

Process	System roles					
	Human	Non-computing Hardware	Computing hardware	Software	Database	Communication & Network
Data entry and validation	<p>A. Data provider from the data sources</p> <ol style="list-style-type: none"> 1. Logs into the AQM system. 2. After logging in, Select the appropriate button for providing data form. 3. Enter the data list in the AQM system. 4. click on the save button to store the data. 5. if data is invalid then the system will show the error notification and also a cancel button ,by clicking on cancel button it will take them to the home page again, if the data is valid then it will save in the system. 6. Logs out from the system. <p>B. Data Entry Manager:</p>	<p>A. Paper and Stationery</p> <ol style="list-style-type: none"> 1. Paper is used by the Data providers for a backup copy of manual data sets. 2. Data Entry Manager can print the data and keep a manual database. <p>B. Data Sheet in Printed Version</p> <ol style="list-style-type: none"> 1. The data sheet can be collected as a printed version, by the Data Entry Manager. <p>C. File Holder</p> <ol style="list-style-type: none"> 1. For holding the printed version of data sheets. <p>D. Cabinets</p> <ol style="list-style-type: none"> 1. Cabinets used to store the Data sheets . 	<p>A. PC/Laptop/Other computing device</p> <ol style="list-style-type: none"> 1. Computers, Mouse, Keyboards used by data entry managers and data providers for displaying, selecting, and inputting data on the AQM system. <p>B. Scanner</p> <ol style="list-style-type: none"> 1. Scanners to scan the data by data entry manager if they want to store the data manually. <p>C. Servers</p> <ol style="list-style-type: none"> 1. Database servers used by the AQM system for data providers,data entry manager and for data entries 	<p>A. AQM system</p> <ol style="list-style-type: none"> 1. Validate the User. 2. It provides an interface for the data entry manager and data providers for data entries. 3. The data providers from the data sources and the Data entry manager can use the AQM system to directly input their own data and generate reports for their own purposes. <p>B. Operating System</p> <ol style="list-style-type: none"> 1. Any Operating System used by the data providers and the data entry manager like Mac, Windows, <p>C. Application</p>	<p>A. Database System of AQM system</p> <ol style="list-style-type: none"> 1. Collection of data is entered into a database system of AQM by the data providers and the data entry manager. <p>B. MS Excel files</p> <ol style="list-style-type: none"> 1. MS Excel files can be used to store the data by the data providers and the data entry manager. <p>C. MySQL</p> <ol style="list-style-type: none"> 1. The data providers can also use database systems like MySQL to store the raw data. 	<p>A. Telecommunication</p> <ol style="list-style-type: none"> 1. Data entry manager can communicate with data providers for exchange of information or if any mishap occurs. <p>B. Internet Connection</p> <ol style="list-style-type: none"> 1. Internet connection used by data providers,Data entry manager for data entry to the AQM system or used by the Data analysts. <p>C. Mail</p> <ol style="list-style-type: none"> 1. Mails can be exchanged between the Data entry manager and data providers

	<ol style="list-style-type: none"> 1. Logs in to the AQM system 2. After logging in, Select the appropriate button for providing data form. 3. Enter the data in the AQM system. 4. Click on the save button. 5. If data is invalid then get the error notification, and also show the cancel button, by pressing on cancel button it will bring them to the homepage again. If the data is valid the data will be saved. 6. If the data entry manager selects faulty data button then the data entry manager can see the list of faulty datas. 7. Logs out from the system. 		<p>D. Router/ Internet Cables by ISP Providers/ Switch</p> <ol style="list-style-type: none"> 1. From the networking side, internet cables by the ISP providers or router or switch used by the data provider and Data entry manager. 	<p>Software</p> <ol style="list-style-type: none"> 1. Application software used by the data providers and the data entry manager like MS Excel. <p>D. Scanning Software</p> <ol style="list-style-type: none"> 1. Data can be scanned by the data entry manager if they want to store the data manually. <p>E. Printing Software</p> <ol style="list-style-type: none"> 1. Printing software used for printing the data sheet like Printer Management or HP Print and Scan Doctor. <p>F. PDF Viewer</p> <ol style="list-style-type: none"> 1. Software used to view the PDF like WPS 		<p>if any mishap occurs. Data entry managers can also exchange mails to the data providers.</p>
Data verification and update	A. Data Entry Manager	A. Paper and stationary	A. PC/ Laptop/ Other	<p>A. AQM System</p> <ol style="list-style-type: none"> 1. The system 	A. Database of AQM System	A. Internet

	<ol style="list-style-type: none"> 1. Logs into the AQM system 2. Once identified as a validated user by the system, Data Entry Manager is allowed to enter the dashboard. 3. Receives notification from the system about the faulty data in a particular timestamp. 4. Views the data trends/ graphs. 5. Sees that particular data has been flagged/ marked by the system as faulty data. 6. Requests Data Source to provide data again for that particular timestamp where data was found faulty. 7. Receives new dataset from Data Source in CSV format. 8. Inputs the new dataset in the AQM System particularly where data was flagged/ marked. 9. Notifies Data 	<ol style="list-style-type: none"> 1. Papers used for printing purposes by the Data Entry Manager. 2. Pen used by the Data Entry Manager if needed to write down any particular query about faulty data. <p>B. File Holder</p> <ol style="list-style-type: none"> 1. For holding the printed version of the compiled verified physical document of data as a manual backup. <p>C. Cabinet</p> <ol style="list-style-type: none"> 1. It is used for storing the printed data version (the physical document) as a manual backup <p>D. Printed Datasheets</p> <ol style="list-style-type: none"> 1. Data Entry Manager can keep the printed datasheets as a manual backup for future references(can use it to compare before after data if needed) 	<p>computing device</p> <ol style="list-style-type: none"> 1. Used by the Data Entry Manager to observe and analyze the data trend/ graphs. 2. Used by Data Entry Manager to store the verified and updated data in the computer as a backup. 3. Data Entry Manager also can store the CSV received from the Data Source in the computer as a backup. <p>B. Printer</p> <ol style="list-style-type: none"> 1. Used by the Data Entry Manager for printing the data sheet for manual backup. <p>C. Server</p> <ol style="list-style-type: none"> 1. Database uses the server to store the updated air quality data 	<p>validates and verifies the users.</p> <ol style="list-style-type: none"> 2. Provides an appropriate interface for the users. 3. Used for viewing the monthly Air Quality data trends/ graphs by Data Entry Manager. 4. Stores data inputted by Data Entry Manager and Smart weather stations. 5. Stores flagged/ marked faulty data in the particular timestamp. 6. Used to send and receive notification from Data Entry Manager, Data Source. 7. Converts the CSV form provided by Data Entry Manager into graphical representation using an in-built function. 8. System checks and validates the data provided by both the Data Entry Manager and Smart weather station using an in-built function. 9. Immediately gives error/ alert if data 	<ol style="list-style-type: none"> 1. AQM database stores information of all the appropriate users.(this is useful while the system validates the user while logging in into the system) 2. AQM database stores data provided by Data Source and Data Entry Manager. 3. After new data is inputted(to replace the faulty data in the particular timestamp) by Data Entry Manager and Smart weather station, Database is validated , verified and updated using the in-built function. 4. This update change is viewed by the Data Entry Manager. 5. After the faulty data has been validated and verified, the new updated and verified data is stored in the AQM database. <p>B. Physical log book</p> <ol style="list-style-type: none"> 1. Used by Data Entry Manager to store the printed 	<ol style="list-style-type: none"> 1. Internet connection used by Data Source, Data Entry Manager to log in, log out, viewing the AQM system. 2. Used when Data Entry Manager and Smart weather stations are inputting data into the AQM system. 3. Used when the AQM system is storing all the data. 4. Used when the Data Analyst is flagging/ marking the faulty data. 5. Used when the AQM system automatically notifies Data Source and Data Entry Managervice versa. 6. Used when AQM system updates the specified faulty data automatically using the in-built function. 7. Used when the AQM system stores the updated and
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	<p>Analyst about the updated changes in the data trend/ graph.</p> <p>10. Logs out from the AQM system.</p> <p>C. Data Source</p> <ol style="list-style-type: none"> 1. Receives request for recollecting data for a particular timestamp from Data Entry Manager and directly from the AQM system. 2. Gather air quality data from the enlisted sources for that particular timestamp. 3. Provides data by sending a dataset in CSV format to the Data Entry Manager. 4. Smart weather stations directly provide data into the AQM system. 		<p>trends/ graphs.</p> <ol style="list-style-type: none"> 2. The AQM System is hosted on the server. 3. The data in the AQM System is provided from the server. 4. AQM system uses the Database server to let the Data Entry Manager view/analyze/ob serve all the data trends and graphs. <p>E. Routers/ Internet Cables by ISP Providers</p> <ol style="list-style-type: none"> 1. From the networking side, internet cables by the ISP providers or router are used by the Data Entry Manager. 	<p>inputted does not match system's validation in-built function.</p> <ol style="list-style-type: none"> 10. Requests Data Entry Manager to re-input correct dataset again in the particular timestamp where data failed to be validated. 11. Requests for data from Smart weather station for the particular timestamp where data failed to be validated 12. Update the data in the particular faulty timestamp 13. Store the validated, verified and updated data in the system. <p>B. Operating System</p> <ol style="list-style-type: none"> 1. Any operating system used by Data Entry Manager Eg : Mac, Windows, Linux etc <p>C. Application Software</p> <ol style="list-style-type: none"> 1. Data Entry Manager can initially make a draft of the datasheet provided by the Data Source in MS Word/ Ms 	<p>datasheets as a manual backup for future references(if needed).</p> <p>C. MySQL</p> <ol style="list-style-type: none"> 1. Data Entry Manager stores all the CSV files in the MySQL database to avoid losing it in the future. 2. Data Entry Manager stores the datasheets here. 3. Stores all the information related to air quality reports in the MySQL database. <p>D. Excel file</p> <ol style="list-style-type: none"> 1. Used by Data Entry Manager to store the specific timestamps where data was found faulty. 	<p>verified air quality report in the system.</p>
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				<p>Excel.</p> <p>D. PDF Viewer</p> <ol style="list-style-type: none"> 1. Data Entry Manager can view the data trends / graphs in the pdf version. 2. Data Entry Manager can view the datasheet in PDF version. <p>E. Web- based Application Software</p> <ol style="list-style-type: none"> 1. Data Entry Manager use browser to log in into the AQM system. 2. Data Entry Manager use to view the data trends/ graphs. 3. Data Analyst use to store the verified and updated data on the AQM system. <p>F. Printing Software</p> <ol style="list-style-type: none"> 1. Printing software used for printing the data sheets by Data Entry Manager as manual backup. 		
Report generation	A. Data Providers	Paper and Stationery	A. PC/ Laptop/ Other Computing Device	A. AQM System	A. AQM Database System	A. Telecommunication

	<ol style="list-style-type: none"> 1. Data providers log into the AQM system 2. Once they get into the system they will see a report button. 3. Click on that specific button to see the report. 4. Once they get into this there they will see all the reports. 5. First report will be the latest one and they can also search the report by the date. 6. Once the specific report is showing they can click on that. 7. After clicking on that they will see the "download pdf" button,if they click there they can download the pdf of the report. 8. If they select the cancel button then it will take them again to the homepage. <p>B. Researchers/General viewers</p> <ol style="list-style-type: none"> 1. Researchers/general viewers log 	<ol style="list-style-type: none"> 1. Data entry Manager,Researchers/general viewers might also need to take notes on the report. 2. For manual verification and calculation pen and papers are used. 3. For printing purpose <p>B. PDF version</p> <ol style="list-style-type: none"> 1. It might be needed for research and analyzing purposes. <p>C. Printed Version</p> <ol style="list-style-type: none"> 1. If Data providers,Data entry managers and researchers/general viewers want to store the report as the printed version. <p>D. Cabinet</p> <ol style="list-style-type: none"> 1. For storing the report which was printed as manual backup by the executives or the 	<ol style="list-style-type: none"> 1. It is used by the Data providers,Data entry managers and researchers/general viewers for viewing and downloading the report. 2. Reports can be stored inside the computing device by Data providers,Data entry managers and researchers/general viewers. 3. Can be used for searching for research purposes. <p>B. Printer</p> <ol style="list-style-type: none"> 1. For printing the report for manual backup by Data providers,Data entry managers and researchers/general viewers. <p>C. Scanner</p> <ol style="list-style-type: none"> 1. To scanning the 	<ol style="list-style-type: none"> 1. It provides an interface which stores the data and gives a report to the Data providers,Data entry managers and researchers/general viewers. <p>B. Operating System</p> <ol style="list-style-type: none"> 1. Any Operating System used by the Data providers,Data entry managers and researchers/general viewers like windows ,mac. <p>C. Application Software</p> <ol style="list-style-type: none"> 1. Data providers,Data entry managers and researchers/general viewers can view the report. <p>D. Web-based Application Software</p>	<ol style="list-style-type: none"> 1. To store the report into the AQM system by themselves as a record. <p>B. MySQL</p> <ol style="list-style-type: none"> 1. Data Entry Manager can store the reports for further research purposes in MySQL Database to avoid losing them. <p>C. Printed Version</p> <ol style="list-style-type: none"> 1. Printed version of the report can be stored as a manual backup by the Data providers,Data entry managers and researchers/general viewers. 	<ol style="list-style-type: none"> 1. Telecommunication like BTCL for phone calls or text messages by the Data providers and Data entry managers of information or if any mishap occurs. <p>B. Internet Connection</p> <ol style="list-style-type: none"> 1. Internet Connection used by Data providers,Data entry managers and researchers/general viewers for generating viewing the report. <p>C. Mail</p> <ol style="list-style-type: none"> 1. Mails can be exchanged between Data providers and Data entry managers if any mishap occurs.
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	<p>into the AQM system.</p> <ol style="list-style-type: none"> Once they get into the system they will see a report button. Click on that specific button to see the report. Once they get into this there they will see all the reports. First report will be the latest one and they can also search the report by the date. Once the specific report is showing they can click on that. After clicking on that they will see the "download pdf" button,if they click there they can download the pdf of the report. If they select the cancel button then it will take them again to the homepage. <p>C. Data Entry Manager</p> <ol style="list-style-type: none"> Data entry Manager log into the AQM system Once they get into 	<p>software developers.</p> <p>E File Holder</p> <ol style="list-style-type: none"> For holding the printed version of the reports. 	<p>reports by the Data providers,Data entry managers and researchers/general viewers</p> <p>D. Routers/ Internet Cables by ISP Providers/ Switch</p> <ol style="list-style-type: none"> From the networking side, internet cables by the ISP Data providers,Data entry managers and researchers/general viewers <p>E.Card Reader</p> <ol style="list-style-type: none"> Data providers,Data entry managers and researchers/general viewers if they want to use this as a medium to transmit the report or store. <p>F. Server</p> <ol style="list-style-type: none"> Database 	<ol style="list-style-type: none"> Data providers,Data entry managers and researchers/general viewers will use browsers to login <p>E. Scanning Software</p> <ol style="list-style-type: none"> Reports can be scanned by the Data providers,Data entry managers and researchers/general viewers if they want to store the data manually. <p>F. Printing Software</p> <ol style="list-style-type: none"> Printing software used for printing reports as a manual backup by the Data providers,Data entry managers and researchers/general viewers <p>G. PDF Viewer</p>		
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	<p>the system they will see a report button.</p> <ol style="list-style-type: none"> Click on that specific button to see the report. Once they get into this there they will see all the reports. First report will be the latest one and they can also search the report by the date. Once the specific report is showing they can click on that. After clicking on that they will see the “download pdf” button,if they click there they can download the pdf of the report. If they select the cancel button then it will take them again to the homepage. 		<p>servers used by the AQM system for Data providers,Data entry managers and researchers/general viewers to view and generate report.</p>	<ol style="list-style-type: none"> To view the report in PDF version by the Data providers,Data entry managers and researchers/general viewers. 		
4. Viewing	<p>A. Researcher/ General Viewer</p> <ol style="list-style-type: none"> Logs into the AQM system.(user not validated as logged in as 	<p>A. Paper</p> <ol style="list-style-type: none"> Used for printing purposes by the Researcher, Data Entry Manager 	<p>A. PC/ Laptop/ Other computing device</p> <ol style="list-style-type: none"> Used by Researcher/general viewers and Data Entry Manager to view reports, data 	<p>A. AQI System</p> <ol style="list-style-type: none"> The system validates and verifies the users. Provides an appropriate interface for the 	<p>A. Database of AQM System</p> <ol style="list-style-type: none"> AQM database stores information of all the appropriate users.(this is 	<p>A. Internet</p> <ol style="list-style-type: none"> Internet connection used by Researcher/general viewers and Data Entry

	<p>guest)</p> <ol style="list-style-type: none"> 2. Enters the dashboard 3. Observes/ Analyzes Air Quality Reports, data trends/ graphs thoroughly. 4. Extracts information as much as needed for their research purpose. 5. Logs out from the AQM system <p>B. Data Entry Manager</p> <ol style="list-style-type: none"> 1. Logs into the AQM system. 2. Once identified as a validated user by the system, he is allowed to enter the dashboard. 3. Receives notification about the missing data in a particular timestamp from the Executives. 4. Notifies Data Source to provide data for that particular timestamp. 5. The process of Basic Data Entry is executed. 6. Notifies the 		<p>trends , graphs from the AQM system.</p> <ol style="list-style-type: none"> 2. Data Entry Manager stores the CSV received from the Data Source in the computer as a backup. 3. Data Entry Manager stores the datasheets in the computer as a backup. <p>B. Printer</p> <ol style="list-style-type: none"> 1. Researchers can use it to print Air Quality reports, data trends , graphs. <p>C. Server</p> <ol style="list-style-type: none"> 1. Database uses the server to store the updated air quality data trends/ graphs. 2. The AQM System is hosted on the server. 3. The data in the AQM System is provided from the server. <p>D. Routers/ Internet Cables by ISP</p>	<p>users.</p> <ol style="list-style-type: none"> 3. Used for viewing the monthly Air Quality data trends/ graphs, reports by Data Entry Manager, researchers/general viewers. 4. Stores validated and verified data inputted by Data Entry Manager and Smart weather stations. <p>B. Operating System</p> <ol style="list-style-type: none"> 1. Any operating system used by a Data Entry Manager and researchers/general viewwr. . Eg : Mac, Windows, Linux etc. <p>C. Application Software</p> <ol style="list-style-type: none"> 1. Researchers/general viewers can jot down important notes by using MS Word. 2. Data Entry Manager can use MS Excel to list the 	<p>useful while the system validates the user while logging in into the system)</p> <ol style="list-style-type: none"> 2. After new data is inputted in the missing timestamps by Data Entry Manager and Smart weather station, Database is validated , verified and updated using the in-built function. 3. This update change is viewed by the Data Entry Manager. 4. After the missing data has been validated and verified, the new updated and verified data is stored in the AQM database. <p>B. MySQL</p> <ol style="list-style-type: none"> 1. Data Entry Manager stores all the CSV files in the MySQL 	<p>Manager to log in, log out, viewing the AQM system.</p> <ol style="list-style-type: none"> 2. Used when Data Entry Manager and Smart weather stations are inputting data into the AQM system. 3. Used when the AQM system is storing all the data. 4. Used when the AQM system automatically notifies Data Entry Manager. 5. Used when the AQM system updates the missing data in the particular timestamp automatically using the in-built function. 6. Used when the AQM system stores the updated
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	<p>Executives about the updated changes.</p> <p>7. Logs out from the AQM system.</p>		<p>Providers</p> <ol style="list-style-type: none"> 1. From the networking side, internet cables by the ISP providers or routers are used by the Researcher/General Viewers Data Entry Manager. 	<p>timestamps where data was found missing.</p> <p>D. PDF Viewer</p> <ol style="list-style-type: none"> 1. Data Entry Manager, researchers/general viewers can view the data trends / graphs , reports in the PDF version. 2. Data Entry Manager can view the datasheet in PDF version. <p>E. Web- based Application Software</p> <ol style="list-style-type: none"> 1. Data Entry Manager and researchers/general viewers use browsers to log in into the AQM system. 2. Data Entry researchers/general viewers use to view the data trends/ graphs , reports. 3. Data Entry Manager use to input missing data in the particular 	<p>database to avoid losing it in the future.</p> <ol style="list-style-type: none"> 2. Data Entry Manager stores the datasheets here. 3. Stores all the information related to air quality reports in the MySQL database. <p>C. Excel file</p> <ol style="list-style-type: none"> 1. Executives can use MS Excel to list the timestamps where data was found missing and then send this file to the Data Entry Manager. 	<p>and verified air quality report in the system.</p>
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				<div>timestamp on the AQM system.</div> <div>F. Printing Software<div>1. Printing software used for printing the Air Quality reports, data trends, graphs by Data Entry Manager and researchers/general viewers.</div></div>		
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