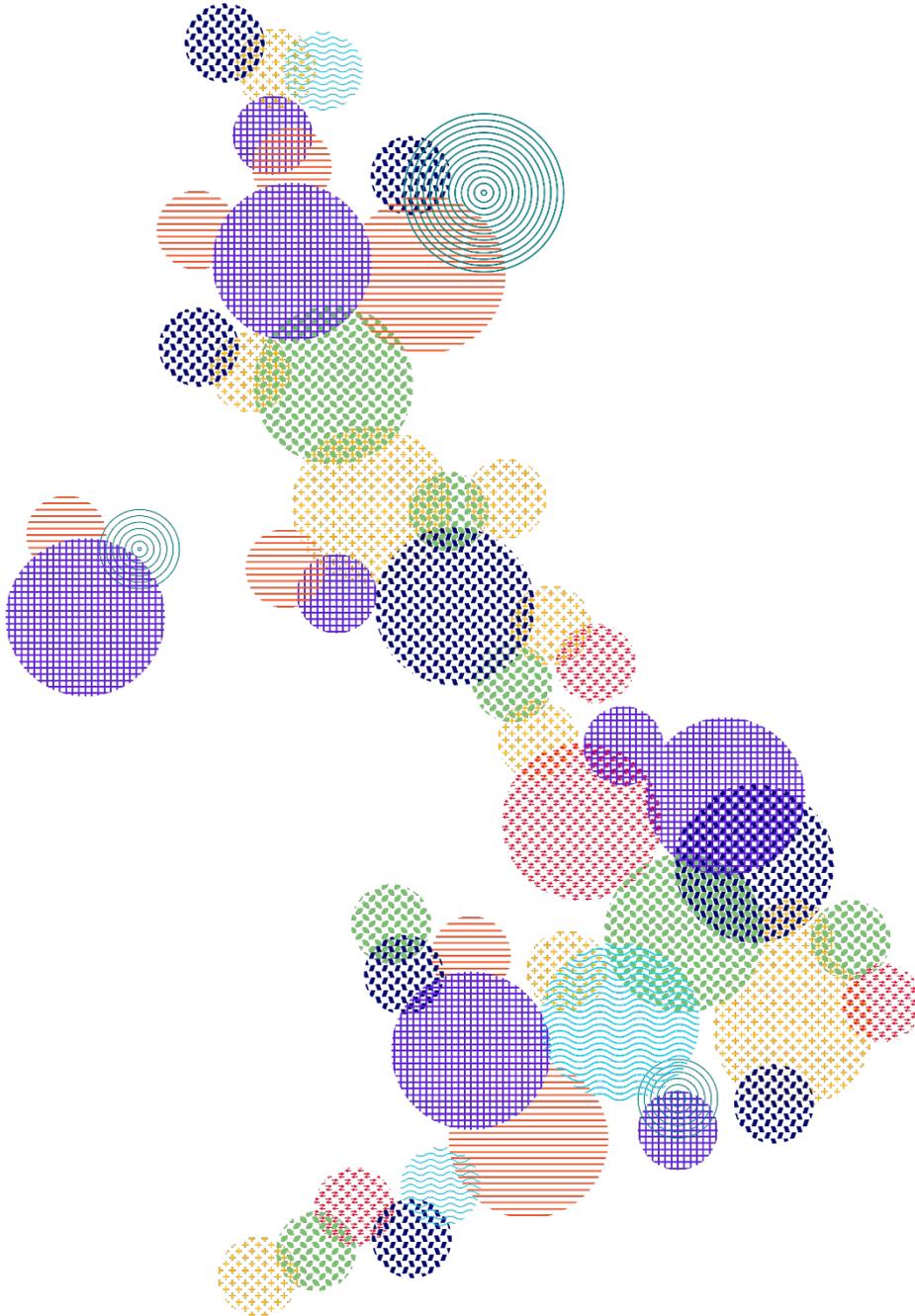


Using CReDo on DAFNI

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Introduction

The Data and Analytics Facility for National Infrastructure (DAFNI) provided storage and computing capabilities via their public portal, and a secure private development environment to enable collaboration on sensitive data across the distributed team.

The version of the CReDo model hosted on DAFNI is designed to be used with data stored on the platform and provides users the opportunity to run the visualisations with their own data, or to integrate with an alternative analysis pipeline.

Signing up to DAFNI

Sign up to the DAFNI platform: <https://dafni.ac.uk/accessing-dafni/>

Once approved, you should be able to log into the DAFNI platform: <https://dafni.ac.uk/dafnlogin/>

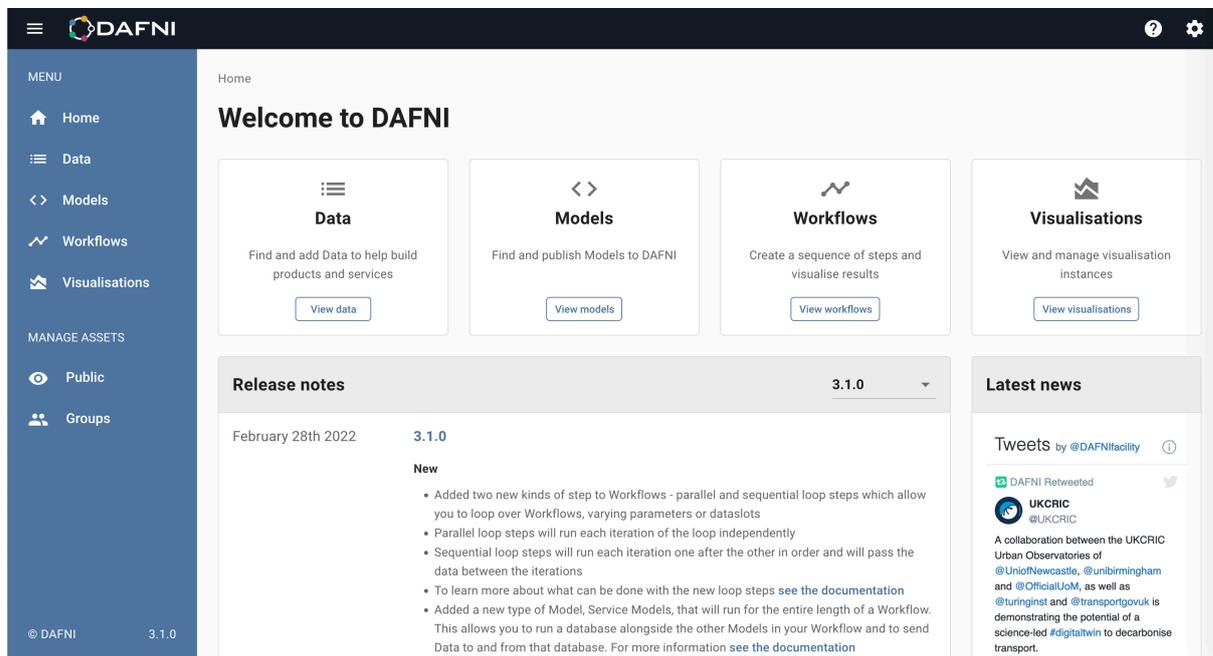


Figure 1 DAFNI Welcome page

Once you log in, you will see something similar to Figure 1. For general guidance on using DAFNI, see their documentation: <https://docs.secure.dafni.rl.ac.uk/>.

How to use CReDo on the DAFNI platform

The left hand menu on the DAFNI Welcome page, Figure 1 shows the key components of software run on DAFNI – Data, Models, Workflows and visualisations. We utilise each of these in the CReDo pipeline.

Data allows us to upload datasets useful for analysis, from flooding simulation outputs and asset infrastructure configurations, through to writing the final outputs back to the database for storage for later analysis.

Models contains the components which perform specific tasks, such as the asset failure model. Models are core components of the DAFNI platform and refer to their help pages for guidance on the format required for model specification and upload.

Workflows consist of several model components chained together to form a series of instructions.

Visualisations contains all visualisation instances.

View previous CReDo outputs

Outputs from previous runs of the CReDo twin have been stored on DAFNI and can be visualised from the browser. The custom visualisation tools developed in the CReDo project have been integrated into the DAFNI platform and can be generated on demand. To do this, navigate to the **Data** section of the DAFNI platform. This will contain a list of all datasets available to you as a user. Outputs from CReDo will be publicly available, such as those in the screenshot below. To visualise the output, select the tick box next to the data to view and click the **Visualise** button also shown in the screenshot, Figure 2.

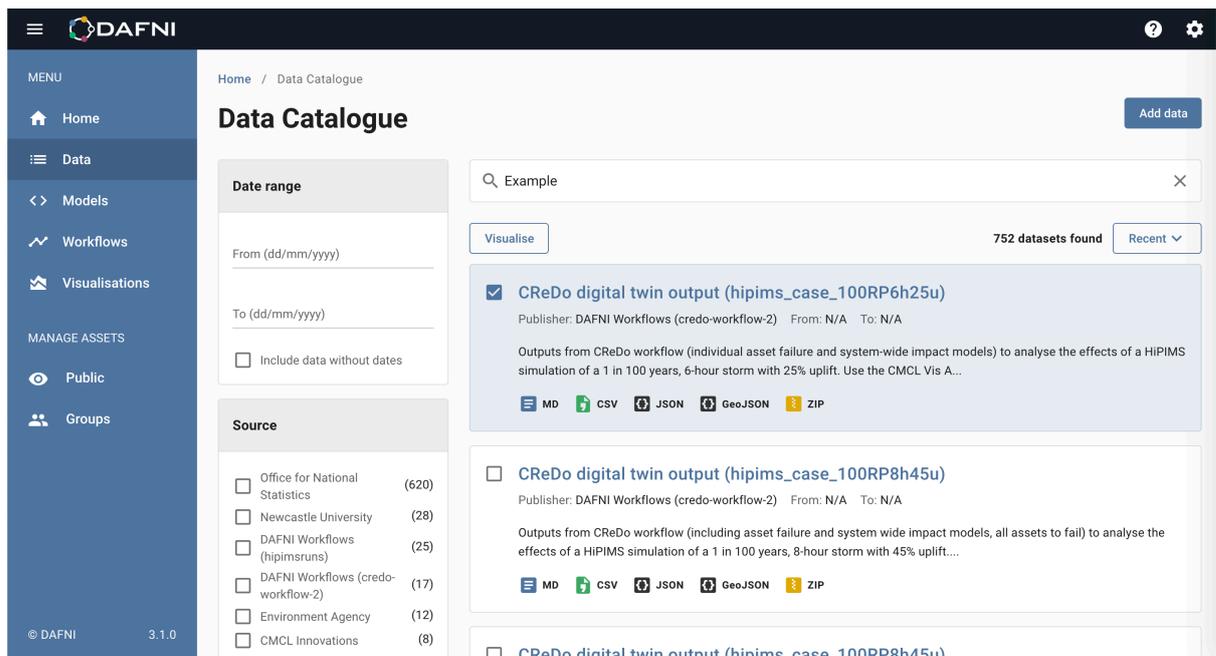


Figure 2 Screenshot of Data section in DAFNI

Clicking on **Visualise** will produce a new screen allowing you to name and specify the form of visualisation to produce.

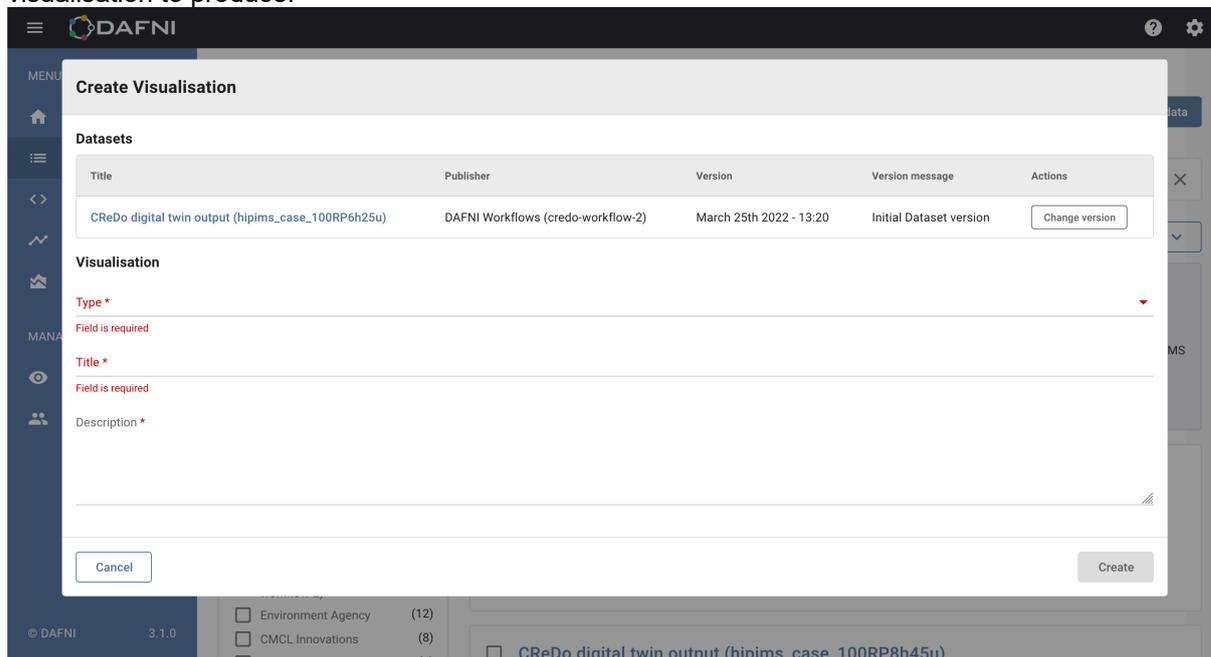


Figure 3 Create visualisation screen in DAFNI

Selecting the drop down menu under **Type** will produce the option of “CMCL Vis App”, amongst others. This is the option to use to specify using the CReDo visualisation tool. Once you have completed the necessary fields, click **Create**. This will then send a request for the necessary resources on the DAFNI platform.

Visualisation instances can be viewed under the **Visualisations** tab, and clicking on a specific visualisation’s name will take you to it. Downloaded and initialising the visualisation will take several minutes, so some errors may appear in the browser if it is accessed before it is ready.

Using the CReDo workflow

Once familiar with the CReDo tools, it is hoped that users will want to build upon the outputs from the project. This section details how you can run the workflow on user specified data, or how to alter the workflow for new applications in the future.

Many models were created during the CReDo project, detailed in the CReDo Technical Reports. This were combined into two main workflows – the modular and the information cascade. The modular workflow has been designed with interoperability in mind, allowing the asset failure and systems impact models designed in [CReDo Technical Report 3: Assessing asset failure](#) and [4: Modelling system impact](#) to be integrated. The information cascade model follows the methodology described in [CReDo Technical Report 1: Building a cross-sector digital twin](#).

Within each workflow, there is a “time step loop” – the time step loop is required because of the several time steps within a flooding simulation. We want outputs monitoring the impact for each stage in the flood, so the workflows need to iterate over each time step in the flood. The necessary stages to run at each time step are contained within this timestep loop, which is

then embedded in a longer workflow which prepares the databases and ingests the data specifying the environment.

For the information cascade model, the time step loop is called **CReDo timestep loop (information cascade model only)** and the full workflow is called **CReDo workflow (information cascade model only)**. For the modular workflow, the time step loop is called **CReDo timestep loop (individual asset failure and system-wide impact models)** and the whole workflow is called **CReDo workflow (individual asset failure and system-wide impact models)**. Clicking on a workflow provides more information and allows it to be customised.

When a workflow is selected, they can be altered by either changing parameters or the workflow itself. Figure 4, below shows the screen for a single workflow produced during the CReDo project.

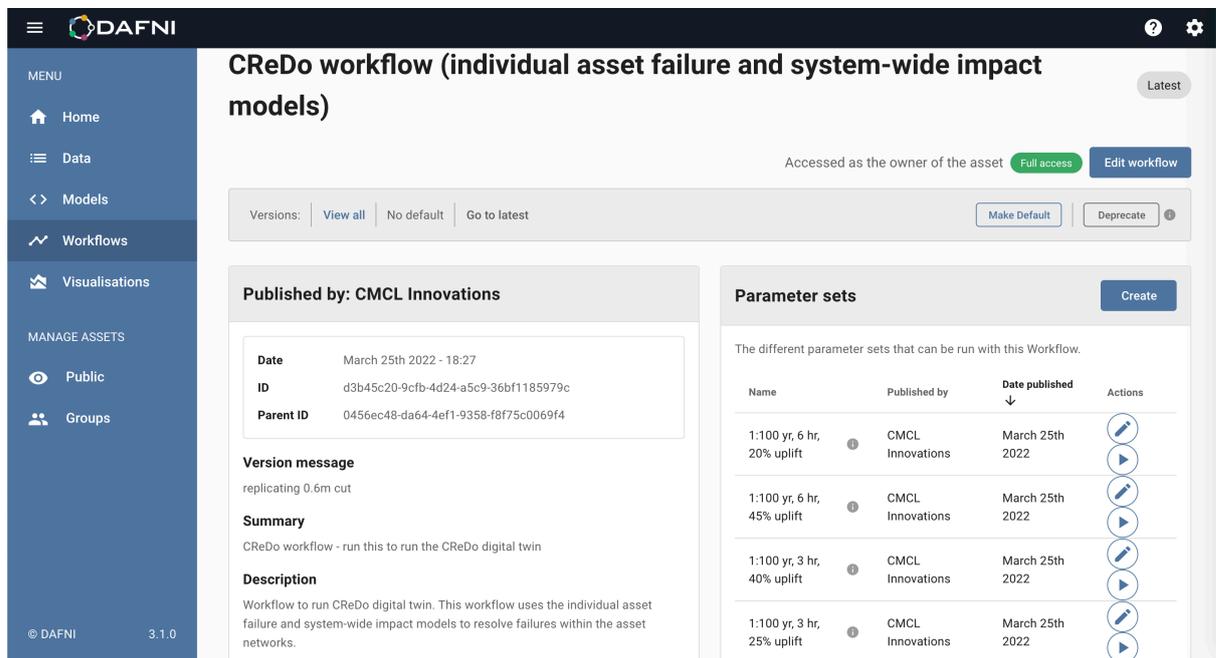


Figure 4 Screenshot of a single workflow produced during CReDo

Parameter sets contain the parameters which specify a run – presets can be rerun by clicking the **Play** button next to a given parameter set, or they can be edited by clicking on the pencil icon. Clicking on edit will take the user to the visualisation of the workflow, and clicking on different sections of the workflow will show the parameters set for each stage, as shown in Figure 5 below.

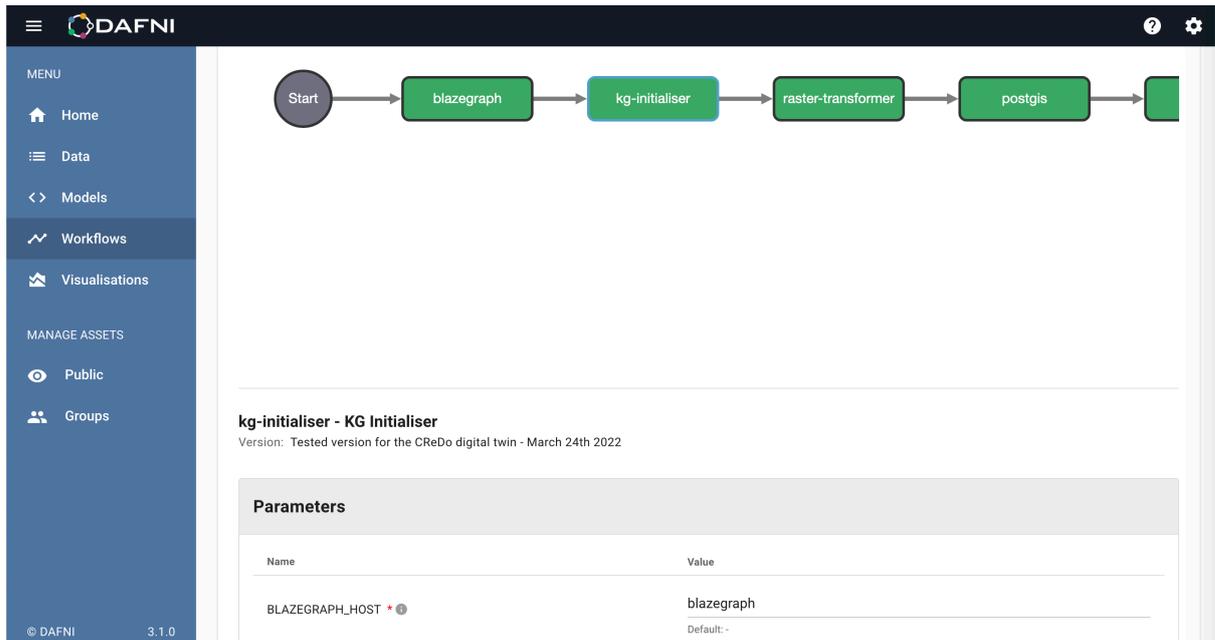


Figure 5 Screenshot showing the different sections of the workflow

Datasets are also specified in this section, with specific datasets able to be loaded to each relevant part of the pipeline.

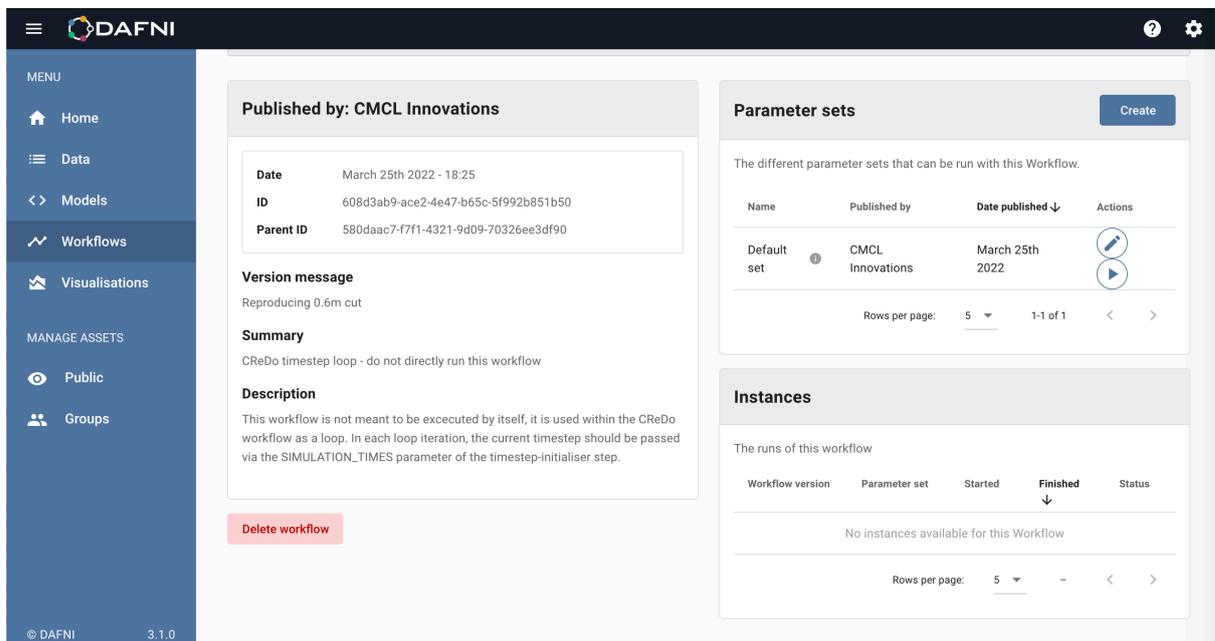


Figure 6 Screenshot showing the parameter sets and Instances for this part of the workflow

Once a workflow has been set running, it will appear under the “Instances” section of its page. The status alongside it can be Pending, for a job yet to run; Running, for a job in process; Error, for if it has failed; and Succeeded, for when it has completed. Variables, such as specifications for the output files, are included as parameters in the workflow. The results will be saved back to the DAFNI data store, and able to be visualised using the approach above.

To edit a workflow and include user specified models, select the **Edit Workflow** button on the workflow’s description page (as shown in Figure 4). After inputting version information, you will

be presented with a view of the workflow. Selecting a component in the workflow shows the current model loaded at that stage, and can be replaced with the “Change model” button.

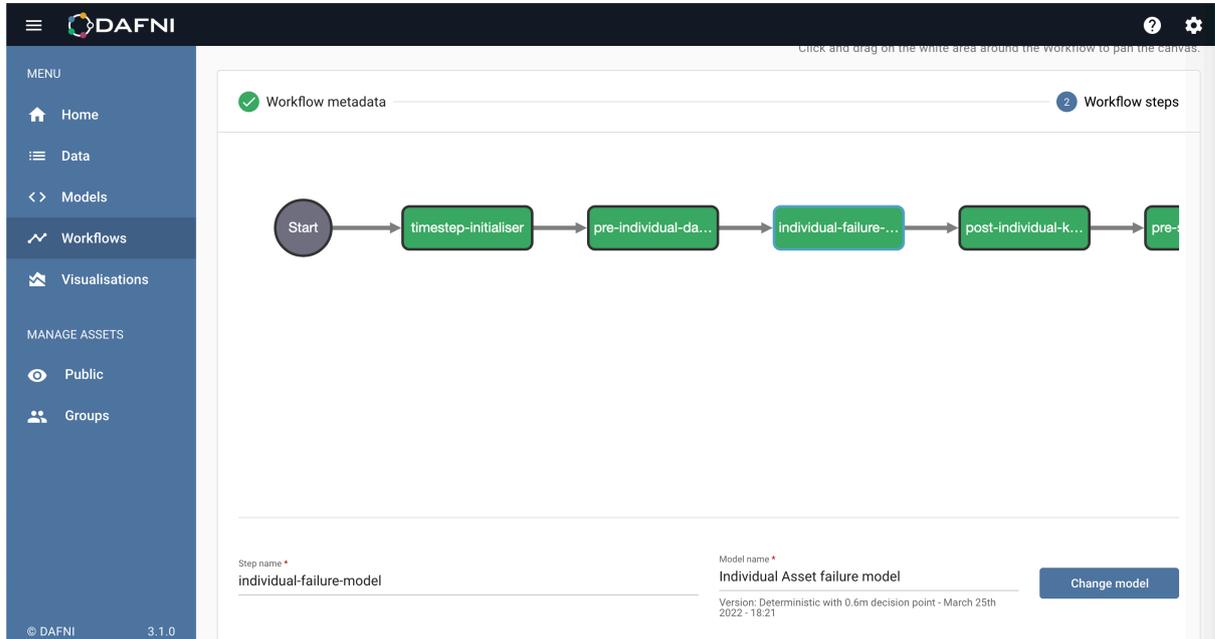


Figure 7 Screenshot of Workflow view, selecting a component to view the model for that stage.

Alternatively, new components can be added by the + icon on the workflow

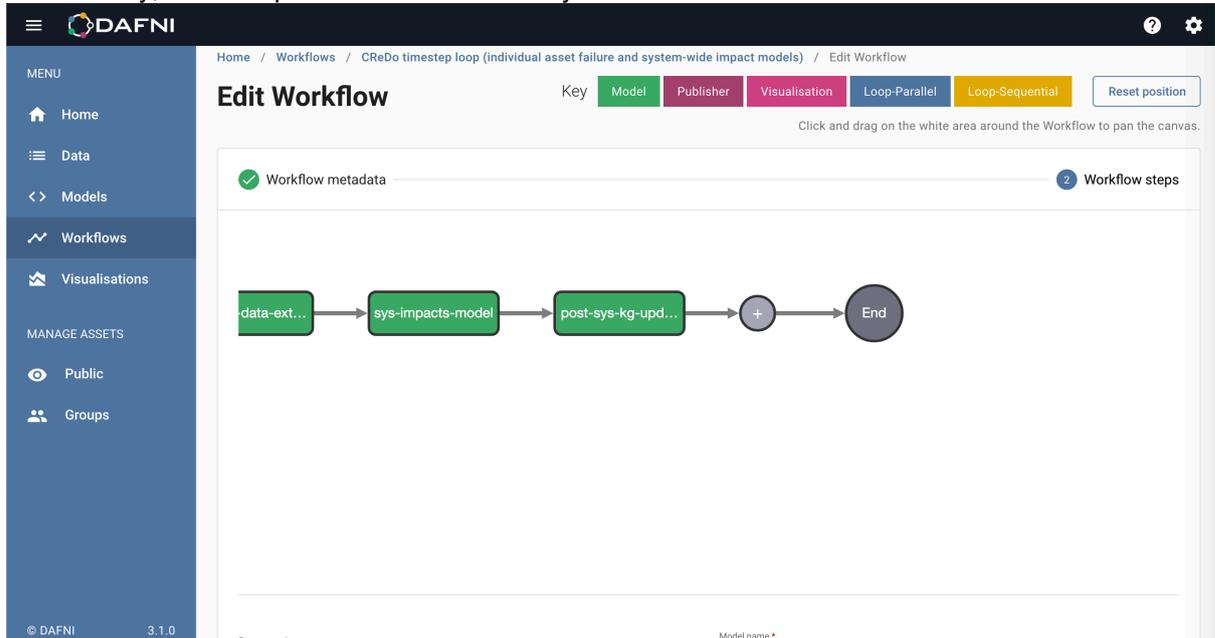


Figure 8 Screenshot showing the add new component icon.

For further information on using the DAFNI platform, contact them directly at info@dafni.ac.uk. For further information on the components in the CReDo project, please visit the [Digital Twin Hub](#).



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