GeBIZ: Singapore and the Suppliers that make her tick
User Manual

Version 1.0
01/12/2018

1.Introduction

This version 1.0 is the first release and any feedback for improvement may be provided to authors (refer to point of contact).

Current user guide aimed to give instruction to application ''GeBIZ: Singapore and the Suppliers that make her tick" use, describe features and user interface. User manual is not a subject to any restriction and can be accessed freely.

2. Overview

''GeBIZ: Singapore and the Suppliers that make her tick" is a RShiny-powered web-application build to provide interactive exploratory visualization of Singapore government procurement based on GeBIZ open data license dataset. It's accessible by pointing web-browser to the address: https://qiaoxy.shinyapps.io/GeBIZ/

No browser restriction foreseen, but we recommend to use Goggle Chrome. No registration or login is required.

Figure 1 - Application map
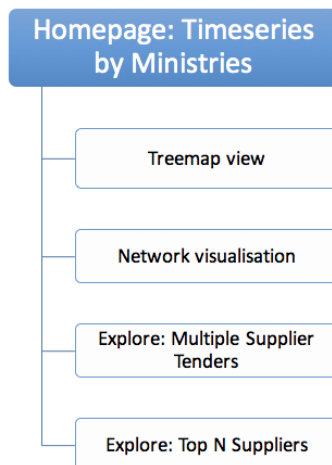
Homepage of the application is timeseries display, using tabs below navigation to Treemap, Network and Exploration function is available.

Table 1 - Glossary and Abbreviations

Term	Acronym	Definition
Government Electronic Business	GeBIZ	Government-to-business (G2B) Public eProcurement business centre
Dashboard	-	Data visualization tool that displays graphs based on selected variables.

Timeseries	-	Series of data points indexed in time order. In current app its total amount of tenders represented as line graph over time.
Treemap	-	Map implementation that keeps its entries sorted according to the natural ordering. In current app the view shows hierarchy based on number of tenders or total dollar amount of procurement.
Facet graph	-	In current app facet graph is a plot into a matrix of panels, showing one tender per plot.
Boxplot	-	The way of representing statistical data on a plot in which a rectangle is drawn to represent the second and third quartiles.

3. Features and Navigation
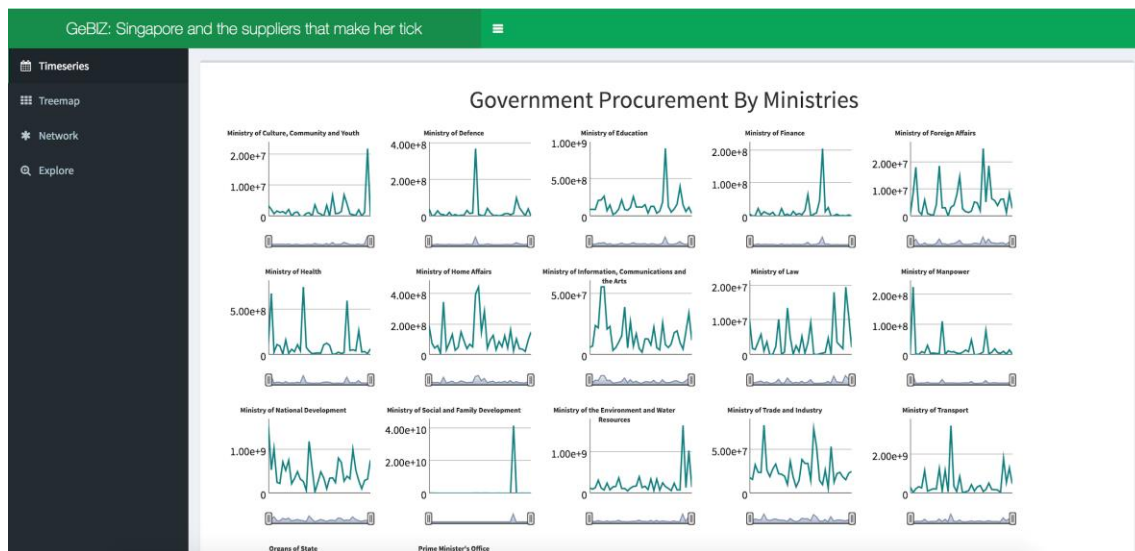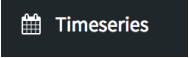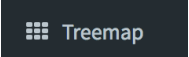
Figure 2 - Homepage Screen Interface

Table 2 - Homepage navigation and controls

Control	Description
☰	Allocated in header next to application title. Click allows to hide/unhide navigation panel on left to maximize main screen.
Timeseries	Navigation tab, selected by default. Click to it opens Timeseries screen.
Treemap	Navigation tab, not selected by default. Click to it opens Treemap screen.

✷ Network	Navigation tab, not selected by default. Click to it opens Network screen.
🔍 Explore	Navigation tab, not selected by default. Click to it opens Explore screen, Multiple suppliers tenders section.

3.1 Timeseries

Timeseries main screen allows to observe total amount of procurement by ministries depending on time with a purpose to look for trends, seasonality, comparison in time.
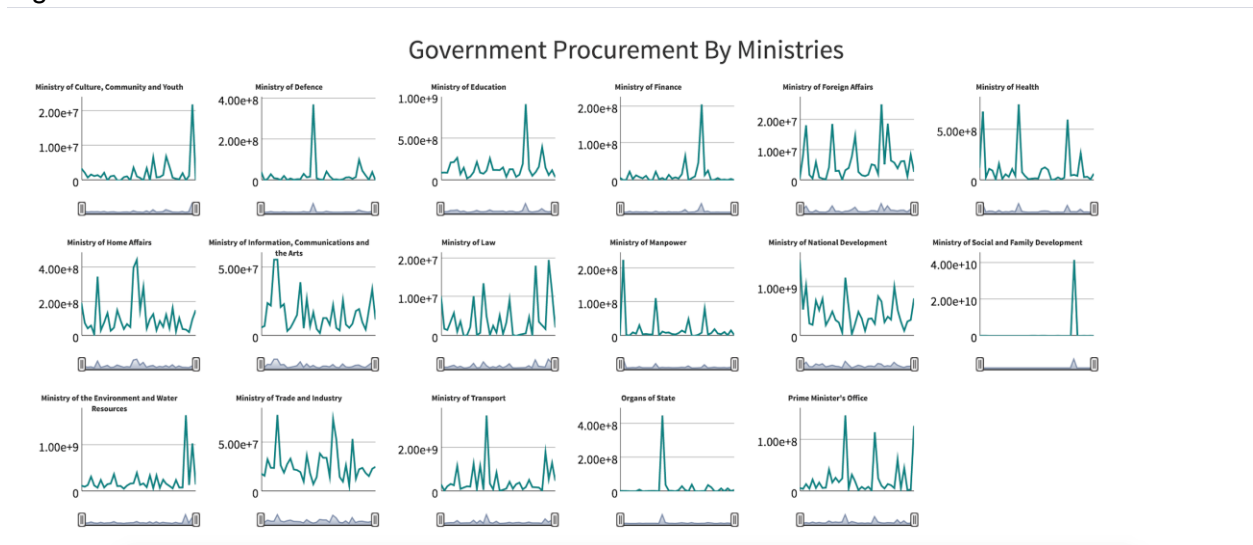
Figure 3 - Timeseries Screen Interface

Table 3 - Timeseries navigation and controls

Control	Description
	Time range selection, slider. By default: all three years range is selected. Drag control to change time interval and apply changes to all graphs at the same time.
	Interactive Tooltip will be shown on hover to the point in line graph. Information included: time and overall amount in Singapore dollars.

3.2 Treemap

Treemap screen will not represent graph by default. To make it shown please select parameters first using left panel controls and click to Show-button.

Figure 4 - Treemap Screen Interface (part one)

Table 4 - Treemap navigation and controls (part one)
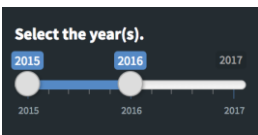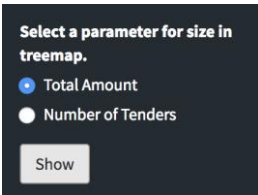
Control	Description
	Selector of years to subset the data. Slider when selected range will include the value shown (for example here 2015 and 2016 are included).
	Selection of area-mapping for treemap: total amount or number of tenders are available to select in radio buttons. Show-button: click to update graph based on new selection.
	On hover to the tile its breakdown structure will come interactively. It also works as a button to navigate to the next layer (refer to part two below).

After click to the ministry tile, part-two screen will be shown - treemap of the agencies of selected ministries. Section below will show distribution of tenders by their dollar amount.

Figure 5 - Treemap Screen Interface (part two)
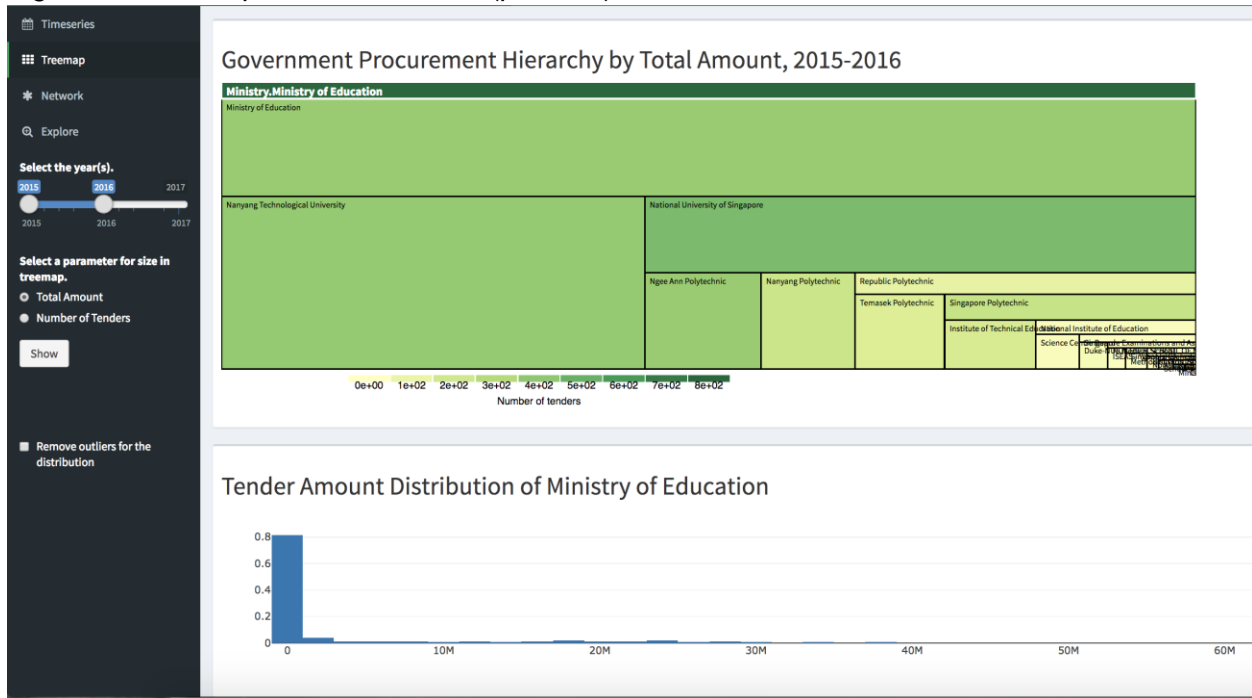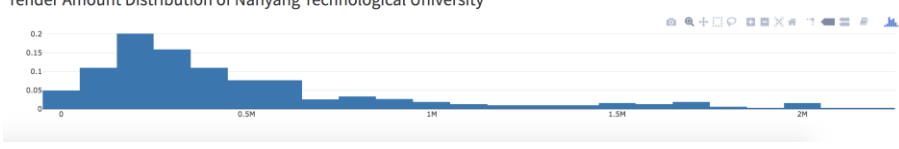
Table 5 - Treemap navigation and controls (part two)

Control	Description
☐ Remove outliers for the distribution	Checkbox to remove outliers allows to see the most frequent tenders by amount as show below:

3.3 Network

Network visualization allows to explore connections and relations between agencies and their suppliers, in this network agencies are shown as yellow nodes and suppliers as blue. Arrow states for tender (or tenders) awarded and arrow line thickness is proportional to total amount awarded. Network will be build base on selection parameter on left panel.

Figure 6 - Network Screen Interface (Agencies' Network)
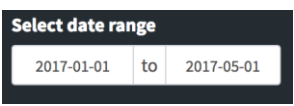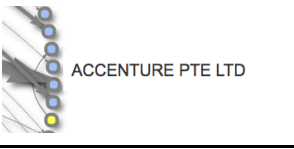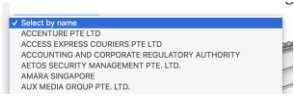
Table 6 - Network navigation and controls (Agencies Network)

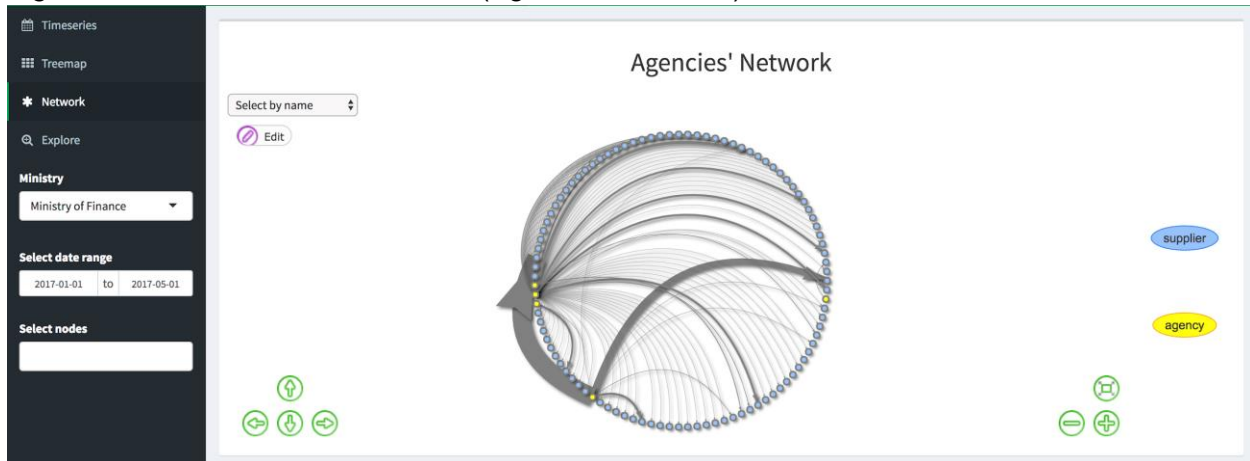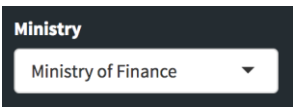| Control	Description
Ministry Ministry of Finance ▾	Dropdown to select ministry from predefined list, single-selection. Ministry of Finance is selected by default. Changes applied automatically.
Select date range 2017-01-01 to 2017-05-01	Date range selection: date pickers for 'from' and 'to' dates to subset the data. Changes applied automatically.
ACCENTURE PTE LTD	Nodes representation interactivity: on hover name od the node (agency or supplier) will be shown. Click will highlight the connections of the node.
(screen regulation icons)	Screen regulation: moving to sides, zoom in and out.
Select by name ACCENTURE PTE LTD ACCESS EXPRESS COURIERS PTE LTD ACCOUNTING AND CORPORATE REGULATORY AUTHORITY AETOS SECURITY MANAGEMENT PTE. LTD. AMARA SINGAPORE AUX MEDIA GROUP PTE. LTD.	Selection dropdown to highlight the node (agency or supplier).

Second section of the screen is available to search for the nodes and show all the connections of selected node (or nodes) in separate graph.

Figure 7 - Network Screen Interface (Node Selection)

Selection Result
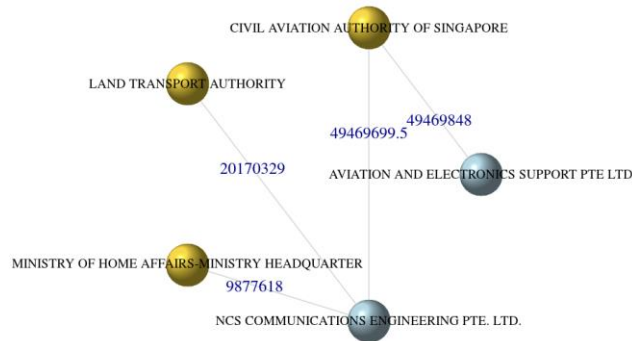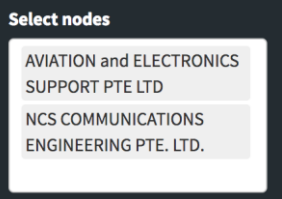
Table 7 - Network navigation and controls (Node Selection)

Control	Description
Select nodes AVIATION and ELECTRONICS SUPPORT PTE LTD NCS COMMUNICATIONS ENGINEERING PTE. LTD.	Node selection: multiselect dropdown. Result will be updated automatically. Type to start the search, suggestion will be shown. By default, no nodes selected.

3.4 Explore: Multiple supplier tenders

Navigation to the last, Explore tab will open multiple suppliers' tenders search. By selection of ministry and agency we can see all the tenders awarded to more than one supplier in facet graph, where each facet represent one tender.

Figure 8 - Explore: Tenders with multiple suppliers
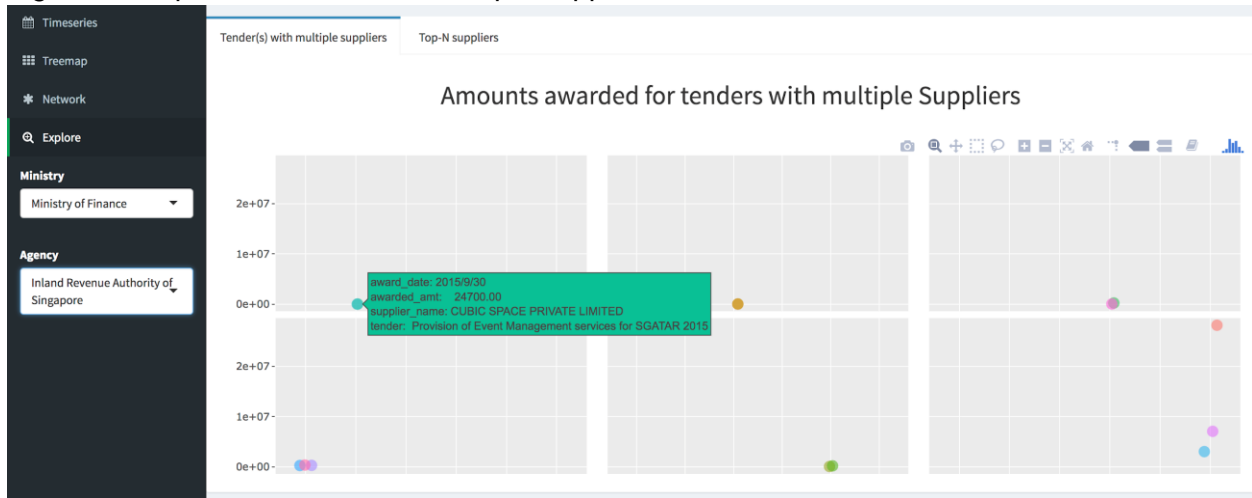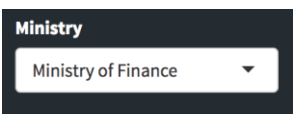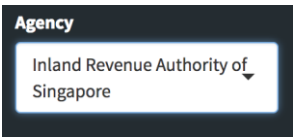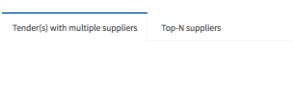
Table 8 - Explore: Tenders with multiple suppliers' navigation and controls

Control	Description
Ministry Ministry of Finance ▼	Single-select dropdown where ministry has to be selected. Default choice is Ministry of finance.
Agency Inland Revenue Authority of Singapore	Single-select dropdown where agency has to be selected. The selection list depends on ministry choice. After selection graph will be updated automatically.
(tender details tooltip)	On hover to each point details of tender part awarded will be displayed: date, amount, supplier, tender description.
Tender(s) with multiple suppliers Top-N suppliers	Navigation tabs. Tenders with multiple suppliers is opened by default and highlighted. By click to Top-N suppliers next exploration screen will be opened.

3.5 Explore: Top N suppliers

The second exploration tab can be navigated from Tenders with multiple suppliers' screen. By default there will be no data shown, you need to click Update-button so that visualization appears based on selected parameters.

Figure 9 - Explore: Top-N suppliers

	rowname	Supplier	Agency	Tender	Amount	Ministry
1	1	FUJITSU ASIA PTE LTD	Monetary Authority of Singapore	INVITATION TO TENDER FOR THE MAINTENANCE SUPPORT OF NETWORK DEVICES FROM 1 SEPTEMBER 2016 TO 31 AUGUST 2017 - PR1100004105 - ITD	108906	Prime Minister's Office
2	3	FUJITSU ASIA PTE LTD	National Institute of Education	Tender for the maintenance of computer hardware and software for National Institute of Education for 24 months from 1 April 2016 to 31 March 2018	799976	Ministry of Education
3	4	FUJITSU ASIA PTE LTD	Agency for Science, Technology and Research	Hardware and software maintenance support for Fusionopolis 1 network infrastructure for a period of 20 months	510840	Ministry of Trade and Industry
4	5	FUJITSU ASIA PTE LTD	Temasek Polytechnic	Tender for the Maintenance of Virtual Desktop Infrastructure (VDI) 1500	568000	Ministry of Education
5	6	FUJITSU ASIA PTE LTD	Nanyang Technological University	Supply and Commissioning of High-performance parallel storage system to the Singapore Centre for Environmental Life Sciences Engineering (SCELSE) and at NTUs option, to extend the service maintenance contract for an additional two years	558087	Ministry of Education
6	7	FUJITSU ASIA PTE LTD	Government Technology Agency (GovTech)	FOR THE PROVISION OF ICT HARDWARE MAINTENANCE SERVICES TO GOVERNMENT, MINISTRIES AND DEPARTMENTS, STATUTORY BOARDS AND ORGAN OF STATE	1	Prime Minister's Office
7	8	FUJITSU ASIA PTE LTD	Agency for Science, Technology and Research	Hardware and Software Maintenance Support for A*STAR Research Network for A One (01) Year Period with Option to Renew for Another One (01) Year	377671	Ministry of Trade and Industry
8	9	FUJITSU ASIA PTE LTD	Land Transport Authority	Maintenance and Software Development of Travel Smart Rewards System	4384247	Ministry of Transport
9	10	FUJITSU ASIA PTE LTD	Agency for Science, Technology and Research	HARDWARE AND SOFTWARE MAINTENANCE SUPPORT FOR BIOPOLIS CAMPUS NETWORK (BCN), BMSI, HQ AND GIS NETWORK INFRASTRUCTURE	529292.73	Ministry of Trade and Industry
10	11	FUJITSU ASIA PTE LTD	Info-communications Media Development Authority	Tender for the Renewal of Hardware, Software and Storage Facility Management Services for Enterprise Storage Systems for 1 year	489146.4	Ministry of Information, Communications and the Arts

Showing 1 to 10 of 442 entries

Previous 1 2 3 4 5 ... 45 Next

To be able access all the information available (dataframe), scroll down is needed.
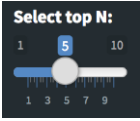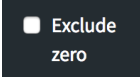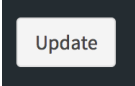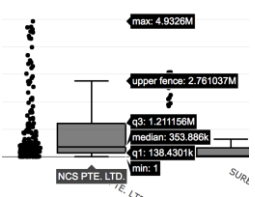
Table 9 - Explore: Top-N suppliers navigation and control

Control	Description
Select top N: 1 5 10 / 1 3 5 7 9	Slider to select how many TOP supplier to show, defaults value is 5 (1 to 10 is available).
☐ **Exclude zero**	Checkbox to exclude zero-value (no dollar amount mentioned) tenders from consideration. By default, not selected.
Min 0 **Multiplier** unit ▼	Adjustment od the scale: counter of units and selection of multiplier out of unit/thousand/million single-select dropdown.
Update	Click to Update-button will refresh the results based on selection applied.
Show ✓ 10 ntries / 25 / 50 / 100	Datatable view management: select from dropdown how many entries to show (10 by default).
Search: prime — Amount / Ministry — 'EMBER 108906 Prime Minister's Office	Search through the table: type into text field to filter table based on search criteria.
Agency ▲	Sorting control: click to arrows to apply ascending or descending sorting based on column selected.
Previous 1 2 3 4 5 Next	Pagination control: navigate to different pages of data table (first is opened by default).
max: 4.9326M / upper fence: 2.761037M / q3: 1.211156M / median: 353.886k / q1: 138.4301k / min: 1 / NCS PTE. LTD.	On hover to boxplot statistical information will be shown as complex tooltip.
1.875658M Filtered / 1.875658M Unfiltered / max: 1.875658M / median: 1.875658M Filtered / upper fence: 800k / q3: 382.455k / median: 162.5k Unfiltered / q1: 96.32k / min: 1 / KPMG SERVICES PTE. LTD.	Selection of specific point or multiple points on scatterplot will show specific data for this point, as well as highlight it simultaneously on boxplot and in data table below:

	rowname	Supplier	Agency	Tender	Amount	Ministry
88	93	KPMG SERVICES PTE. LTD.	Temasek Polytechnic	Tender for the supply, delivery, design, development, testing, implementation and maintenance of Temasek Advanced Learning, Nurturing and Testing Laboratory at Temasek Polytechnic	1875658.33	Ministry of Education

4. Troubleshooting & Support

The application uses single augmented dataset and shouldn't produce errors in case of any kind of alternative use scenarios.
In case of any assistance required, please use the points of contact for correction measures to be taken.

Appendix: Points of Contact

Contact	Organization	Email	Profile	Role
Charu MALIK	Singapore Management University	charu.malik.2017@mitb.smu.edu.sg	https://www.linkedin.com/in/charu-malik/	Financial Analytics student
Kateryna MAZURENKO	Singapore Management University	kmazurenko.2017@mitb.smu.edu.sg	https://www.linkedin.com/in/katerynamazurenko/	Analytics student
QIAO Xueyu	Singapore Management University	xyqiao.2017@mitb.smu.edu.sg	https://www.linkedin.com/in/xueyuqiao/	Analytics student