Ferrio – Force Directed Network Graph

I. Introduction

Disclaimer

This project has been developed as a research project conducted by the University of Sheffield in collaboration with Ferrio.

Objectives

The main objective of this project is to represent Ferrio's business idea, i.e. its automation system, in a simple and expressive graphical user interface. This is projected to have several benefits:

1. It clarifies the relationships between different triggers and workflows, which are the main structural units for the Ferrio system, and presents a holistic view of their interconnectedness and their inter-relationships.
2. It allows easy access to the different descriptors and properties pertaining to each trigger, workflow, or link.
3. It has the potential for dynamic interaction. In other words, future releases may include the ability to use this graph for CRUD (Create, Read, Update, and Delete) operations, making interaction with the automation profile of the user much easier.

II. Main Page Sections:

The resulting graph consists of the following sections (Figure 1) :

1. Controls (left), these controls allow:
    a. Zoom: zooming in and out, resetting zoom level, and showing a bird's eye view of the network.
    b. Simulation control: Pausing the simulation (to freeze nodes and allow rearranging them without them reverting to default simulation behaviour)
    c. Settings: Reveals a settings menu on the right which allows the user to alter stylistic parameters such as node radius, text colour...etc.
2. Graph Area (middle): This is where the visualization is shown along with all connections, properties...etc.
3. Control/Description Panel (right): This is where the control panel shows up when the settings control is clicked. It is hidden by default. Additionally, when the user clicks on a certain label in the graph, a description panel pops up that shows additional details.

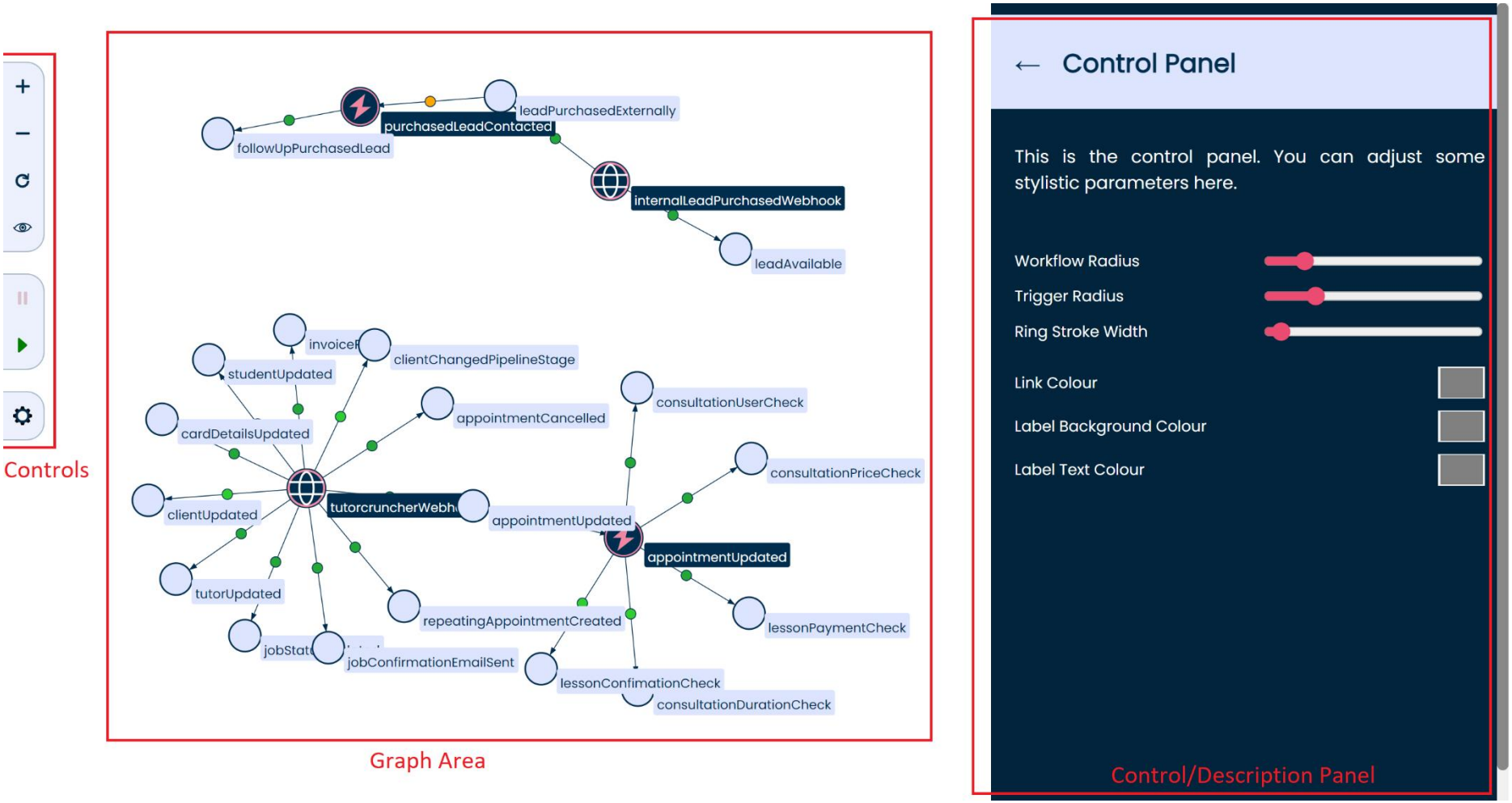

Figure 1 Main Page Sections

III. Main Functionality

Zoom

Initially, the webpage shows the left controls and main graph area. The graph may not be aligned as the user wants it to be. They can use the zoom controls to resize and the cursor to align the graph as necessary. The user can zoom in, zoom out, reset the zoom, and get a bird's eye view ().

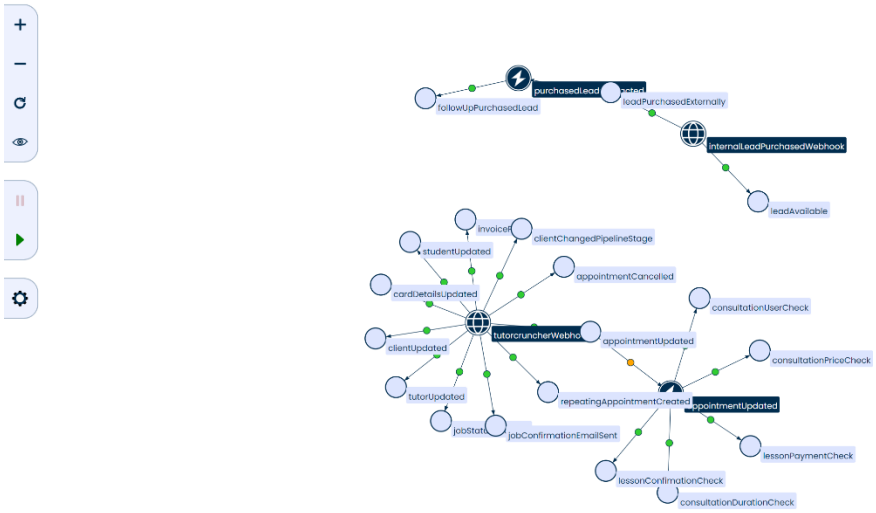

Figure 2 Zoomed Out View

Figure 3 Bird's eye view

Dragging Nodes

The user can also drag the nodes of the graph to align them as they wish. If the simulation is running, the nodes will re-align after the user releases their drag according to the simulation's pre-assigned forces (Figure 4). If the simulation is paused, the nodes will not re-align, BUT there is a slight re-alignment because the simulation requires that the forces acting on the nodes persist for a short amount in order to be able to drag or redraw elements (Figure 5).

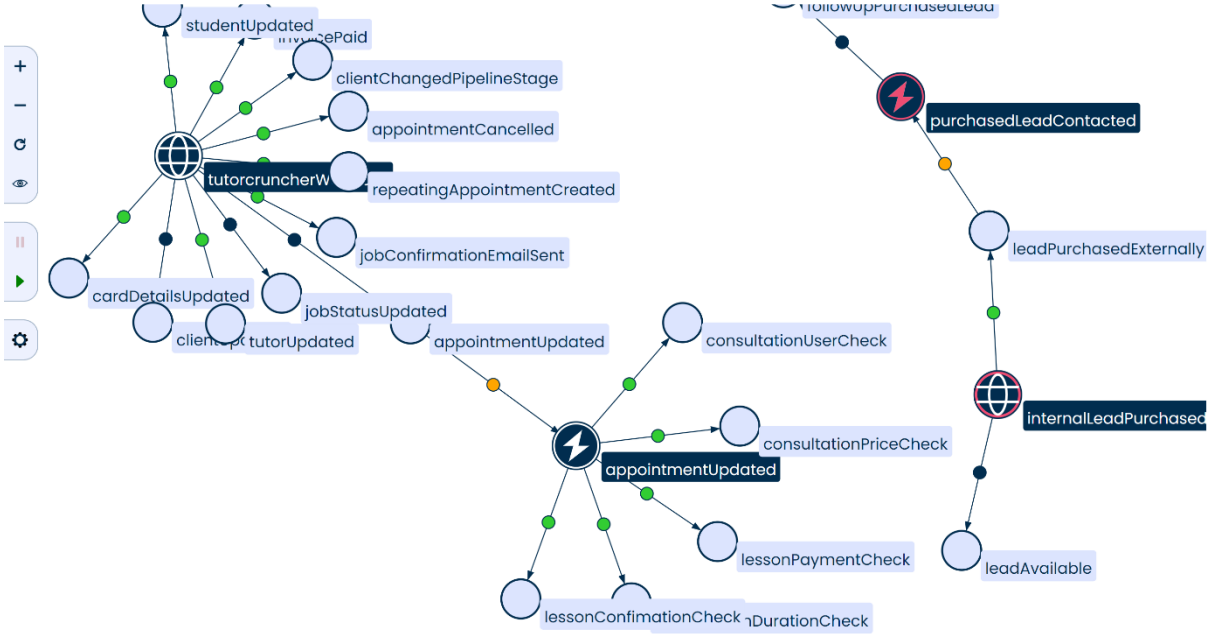

Figure 4 Dragged nodes

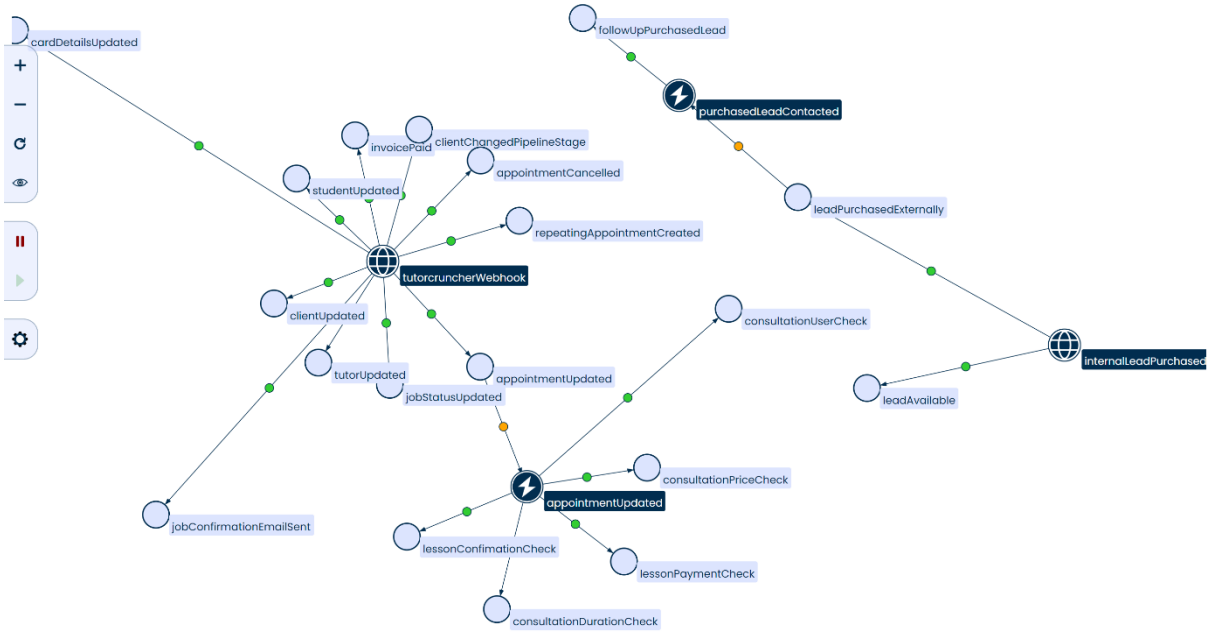

Figure 5 Dragged Nodes, simulation paused

Description of Entities (Nodes, Relationships…etc.)

Clicking on the node labels allows the user to get more details about the node (Figure 6, Figure 7). Triggers and workflows may contain more details that are not represented directly in the graph section of the page. Upon click, the description panel allows the user to view this additional information.

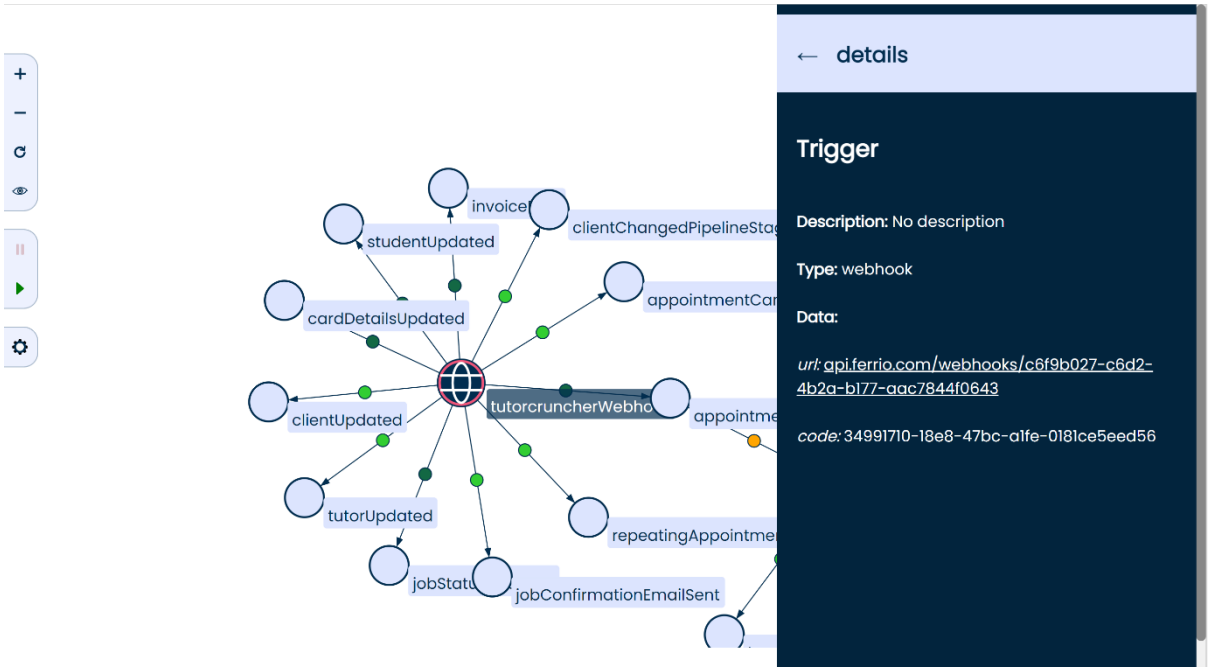

Figure 6 Description panel: Trigger

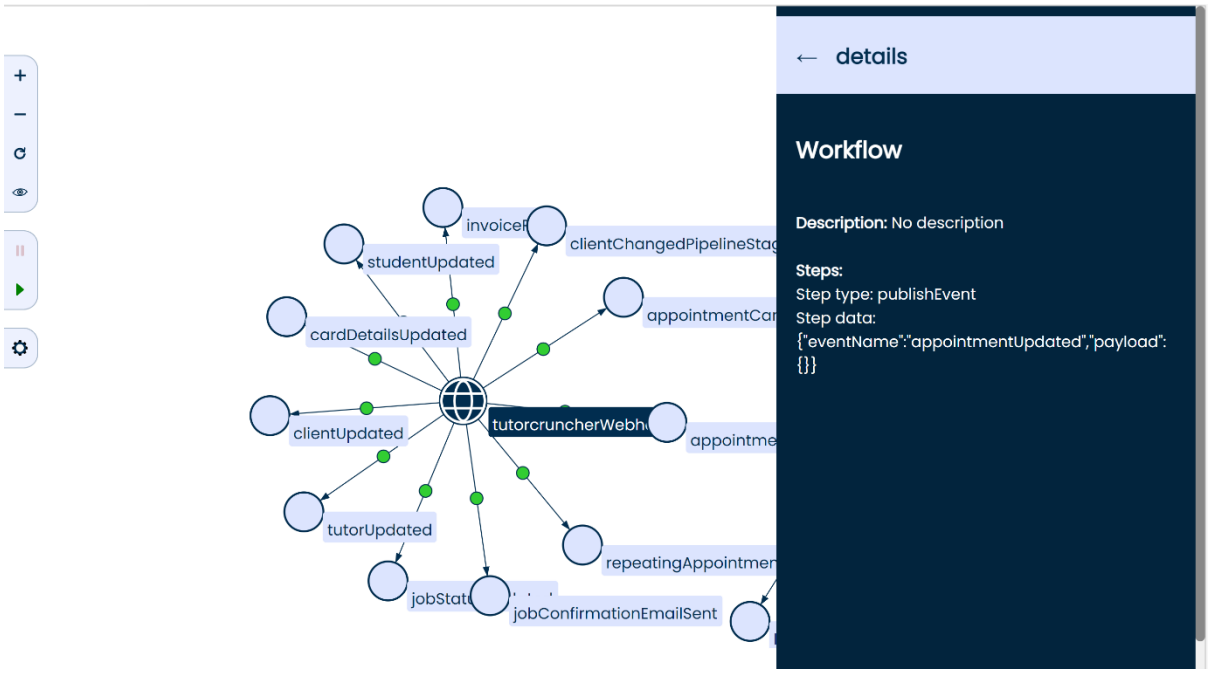

Figure 7 Description Panel: Workflow

The user can also view the relationship between the different triggers and workflows. This is possible by clicking on the small circle present on the link between different nodes (Figure 8).

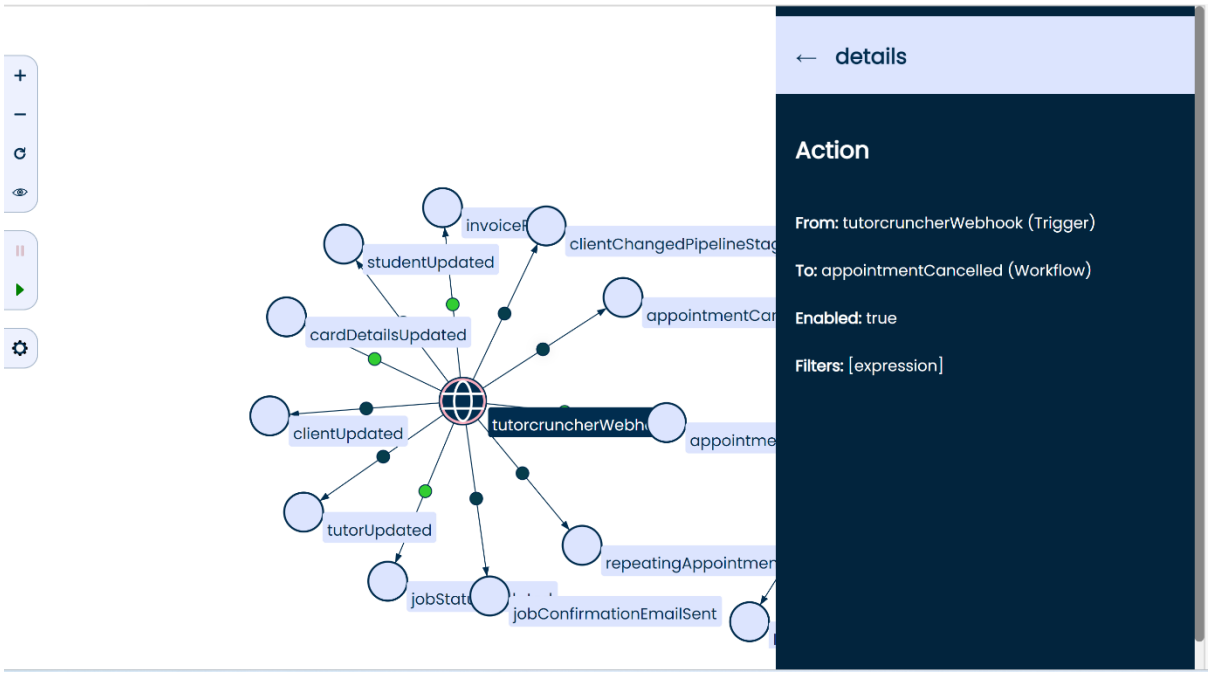

Figure 8 Description panel: Trigger/WF relationship

Changing Graph Styles

Finally, the user can change some stylistic aspects of the graph components, like node sizes and link colours. This is possible by accessing the control panel using the gear icon on the left menu (Figure 9).

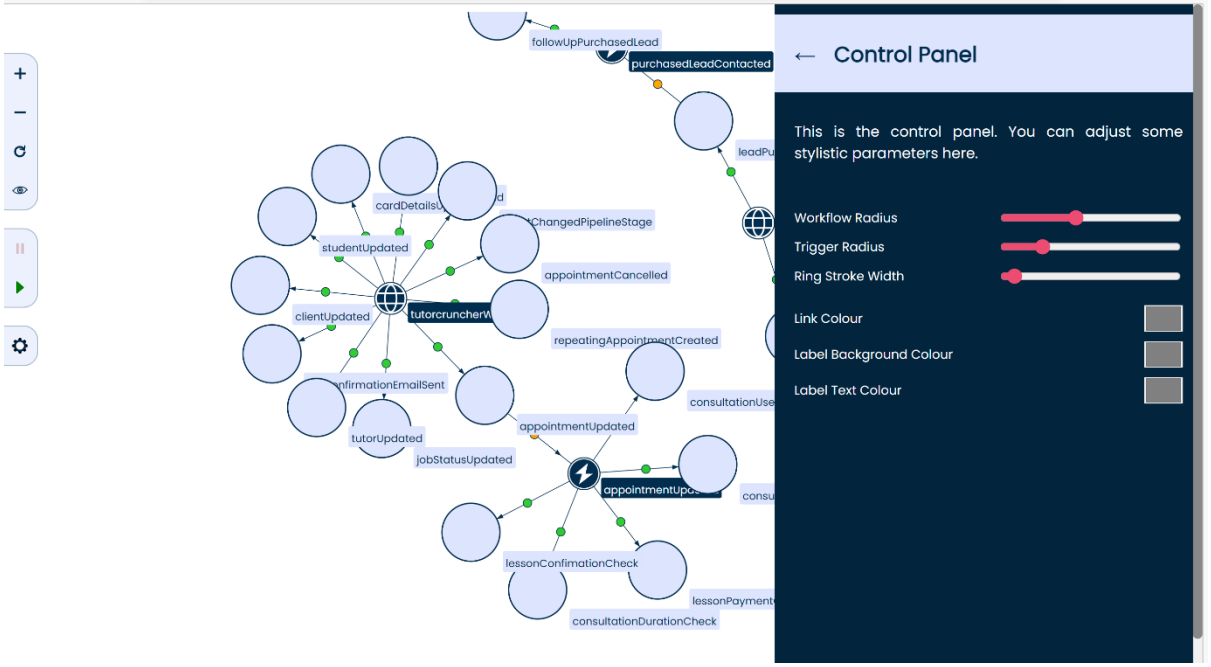

Figure 9 Control panel: increase workflow radius