

# Customer Requirements Specification

## AAS Digital Nameplate Generator

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# Version Control

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## 1 Introduction

The purpose of this document is to define the requirements for the digital nameplate generator. The information stated in this document will be used for other documents, for instance, the Software Requirements Specification (SRS) as well as providing a base for subsequent development activities. This includes design, implementation and testing.

## 2 Scope

The main objective of this project is to create a nameplate generator for an Asset Administration Shell (AAS). As visible in figure 2.1 the application shall be able to create graphical illustrations based on the properties provided by the AAS as well as the ability to generate QR codes according to the DIN standard.

Furthermore, a user-friendly front-end application, set up on the host system, shall be designed and implemented utilizing React. This includes a home page where the user can enter a server address. After selecting the server, the user shall be directed to a user interface (UI) listing all the components available on the server. Additionally, the interface shall display the data regarding the asset chosen by the user in an organized and clear structure. Both search functions contain autocomplete. The interface allows the communication between any AAS server through REST-API. Additionally, there shall be an option to download the nameplate in SVG or PNG format. The application shall be tested to ensure compatibility with a diverse AAS server infrastructure. Forbye, the project shall provide a user manual documentation online.

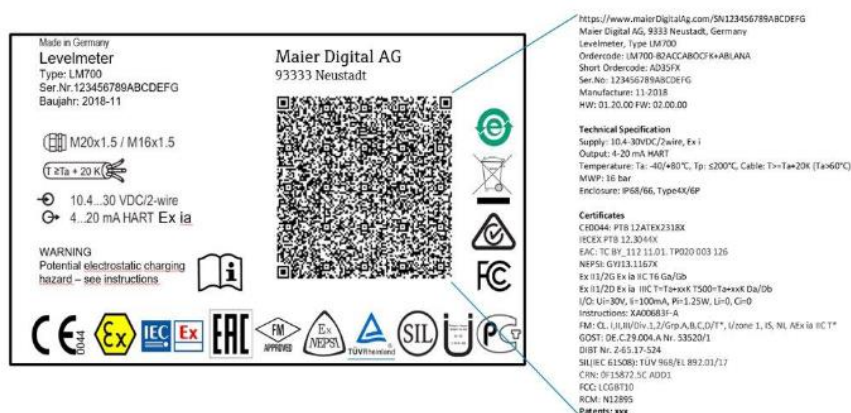


Figure 2.1: Nameplate

### 3 Product Environment

The web application shall be developed utilizing the framework React, which is an open source front-end JavaScript library. It is used for creating user interfaces (UI) based on UI components [1] . The source code shall be converted to pure with the assistance of the JS platform *Node.js* as well as other modules. This ensures the display of the application in the browser without the use of Node.js.

Thus, the user's web browser acts as the execution environment loading the application through Hypertext Transfer Protocol (Secure), also known as HTTP(S), as well as acquiring the data through REST-API from the AAS-Server.

Since the compiled project shall be hosted on a HTTP(S) server, it does not require an extraordinary infrastructure except providing HTML, CSS and JS to the user.

The AAS is comprised of a number of submodules containing information and functionalities of an asset. It is not only a digital representation of an asset but also acts as a link between physical objects and the intertwined, digital world [2].

### 4 Product Usage

#### 4.1 Business Processes

##### 4.1.1 BP01 View Asset

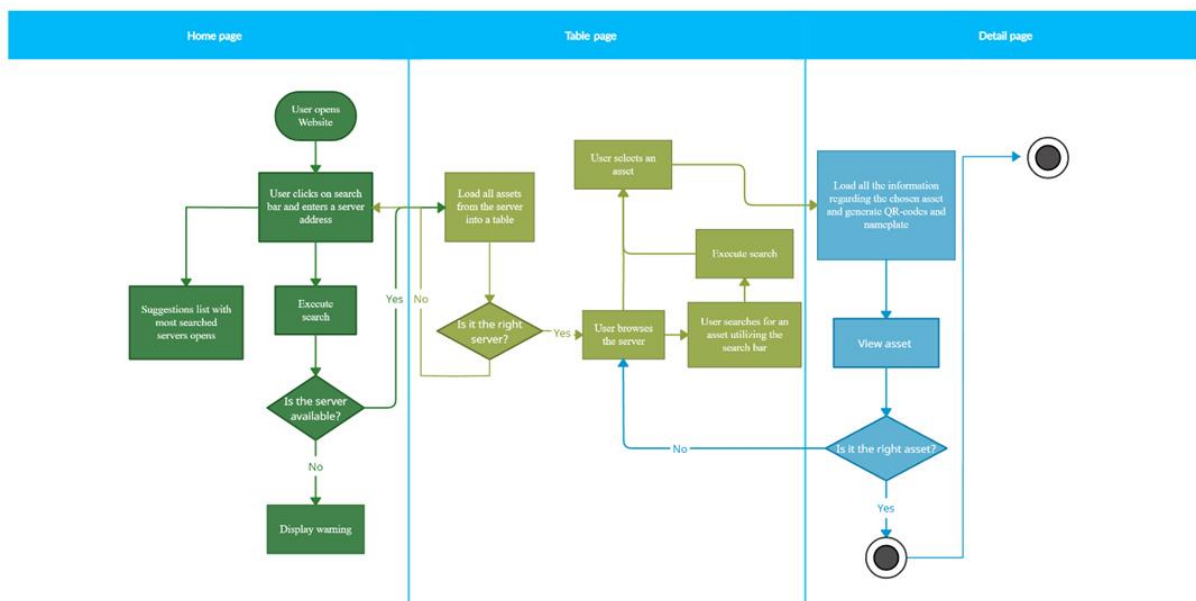


Figure 4.1: BPMN diagram of view asset

Business Process ID	BP01
Involved Roles	User, AAS-Server
Result	The user is able to access a chosen server by entering the server address into a search bar. To ensure easier handling the most popular servers shall be suggested. After choosing a server a table containing the components of it are displayed. The user can select an asset and view all the sorted information provided by the AAS-Server regarding the given asset. Additionally, a user can return to the previous page by using the back button.
Triggering event	The user wants to view a chosen asset on a specific server.
Exceptions	The server is unavailable therefore the user's web browser cannot acquire the information for the component list and the information regarding a specific asset.
Control points and measurement	There shall be search functions for servers and assets. All the components of a chosen server shall be displayed. The user can select an asset and more information about it shall be presented in a structured order. A navigation button shall enable to user to return to the previous page.

#### 4.1.2 BP02 Nameplate generation

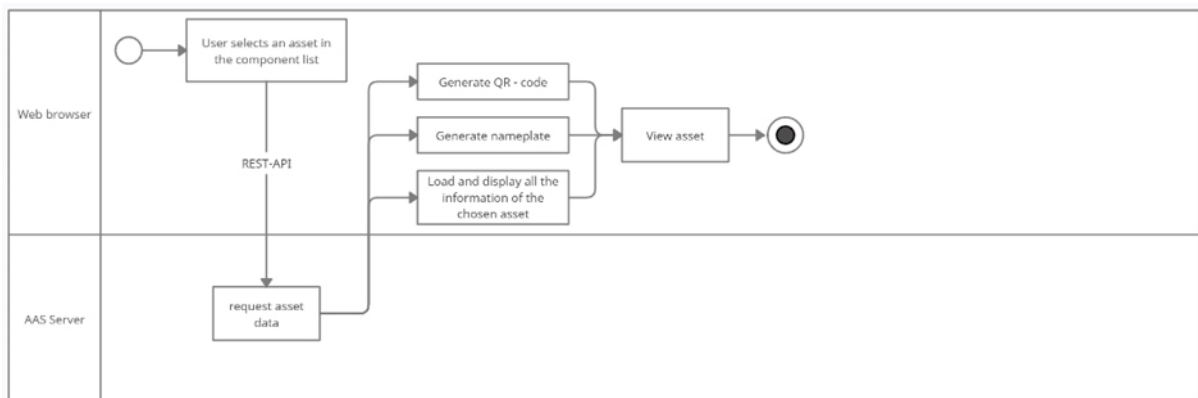


Figure 4.2: BPMN diagram of nameplate generation

Business Process ID	BP02
Involved Roles	User, AAS-Server
Result	The application generates a graphical illustration of a nameplate for a given asset with the information provided by the AAS-Server. It contains General Information, Technical Specification, Certificates and Patents. Additionally, the information is stored in a QR-code displayed on the nameplate. Furthermore, the nameplate must conform to the DIN standard. The nameplate shall be displayed on the UI.
Triggering event	The user wants to look at the nameplate of a chosen asset.
Exceptions	The nameplate shall be generated regardless of missing information, however, the application shall alert the user that the nameplate is not complete.
Control points and measurement	<ul style="list-style-type: none"> <li>- A nameplate corresponding to the DIN standard must be generated for every asset.</li> <li>- The information used for the generation should belong to the chosen asset.</li> <li>- It shall always be displayed in the same position on the web application.</li> <li>- If there is an error such as missing information, the user shall be notified.</li> </ul>

#### 4.1.3 BP03 Nameplate download

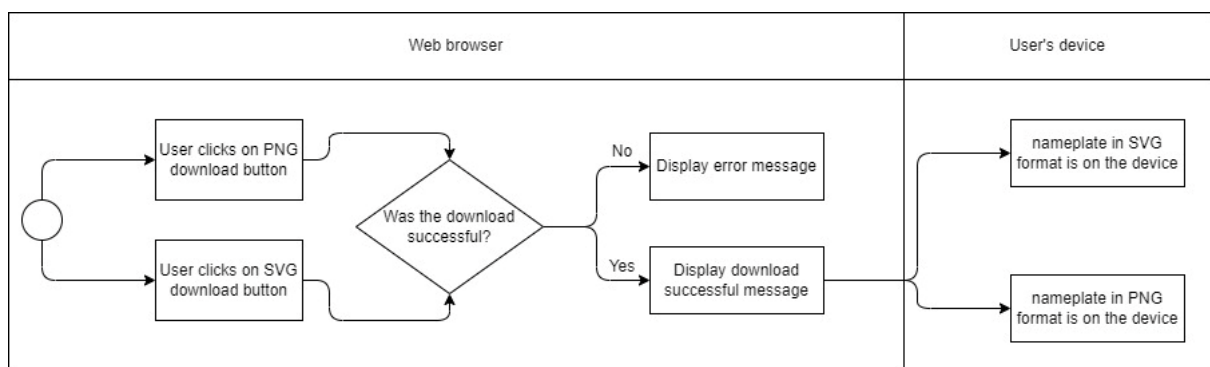


Figure 4.3: BPMN diagram of nameplate download



Business Process ID	BP03
Involved Roles	User, AAS-Server, User's device
Result	A version of the nameplate in either SVG or PNG format is downloaded to the user's device.
Triggering event	The user wants a version of the nameplate on their device.
Exceptions	The user's device has no storage for the file or downloads a broken file that cannot be opened by the hardware.
Control points and measurement	A correct version of the nameplate is on the user's device. The user can open the downloaded file and examine the nameplate.

## 4.2 Use cases

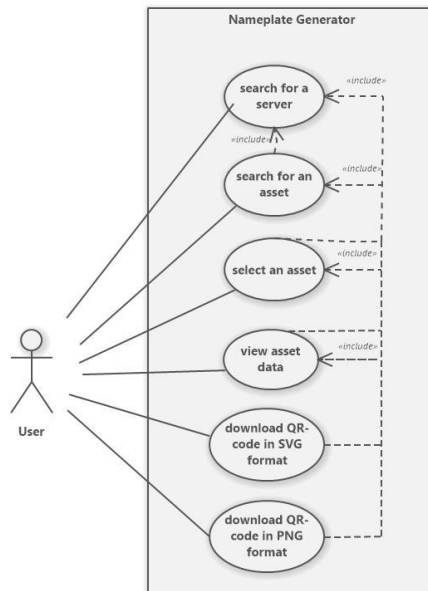


Figure 4.4: Use Case diagram

### 4.2.1 UC01 Select a Server

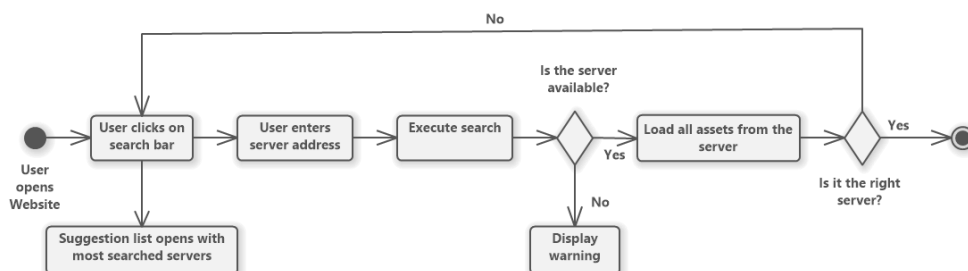


Figure 4.5: Select a server flow chart

Use Case ID	UC01
Description	The user can select a server by entering the server address into the search bar. When clicking on the search bar a suggestion list opens and shows a suggestion list.
Involved roles	User, AAS-Server
System boundary	AAS-Server, web browser
Precondition	The user knows the server address and the server must exist as well as being available.
Postcondition on success	The interface visualizes a table filled with all the components that the server contains.
Triggering event	The user opens the website and wants to view the components of a specific server.

#### 4.2.2 UC02 Browse the Server

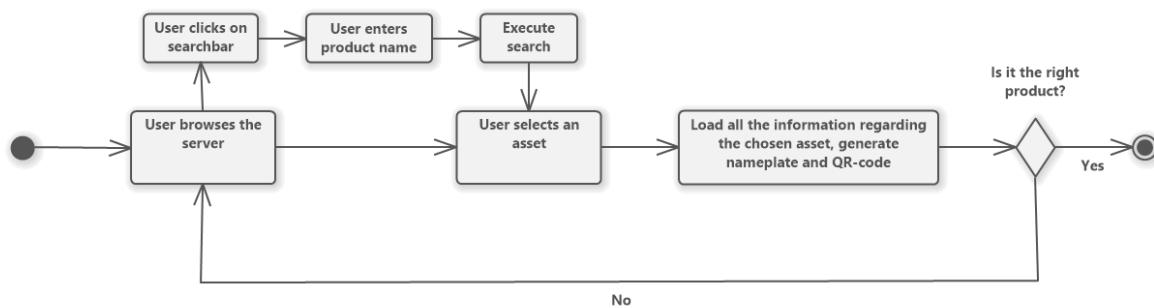


Figure 4.6: Browse the server flow chart

Use Case ID	UC02
Description	The user can acquire the information of an asset by searching for the product name in the table directly or with the search bar.
Involved roles	User, AAS-Server
System boundary	AAS-Server, web browser
Precondition	The user knows the name of the product and is on the right server containing that specific product.
Postcondition on success	The table displays the product names of the assets that match the search key.
Triggering event	The user wants to find a certain product.

### 4.2.3 UC03 Select and view an asset

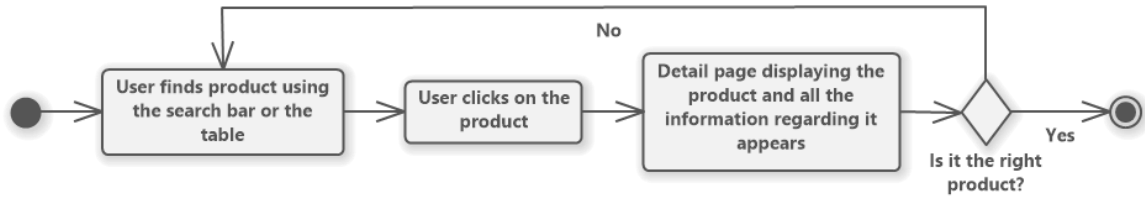


Figure 4.7: Select and view an asset flow chart

Use Case ID	UC03
Description	It describes the selection of an asset and the displayed data.
Involved roles	User, AAS-Server
System boundary	AAS-Server, web browser
Precondition	The user is on the right server containing that specific product. Additionally, if there are multiple assets with the same name, the user knows which one they are searching for.
Postcondition on success	The user is lead to a page displaying the data regarding the chosen asset and the generated nameplate.
Triggering event	The user wants to view the data of a selected product.

### 4.2.4 UC04 Download in SVG format

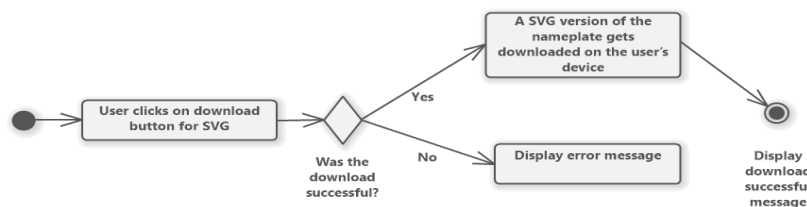


Figure 4.8: Download in SVG format flow chart

Use Case ID	UC04
Description	The nameplate shall be downloaded in SVG format.
Involved roles	User, User's device
System boundary	Web browser
Precondition	The user's device has enough space to store the file.
Postcondition on success	A SVG version of the nameplate is on the user's device.
Triggering event	The user wants to download the nameplate in a SVG format.

### 4.2.5 UC05 Download in PNG format

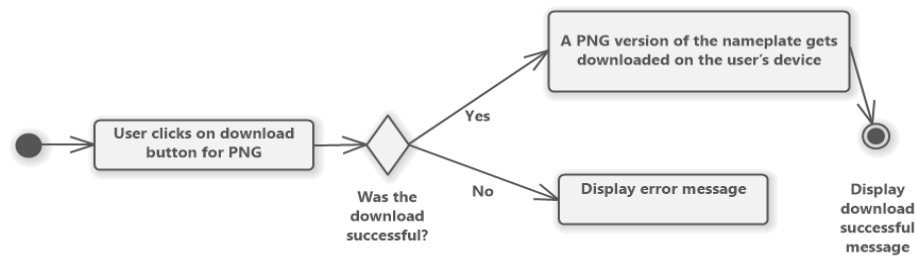


Figure 4.9: Download in PNG format flow chart

Use Case ID	UC05
Description	The nameplate shall be downloaded in PNG format.
Involved roles	User, User's device
System boundary	Web browser
Precondition	The user's device has enough space to store the file.
Postcondition on success	A PNG version of the nameplate is on the user's device.
Triggering event	The user wants to download the nameplate in a PNG format.

## 4.3 Functional Requirements

The requirements shall be described using a requirement number, an overview describing the requirement, originator, fit criterion and a priority number. The requirements shall be ranked from zero to five. Zero being the least important and five being the highest priority. This enables the developers to determine which requirements, have a higher priority and therefore need to be dealt with first or which ones are rather optional.

### 4.3.1 DNG.GUI.001 Responsive and compatible GUI

Requirement ID	DNG.GUI.001
Overview	<p>The interface is built on a responsive web design thus it can be accessed on phone and laptop and the view shall adjust according to the user's device.</p> <p>It shall also be compatible with multiple browsers.</p>
Priority	2
Originator	Customer

Fit Criterion	Testing whether there is a similar design on laptop and phone as well as on different Browsers, for instance, Chrome, Firefox and Edge.
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#### 4.3.2 DNG.GUI.002 Download buttons for SVG and PNG format

Requirement ID	DNG.GUI.002
Overview	The nameplates are downloaded onto the user's device.
Priority	4
Originator	Customer
Fit Criterion	A SVG or PNG version of the exact nameplate displayed on the page shall be on the user's device. The format depends on which button is pressed.

#### 4.3.3 DNG.GUI.003 Search functionality

Requirement ID	DNG.GUI.003
Overview	The search functions allow the user to search for a certain product or a server.
Priority	3
Originator	Customer
Fit Criterion	It requires a search bar where the user can type in the server or product name with the assistance of autocomplete. When clicking the search button, the right asset on server shall be displayed for the user.

#### 4.3.4 DNG.GUI.004 Navigation buttons

Requirement ID	DNG.GUI.004
Overview	When clicking the back button the user shall be led to the page, he previously viewed, while being directed to the following page when clicking the forward button.
Priority	1
Originator	Customer

Fit Criterion	With the back button the user shall be able to move to the previous page. Navigating to the root shall be possible, e.g., from detail page to table page to home page. The forward button shall forward the user to the next page.
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#### 4.3.5 DNG.GUI.005 QR-code generator

Requirement ID	DNG.GUI.005
Overview	The application is able to generate QR-codes for the nameplates.
Priority	5
Originator	Customer
Fit Criterion	QR-codes shall be generated for every asset and visible on the detail page. They shall correspond to the DIN Standard and contain information in the following order: General Information, Technical Specification, Certificates and Patents.

#### 4.3.6 DNG.GUI.006 Nameplate generator

Requirement ID	DNG.GUI.006
Overview	It can create nameplates for the chosen asset.
Priority	5
Originator	Customer
Fit Criterion	Nameplates according to the DIN standard shall be generated out of the asset the user chose. It shall contain all the necessary information such as general Information, warning signs, certificates and a QR-code. A small version shall be displayed on the detail page.

#### 4.3.7 DNG.GUI.007 Error handling

Requirement ID	DNG.GUI.007
Overview	The system has an error handling.
Priority	4
Originator	Team

Fit Criterion	When the server is down or does not exist, the user shall be notified.
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## 4.4 Non-functional Requirements

### 4.4.1 DNG.USER.001 User-friendly

Requirement ID	DNG.USER.001
Overview	The application should be user-friendly, thus, a user with no experience with the website shall be able to use it effortlessly.
Priority	5
Originator	Customer
Fit Criterion	An inexperienced user shall be able to navigate through the page in two minutes and use search functions in 30 seconds. If the user knows the right server and product name, it shall take them one minute to get to the detail page of the asset they were trying to look at and 20 seconds to download a SVG or PNG version of the nameplate.

### 4.4.2 DNG.PERF.001 Performance

Requirement ID	DNG.PERF.001
Overview	The software should maintain a high performance in terms of how fast a website loads including the time fetching data from the server and displaying it.
Priority	3
Originator	Customer
Fit Criterion	The standard loading time of websites is one to two seconds. However, taken into consideration that it depends on the internet connection as well, the pages will load in a duration of well below seven seconds.

#### 4.4.3 DNG.REL.001 Reliability

Requirement ID	DNG.REL.001
Overview	The application needs to be reliable in terms of containing the right information.
Priority	4
Originator	Customer
Fit Criterion	The nameplates and QR-codes have to be generated according to the DIN standard. The information must belong to the chosen asset meaning there shall not be a false exchange of data regarding different assets.

#### 4.4.4 DNG.MAIN.001 Maintainability

Requirement ID	DNG.MAIN.001
Overview	The website requires a high maintainability.
Priority	3
Originator	Team
Fit Criterion	Each team member shall be able to read and understand the code as well as knowing how to make changes. Additionally, developers not belonging to the team shall be able to do so as well after reading the code for five hours.

#### 4.4.5 DNG.LIC.001 License

Requirement ID	DNG.LIC.001
Overview	The product is an open source software thus a license for publishing it is required.
Priority	5
Originator	Team
Fit Criterion	The product is published under the MIT license and it is added to the GitHub.



## 5 References

- [1] W3Schools, "What is React?," [Online]. Available: [https://www.w3schools.com/whatis/whatis\\_react.asp](https://www.w3schools.com/whatis/whatis_react.asp). [Accessed on 29.09.2022].
- [2] A. O. S. P. Jörg Neidig, "Asset Administration Shell Reading Guide," 01 2022. [Online]. Available: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/[https://www.plattform-i40.de/IP/Redaktion/DE/Downloads/Publikation/AAS-ReadingGuide\\_202201.pdf?\\_\\_blob=publicationFile&v=4#:~:text=The%20Asset%20Administration%20Shell%20\(AAS,and%20capabilities%20%E2%80%99](https://www.plattform-i40.de/IP/Redaktion/DE/Downloads/Publikation/AAS-ReadingGuide_202201.pdf?__blob=publicationFile&v=4#:~:text=The%20Asset%20Administration%20Shell%20(AAS,and%20capabilities%20%E2%80%99). [Accessed on 28.09.2022].