

Ergonomic inspection

This document refers to inspection on the dryad web application using the criteria of the research "[Ergonomic criteria for the evaluation of Human-computer Interfaces](#)" by BASTIEN and SCAPIN. The flow is the following. I will take all criteria in order and will check that the current interface respects them and if not propose a way to fix it.

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1. Guidance

1.1. Prompting

1.1.1. Specify the use of the asterisk in the forms

1.1.1.1. X Problem

It's actually not obvious for every users what (*) means in a form.

1.1.1.2. ✓ Solution

Simply add an explanation message at the top like “Fields with the symbol (*) are required!”.

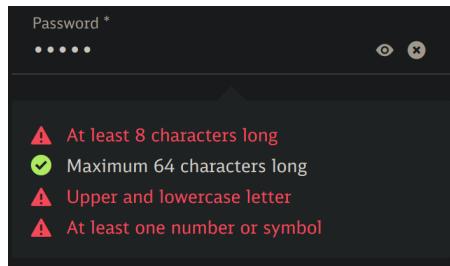
 * fields are required !

1.1.2. Clear password format requirements

1.1.2.1. X Problem

1.1.2.2. ✓ Solution

Show to user what's missing or not by using a list:



1.1.3. Use clear form labels

1.1.3.1. X Problem

Some forms labels are not clear for new clients like:

- In add user form: **Ns role, role, client**
- In add experiment form: **Hotplate Temp**

1.1.3.2. Solution

If the label is not clear → add a little explanation of what is expected in a simple helper text or a helper tooltip:

- Example of input with helper text



- Example of input with helper tooltip



1.1.4. Avoid icons only labels

1.1.4.1. Problem

The icons can be interpreted in different ways from one user to another. Here is an example of confusing interface:

Last sending alert sensor	
	03.05.2022
	10:07:40
	27b2
	52.85683
	13.760759
	

Sensor data presented in the alert center at <http://localhost:4200/alert-centre>

1.1.4.2. Solution

In order to avoid interrogation or misinterpretation by the user, it is recommended to add a textual label next to the icon.

1.1.5. Define latitude/longitude data format in inputs label

1.1.5.1. Problem

Some forms input like for latitude/longitude, the desired format is not specified.

1.1.5.2. Solution

Specify in the label what the required format is like:

1.1.6. Define weight data format in inputs label

1.1.6.1. Problem

The Burn Material Amount input is not clear:

Burn Material Amount is required

1.1.6.2. Solution

Simplest solution would be to specify in the label what the required format is like:

Burn Material Amount is required

Another solution is to provide an input with a dropdown addon like:

grams ▾

kilograms

milligrams

1.1.7. Define min/max length on textarea with current status

1.1.7.1. Problem

Long text inputs have probably a min or max length required. The user needs to be informed about it which is currently not the case on several textareas like:

- Edit gateway popup at <http://localhost:4200/messages>

1.1.7.2. Solution

Specify in the label or in a helper text below the rules and the current status like for example:

Message *

Lorum ipsum dolor

Minimum 50 expected characters (currently 17)

1.1.8. Provide a title for each window

1.1.8.1. X Problem

Good prompting guides the users to navigate in the application. Currently there is no title on each app window. For a new user it could be confusing what the current opened window is.

1.1.8.2. ✓ Solution

Adding a title (h1) on each windows help the user to easily keep track on his location:

The screenshot shows a user interface with two main sections:

- Dashboard:** This section contains a circular progress bar and three cards:
 - Total Sensors:** Active Sensors: 1096, Site 1: 1096, Site 2: 20
 - Total Gateway:** 3
 - Total Number Of Sites:** 3
- My sites:** This section shows two satellite maps labeled "Eberswalde A" and "Eberswalde B", each with a gear icon and a delete icon.

Site Management: This section has a title bar "Site Management" and a sidebar with icons for Home, Site Management, Devices, and Help. It displays data for the site "Eberswalde":

- Eberswalde:** Active Sensor: 1804, Active Gateway: 196
- Metrics:** Cover area: 12 km, Average temperature: 27°C, Average air pressure: 1013,07, Average humidity: 82% RH
- Map:** A map of the Eberswalde area showing various locations like Havelberg, Elbig, Pannen, and Jenchow.

1.1.9. Disable next step in stepper

1.1.9.1. X Problem

When using a stepper component (see in “add a device” in <http://localhost:4200/sites>), the next step or other steps are clickable.

1.1.9.2. Solution

If some steps are required make the following disabled to keep consistency with the “next” button.

1.2. Grouping/Distinction by Location

1.2.1. Organize “Active sensors” in the dashboard total sensors area

1.2.1.1. Problem

An hierarchical list should be organized according to a defined parameter which is not clear when observing the mockup.

1.2.1.2. Solution

Order the sites alphabetically or according to the number of sensors. The best case would be to let the user sort the sites when clicking on the label and symbolize the order with a simple arrow like:

STATUS ↓	PROJECT	TEAM
----------	---------	------

1.2.2. Better localisation for filters menu

1.2.2.1. Problem

The filter options are on the same level as the section title. It's good enough for tiny lists but if it grows then it can be hard to see the hierarchy.

Filter by devices

Gateways

Sensors

Filter by sites

Eberswalde A

Eberswalde B

Eberswalde C

1.2.2.2. Solution

Just adding a tiny more padding helps the human eyes to visualize a hierarchy. Additionally to that, a system of collapse can be used with the help of a chevron icon to improve the presence of a hierarchy to the user.

v Filter by devices

Gateways

Sensors

> Filter by sites

1.3. Grouping/Distinction by Format

1.3.1. Use common edition flow

1.3.1.1. Problem

In some areas in the app, the “edition” action flow is done in several ways. That should be normalized. Here are some non-normalized modal:

- In the “Update payload format” at <http://localhost:4200/sites>
-

1.3.1.2. Solution

Use the more common flow which is to open a modal with a submit button.

1.3.2. Use unique design for Gateway/Site/SensorNode name

1.3.2.1. Problem

On multiple views there is the display of names of devices. However the names are presented as pure text and in some cases (like in <http://localhost:4200/messages>) it's really hard to identify what the name relates to.

1.3.2.2. Solution

Adding a simple/lean design to device names according to its type will help the user to read a dense interface.

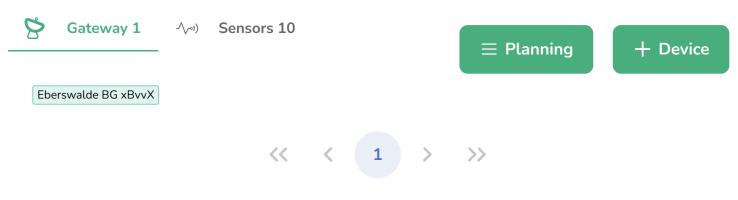
Device	Site	Device type
Eberswalde BG xBvvX	Eberswalde A	Gateway
Eberswalde SN ofUAI	Eberswalde A	SensorNode

List of devices as pure text

Device	Site	Device type
Eberswalde BG xBvvX	Eberswalde A	Gateway
Eberswalde SN ofUAI	Eberswalde A	SensorNode

List of the same devices with it's matching device type format

The chosen format can be then used across the different pages/views:





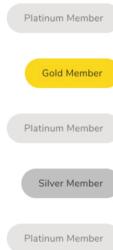
1.3.3. Add UI design for a specific role

1.3.3.1. ✗ Problem

The users table at <http://localhost:4200/users> is just composed of string without any visual help.

1.3.3.2. ✓ Solution

The table can be improved by using an additional UI design for the roles like the following:



Example from <https://dribbble.com/shots/8573883-Restoranku-Discount-Member-Dashboard>

1.4. Immediate Feedback

1.4.1. Better feedback for submit button

1.4.1.1. ✗ Problem

When the submit button is clicked, no feedback is provided to the user. For most cases the action is done pretty quickly but the case can occur that the action takes time (bad connexion for example) and the user needs to be informed that the application is processing. That concerns:

- Edit Site popup at <http://localhost:4200/sites> when clicking submit
- Link new payload popup at <http://localhost:4200/sites> when clicking submit

1.4.1.2. Solution

After a click on a submit button, an animation should be triggered on the button or an overlay until the processing is done. Here is an example of a loading animation on a button:



1.4.2. Add loading animation to site area

1.4.2.1. Problem

The different devices of a site are fetched at a specific zoom level. However, if the internet connection is not fast enough, the user has no feedback that a request takes place in the background.



With slow wifi connection, the user zooms in the site (blue area) but nothing seems to happen. Only after several seconds the sensors are visible.

1.4.2.2. Solution

Adding a loading animation on the site area will indicate to the user that something is processing. An UI example can be waves coming from the center of the circle zone like this <https://cdn.dribbble.com/users/26878/screenshots/3777480/39-location.gif>.

1.4.3. Add loading animation when fetching data

1.4.3.1. Problem

There is no loading feedback during the fetch of

- The sites in <http://localhost:4200/sites>
- The sites in the filters in <http://localhost:4200/messages>
- The devices in the table at <http://localhost:4200/messages>
- The users in the table at <http://localhost:4200/users>
- The settings in the table at <http://localhost:4200/settings>
- The gateways and sites at <http://localhost:4200/dashboard>
- The Contact SOS modal at <http://localhost:4200/alert-centre>

1.4.3.2. Solution

Add some nice loading like skeletons (see <https://primefaces.org/primeng/skeleton>):



Example of a card skeleton component

1.5. Legibility

1.5.1. Avoid line return in text

1.5.1.1. Problem

From the recommendation: “When space for text display is limited, display a few long lines of text rather than many short lines of text”.

1.5.1.2. Solution

Avoid as much possible to have line return in the interface like in:

- Site descriptions at <http://localhost:4200/alert-centre>
- Table header in site planning at <http://localhost:4200/packet/18>
- Values in table at <http://localhost:4200/settings>
- Values in “Update payload format” table at <http://localhost:4200/sites>

2. Workload

2.1. Brevity / Concision

2.1.1. Use proper area units

2.1.1.1. Problem

Area size are displayed in the interface but not always with an according unit that is easy to read:

Covered area of each site

Eberswalde A	77012 m ²
Eberswalde B	216557 m ²
Eberswalde C	1963 m ²

2.1.1.2. Solution

Use proper units like km², ha, ... according to the order of size (also a good idea would be to let the user choose between m² and ha). See in:

- In the dashboard at <http://localhost:4200/dashboard>
 - In a site at <http://localhost:4200/sites>
 - In the map in the site dialog (the unit used is “sq.m”)
-

2.2. Brevity / Minimal Actions

2.2.1. Be able to request a particular page directly

2.2.1.1. Problem

It's really important to limite as much as possible the steps users must go through in the application. Therefore all “important” page sections need to be accessible by a shareable URL.

2.2.1.2. Solution

Provide an URL endpoint to directly access the following app sections:

- In the dashboard, the current “devices status” type should be kept in the URL as a query string to avoid the user to always click to go to the non default one

- A specific site at <http://localhost:4200/sites> so that the user doesn't need to click again on the toggle icon. A good endpoint could be **/sites/{siteid}**
- Create a site. Example of an endpoint is **/sites/_create** (the use of the underscore in **_create** is to denote that **create** is an action and not an entity id following the REST convention)
- Edit a specific site → **/sites/{siteid}/_edit**
- Delete a specific site → **/sites/{siteid}/_delete**
- In the **/messages** endpoint be sure to keep the user filters as query strings in the URL. That will allow him to share it easily to others

2.2.2. Add routing functionality to the map

2.2.2.1. Problem

There is no routing functionality in the map which makes it difficult to explore properly and share to other users. If a user jumps to a specific site or sensor, an accidental refresh of the page will forget its location on the map and the user will have to do all the travel again.

2.2.2.2. Solution

The map should be reactive to routing change in the scope of the **/map** endpoint. An example would be that the endpoint **/map/sites/42** makes the map jump to the given site. Here are some ideas of endpoints:

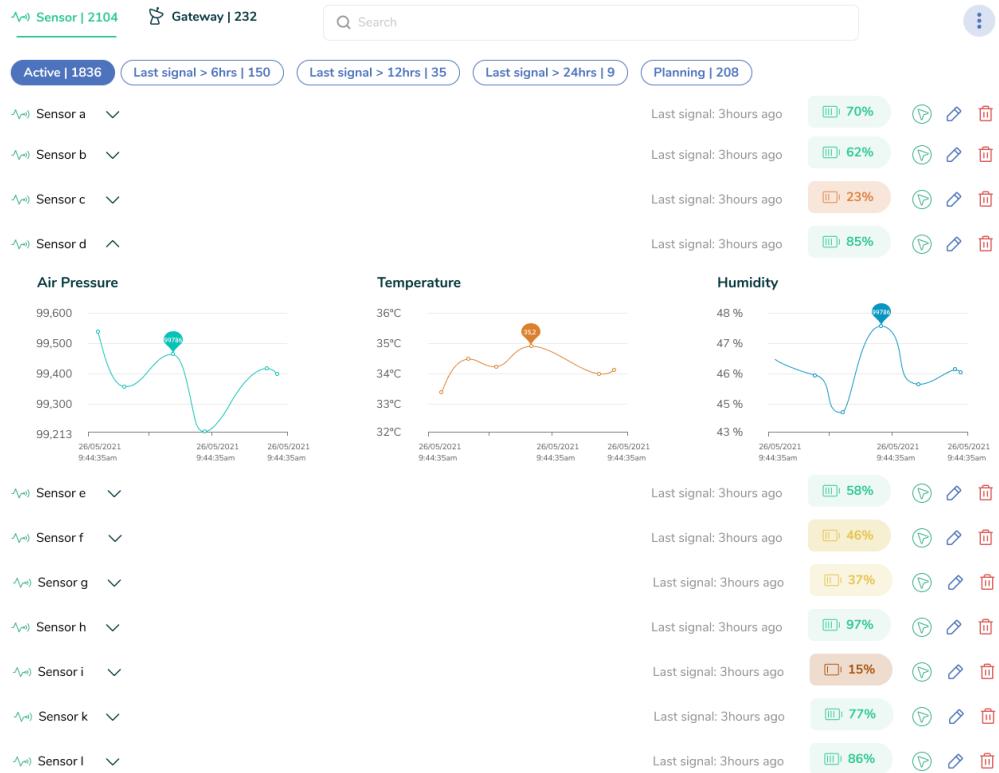
- **/map/sites/{siteid}**
 - **/map/sites/{siteid}/sensors/{sensorid}**
 - **/map/sites/{siteid}/gateways/{gatewayid}**
-

2.3. Information Density

2.3.1. Reduce/improve density of a site overview

2.3.1.1. Problem

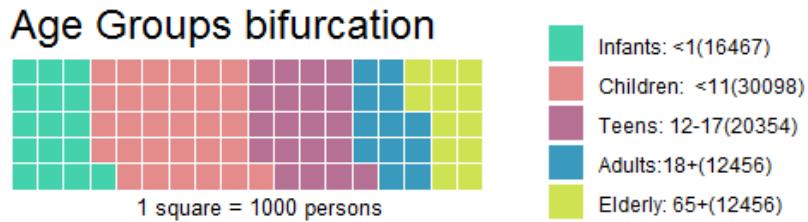
The user should be able to see all the sensors on the site. However, representing all of them as a table takes a lot of space on the interface and this without necessarily adding much advantage to the user.



Current design of the sensors section in the dashboard.

2.3.1.2. Solution

The main goal of this section should be to group the sensors according to several filters. In this case it would be nice to present the filtered devices in a way that the user can easily see some groups emerging. An interesting representation for that would be a heatmap like:

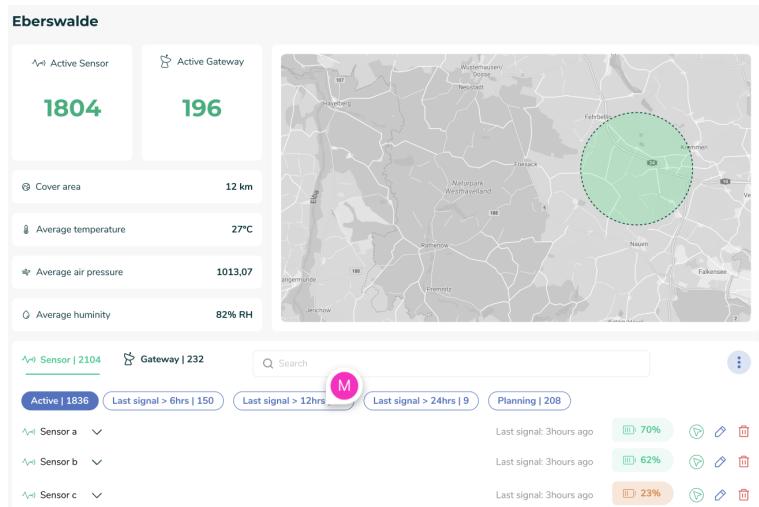


The heatmap should be able to group the sensors according to the "last signal", "battery", "air pressure", "temperature" and "humidity". The user would be then be able to select a unique sensor (one of the squares of the heatmap) to check its data more in details:

- Name
- Time since last signal
- Battery level
- Air pressure
- Temperature

- Humidity

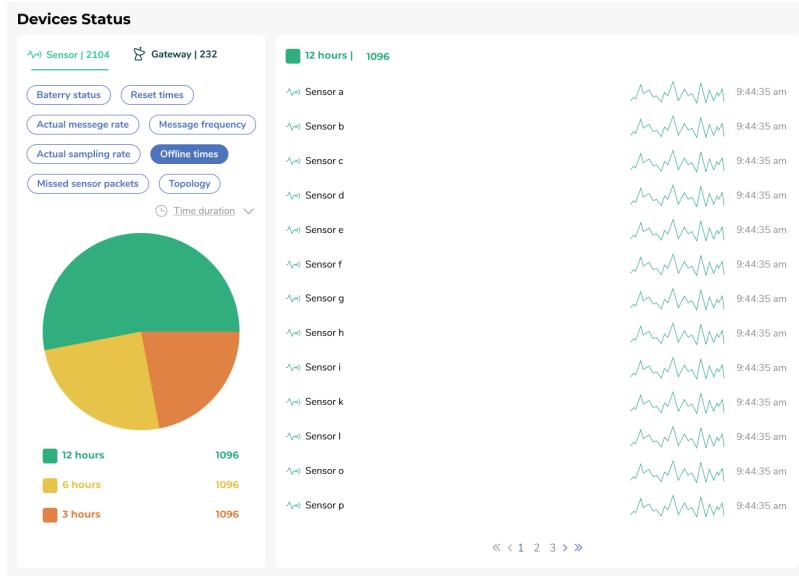
The user will be able to also select directly a group of sensors or multiple sensors. The result of that will be a similar dashboard to the one for a single sensor but with “all data for each sensor”. To do so, the “air pressure”, “temperature” and “humidity” charts are going to be a multiline chart. The representation of the “Time since last signal” and “Battery level” could then be a simple pie chart. Also when selecting a single or multiple sensors, the map above the section could be updated to present only the selected sensors:



2.3.1. Reduce/improve density of a dashboard sensors overview

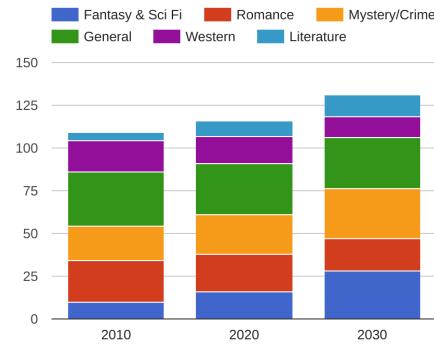
2.3.1.3. X Problem

It's exactly the same issue as the one above. Here the user can't really digest all the information and draw conclusions:



2.3.1.4. Solution

The different sensors data could be represented across a “stacked column charts” where every column is a site like:



stacked column charts example

3. Explicit Control

3.1. Explicit User Action

3.1.1. Don't save data on alert modal close

3.1.1.1. X Problem

If you edit a gateway in a site in <http://localhost:4200/sites>, a modal opens. If you change the value of the gateway and close the popup, there is a toast message that indicates that the gateway has been updated. That's probably not what the user expected.

3.1.1.2. ✓ Solution

As mentioned in the "Ergonomic Criteria for the Evaluation of Human-Computer Interfaces" document, an interface should "*Always require a user to take an explicit ENTER action to initiate processing of entered data*". In this case, closing a modal shouldn't have a side effect. The problem also occurs in:

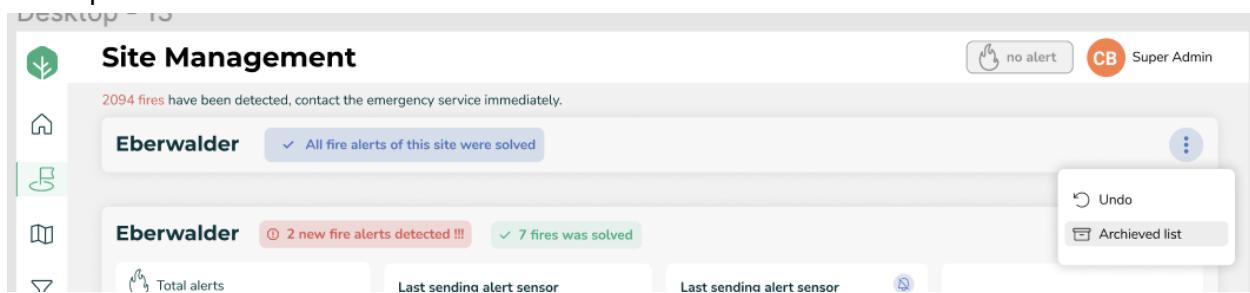
- The edit device modal at <http://localhost:4200/messages>

3.2. User Control

3.2.1. Add an Undo button when changing a sensor fire alert state

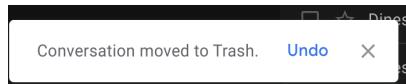
3.2.1.1. X Problem

When there is a fire, the alert center page at <http://localhost:4200/alert-centre> enables the user to change a state of sensors to "false alarm" for example. However when done there is no undo action possible.



3.2.1.2. Solution

Add an Undo action button that return to the previous state like you can see on gmail when deleting a mail:



Example of Undo button in gmail interface

4. Adaptability

4.1. Flexibility

4.1.1. Customize sites design

4.1.1.1. Problem

It's recommended to give the user as much flexibility as possible to customize an interface. Currently all the sites are listed at <http://localhost:4200/sites>. However there is no way given to the user to distinguish one site from another.

4.1.1.2. Solution

Adding the possibility to customize the visual of a site in this list will definitely help users to easily distinguish each site. Here are some customization ideas:

- Change the background color of a site panel with given colors
- Change the order of the sites with a draggable sortable list
- Change the map view to a custom picture

4.1.2. Customize what happened in case of fire

4.1.2.1. Problem

In case of fire, it's a good idea to let the user customize what should happen for a specific site.

4.1.2.2. Solution

When creating a site and in the settings page, the interface should let the user configure some actions for a given site. Here are some ideas:

- Send a push notification
- Send a sms to given numbers
- Send an email to given emails

4.1.3. Localisation

4.1.3.1. Problem

Dryad wants to sell products worldwide. However the current interface is in english only but all the users are not native english speakers.

4.1.3.2. Solution

We should give the user the possibility to choose in which language the interface should be displayed.

4.1.4. Customize the units and format

4.1.4.1. Problem

Worldwide some units and formats are not the same so the interface shouldn't force the user to use non common ones.

4.1.4.2. Solution

The interface should let the user choose in which units/formats some data should be displayed.

Here some concerned data:

- Date
- Time
- Distance (metric vs Customary system)
- Area
- Temperature
- Pressure
- Float number
- Volume?
- Weight and mass?

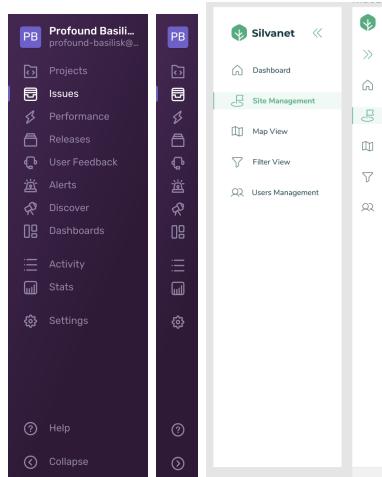
4.1.5. Customize sidebar layout

4.1.5.1. Problem

Currently the sidebar only presents icons which can be confusing for some users that are not sure what a flag icon refers to.

4.1.5.2. Solution

A simple solution is to add labels to each icons that you can collapse just like:



Example of a collapsible sidebar from the sentry dashboard.

4.2. User Experience

4.2.1. Add advanced search bar

4.2.1.1. X Problem

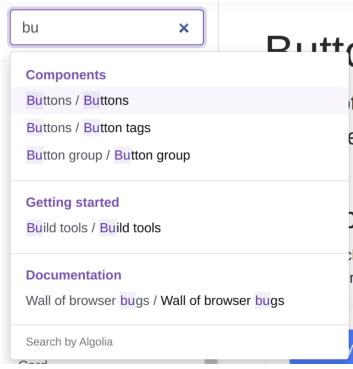
Currently there is almost only one way to go to a specific page in the app. However, an experienced user would probably like to easily go to a specific site or sensor.

4.2.1.2. ✓ Solution

The app could include an advanced search bar that proposes actions to the user on inputs. Here is an example: the user start to type the name of a site → The search bar propose to:

- Sites
 - Open the site ... → the user is redirected to the sites endpoint with the right site opened
 - Open the site ...
- Map
 - Navigate to ... → the user is redirected to the map on the right site location
 - Navigate to ...

A good UI example is the algolia search bar:



Note: this can only be done when every page has a proper router endpoint.

5. Error Management

5.1. Error Protection

5.1.1. Disable draggable gateway in “edit Gateway”

5.1.1.1. Problem

In edit gateway popup, the gateway can be moved on the map without asking the user so which is really confusing and error prone.

5.1.1.2. Solution

There should be an edit button to trigger the edition mode and ask the user if he agreed to move the gateway to the new location.

5.1.2. Better input validation

5.1.2.1. Problem

As mentioned in the paper, “*It is preferable to detect errors before validation rather than after*”.

5.1.2.2. Solution

Each input in the interface should display what the error is and prevent those. Here is a list of what should be taken into account:

- No empty spaces
 - No characters in number inputs
 - The decimal value should be the expected one (comma vs period)
-

5.2. Quality of Error Messages

5.2.1. Improve error messages

5.2.1.1. Problem

Most error messages are not descriptive enough.

5.2.1.2. Solution

Improve error messages by using task-oriented wording.

5.2.2. Add report a bug option when “Unknown error” occurs in request

5.2.2.1. Problem

Some “Unknown errors” can happen when the frontend communicates with the backend (error 500 for example). In most cases the users can’t solve the issue by themselves and there is currently no help center.

5.2.2.2. Solution

When such an error occurs, there should be a “report bug” button in the toast message that opens an email with a pre-filled title, contact and body.

The title should include:

- The site id
- What was the action

The body of the email should include the user message that explain how to reproduce the error but also the following data in a hidden section (by using html5 <details> tag):

- The request with the http verb used
- The request body
- The response’s http status code
- The error message in the response

5.3. Error Correction

6. Consistency

6.1. Consistency

6.1.1. Keep fire icons consistent

6.1.1.1. Problem

When detecting a fire, the fire alert button is presented with the sensor icon where on the map another is used:



Icon of a sensor used on the fire alert animation



Icon used in a pin to indicate the location of a fire on the map

6.1.1.2. Solution

The visual representation of an entity must be unique as much as possible to facilitate its memorization and thus allow a faster recognition later on. That's why it would be recommended to use the flame icon on each fire related UI as the sensor icon is already used to represent a sensor.

6.1.2. Keep action buttons format consistent

6.1.2.1. Problem

The main action buttons like **EDIT** or **DELETE** have different layout/design in pages:

- /experiments in tab **training**
- /experiments in tab **experiment**

6.1.2.2. Solution

Respect on those pages the original design: Big Icons in a button with no background-color or border. Actions should always be displayed (not just on mouse hover).



6.1.3. Use common design for entity amount

6.1.3.1. Problem

The interface often presents an entity with its amount. However the design of the amount is not always the same and that doesn't help the user to easily identify it. An example is the difference between the amount of the devices and the fire alarm. One is presented as a badge and the other just display the amount next to it:



6.1.3.2. Solution

A decision should be made to determine which format to use when presenting an amount. The badge seems to be a good candidate for that.

7. Significance of Codes

7.1. Significance of Codes

8. Compatibility

8.1. Compatibility

8.1.1. Update lat/long together

8.1.1.1. Problem

It's common for a user to work with latitude and longitude together as. However in some inputs the latitude and longitude can be edited separately.

8.1.1.2. Solution

A user will be able to modify a single latitude or longitude, but the form should always present both as it's more natural.