describing the analysis and results, similar to a dedicated mail handler adding contents to parcels before they are sent on to their intended destinations.



## Stage 4 – Safeguarding Data Privacy



The RO-Crate undergoes further checks to ensure that its content is not disclosive (e.g. possible identification of individuals). This is a semi-automatic process that integrates with existing TRE disclosure control practices and DARE advancements.

Any manual disclosure control will make use of the RO-Crate metadata for consideration of the analysis outputs, by using the context of the requested workflow and its parameters.

TRE safeguarding is able to modify the RO-Crate to redact sensitive data, but could allow their metadata to remain so that the researcher can track which outputs were modified or removed.



To provide transparency and accountability, the RO-Crate is appropriately tagged to indicate the specific disclosure control measures that have been applied.

This tagging system serves as a clear indication of the protective measures in place, further enhancing the security and integrity of the RO-Crate and its contained data.





## Stage 5 – Return of the analysis



Finally, it's time for the RO-Crate to be returned to the submission layer for collection by the user, akin to the postal service delivering a package to a holding office.

The submission layer then holds the RO-Crate for collection, allowing the user to gain access to their analysis results.



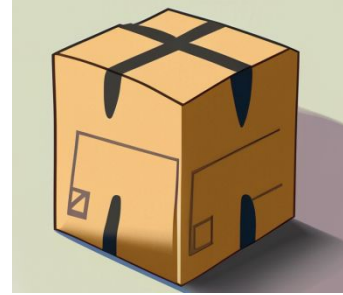
## Stage 6 – Transparency and Reproducibility

As part of promoting transparency and reproducibility, a public (potentially redacted) version of the RO-Crate will be published on national data use registers, such as HDR-UK.

These *data use registers* serve as platforms for sharing and documenting research data, ensuring transparency and facilitating reproducibility of analyses. They also help TREs to showcase which analyses can be done on a particular dataset.

The redacted RO-Crate contains essential information that allows other researchers to understand the analysis process and reproduce the results, while maintaining TRE data privacy and confidentiality. For some types of workflows (e.g. statistical summaries), no redaction may be necessary.

By releasing the public RO-Crate on data use registers, the research findings can be shared with the wider community, fostering collaboration, validation, and further scientific advancements.



A public version of the RO-Crate will be published on publicly accessible data use registers, such as HDR-UK and ADR-UK.



For more information about TRE-FX please email:  
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To learn more, visit our website at  
[www.trefx.uk](http://www.trefx.uk)



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