The Future
of Machine Industry.

1.1 Login:

When navigating to the site https://rocket.senseforce.io authentication is required as seen in the screenshot below. Please note that using Google Chrome is strongly recommended for the best user experience and is the only officially supported browser at the moment.

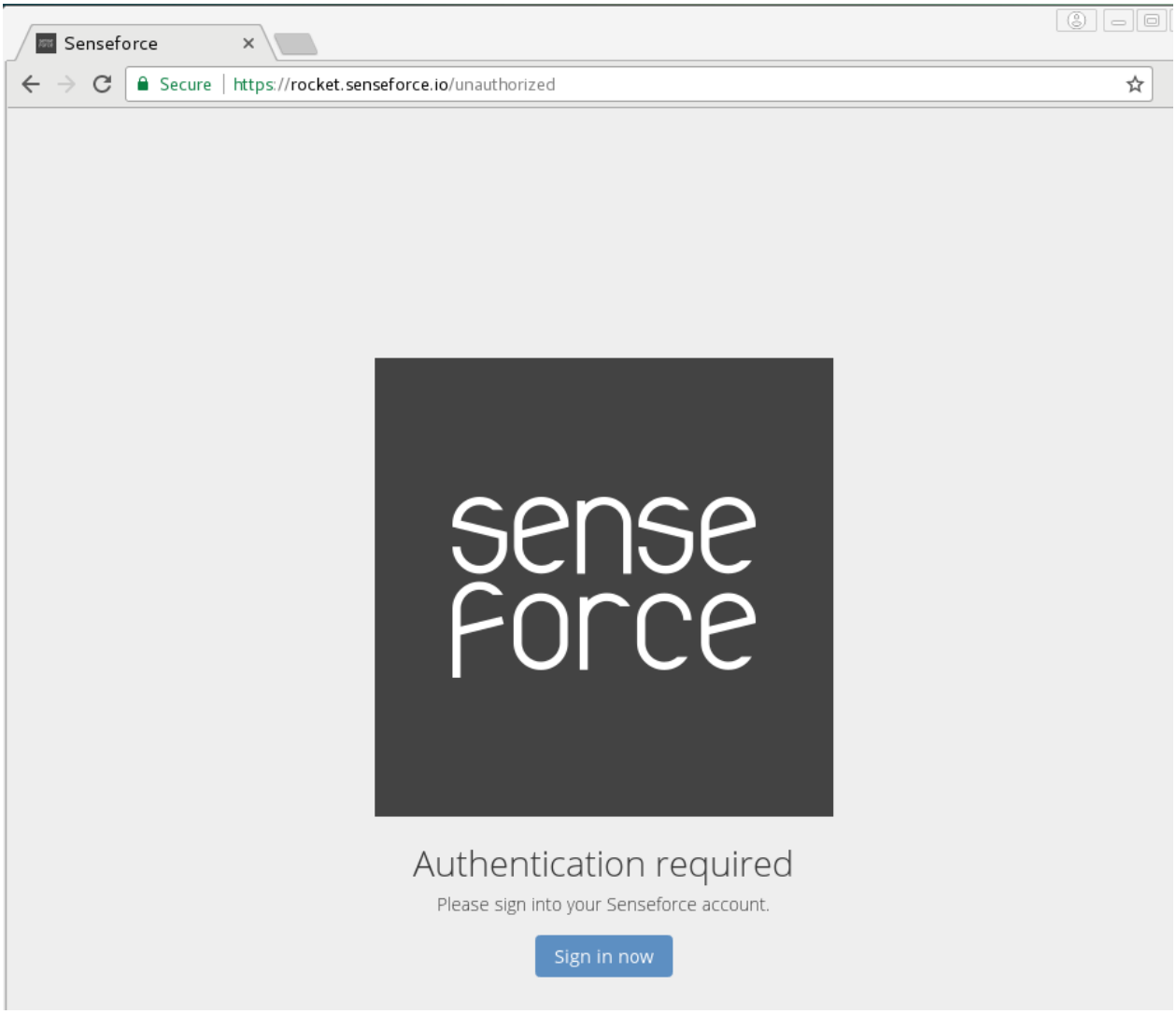


Illustration 1: rocket.senseforce.io login screen

After clicking the “Sign in now” button a redirection to the domain https://auth.senseforce.io takes place where the user is greeted by a login prompt (seen in the figure below). To sign in enter the provided credentials and click “Sign in”.
Optionally it is possible to tick the “Keep me signed in” option so that the user is not automatically signed out after a certain amount of time.
In case the password has been forgotten it can be recovered by clicking “Forgot your password?”. Please note that a valid and previously confirmed e-mail address has to be set for the user in order to recover the password.

To get a new account use the “Contact us” button to get in touch with the sales team.

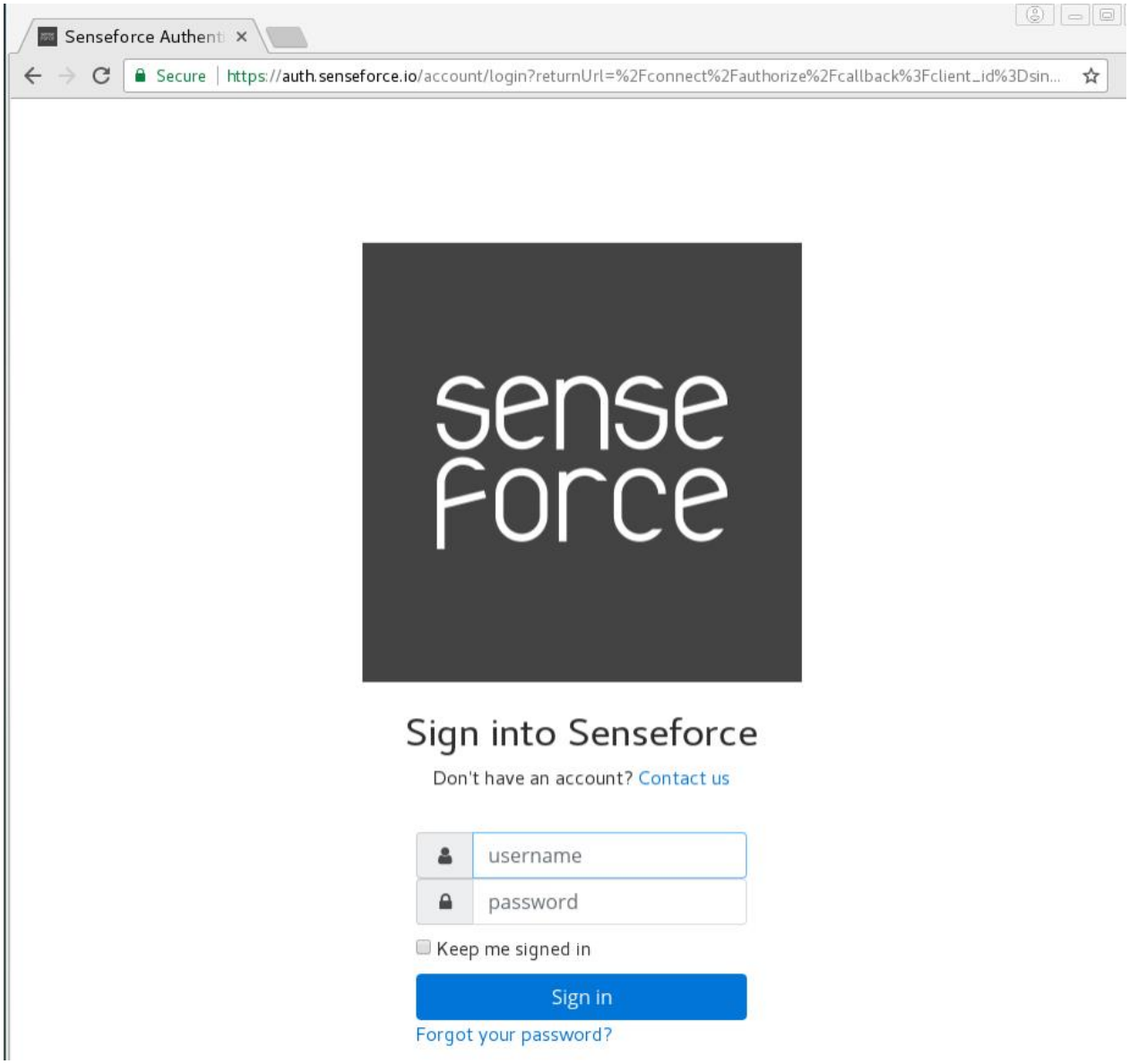


Illustration 2: auth.senseforce.io secure login

1.1.1 Forgot password:

Clicking the “Forgot your password” will prompt for the username. Enter the username and check the e-mail address. Please note that a valid and confirmed e-mail address has to be set for a user. If no e-mail address has been resisted, the password cannot be recovered.
If the e-mail address is not registered contact the companies senseforce administrator.

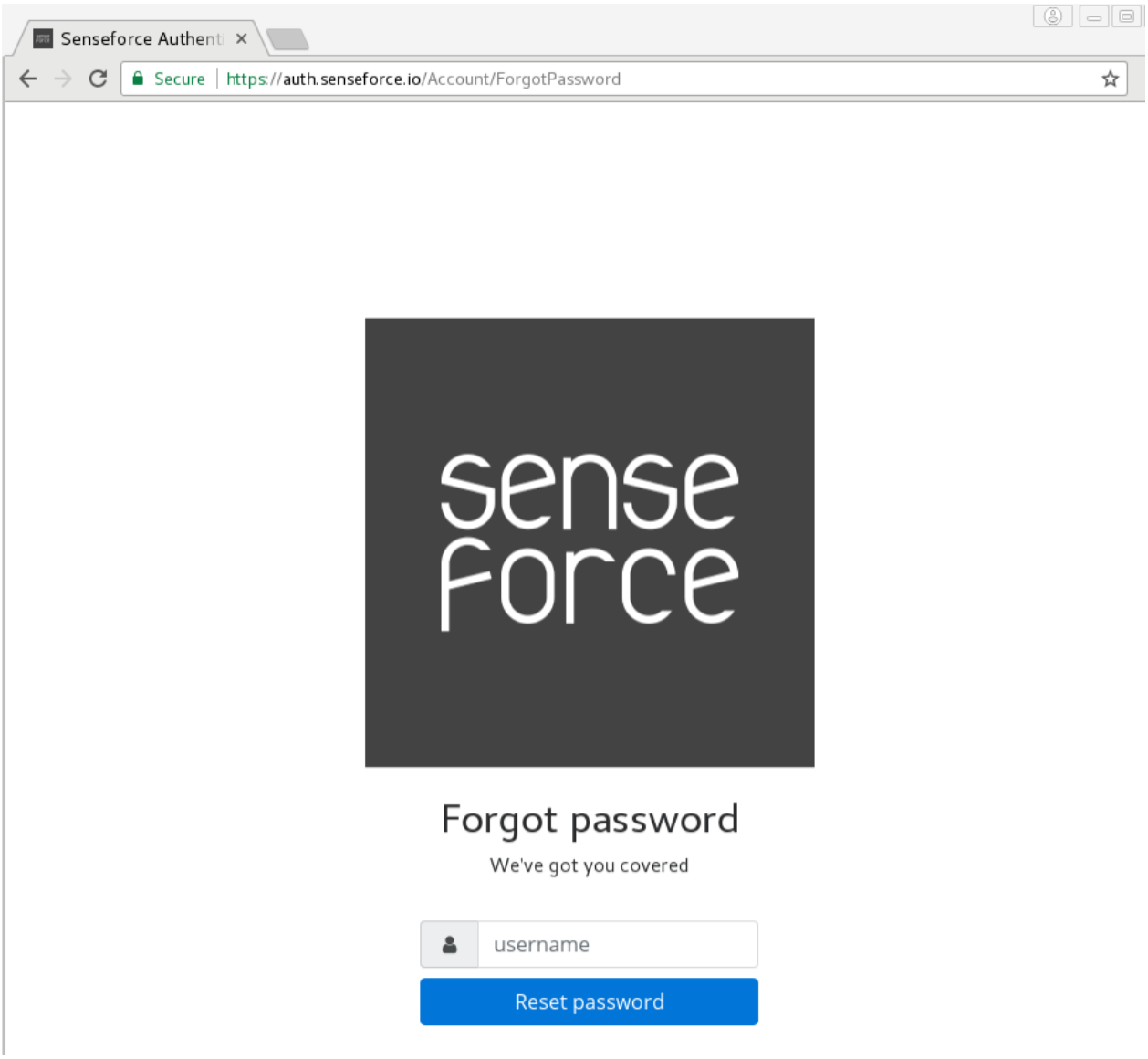


Illustration 3: password recovery

1.2 Dashboard:

This will greeted the user by displaying the dashboard overview (as seen in the screenshot below). By clicking one of the tiles the user is taken to a specific dashboard.
The button in the top right corner can be used to sign out from the application, the menu entry on the bottom left offers the same functionality.
A search bar can be used to find a specific dashboard. The button to the left of the search bar lets the user filter the results by tags specified beforehand (refer to tag management for further details).
Three buttons to the right of the search bar allow for refreshing the dashboard list, switching to a table view and adding a new dashboard.
A drop down menu lets the user choose how many cards are shown per page.
The navigation menu can be conveniently collapsed to gain more screen real estate, by using the button to the right of the senseforce logo.

The screenshot below shows the same dashboard list as a table instead of tiles. This can be selected to accommodate some of the user preferences.

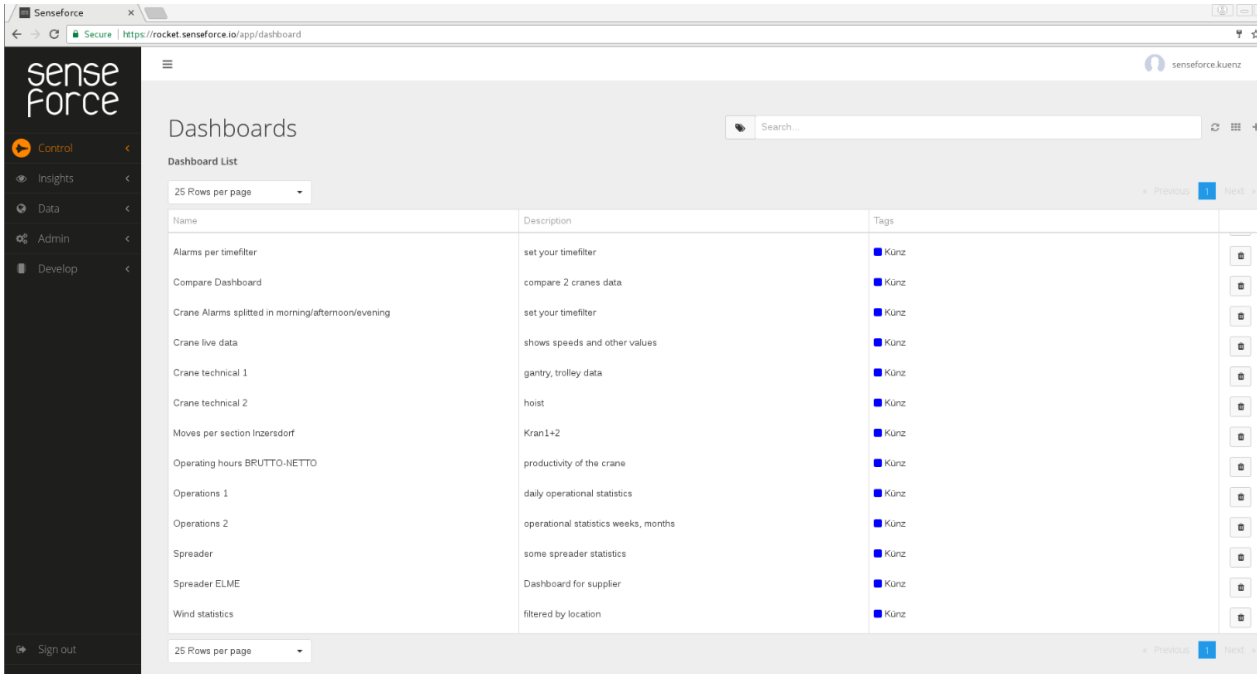


Illustration 5: dashboard overview as table

The following figure shows the dashboard overview with the collapsed navigation menu.

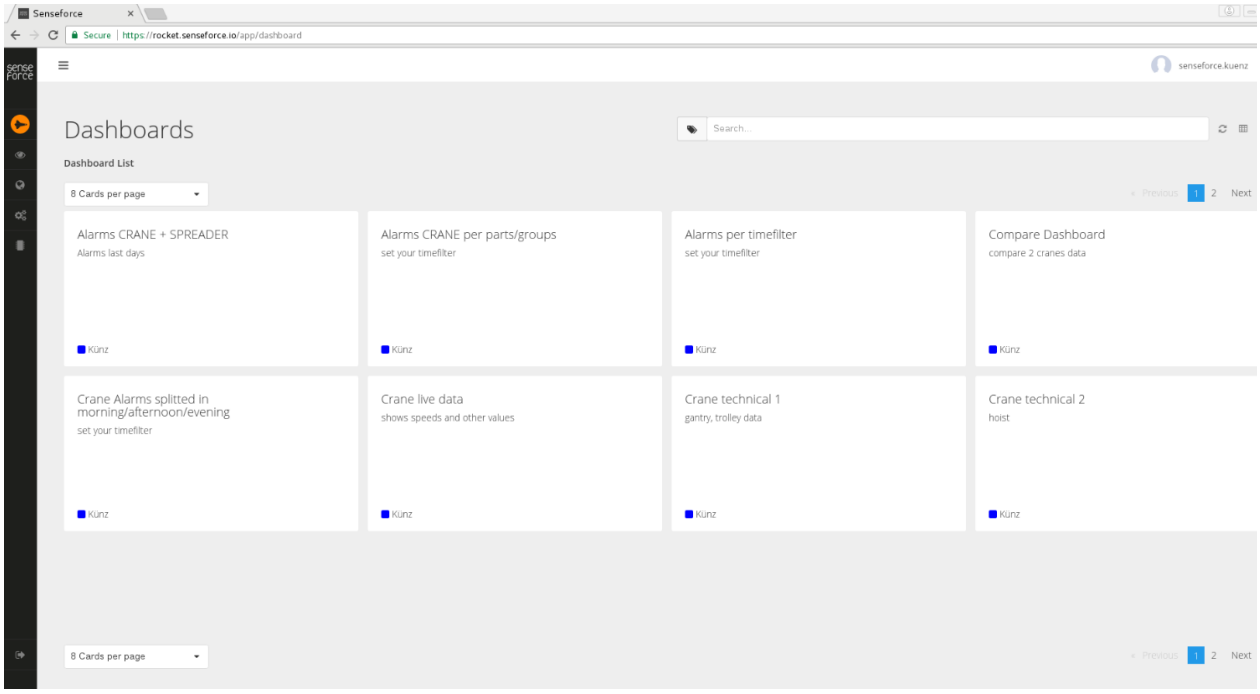


Illustration 6: collapsed navigation bar

An example dashboard with a bar-, line-, pie- chart and table widget can be seen in the following screenshot.

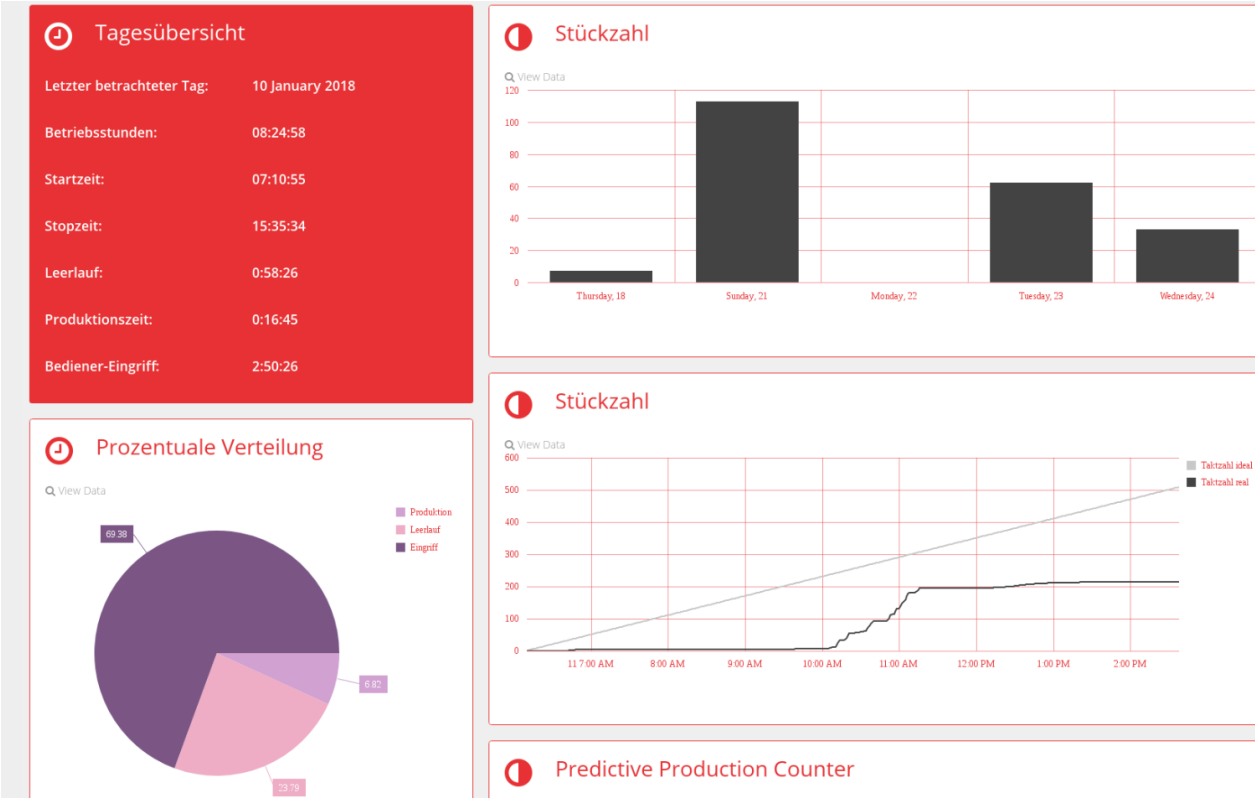


Illustration 7: sample dashboard with widgets

1.3 Dashboard Filters:

The dashboard filters allow to overwrite the query filter without changing the original query or having to navigate away from the dashboard. This can be very helpful to switch between machines or different time periods inside the dashboard.
To use the dashboard filters the following conditions have to be satisfied.
- add a filter to a query (this can also be an empty filter)
- expose the widget filter through the “Parameters” tab inside the widget editor (please consult the widget section of the manual for further detail) and give it a meaningful name.
- link the dashboard filter to the widget filter by clicking on gear symbol on the dashboard and then “Edit data source”.
- select the desired filter parameter
- save the changes made to the dashboard.

1.4 Analytics:

When navigating to Insights → Analytic queries (shown in the illustration below) the user sees all previously created queries.
By selecting an existing query or by creating a new one clicking the “+” symbol, the user is take the the query editor as seen in figure 9.

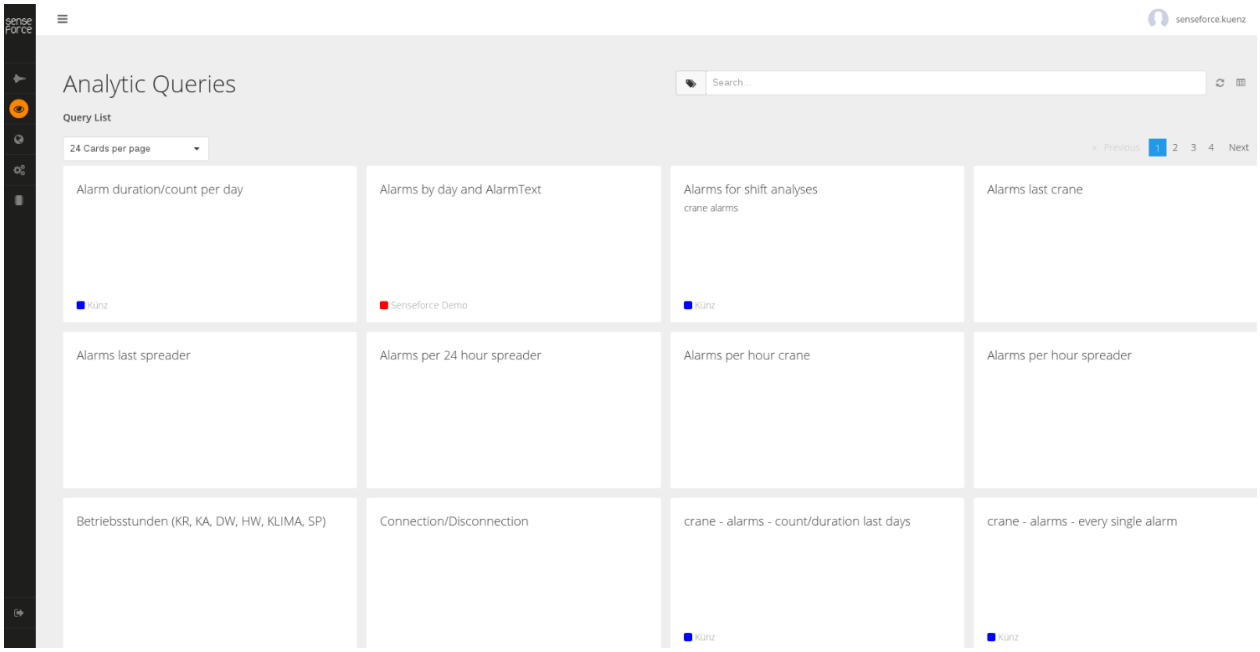


Illustration 8: analytic queries

The screenshot below shows the query editor when creating a new query. A query settings section allows for naming the query, adding a description and tagging for easy retrieval later on.
The menu to the left lets the user select the Events (generated by luna, fixed schema), the Dimensions (additional metadata), Dynamic (generated by luna, no fixed schema) and formulas to create a data set. One or multiple items from this list is easily added to the data set by clicking on them. Clicking the event queries the senseforce database and returns a result instantly. If the result is empty it is most likely that the selected event does not contain any entries for the specified time. At the bottom of the site a counter is displayed showing how many entries are stored in the database that satisfy the selection criteria.

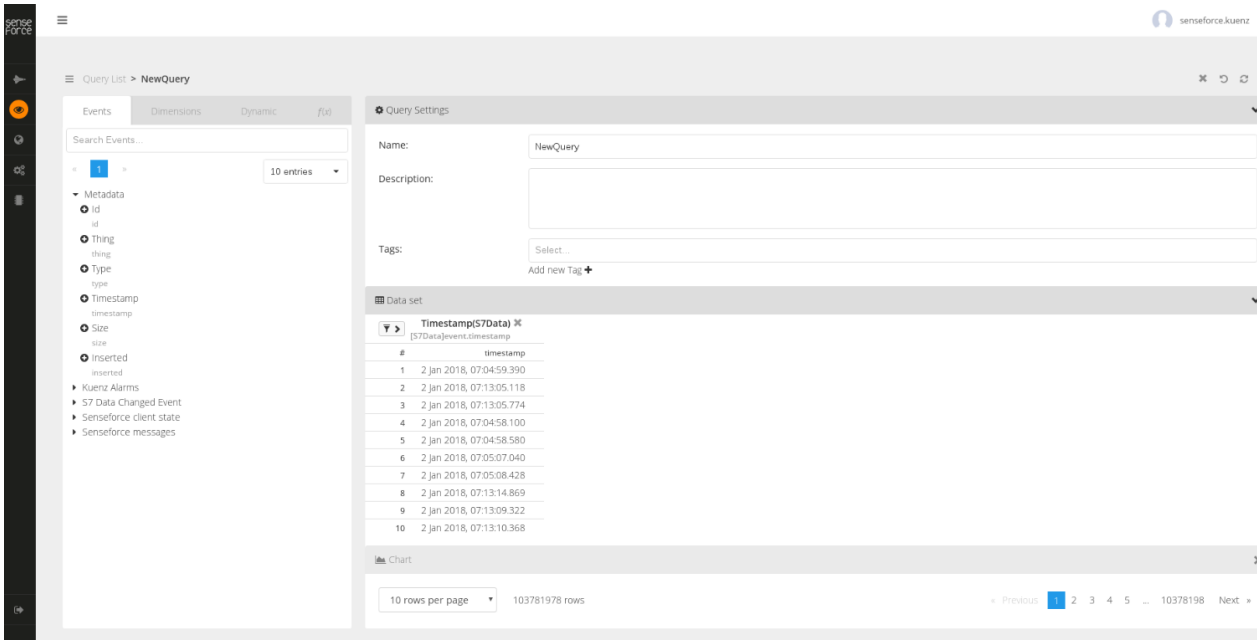


Illustration 9: query editor

It is possible to filter, group, sort and aggregate the results conveniently by clicking the filter icon in the data set section (as seen in screenshot below). This allows to query the senseforce database intuitively without having to know the exact SQL syntax that would be required otherwise. It has to be stated that the basic rules and operations of SQL still apply.

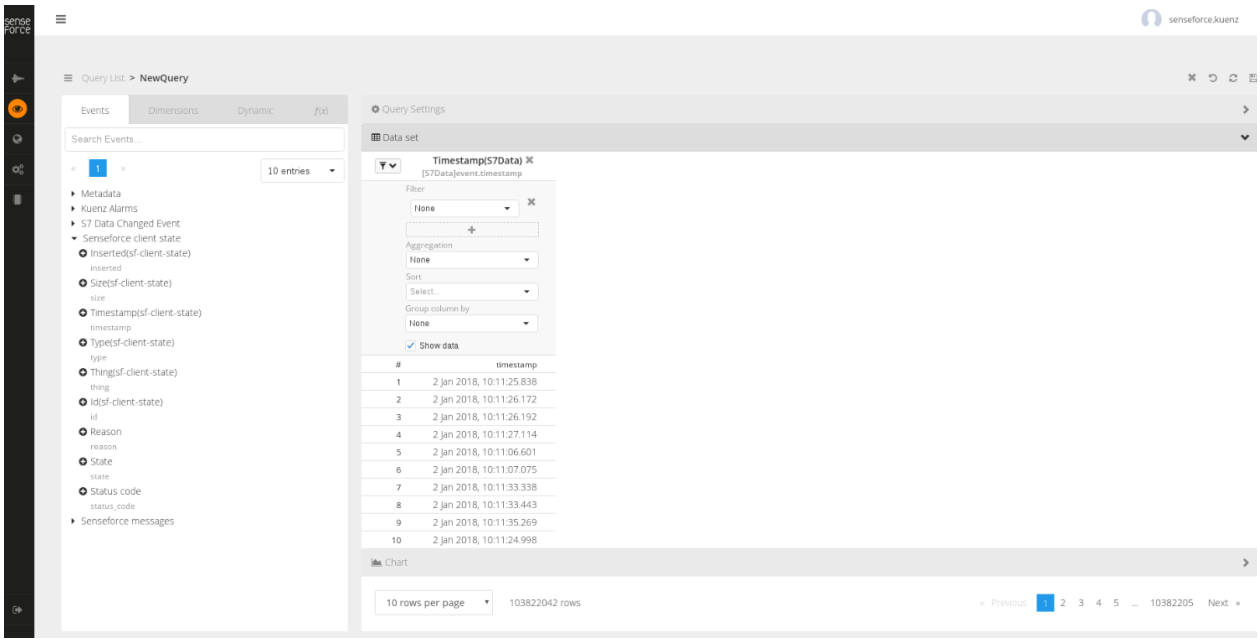


Illustration 10: query editor collapsed query settings

Formula editor: More sophisticated queries with calculations and decisions can be created using the integrated formula editor. It can be used by clicking the “f(x)” tab as seen in the screenshot below.
In addition to the standard arithmetic operations the formula editor allows for “if/else”, “switch/case”, string operations, regular expressions, casting, timestamp operations, random number generation, hashing and much more.
It is important to select a suitable “Result data type” for the intended calculation.
The formula editor spans a tree with each node being an operation. By clicking the blue dots a new operation can be added. If the text next to the blue dots is clicked the node can be removed or the operation can be changed.

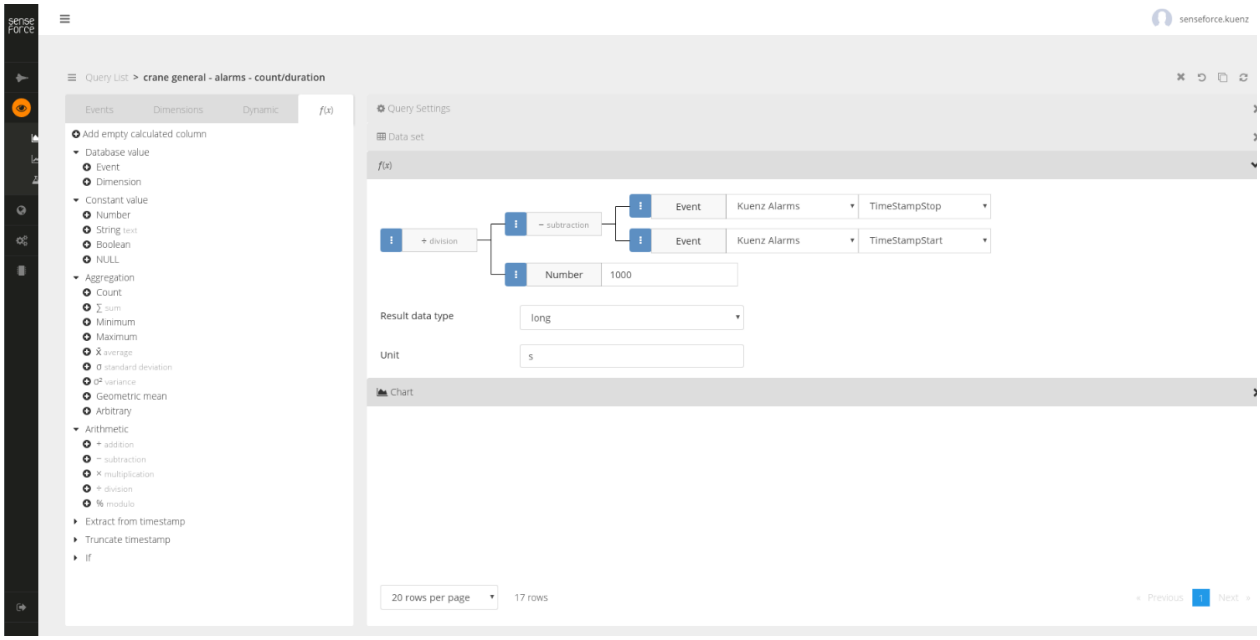


Illustration 12: query editor formula editor

1.5 Statistical Computing:

This is a feature for seasoned data scientists and statisticians, which allows for custom Python and R scripts to be executed. Covering the extent of R and Python is out of scope for this document.
See https://cran.r-project.org/doc/contrib/Torfs+Brauer-Short-R-Intro.pdf for a short introduction to R.

1.6 Widgets:

Widgets contain queries and allow visualizing the data using a variety of common chart types. The figure below shows the widget list overview. The tiles show show the name and description and additionally the elements (queries, fixed values, tables and images) that are used by the widget.

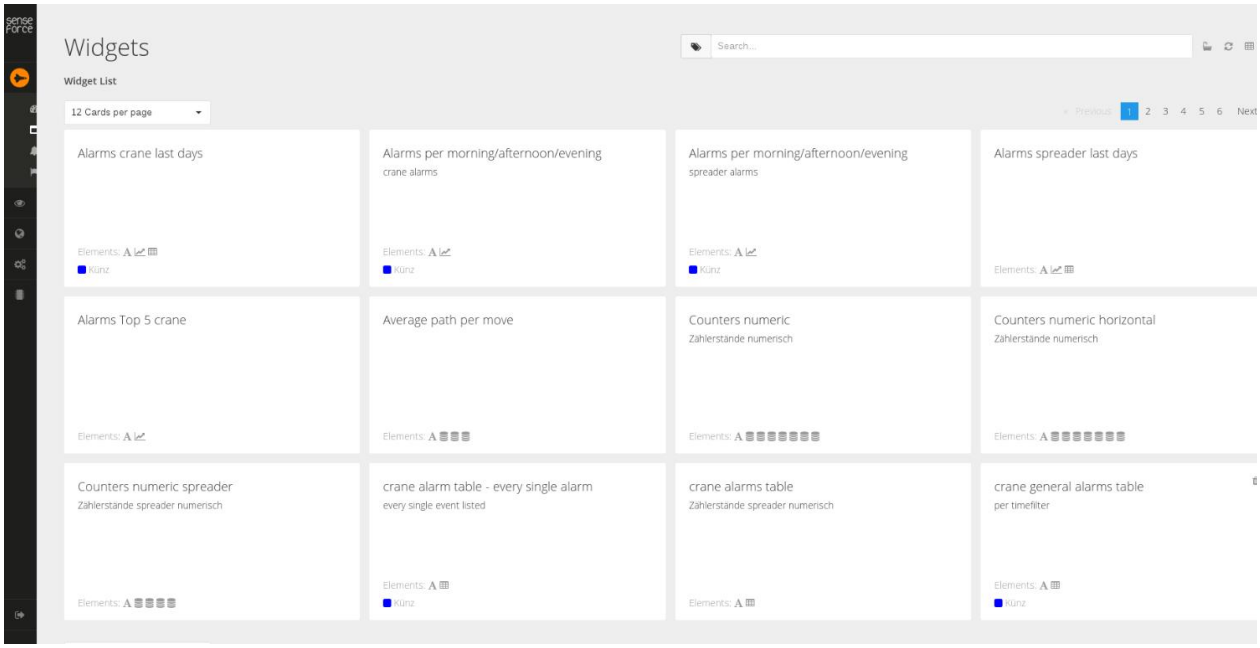


Illustration 13: widget list overview

By clicking the “+” icon a new widget is created as seen in the figure below. This view allows to name, describe and tag the widget. On the bottom of the window a preview of the widget is rendered, displaying the current settings.

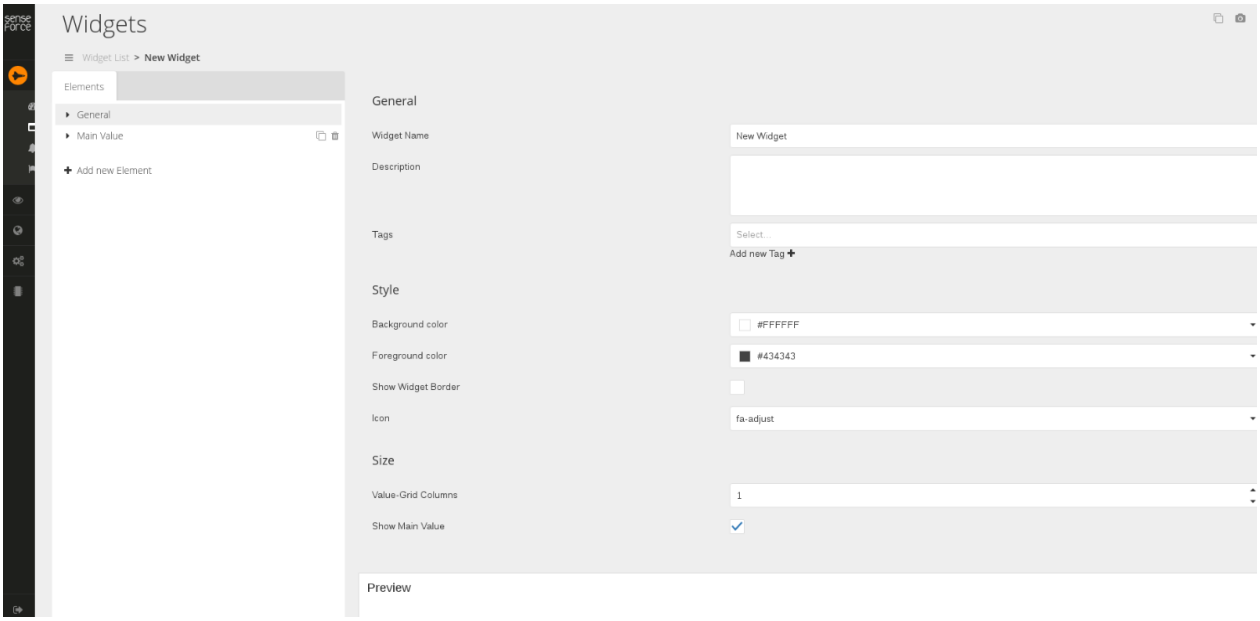


Illustration 14: new widget dialog

Save Widget: Located on the right side is the universal save icon, used to save the changes, alternatively it is possible to use “Ctrl + S” for saving.

Clone Widget: This function allows to clone an existing widget.

1.7 Style:

This section allows to change the color scheme of the widget and its font. Additionally a boarder and an icon can be selected, which is shown next to the main value.

Value-Grid Columns: Due to the nature of the widget being a grid allowing for multiple elements (quires, tables, values, images and charts), the “Value-Grid Columns” lets the user select the number of columns used by the widget.

Main Value (seen in figure below):
Header: Lets the user change the title of the widget.
Show Header in Widget: This allows to hide the title of the widget.

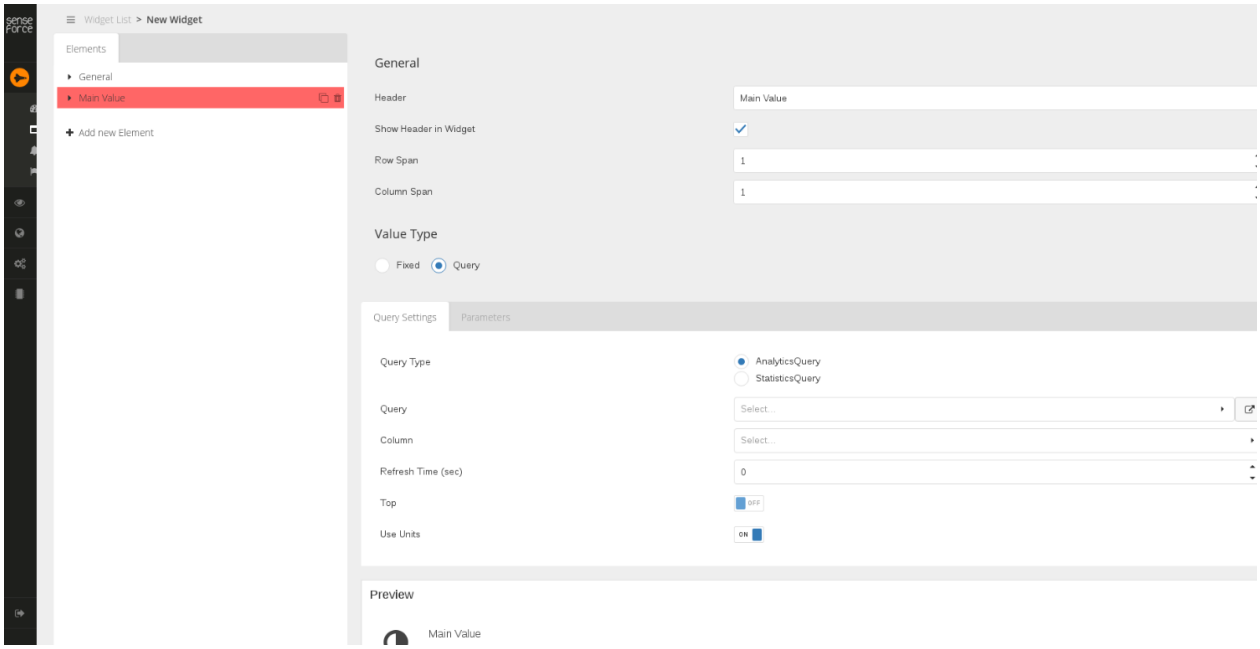


Illustration 15: widget editor main value

Row Span: Lets the user adjust the height of the row inside the widget.

Column Span: Allows to have multiple columns inside the same widget (e.g. two charts next to each other).

Add new Element: New widget elements (queries, tables, charts, images… etc.) can be added with this button as seen in the figure below.

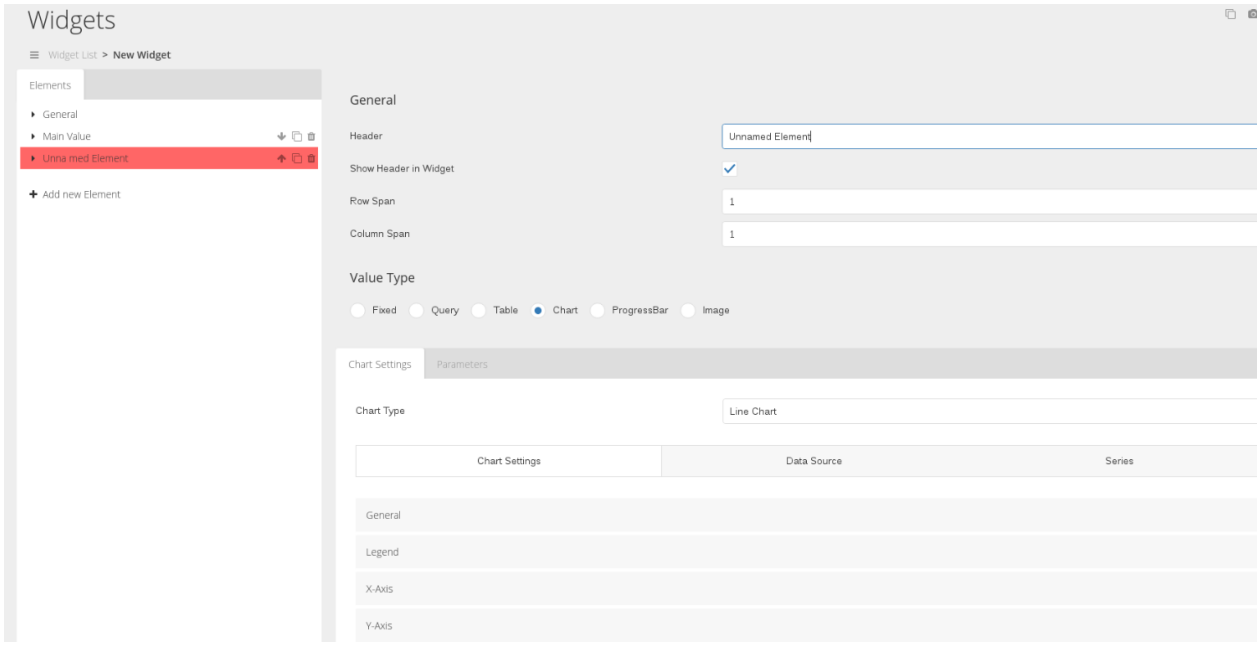


Illustration 16: widget editor additional element

Fixed: Can be used to enter a fixed value or string, which is shown in the widget.

Query: Is used to display a single value of a specified query.

Table: This Value Type displays a query as a table. The widget will look like a table showing the selected columns of the specified query.

Progress Bar: Will make the widget look like a progress bar, with a predefined target.

Image: This allows the user to upload images to customize the widget.

Chart: Lets the user create different charts that can be used to visualize query data on dashboards.

Chart Type: This menu allows to choose the different chart types listed below.

Line Chart: A very common type of chart where the discrete values resulting from the query are connected with lines (as seen in the screenshot below).

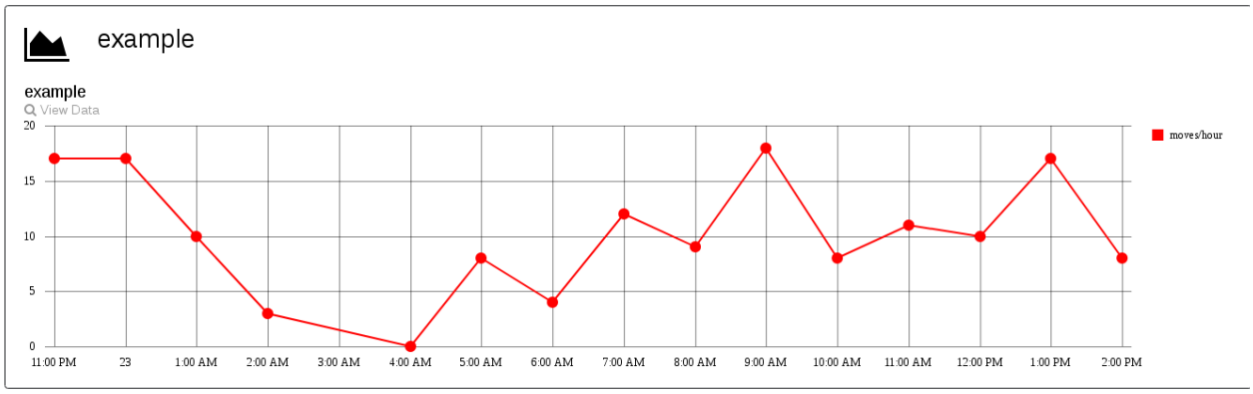


Illustration 17: example line chart

General:

Line Type: Lets the user select the preferred interpolation mode (Spline, Line, Step). To display discrete values without interpolation the point chart is used instead. The stacked option creates the graphical sum of both lines.

Use Point-Aggregation: Reduce the number of points in chart and hide outliers; zooming shows them again. This option reduces the amount of data rendered on the client computer.

Enable Zooming: This enables zooming inside the widget by using the mouse wheel.

Show Cross-hair: This accessibility feature displays a cross-hair when the mouse is held over the chart, which allows to easily read the x and y-axis values of a specific point of interest.

Animations: Shows an animation when the widget is loaded initially.

Show Units: Displays the unit of the y-axis in the legend section of the chart.
Disable Tooltip: When the mouse is held over a specific point inside the chart, the y-axis label is shown as a tooltip, which can be disabled if desired.

Enable Export: Gives the widget an option to export it as a pdf, png and jpeg and is located in the top right corner of the widget.

Legend: contains all settings regarding the legend of the chart.

Show Legend: Allows to hide the legend inside a chart.

Position: Changes the position of the legend to inside or outside the chart.

Horizontal Alignment: The horizontal position of legend can be changed with this setting.

Vertical Alignment: The vertical position of legend can be changed with this setting.

X-Axis: contains all settings for formatting the x-axis.

Show X-Axis Label: Allows to enable or disable the label on the x-axis of the chart.

X-Axis Label: Can be freely defined by the user and shows a label for the x-axis.

X-Axis Position: Lets the user select the position of the x-axis.

Show X-Axis Grid Lines: Lets the user enable/disable the squared chart background pattern.

Axis-Overlapping Mode: To avoid overlapping of the discrete values below the x-axis (useful for large number of data points).

Override Axis Type: This setting avoids graphical gaps in the chart representation due to missing values when discrete is chosen. The default is continuous which shows gaps in the data sets and is dependent on the datatype.

Override Axis Data Type: Allows to influence the order of the values in the x-axis by changing the data type.

Y-axis: Contains all y-axis settings respectively.

Contains the same options for the y-axis as used in the x-axis.

Spacing: Gives control over the spacing used in the widget.

Margin Top (px): allows to modify the spacing from the top in pixels between the various chart elemaents.

Margin Bottom (px): allows to modify the spacing from the bottom in pixels between the various chart elements.

Margin Left (px): allows to modify the spacing from the left in pixels between the various chart elements.

Margin Right (px): allows to modify the spacing from the right in pixels between the various chart elements.

Data Source:

Query Type: Lets the user choose between a standard “AnalyticsQuery” and a “StatisticsQuery” that uses an R or python script for calculations.

Query: Lets the user select a previously created query. The button to the right conveniently takes the user back to the query editor so that it can be modified and tweaked if necessary.

X-Axis Column: The column used for the x-axis can be selected here.

Refresh time (sec): This setting changes how often the query of this chart is executed and the widget refreshed. The default value refreshes the widget once when the dashboard is loaded.

Limit Rows: Allows to limit the number of results shown int the chart, which is especially useful for bar charts.

Use Grouping Column: Allows for additional grouping of columns. This allows to display certain series without the necessity of having a 3d chart. If this option is used the “Series” tab is disabled. The Group column lets the user select the column that is used to group by. The y-axis column is used to choose the y-axis when a grouping column is used.

Series:

Allows to add one or more series to a single chart by clicking the ”Add new Series” button.

Series Name: The name of the series which is shown in the charts legend.
Y-Axis Column: Lets the user select a column for the y-axis.

Delta Series: This calculates and displays the deltas between two values in the data set and displays the difference instead of the actual value.

Sum Series: This setting does the opposite of Delta Series, it performs an addition instead of a subtraction of the values that are shown in the chart.

Color: A color can be assigned to the chart series.
Show Series Points: Highlights the discrete values that are used to draw the chart.

Area Chart: Similar to the line chart with the difference that the area below the line is filled out. It uses the same settings as the line chart.

Point Chart: Draws the discrete values without any interpolation. The settings are the same as the line chart.

Bar Chart: Similar to the line chart with the additional settings being described below.

Line Type: “The Side-by-Side Bar” can be used to draw multiple series next to each other for easy comparison, while the “Stacked Bar” shows them on top of each other. The “Full-Stacked Bar” shows the y-axis in % and is used to visualize relations between values.

Pie Chart: The settings specific for this chart type are described below.

Label-Overlapping Mode: This setting can changed to avoid the labels inside the pie chart from overlapping.

Group Small Values: This allows for small values to be treated as one slice of the pie. The “Group Threshold” setting defines what small values are.

Show Labels: Shows the label with its value for each pie slice. If this is turned of the labels are only shown when hovering the mouse over the chart.

Donut: Displays the pie chart with a hole in the middle to resemble a donut.

Disable Tooltip: Disables the tool tip that is shown when the mouse is hovered over the chart.

Category: Lets the user select the column that is shown in the legend.

Parameters: Allows the filters from the query to be overwritten from within the dashboard. This is only valid for queries that contain a filter, please consult the dashboard filters chapter for further instructions.

1.8 Tag management:

Tags are a handy way to organize and label the different widgets, dashboards and queries. The tag management lets the user create, edit and remove tags from a central location. The view in the figure below shows all existing tags.

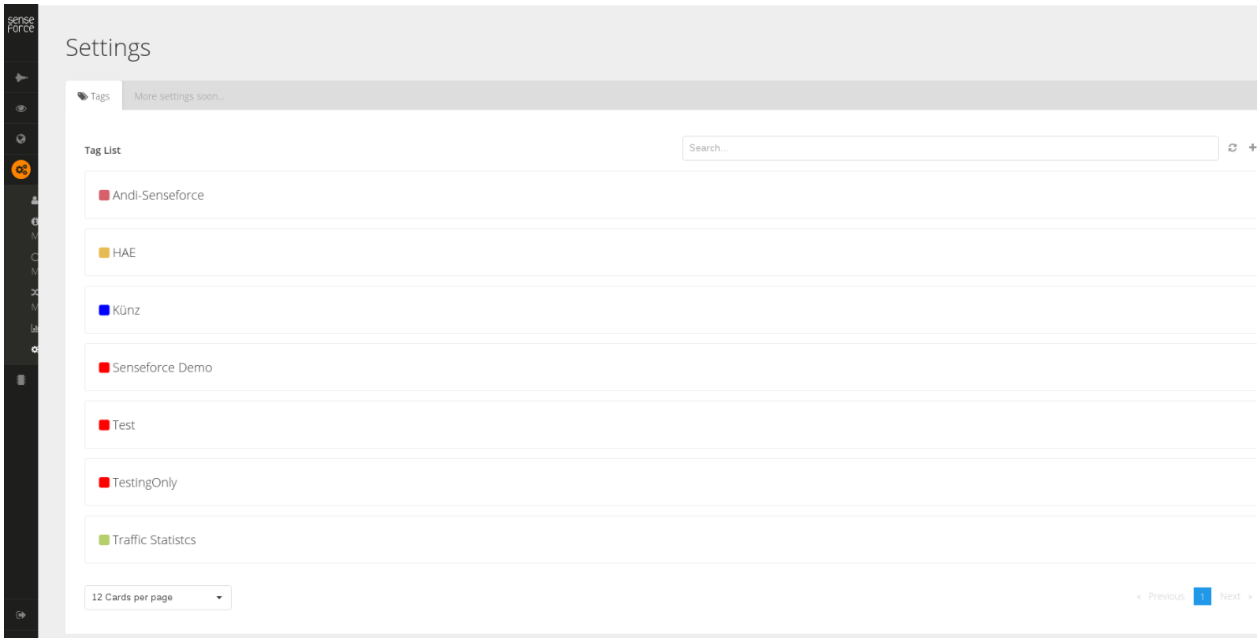


Illustration 18: tag management

A tag can be edited by clicking on it (see screenshot below). This menu allows to rename, change color and show which query, dashboard or widget uses the selected tag.

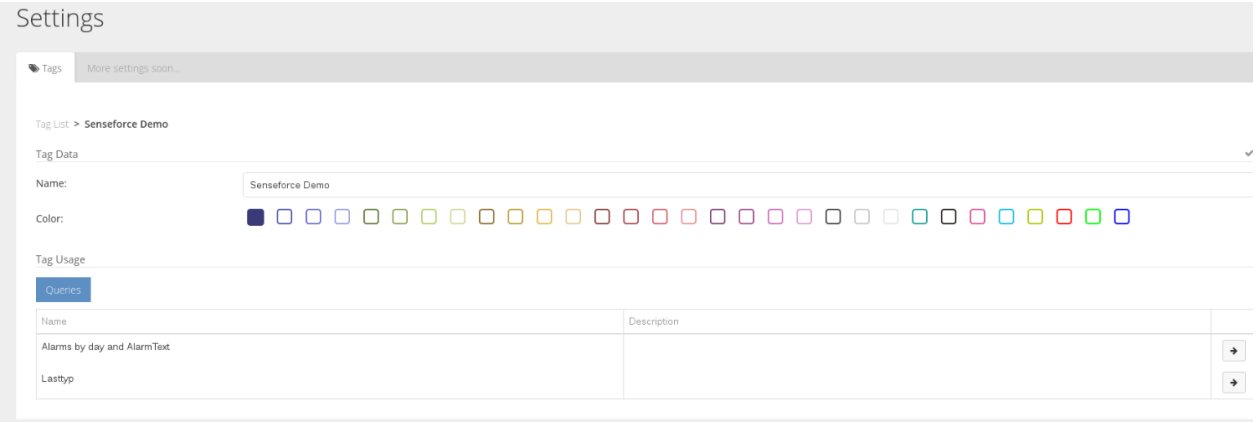


Illustration 19: edit tag

1.9 User Management:

For collaboration and sharing purposes there is a user management built into the application, within this menu all existing users are shown.
From here it is possible to create a new user or edit an existing one. There is also a fine grained permission system to limit the access and features a user can access on the platform.
Changing the password or username, adding or changing an e-mail address and group management can also be done from within this menu (as seen in the screenshot below).

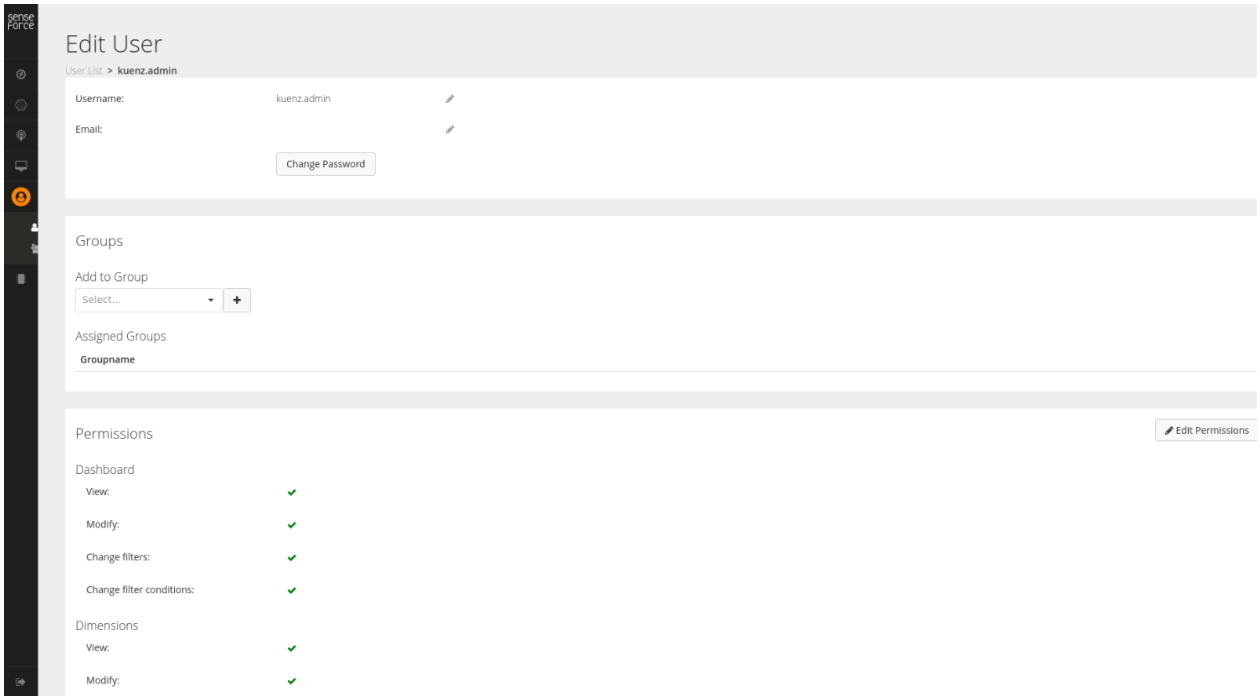


Illustration 20: user management

1.10 Things:

A thing is a device or software which collects (typically luna) data (e.g. from sensors or process) and emits events (messages). This is the representation of each messaging service (luna) connected to the senseforce platform.

One of the main functions is to link (see dimension management) dimensions with an event, which can be used to filter the data inside a query.

Things can be conveniently administered from the senseforce application suite as seen in the screenshot below. This overview shows all known things and their connection to a dimension row. For curating purposes a name and description can be added to each entry. The “+” links the thing to a dimension row (described in the Dimension section).

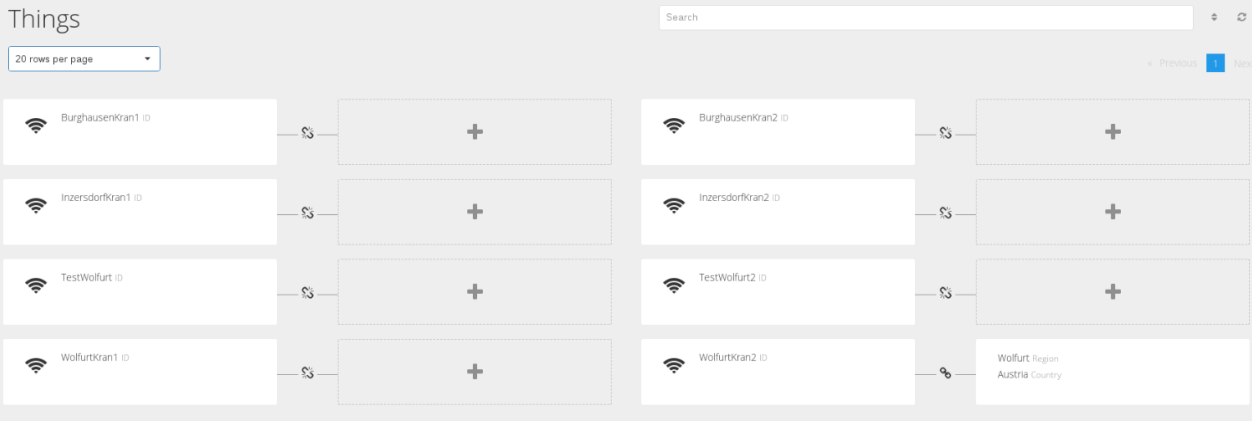


Illustration 21: things overview

Synchronize Things: Returns all things that have sent data to senseforce and adds new ones that where previously unknown. This is used when connecting a new thing to the senseforce application.

1.11 Dimension management:

The dimension management allows to add additional metadata that can be freely defined by the user and can be used inside the query. Dimensions are used to enrich the event data with additional attributes that are not part of the event.
Since this is highly dependent on the use case and the intended analysis only examples can be given as seen in the figure below.

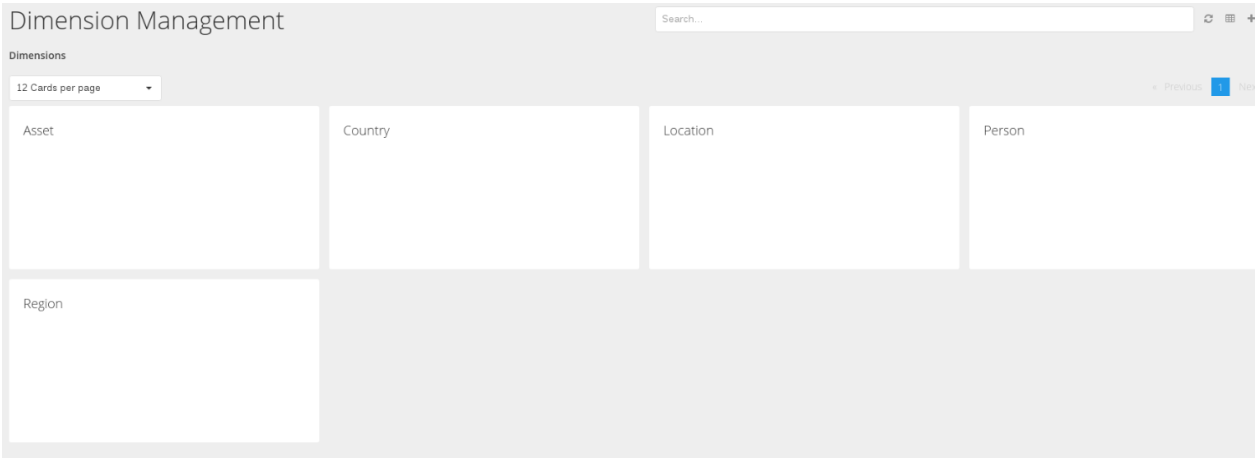


Illustration 22: dimension management

Adding a new or editing an existing dimension can be seen in the screenshot below. The “Key” is used for the database and needs to be unique per dimension. The “Name” and the “Description” can be defined by the user.
Setting the “items of this class may have associated ‘Things’” will allow the dimension to be linked to one or multiple things. The “Dimension Attributes” can be used inside a query to

restrict the output to the specified values. Each attribute consists in itself of a key, name, data type and a description. The “mandatory” field is used to make a attribute mandatory, when adding a new dimension row. The dimension row is an actual entry for a dimension. This can be a country like Switzerland in the country dimension.
The “show” function is used to display the entry in the tile overview. The “is filter” is used to specify it the attribute can be used inside a query.
The trash icon lets the user delete the attribute.

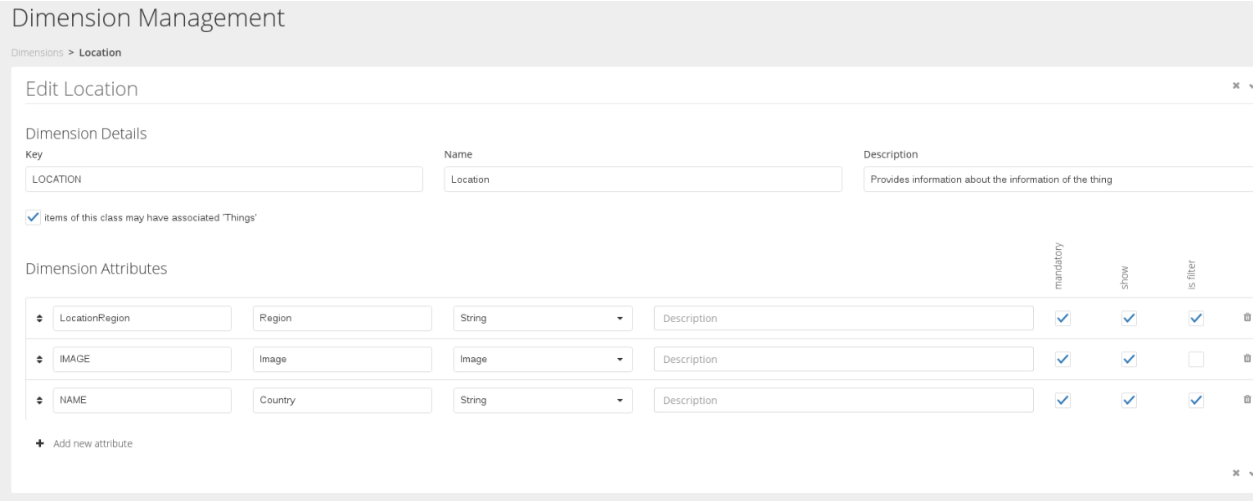
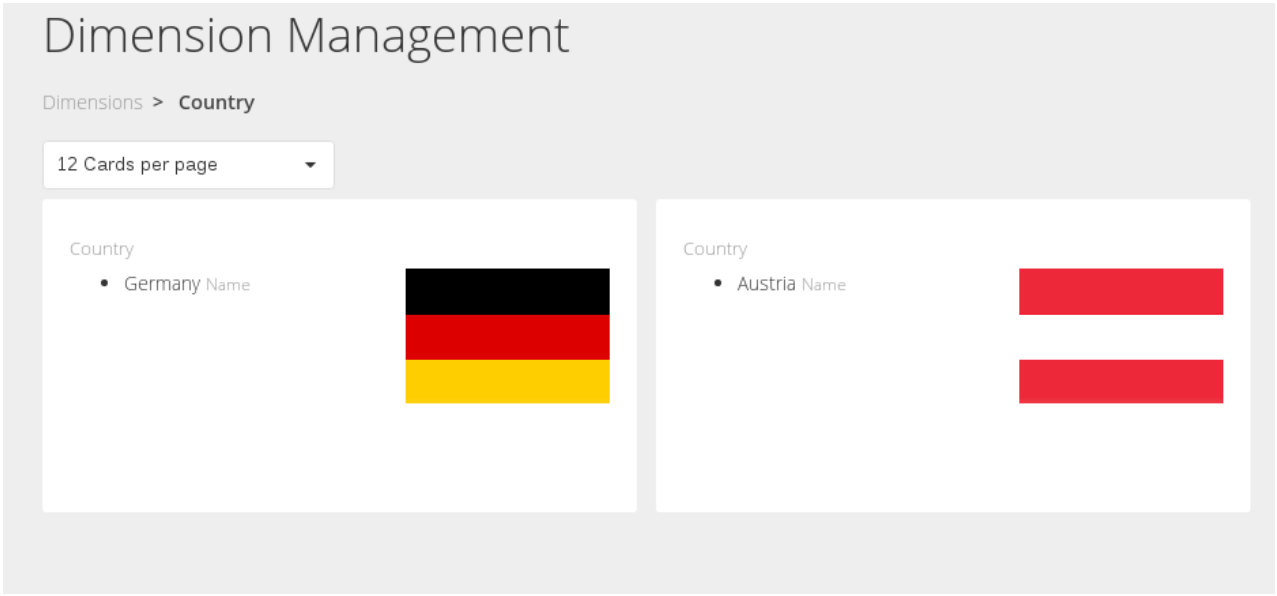


Illustration 23: dimension management edit dimension

Each dimension consists of additional attributes (seen below) that can be used inside a query, after the dimension has been linked to a thing (see thing section for further information).



- A geographic region could be a dimension, this would allows to quickly switch between machines that are located in different regions or countries.
- A person in charge, a company, a location, a specific customer or a certain machine type could be used as a dimension, this allows for convenient comparison.

Thing assignment: This dimension row can be linked to one or multiple things as seen in the figure below. The defined metadata will be available in the query editor only after linking to a thing and publishing the dimensions accordingly.

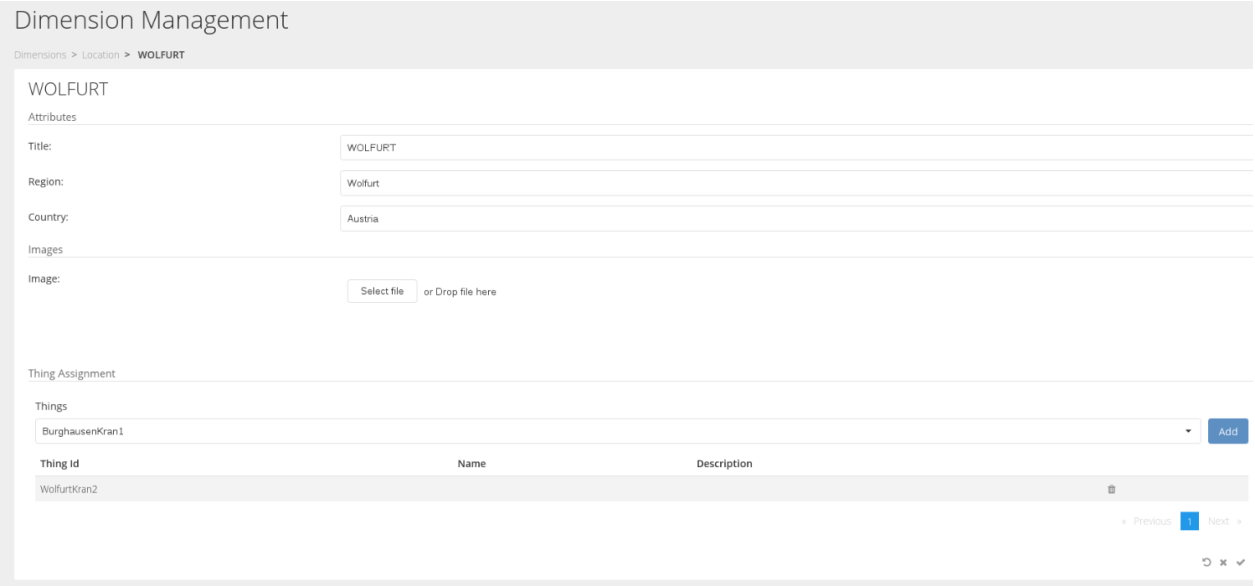


Illustration 24: dimension management thing assignment

Publish dimensions: This function writes the defined data into the database where it can be later used for queries. Warning this may affect existing queries.

1.12 Event Metadata management:

This allows additional information to be sent on top of an ordinary event (e.g. city, production site, business unit … etc.). The Event Metadata Management allows the additional meta information to defined.

1.13 Event Schema management:

To keep the data clean and tidy it is recommended to create an event schema where the data sent by luna is verified against. This ensures that only correct, legitimate and desired data is stored in the database, with the additional benefit of reducing the time spent on data cleaning. Two predefined schemes already exist (sf-messages, sf client state) so that message metrics can be evaluated by the user.

Publish all events: This is used to enable a newly defined or updated schema. The process can take several minutes to complete. Warning: Attributes and schemes that are published once can never be deleted, therefore use this with caution.
The Management interface to administer the schemes can be seen in the screenshot below.

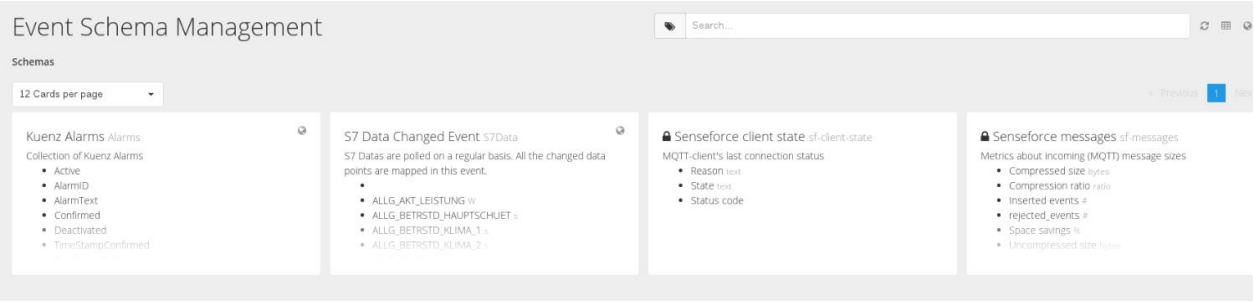


Illustration 25: event schema management

Creating or editing an existing schema is shown below.

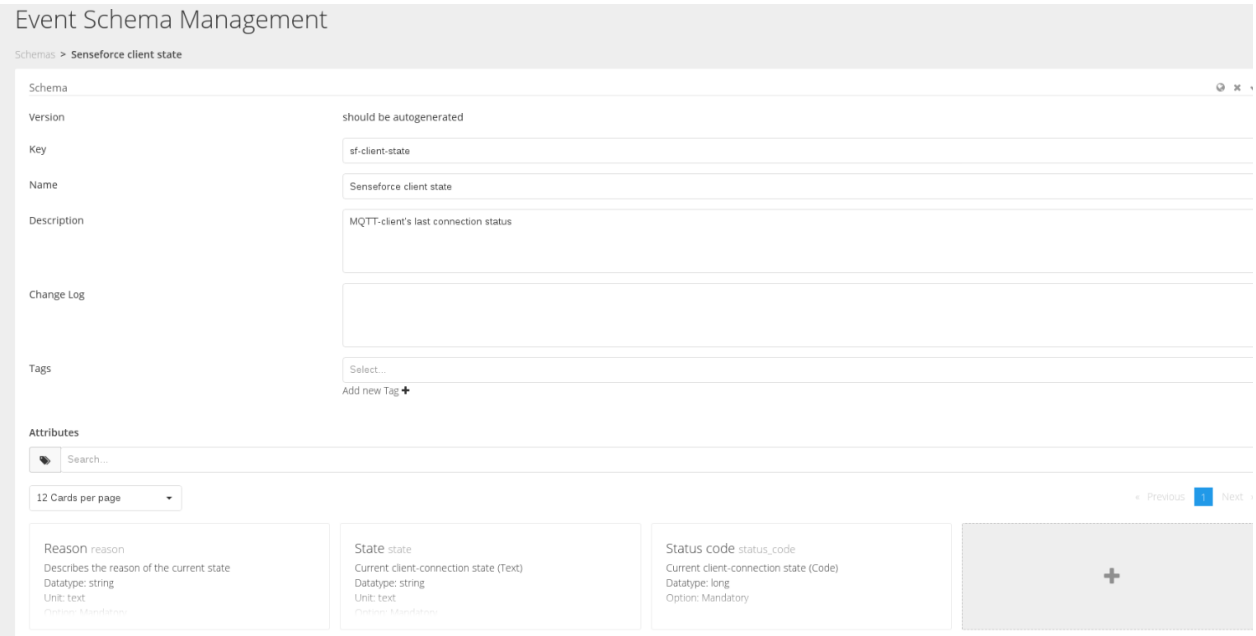


Illustration 26: event schema management add or edit schema

The schema can be individually published, contains a version, key, name, description and a tag. The “Change Log” shows why a new version of an existing schema was created.

The attributes seen in the bottom section of the screenshot above can be created or updated (seen below). A schema attribute contains a key, name, optional description, data type, optional unit, number of decimal places to show and an optional tag. In addition a attribute can be defined as mandatory (needs to be sent with each event), optional or forbidden (can be used to suppress an attribute for a new schema version).

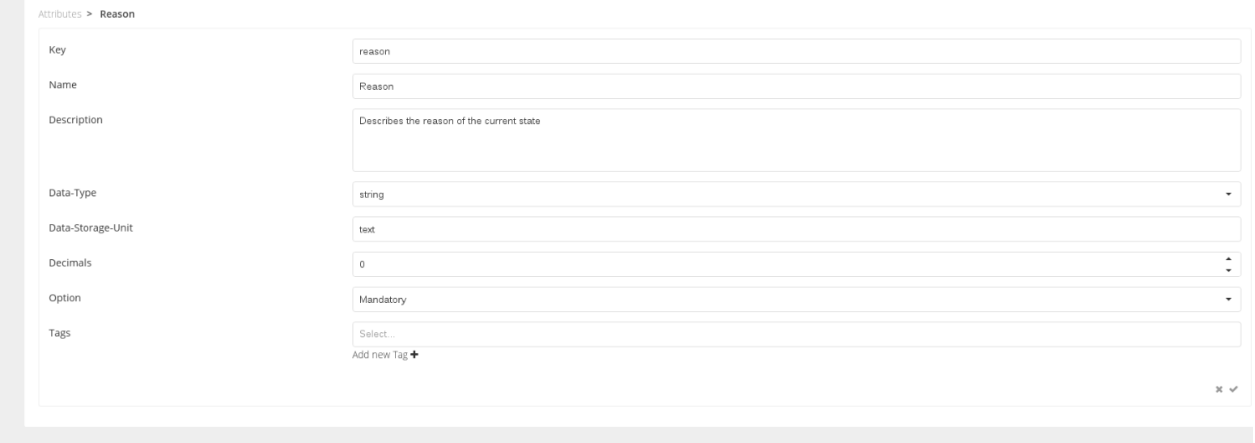


Illustration 27: event schema management attributes

1.14 Dynamic Attribute Management:

If events want to be sent without a predefined schema this can be archived with the dynamic attributes. It can be used for commissioning a new machine without defining a event schema first.
However using a dynamic attributes can make data analysis more challenging.

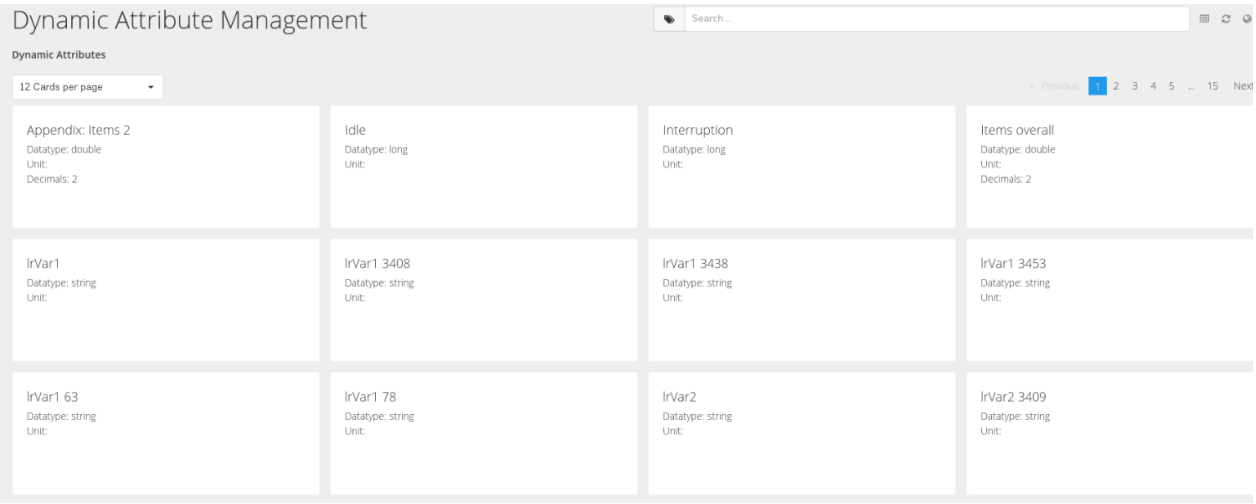


Illustration 28: dynamic attribute management

Synchronize attributes: Reads the attributes from the database and creates new ones on the fly. This is used if a thing sends new dynamic attributes that are not shown inside the query editor.

Create Dynamic columns: This enables the feature for dynamic attributes. Warning this cannot be reverted!

The dynamic attribute can be named, described, given a unit and a tag for better management (seen below).

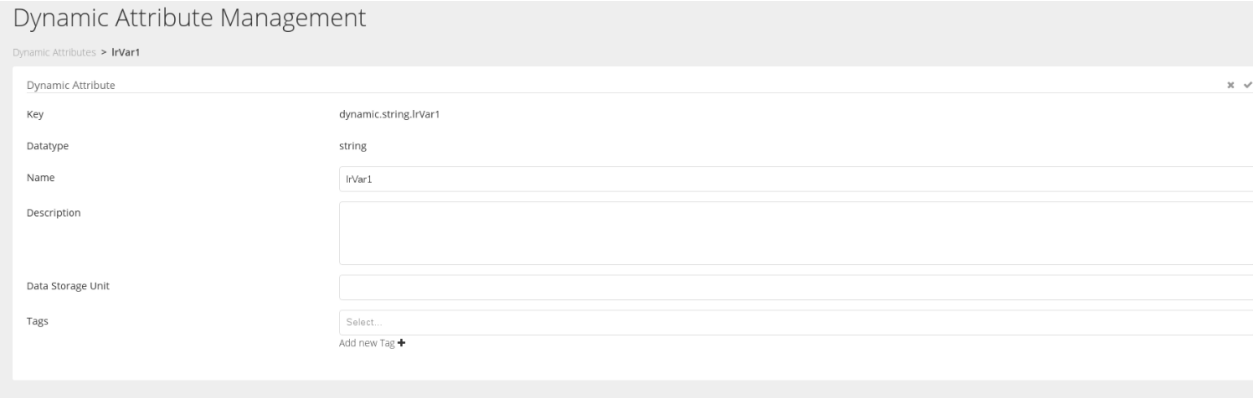


Illustration 29: dynamic attribute management edit

1.15 User profile settings

Click on your user-name in the top-right corner to open the user profile settings.
The screen shown below appears. Change your E-Mail or password settings by entering the according settings.
Press save to complete the change.