

INDUSTRIAL CYBERSECURITY CENTER

EDITION 2021

# RECIN USER MANUAL

IEC-62443 SECURITY LEVEL STANDARDS



# Industrial Cybersecurity Center

The **Industrial Cybersecurity Center** (CCI) is an independent, non-profit organization whose mission is to promote and contribute to the improvement of Industrial Cybersecurity, in a context in which organizations in sectors such as manufacturing and energy play a critical role in the construction of today's society, as pillars of the welfare state.

The CCI meets this challenge through the development of research and analysis, generation of opinion, elaboration and publication of studies and tools, and exchange of information and knowledge, on the influence of both technologies, including their processes and practices, and individuals, on the risks - and their management - arising from the integration of industrial processes and infrastructures in Cyberspace.

Today, CCI is the ecosystem and meeting point for private and public entities and professionals affected, concerned or involved in Industrial Cybersecurity; it is also the Spanish-speaking reference for the exchange of experiences and the dynamization of the sectors involved in this field.



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## **Index**

|   |          |
|---|----------|
| <b>INTRODUCTION</b>                           | <b>1</b> |
| <b>PROJECT CREATION</b>                       | <b>2</b> |
| REGISTRATION OF ZONES AND THEIR COMPONENTS    | 4        |
| REGISTRATION OF CONDUITS AND THEIR COMPONENTS | 8        |


## Introduction


RECIN is an agile platform to facilitate the incorporation of cybersecurity requirements in industrial projects, both automation and digitalization. It is based on the IEC-62443 standard and allows you to define the basic architecture of a project through zones and pipelines, as well as to generate cybersecurity requirements automatically based on the criticality of integrity, availability and confidentiality that you can establish for each component of the project's zones and conduits.

To access the RECIN platform, you first need to be registered as a CCI member; you can use the same username and password that you use in the CCI collaborative platform:


<https://www.cci-es.org/colaborativa> Access to RECIN via link: <https://recin.cci-es.org/>



With this platform you can create projects from scratch or create templates that can be used as a basis for your new projects, for this you simply must create a project and copy it as many times as you need using .

The platform includes a search engine  that will make it easy to locate projects and edit them using , you can also generate a project report with the cybersecurity requirements using .

From the main screen you can delete projects at any time using .

You can also consult a history of the Create, Edit, Clone and Delete projects actions by clicking on  and you will access:



| Project's name                        | Project ID | Action | Date                |
|---------------------------------------|------------|--------|---------------------|
| Photovoltaic predictive maintenance   | 466        | Delete | 2021-10-10 07:24:19 |
| Mantenimiento predictivo fotovoltaico | 467        | Edit   | 2021-09-28 16:00:13 |
| Mantenimiento predictivo fotovoltaico | 466        | Edit   | 2021-09-26 12:48:34 |
| SUPERVISION_TV - Clonado              | 461        | Edit   | 2021-09-22 11:38:43 |

## Project creation

To create a project, you must use [CREATE NEW PROJECT](#) and access the following form:

The screenshot shows a web form titled "New Project". At the top, there is a navigation bar with a home icon, "Contact", "Logout", and a language selector (Spain). The main content area is titled "New Project" and contains the following sections:

- Project data**:
  - Enter the name of the project: "Industrial project name" (required field) with a text input field.
  - Select the sector to which the project belongs: "Select the project sector" (required field) with a dropdown menu showing "Select a Project Sector".
  - Select the type of project: "Select the type of project" (required field) with a dropdown menu.
  - Upload architecture of zones and conduits of the project: "Template to create architecture" with a "Seleccionar archivo" button and the text "nada seleccionado".
- Zones**: "Create the project's zones and components" with a "+ Add zone" button.
- Conduit**: "Create the communication conduits and project components" with a "+ Add Conduit" button.
- A large red "SEND" button at the bottom.

Where you must indicate the name of the project. If you want to create a template, we recommend that the name of the project begins with "Template - XXX" which will make it easier for you to find templates. Once the name has been indicated, you must select the sector to which your project belongs. If the sector of your project does not appear, you must send an email to [recin@cci-es.org](mailto:recin@cci-es.org) to indicate your sector and the types of projects you need; you can see types of projects from other sectors. In less than 24 hours we will register your sector and the types of projects and will notify you by email of their incorporation.

This close-up shows the "Project data" section of the form. The "Industrial project name" field is filled with "Lyon gasification plant". The "Select the project sector" dropdown menu is open, with "Electric" selected. The "Select the type of project" dropdown menu is also open, displaying a list of project types:

- Electrical substation
- Combined cycle
- Thermal generation supervision
- Pain Management
- Systems automation (PMS, EMS, PCS)
- DIGITALIZED N (MONTH, Predictive Maint ...)
- Thermoelectric
- Coal treatment
- Wind-power generator
- EDAS
- Alarm system automation

Once you have entered the name of the project, its sector and type, you will have to create a basic architecture that includes zones and conduits of your project and all the types of components. To do so, you have a ppt template that you can download from

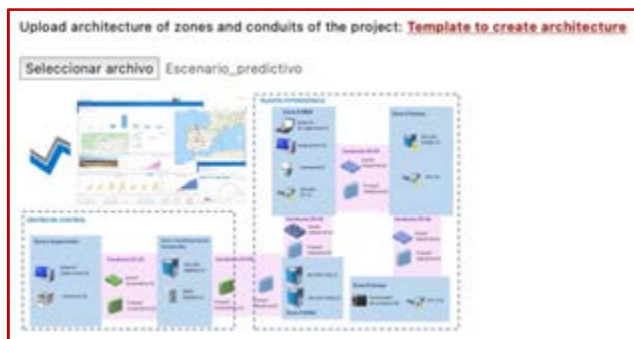
[Template to create architecture](#) where all the components and examples to prepare the architecture of your project can be found:



Example:



Once you have created the architecture, you must save it as a jpg image file and upload the file using the **Select File** option.



The architecture should group all components into zones and conduits. A zone is a logical or physical grouping of industrial assets, system-type components, which must share the same security requirements. A Conduit is a particular type of zone that groups together communications components that allow data or information to be transmitted between different zones.

Some recommendations when creating the architecture of your project according to the IEC-62443 standard:

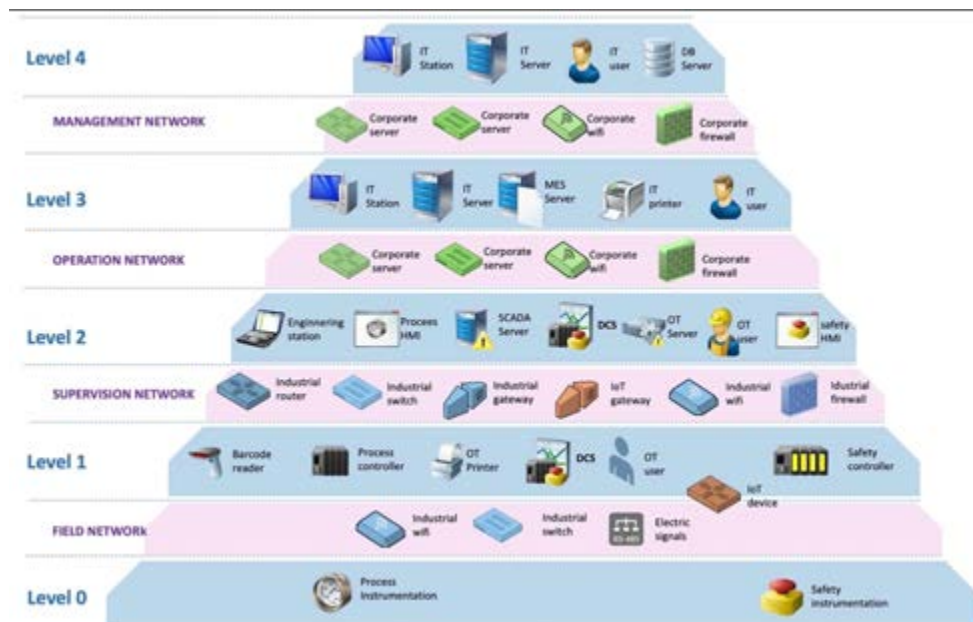
- Information systems (IT) components and industrial control systems (OT) components should be grouped in separate areas because the responsibility for them lies in different areas of the organizations, determined by the results of previous risk analyses, and their location is usually different. It is important to understand that the main difference between the two environments is that industrial control systems

have a direct impact on the health of people and the environment and can affect production and corporate image when an incident occurs.

- Assets identified as Safety Instrumented Systems (SIS) must be in separate Zones. SIS by their nature have different security requirements than other components of an industrial control system.
- Assets or devices that are temporarily connected must be separated into distinct Zones. Devices such as maintenance laptops, portable cyber security analysis devices (behavioral analysis tools based on network traffic capture), USB storage devices, among others, are often exposed to a much higher number of threats than those that are permanently inside an area. These devices should therefore be modelled in a separate area. The main reason is that as temporary connection devices, they are also likely to connect to other networks outside the area whose cyber-security requirements do not meet those set for the area.
- Wireless communications should be in one or more areas separate from wired communications. Wireless communications are not controlled by walls or cabinets and therefore have a higher level of exposure than wired communications.

## Registration of zones and their components

Within the project you will register the zones and their components according to the defined architecture; to do this you must indicate a zone name and select a zone type: the zone types correspond to one or more levels of the Purdue pyramid shown below:



As you can see in the image above, the **level 0**, contains the sensor and actuator instrumentation type components, both for process and instrumentation. **Level 1** contains

the control components, such as process or safety controllers like PLCs or RTUs, OT printers or barcode readers, as well as DCS (the control layer of a distributed control system). **Level 2** contains the supervisory components, such as HMI, SCADA server, or the supervisory layer of a DC. **Level 3** contains operational or optimization components for predictive maintenance, e.g. as MES server or other IT servers or stations. Finally, **level 4** contains the information systems components.

To add a zone, you have the button  that will display the following form:

You will need to select the appropriate zone type by selecting one of the 11 zone types:

- Corporate zone with level 4 components
- Vendor Zone with level 4 Components
- Level 0 and level 1 safety component zone
- Level 0 Component Zone
- Component zone of level 0 and level 1 basic process
- Component zone level 0 and level 1 advanced process
- Level 1 and level 2 Component Zone
- Level 2 Component Zone
- Remote level 2 Component Zone
- Level 2 or Level 3 Component Zone
- Level 3 Component Zone

The selection of the zone type will indicate the type of components we will have. Next, you will need to indicate the criticality in terms of loss of integrity, availability and confidentiality of the area, i.e. the impact that the loss of integrity, availability and confidentiality would have. Criticality in these three dimensions will be expressed qualitatively in 4 grades (Low, Medium, High and Very High):

To establish the degree of criticality of loss of each of the dimensions, an impact analysis should be carried out to determine the assessment based on the consequences of the loss of integrity, availability and confidentiality of the area, using a table of assessment criteria, for



example, with criteria of loss of production, cost of recovery, loss of life, loss of image, environmental impact and operational security.

If it is not possible to carry out this risk analysis, we provide an indicative table for each type of area and sector, which has been drawn up based on the criteria of professionals in the sector:

| TYPE OF ZONES                                       | SECTORS |    |   |          |    |   |      |    |   |           |    |   |          |    |   |
|---|---------|----|---|----------|----|---|------|----|---|-----------|----|---|----------|----|---|
|   | Water   |    |   | Chemical |    |   | Food |    |   | Transport |    |   | Electric |    |   |
| Corporate zone with level 4 components              | M       | M  | H | H        | M  | H | M    | M  | H | H         | M  | S | M        | M  | H |
| Vendor Zone with Tier 4 Components                  | H       | VH | H | H        | S  | H | H    | VH | H | M         | S  | M | H        | VH | H |
| Level 0 and level 1 safety component zone           | VH      | VH | S | VH       | VH | M | VH   | VH | S | VH        | VH | S | VH       | VH | S |
| Level 0 Component Zone                              | VH      | VH | S | S        | S  | S | VH   | VH | S | S         | S  | S | VH       | VH | S |
| Component zone of level 0 and level 1 basic process | VH      | VH | S | H        | M  | S | VH   | VH | S | H         | H  | S | VH       | VH | S |
| Component zone level 0 and level 1 advanced process | VH      | VH | S | H        | M  | H | VH   | VH | S | H         | H  | M | VH       | VH | S |
| Level 1 and Level 2 Component Zone                  | VH      | VH | M | VH       | M  | H | VH   | VH | M | H         | H  | M | VH       | VH | M |
| Level 2 Component Zone                              | VH      | M  | M | VH       | M  | H | VH   | M  | M | H         | M  | S | VH       | M  | M |
| Remote Level 2 Component Zone                       | VH      | H  | M | M        | M  | H | VH   | H  | M | H         | M  | S | VH       | H  | M |
| Level 2 or Level 3 Component Zone                   | VH      | H  | M | H        | M  | H | VH   | H  | M | H         | S  | H | VH       | H  | M |
| Level 3 Component Zone                              | VH      | M  | H | H        | S  | H | VH   | M  | H | H         | S  | H | VH       | M  | H |
|   | I       | A  | C | I        | A  | C | I    | A  | C | I         | A  | C | I        | A  | C |

The following impact assessment matrix has been used to compile the table:

| Valuation | Operational impact | Environmental impact or health               | Legal impact            | Patrimonial impact          | Reputational impact                     |
|-----------|--------------------|--|-------------------------|-----------------------------|---|
| Very high | +24 hours stop     | Loss of life or high environmental impact    | Strong sanction         | More than 50% of the profit | On important clients                    |
| High      | +8 hours stop      | High injuries or medium environmental impact | Medium penalty          | 25% to 50% of the profit    | In medium customers and suppliers       |
| Medium    | +4 hours stop      | Medium injuries or low environmental impact  | Temporary sanction      | 1% to 25% of profit         | In suppliers                            |
| Low       | >1 hour stop       | No injury and no impact                      | Administrative sanction | Less than 1% of profit      | Punctual and without significant impact |

Once the criticality of each of the dimensions has been established, a safety pattern is automatically generated that establishes the safety levels for each of the 7 IEC-62443 categories according to the criticality correspondence defined by CCI, which can be seen in the following table:

Security patterns (Criticality mapping to IEC-62243 security categories)

| PATTERN | INTEGRITY | AVAILABILITY | CONFIDENTIALITY | IAC | UC | SI | DC | RDF | TRE | RA |
|---------|-----------|--------------|-----------------|-----|----|----|----|-----|-----|----|
| 650     | VERY HIGH | VERY HIGH    | VERY HIGH       | 4   | 4  | 4  | 4  | 4   | 4   | 4  |
| 640     | VERY HIGH | VERY HIGH    | HIGH            | 4   | 4  | 4  | 3  | 4   | 4   | 4  |
| 630     | VERY HIGH | VERY HIGH    | MEDIUM          | 4   | 4  | 4  | 2  | 4   | 3   | 4  |
| 620     | VERY HIGH | VERY HIGH    | LOW             | 4   | 4  | 4  | 1  | 2   | 2   | 4  |
| 610     | VERY HIGH | HIGH         | VERY HIGH       | 4   | 4  | 4  | 4  | 4   | 4   | 3  |
| 600     | VERY HIGH | HIGH         | HIGH            | 4   | 4  | 4  | 3  | 4   | 4   | 3  |
| 590     | VERY HIGH | HIGH         | MEDIUM          | 4   | 4  | 4  | 2  | 3   | 3   | 3  |
| 580     | VERY HIGH | HIGH         | LOW             | 4   | 4  | 4  | 1  | 3   | 3   | 3  |
| 570     | VERY HIGH | MEDIUM       | VERY HIGH       | 4   | 4  | 4  | 4  | 3   | 3   | 2  |
| 560     | VERY HIGH | MEDIUM       | HIGH            | 4   | 4  | 4  | 3  | 3   | 3   | 2  |
| 550     | VERY HIGH | MEDIUM       | MEDIUM          | 4   | 4  | 4  | 2  | 3   | 3   | 2  |
| 540     | VERY HIGH | MEDIUM       | LOW             | 4   | 4  | 4  | 1  | 3   | 3   | 2  |
| 530     | VERY HIGH | LOW          | VERY HIGH       | 4   | 4  | 4  | 4  | 3   | 3   | 1  |
| 520     | VERY HIGH | LOW          | HIGH            | 4   | 4  | 4  | 3  | 3   | 3   | 1  |
| 510     | VERY HIGH | LOW          | MEDIUM          | 4   | 4  | 4  | 2  | 3   | 3   | 1  |
| 500     | VERY HIGH | LOW          | LOW             | 4   | 4  | 4  | 1  | 3   | 3   | 1  |
| 490     | HIGH      | VERY HIGH    | VERY HIGH       | 3   | 3  | 3  | 4  | 4   | 4   | 4  |
| 480     | HIGH      | VERY HIGH    | HIGH            | 3   | 3  | 3  | 3  | 3   | 3   | 4  |
| 470     | HIGH      | VERY HIGH    | MEDIUM          | 3   | 3  | 3  | 2  | 3   | 3   | 4  |
| 460     | HIGH      | VERY HIGH    | LOW             | 3   | 3  | 3  | 1  | 3   | 3   | 4  |
| 450     | HIGH      | HIGH         | VERY HIGH       | 3   | 3  | 3  | 4  | 3   | 3   | 3  |
| 440     | HIGH      | HIGH         | HIGH            | 3   | 3  | 3  | 3  | 3   | 3   | 3  |
| 430     | HIGH      | HIGH         | MEDIUM          | 3   | 3  | 3  | 2  | 3   | 3   | 3  |
| 420     | HIGH      | HIGH         | LOW             | 3   | 3  | 3  | 1  | 2   | 2   | 3  |
| 410     | HIGH      | MEDIUM       | VERY HIGH       | 3   | 3  | 3  | 4  | 2   | 2   | 2  |
| 400     | HIGH      | MEDIUM       | HIGH            | 3   | 3  | 3  | 3  | 2   | 2   | 2  |
| 390     | HIGH      | MEDIUM       | MEDIUM          | 3   | 3  | 3  | 2  | 2   | 2   | 2  |
| 380     | HIGH      | MEDIUM       | LOW             | 3   | 3  | 3  | 1  | 2   | 2   | 2  |
| 370     | HIGH      | LOW          | VERY HIGH       | 3   | 3  | 3  | 4  | 2   | 2   | 1  |
| 360     | HIGH      | LOW          | HIGH            | 3   | 3  | 3  | 3  | 2   | 2   | 1  |
| 350     | HIGH      | LOW          | MEDIUM          | 3   | 3  | 3  | 2  | 2   | 2   | 1  |
| 340     | HIGH      | LOW          | LOW             | 3   | 3  | 3  | 1  | 2   | 2   | 1  |
| 330     | MEDIUM    | VERY HIGH    | VERY HIGH       | 2   | 2  | 2  | 4  | 3   | 3   | 4  |
| 320     | MEDIUM    | VERY HIGH    | HIGH            | 2   | 2  | 2  | 3  | 3   | 3   | 4  |
| 310     | MEDIUM    | VERY HIGH    | MEDIUM          | 2   | 2  | 2  | 2  | 3   | 3   | 4  |
| 300     | MEDIUM    | VERY HIGH    | LOW             | 2   | 2  | 2  | 1  | 3   | 3   | 4  |
| 290     | MEDIUM    | HIGH         | VERY HIGH       | 2   | 2  | 2  | 4  | 2   | 2   | 3  |
| 280     | MEDIUM    | HIGH         | HIGH            | 2   | 2  | 2  | 3  | 2   | 2   | 3  |
| 270     | MEDIUM    | HIGH         | MEDIUM          | 2   | 2  | 2  | 2  | 2   | 2   | 3  |
| 260     | MEDIUM    | HIGH         | LOW             | 2   | 2  | 2  | 1  | 2   | 2   | 3  |
| 250     | MEDIUM    | MEDIUM       | VERY HIGH       | 2   | 2  | 2  | 4  | 2   | 2   | 2  |
| 240     | MEDIUM    | MEDIUM       | HIGH            | 2   | 2  | 2  | 3  | 2   | 2   | 2  |
| 230     | MEDIUM    | MEDIUM       | MEDIUM          | 2   | 2  | 2  | 2  | 2   | 2   | 2  |
| 220     | MEDIUM    | MEDIUM       | LOW             | 2   | 2  | 2  | 1  | 1   | 2   | 2  |
| 210     | MEDIUM    | LOW          | VERY HIGH       | 2   | 2  | 2  | 4  | 2   | 2   | 1  |
| 200     | MEDIUM    | LOW          | HIGH            | 2   | 2  | 2  | 3  | 2   | 2   | 1  |
| 190     | MEDIUM    | LOW          | MEDIUM          | 2   | 2  | 2  | 2  | 2   | 2   | 1  |
| 180     | MEDIUM    | LOW          | LOW             | 2   | 2  | 2  | 1  | 1   | 1   | 1  |
| 170     | LOW       | VERY HIGH    | VERY HIGH       | 1   | 1  | 1  | 4  | 3   | 3   | 4  |
| 160     | LOW       | VERY HIGH    | HIGH            | 1   | 1  | 1  | 3  | 3   | 3   | 4  |
| 150     | LOW       | VERY HIGH    | MEDIUM          | 1   | 1  | 1  | 2  | 3   | 3   | 4  |
| 140     | LOW       | VERY HIGH    | LOW             | 1   | 1  | 1  | 1  | 3   | 3   | 4  |
| 130     | LOW       | HIGH         | VERY HIGH       | 1   | 1  | 1  | 4  | 2   | 2   | 3  |
| 120     | LOW       | HIGH         | HIGH            | 1   | 1  | 1  | 3  | 2   | 2   | 3  |
| 110     | LOW       | HIGH         | MEDIUM          | 1   | 1  | 1  | 2  | 2   | 2   | 3  |
| 100     | LOW       | HIGH         | LOW             | 1   | 1  | 1  | 1  | 2   | 2   | 3  |
| 90      | LOW       | MEDIUM       | VERY HIGH       | 1   | 1  | 1  | 4  | 2   | 2   | 2  |
| 80      | LOW       | MEDIUM       | HIGH            | 1   | 1  | 1  | 3  | 2   | 2   | 2  |
| 70      | LOW       | MEDIUM       | MEDIUM          | 1   | 1  | 1  | 2  | 2   | 2   | 2  |
| 60      | LOW       | MEDIUM       | LOW             | 1   | 1  | 1  | 1  | 2   | 2   | 2  |
| 50      | LOW       | LOW          | VERY HIGH       | 1   | 1  | 1  | 4  | 1   | 1   | 1  |
| 40      | LOW       | LOW          | HIGH            | 1   | 1  | 1  | 3  | 1   | 1   | 1  |
| 30      | LOW       | LOW          | MEDIUM          | 1   | 1  | 1  | 2  | 1   | 1   | 1  |
| 20      | LOW       | LOW          | LOW             | 1   | 1  | 1  | 1  | 1   | 1   | 1  |

|   |                         |
|---|-------------------------|
| IAC Identification and authentication control | UC Usage Control        |
| SI Systems Integrity                          | DC DATA Confidentiality |
| RDF Restricted Data Flow                      | TRE Event Response Time |
| RA Resources Availability                     |                         |

The numbers 1 to 4 correspond to the security levels of IEC-62443.

Below you will find a table with the meaning of each security level (SL):

| Security Level (SL) | Meaning   |
|---------------------|---|
| 0                   | Does not have requirements or does not require security protections   |
| 1                   | Requires protections against accidental breaches (technology errors or human failure)   |
| 2                   | Requires protections against willful violations with few resources, general knowledge, and low motivation   |
| 3                   | Requires protection against willful violations with sophisticated resources, specific knowledge of Automation and Control Systems, and moderate motivation. |
| 4                   | Requires protection against intentional violations with sophisticated resources, advanced knowledge of Automation and Control Systems.                      |

Once the zone is created, we can start incorporating components of the zone using the following button:



As when registering a zone, we must indicate the name of the component, its type and the quantity by selecting a range.

The type of component we can select will depend on the type of zone, and the number of components will be selected from a range.

You should then review the criticality of the component, which shall match the criticality set in the area. We can change the criticality in any of the dimensions, to raise or lower it.

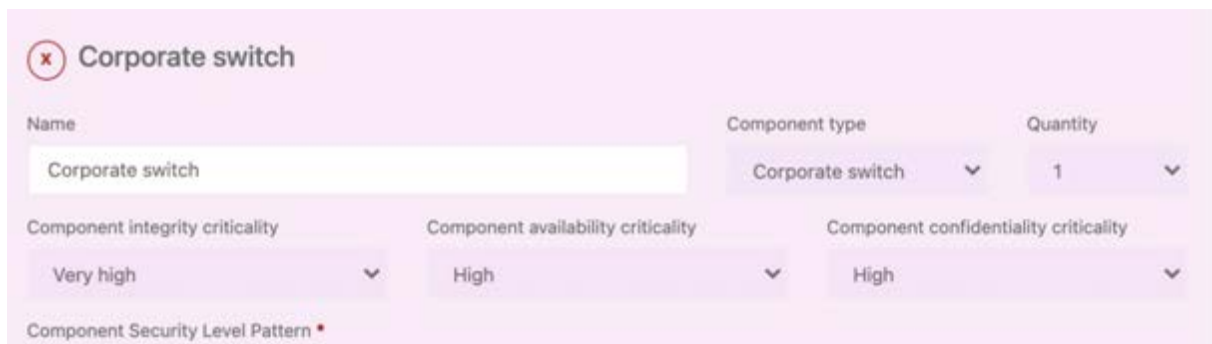
## Registration of conduits and their components

Within the project you will register conduits and their components according to the defined architecture. For this purpose, you will have to indicate a conduit name and a description. As in the zones, you must establish the criticality of the conduit in each of the three dimensions.

Once the criticality has been established, the source zone and the destination zone of the conduit must be indicated, and we can start to incorporate components of the conduit using the following button:



As when registering a zone, we must indicate the name of the component, its type and the quantity by selecting a range.



The screenshot shows a form titled 'Corporate switch' with a close button (x) in a circle. The form contains the following fields:

- Name:** A text input field containing 'Corporate switch'.
- Component type:** A dropdown menu with 'Corporate switch' selected.
- Quantity:** A dropdown menu with '1' selected.
- Component integrity criticality:** A dropdown menu with 'Very high' selected.
- Component availability criticality:** A dropdown menu with 'High' selected.
- Component confidentiality criticality:** A dropdown menu with 'High' selected.
- Component Security Level Pattern:** A label with a red asterisk, indicating it is a required field.

In addition to the type of component, you can set its quantity.

You should then review the criticality of the component, which shall match the criticality set in the area. We can change the criticality in any of the dimensions, to raise or lower it.

Once you have registered all the zones and their components, as well as the ducts and their components, you can save the project by clicking on



The process of securely submitting project information to a database can take a few seconds, depending on the size.