

Software Requirements Specification



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1. Introduction

Collaboration and project management platforms are a new entry into cloud computing marketplace. They are gaining polarity and acceptance by the users. They promise a new and more effective means of control and administration.

Cloud Management and Control System (CMaCS) is a software platform providing device independent cloud-based functionality that facilitates communication and data access between individuals, project teams and enterprises. CMaCS is essentially a powerful communication tool facilitating collaborative tasks, project management data, file sharing, data analysis, and information exchange. As a software platform, CMaCS is loosely designed around facade product manufacturing in the building construction marketplace but is easily adapted to the requirements of other project-based industries.

The introduction of the Software Requirements Specification (SRS) provides an overview of the entire SRS with purpose, scope, definitions, acronyms, abbreviations, and references. The aims of this document are as follows: to analyze CMaCS through a detailed definition of the problem statement, to elucidate the needs and capabilities of stakeholders, and to define the system's high-level product features.

1.1 Purpose

The purpose of this document is to report and analyze all assorted ideas that have come up to define the system, the systems components, and customer requirements. Also, this document will map out intended uses of the system, outline ideas that are currently being considered for integration, and explore concepts that may be investigated in the future.

In short, the purpose of this SRS document is to provide a detailed overview of our software product, its parameters, and goals. This document describes the project's target audience and its user interface, hardware and software requirements. It defines how our client, team, and audience see the product and its functionality. Also, it helps any designer and developer to assist in Software Development Life-Cycle (SDLC) processes.

This documents outlines and describes all specifications and requirements that are established and agreed by the software developers, software administers, and the organizational managers. It tracks the development stages as well as documenting various modifications and changes throughout the development of the software.

The most important part of this document is to create a uniform media for all participants to work within a predictable and efficient development guideline. It facilities clean and concise working environment and monitors and maintains a progress schedule. This document follows IEEE recommended practice SRS workflow procedures.

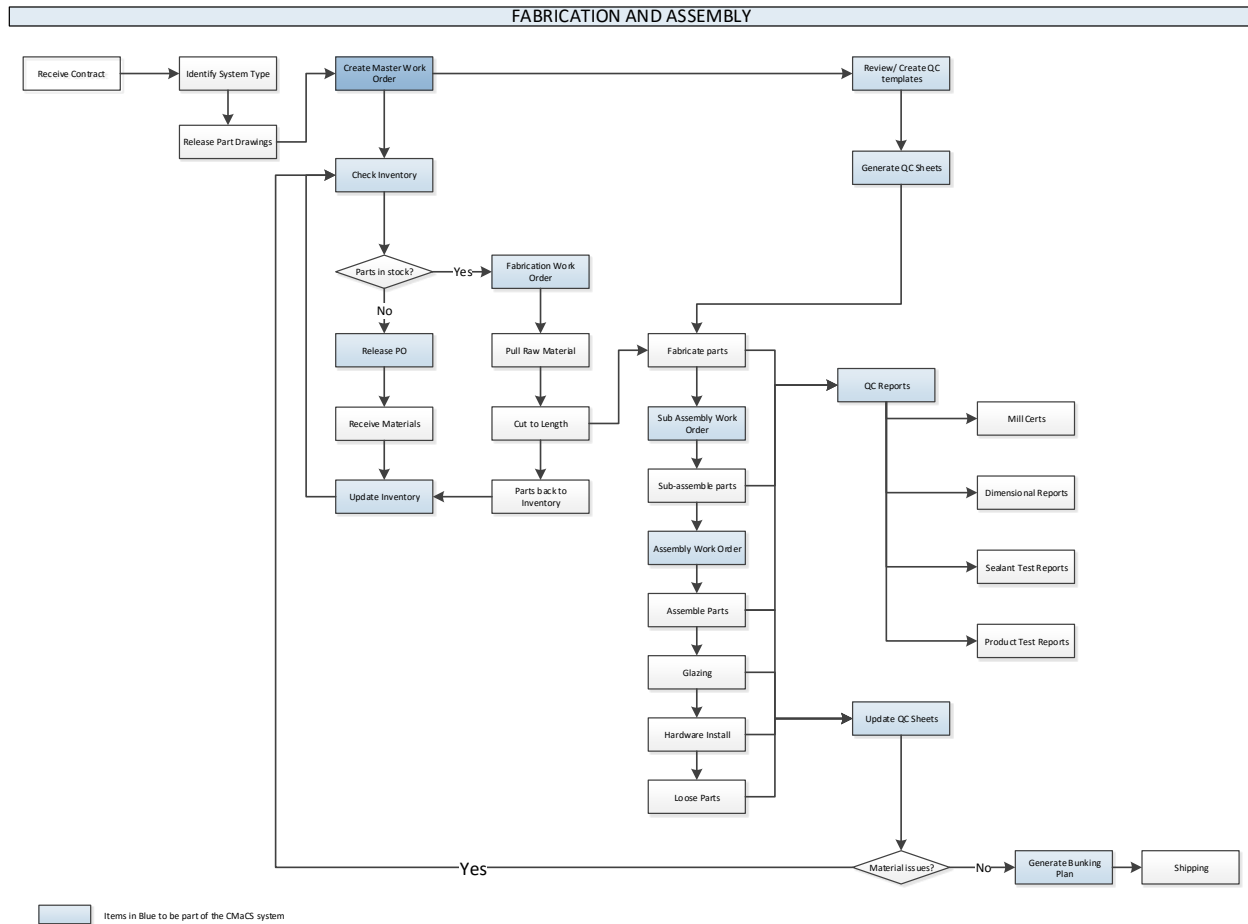
1.2 Project Scope

The scope of the project pertains primarily to the cloud-based, supply chain management system for small to mid-sized Schüco Customers. The scope features for making manufacturing projects live and focuses on the company, the stakeholders, and applications, providing cloud solutions to track purchase orders, distribution of materials, fabrication and assembly of materials, Schedule and Time management and installation of the final product. The CMaCS platform is used by the provider to develop customized applications in a detailed response to client needs. Each custom tailored application is unique, embodying the processes, workflows, and best practices of the user(s). The result is an integrated platform for differentiated access by the various project stakeholders. The following are key features of CMaCS:

1. CMaCS is hosted on a secure site with protocols on the client side to ensure the safe transfer of information and data. The framework is scalable with responsive design. The web server hosting domain will hold all clients and customer's data.
2. The platform provides a centralized access point for all the customers' data to handle inventory, fabrication, assembly, and quality and other project needs.
3. The document collaboration module provides a unique facility for clients and customers to communicate to cooperate. It provides specialized functionalities such as annotation; storage and retrieval of markups and comments; keyword search; versioning of changes and ability to retrieve and compare different versions. Other features include the ability to edit simultaneously documents between users which increases productively and reduces rework. In addition to handling document information, CMaCS will have the ability to access Building Information Modeling (BIM) data without additional tools & training. Having 24/7 access to BIM data provides a better means of coordinating designs and computer modeling which can improve decision making and increases productivity. This digital platform will be the most efficient way to manage all types of information and ability to access anywhere and on any device.
4. CMaCS Green, a flavor of CMaCS, is catered towards Schüco's family of customers and will be customized towards integrating with existing Schüco products, such as SchüCal, giving customers an added advantage over any other existing product in the market.
5. CMaCS will provide Schüco, the ability to analyze customer's performance in various project phases. It aids Schüco to make better decisions regarding customers' needs and requirements. Schüco will be able to compare the performance of customers quickly with informative graphs and reports.

1.3 References

Most of the reference will be based on the workflows (TBD)



Example of Fabrication and Assembly Workflow

1.4 Document Conventions

System/Product	CMaCS Application
Primary Customer	Fabricators and Installers aka Schüco's Customers
Secondary Customer	Schüco
Primary Supplier	Schüco Sales
Users	Any one that uses CMaCS
Basic Users	Free account users
Pro Users	Employee of Primary Customers or Individuals with Pro account
Key Users	Schüco Employees
Widget/Web Widget	A small web application that can run with in a large web application
PO	Purchase Order
WO	Work Order

2 System Description

CMaCS provides a device-independent, cloud-based functionality that promotes effortless communication and data access between individuals, project teams, and enterprises. As such, CMaCS can assist in the facilitation of collaborative tasks, project management data, file sharing, data analysis, and information exchange. The core system is designed around manufactured products in building construction. The system is customized by the provider to enable best practices on an application basis, forming an integrated platform for differentiated access by the various stakeholders.

2.1 Architecture

CMaCS follows the MVC design pattern for development (see Figure 2.1.1). This approach is a standard practice used by developers of the design and implementation of complex web applications.

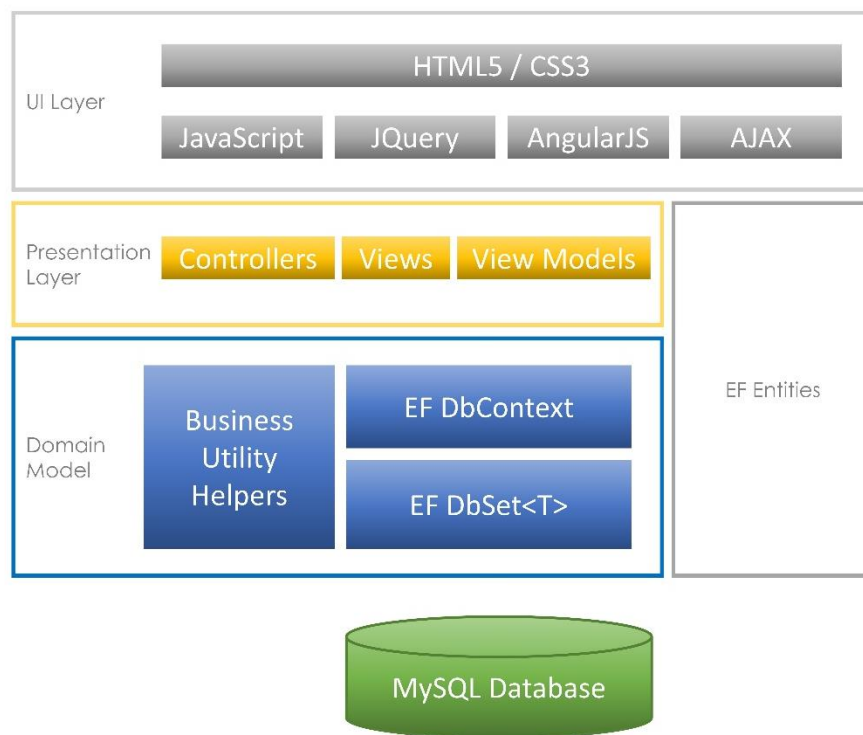


FIGURE 2. 1.1 CMACS ARCHITECTURE

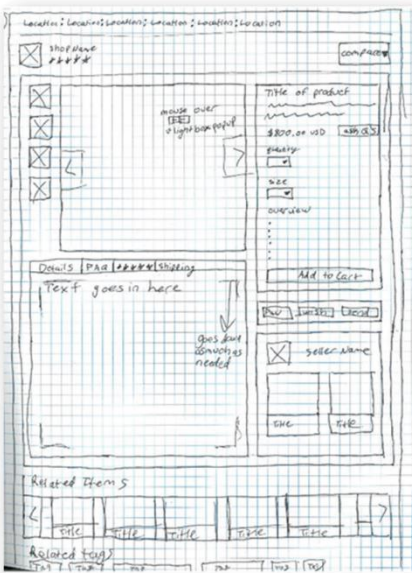
The process segregates the architecture into three parts.

1. **Model** – Defines the data structure which is also the database part of the cloud application. The model defines what data the SaaS application contains. If the state of this data changes, then the model will usually notify the view and sometimes the controller (if different logic is needed to update the view). MySQL is an open-source relational database management system and serves as the primary database for CMaCS. MySQL is widely used for mid-large scale complex web applications. The model data links the application via classes and objects. The model instances are handled by the Object Relational Mapping (ORM) system. ORM is a programming technique for converting data between incompatible type systems in object-oriented programming languages and converting them into MVC. ORM is a faster and easier way to update the database. Entity Framework (EF 6) serves as the primary ORM in CMaCS.
2. **View** – Defines the front-end of CMaCS and the top layer of MVC architecture, View is the layer the customers see and interact. It is written using HTML5 and CSS3, which are the latest tools for developing platform-independent cloud applications. HTML is an independent browser language used for structuring and presenting content on the World Wide Web. CSS is a design language used to style the HTML code. The system will be using Twitters Bootstrap framework as a quick means for styling the CMaCS on multiple devices. By making the application responsive, it makes the platform independent, which means there are minimal design changes between devices. JavaScript is a common coding language, which will be used for interactivity and function when navigating through the application. CMaCS also uses front-end frameworks such as JQuery and AngularJS to define the user interface in the MVC structure. AngularJS will be used to display widgets for the dashboards, which will help analyze customer information. JQuery will be used to have the model interact with the elements on the web page.
3. **Controller** – Contains control/business logic. The controller contains the logic that updates the model and view in response to the input from users of CMaCS. Controllers process incoming information and interactions, which the user manipulates in the view, and the controller executes the appropriate application logic. The “Backend” of the application, which in this case is ASP.NET, is written in C#. C# is a programming language that is simple and modern used for an object-oriented system. The controller communicates with the model layer using Language-Integrated Query (LINQ) to access data securely. LINQ with C# provides powerful querying to grab the data from the data source. The LINQ framework works with a consistent model for data across various kinds of data sources and formats.

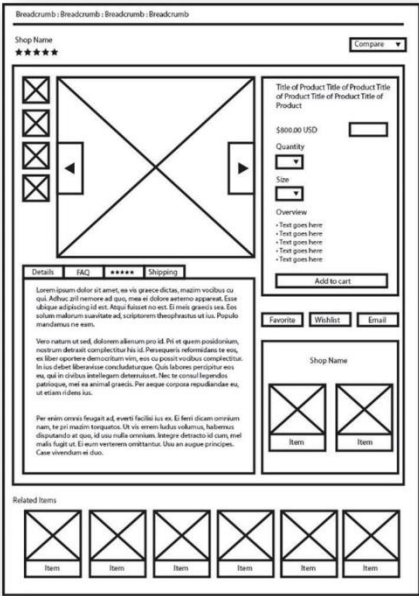
2.2 User Interface

The user experience is a crucial element in the design of CMAACS. This design takes place in three stages:

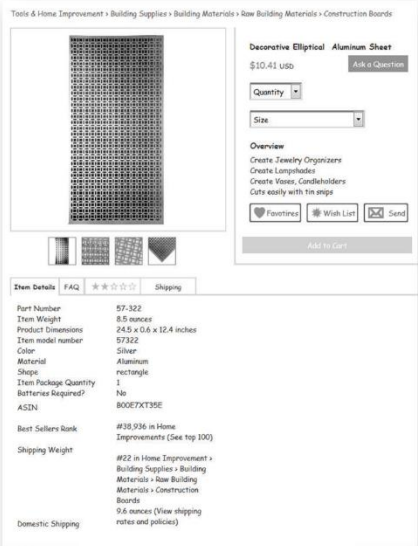
1. Sketches (see figure 2.2.1a) are a way to understand how basic concepts and ideas will take shape in the user interface. Ideas are hashed out quickly between designer and client, so the details in between can be thought about based on the user's interactions. Thinking about the user experience will help to visualize the screen-to-screen architecture in a clear and cohesive manner. The sketches help the team come to a mutual understanding on rough design choices and move forward together.
2. Wireframes (see figure 2.2.1b) are low-fidelity documents that are used for quick communication to refine the concept of how the site will function. This medium defines the main group of content, the structure of information, descriptions of interactions and basic visualization. If the sketches are thorough, the easier it will be to have detailed wireframes and more time will be spent on refining the concept in a clear visual manner. Wireframes allow the designer to get a sense of hierarchy and content placement on the page related to other elements for strong visual treatment. Usually, items at the top are perceived as most important. White space is created around the element placement because it is an important part of your layout, which helps reduce noise on crowded pages, and increase readability throughout the site.
3. Prototype (see figure 2.2.1c) are mid to high-level fidelity documents that are interactive and responsive. Prototypes let users experience content and interactions with the interface. They are used to test the main interactions in a way similar to the final product. The clients can go through a basic walkthrough of main pages to see what the site will look like on all devices. Designers can see if there are any issues with the design that might inhibit the client from being able to understand the interface. Creating continuity throughout a design makes the interface pages' work together and helps the clients learn the interface quicker.
4. A mockup (see figure 2.1.1d) is a high-level fidelity static design representation of the final product. Visual decisions about color schemes, typography, and visual style may be implemented to give the client the graphical details for the site's aesthetics. The visual design enhances the application by engaging users and helping to build trust with the brand. Color schemes are used to create depth, add emphasis, and help organize information by drawing the user's eye to certain areas on the screen. The user can understand basic interactions in the interface quicker when their eye is drawn to an area of emphasis. The elements on the page will have a sense of unity because the visual aspects of the design with a link with the hierarchy of the page. The CMAACS mockup is a visual design draft of the application, which is used to gather feedback and used to get stakeholders approval. Figure 2.2.2 depicts a completed mockup screenshot.



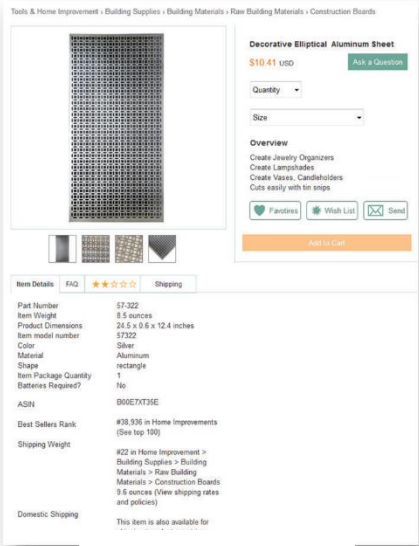
(A) SKETCHES FOR CMACS



(B) WIREFRAME FOR CMACS



(C) PROTOTYPE FOR CMACS



(D) MOCKUP FOR CMACS

FIGURE 2. 2.1 USER INTERFACE DEVELOPMENT PROCESS

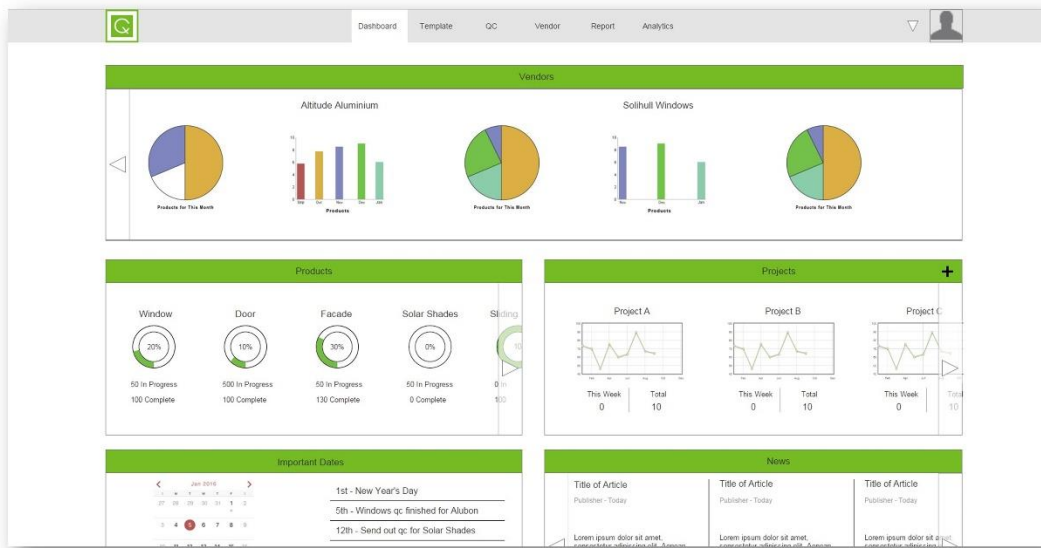


FIGURE 2. 2.2 CMACS PROTOTYPE

2.3 Security

Security is fundamentally about protecting assets. Assets may be tangible items, such as a Web page or customer database or any data on the cloud platform. CMaCS mantra is that security is a path, not a destination. CMaCS developers follow secure coding techniques to develop secure, robust and hack-resilient solutions. The design and development are supported at every level by a secure application, host, and network and on the servers where CMaCS is developed, deployed and distributed (see figure 2.3.1).

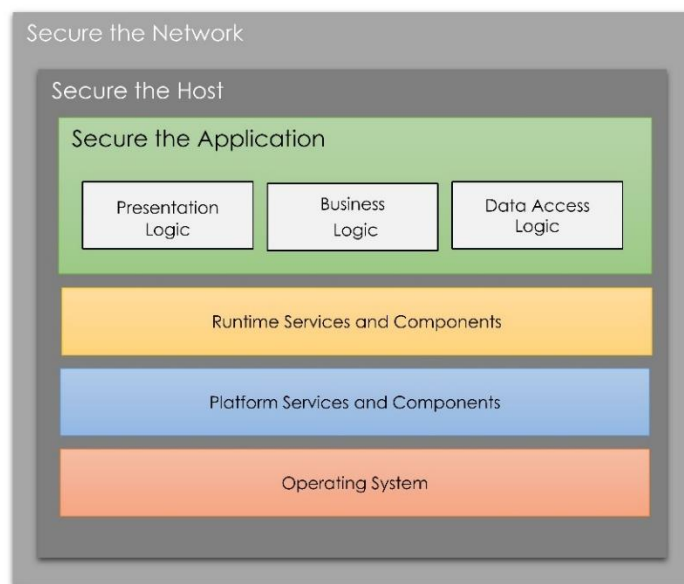


FIGURE 2. 3.1 CMACS SECURITY ISSUE

2.3.1 Application Security

Resilience of CMaCS is evaluated for potential application vulnerabilities, and security measures are taken at every CMaCS category:

1. **Input Validation** – It protects the business information and the input/output of information in the system. This system protects data by attacking any intrusion that is not authorized by the system. Data filters and scrubs are enabled to create a more robust protection against all forms of data input. The filters can reject inputs before additional processing if the data fails to meet the requirements of the filter. These filters can be of various types such as, required attribute filters that specify the value is needed, pattern filters that specify the value to be of a certain input pattern, and type filters that specify the value should be of a certain data type. For example, when inputting information into an address section, the zip code input only allows for five number inputs. Often on sites the required validation filters contain an asterisk (*) in red to indicate that the section needs a value.
2. **Authentication** – Once the data passes through the login filters, the user can gain access to an entry point of the site. Authentication is the secured way of validating a user by the means of a username and password. This information is encrypted on the client side before reaching the web servers so that no outsiders can get your information. If the information the user inputs is not correct, the system will prevent the user access. A user's privileges and preferences for their account depend on the user's permissions, which are stored on a secured authentication server.
3. **Authorization** – After passes through authentication, CMaCS authorizes the user by creating a session and providing access controls for resources and operations. The user's permissions for various actions such as viewing, adding, editing, and deleting data are defined in the authorization sessions.
4. **Cryptography** – All data transfers are enforced using web cryptography APIs recommended by w3.org to maintain confidentiality and integrity of data. The data that is transferred is transformed so that no unauthorized personnel can read the information. This process maintains confidential information and the integrity of the data. The recipient of the information can see who sent the information to authenticate that is from a reliable source and not someone trying to access their system.
5. **Auditing and Logging** –All sessions are recorded and audited for security related events. This process provides documentary evidence of a sequence of activities that have affected a specific operation, procedure, or event. Auditing can process who did something and possibly why they did it in the system, which has legal requirements. This process verifies the logs to retrieve information about the state of the system and answer questions about how the system got to a particular state. Logging is what happened when someone did something in the system; if there is information being recorded by the system, it is being logged. Logs cannot be overwritten or tampered with by users, which provides with a system with high integrity and traceable information. Also, to the above categories, parameter manipulation, and exception handling events make sure data in the session and cookies cannot be breached.

2.3.2 Host Security

Host Based Security Systems (HBSS) are for a software application to monitor, detect, and protect against intrusions from the host system. The HBSS ensures that every user's machine is safe and secure for the protection of data transfer. CMA^{CS} is a cloud computing SaaS application, which will be deployed on Amazon AWS Europe servers. AWS is a public and secure cloud service provider, which is governed by local government laws. There are multiple server locations in Europe, which will provide fast access to the information based on the number of customers in the European locations. Also, being an AWS customer:

1. CMA^{CS} inherits all the best practices, policies, architecture and operational processes build for the most security sensitive environments. The network works fast with private fiber-optic networks, which allow the application to be deployed with few interruptions from the network.
2. CMA^{CS} has access to hundreds of tools and features to help us meet host-level security. The security for the system is robust and able to adapt to future changes based on the expansion of data that is input into the system through an encrypted system. The space provided will increase in areas as it is needed. The system is backed up regularly and can be shared between different server locations in case the server crashes. Identity and access controls allow for users to have access to information that is pertinent to their work.
3. CMA^{CS} environments are continuously audited, with certifications from accreditation bodies across geographies and verticals. Auditing security configuration gives authorized personnel the opportunity to remove unwanted information and check the user permissions. This process will ensure that the system is up to date, and there are no breaches in the system by unwanted personnel.
4. In addition to the service provider, CMA^{CS} will be deployed on a web server such as Internet Information Server (IIS), which are controlled by domain security protocols and all the ports are monitored by automated tools. IIS is an integrated part of Windows, which the clients and customers use frequently, and provides support for data communication tools on the Internet, such as HTTP, HTTPS, FTP, FTPS, SMTP, and NNTP.

2.3.3 Network Security

Network security takes preventative measure to ensure the underlying network infrastructure is protected from intrusions. Basic computer security measure includes routers, firewalls, and switches to keep out intruders. This feature will transpire at the customer's end at the time of accessing CMA^{CS}. The information in CMA^{CS} can be retrieved on any device and browser. When customers access the information on a device that is not from the client, the device may not be secure, which is why the security is located at the access point of the site. An added layer of security on the customer end is the authentication of the user using an encrypted password.

To make sure only a secured connection exists, CMaCS deploys a Secure Sockets Layer (SSL) certificate and Green Certificates (Renewable Energy Certificates) on the host. Hence, only HTTPS connections are accepted. This layer of prevention establishes an encrypted link between the web server and the supported browsers. All data and documents that are transferred through the system will remain private and integral. SSL is an industry standard, which is used by millions of websites, to protect online transactions with customers.

2.4 CMaCS Modules

CMaCS is Brocken into seven main modules (figure 2.4.1). These modules will be developed during the three releases. The first release products are currently incorporated in this document.

Release 1 – Global Services, Document Control, Manufacturing

Release 2 – 3D BIM Viewer, Installation, Advanced Analytics

Release 3- e-Commerce

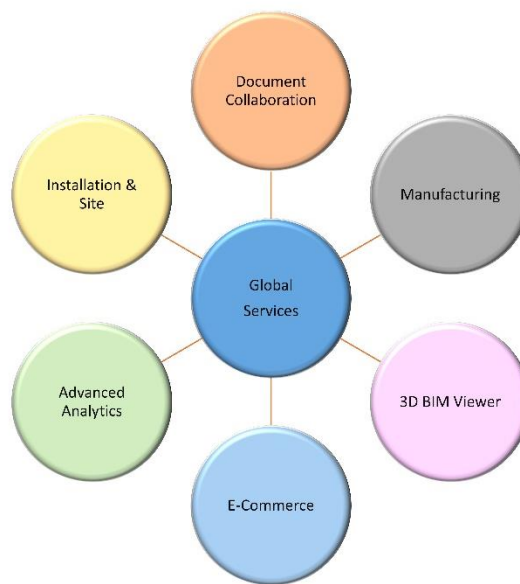


FIGURE 2. 4.1 CMACS MODULES

2.5 Global Services

All the utility modules that define the core of the system make up the global services (GS). GS is modular and shared all throughout the system. The service has various sub-modules such as Project, User, Customer, Dashboard, Access Control, Notifications, Tasks etcetera. The customer sub-module provides functionalities such as adding, delete customer accounts, adding new users under customers, storing communication logs with customers, adding ratings for the customers in general and/or rating the customer processes.

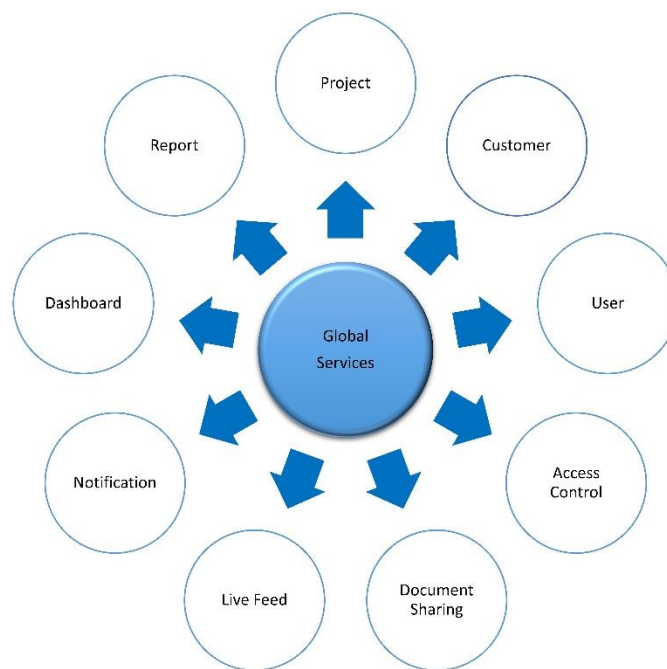


FIGURE 2. 5.1 GLOBAL SERVICES MODULE COMPONENTS

2.5.1 Access Control

The Access Control sub-module provides the ability to add users while specifying their specific access levels for different projects, thereby defining what a user can and cannot do in CMaCS.

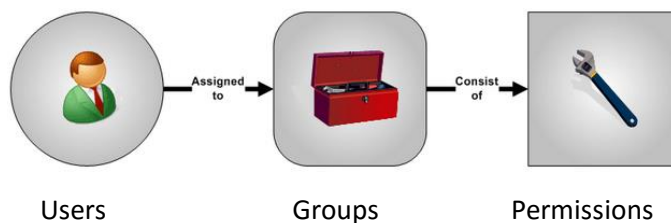
Access Control is broken down into two levels of control

- I. System Level
- II. Project Level

System Level access defines what modules the user can access and this level defines the dashboards the user can see. Various System Levels include:

- Basic Users
- Pro Users
- Key Users (Schüco Employees)

Project Level access will be divided into groups and permissions.



- Permission is an action a user can perform, such as viewing, adding, editing, and deleting data. *Special permissions* reflect global functionality, such as running imports and sharing reports. These permissions will be set up on the site and categorized according to functional area.
- *Groups* consist of one or more collections of permissions. Pro Users can create groups to mirror departments or divisions and assign users to groups in meaningful ways.
- A *user* refers to an individual with a CMaCS account. By adding a user to one or more groups consisting of permissions, the Pro User can grant that user actions that mirror his or her responsibilities.

2.5.2 Project

The Project sub-module provides functionalities such as adding and deleting a project, adding users to a project, and running reports on project performance. Using Project, Super Users will be able to assess their projects at all times.

2.5.3 Customer Management

Customer Admins are created by Key Users either by e-mail invite or manual entry. Users designated as Customer Admins / Pro Admins will in turn have the ability to add users into the system. Key Users and can also set rate and review customers – this information is only available to Key Users.

2.5.4 Users

This sub-module contains the user's personal information, access control information, history of logs, personal settings, etc.

Users are divided into 3 categories. In order to identify the different parameters required for each functionality, the following sections are described based on features used by each type of user

- Basic Users
- Pro Users
- Key Users

Basic User:

Anyone can register with CMaCS and become a Basic Users. A Basic User gets limited access to all the features and will get 2GB storage space on the system. Also the Basic User can upgrade to a Pro User by paying a small fee. Section 3.1 describes all the features a Basic User can utilize.

Pro User:

A Pro user can be added in two different ways, Basic user who upgrades is called an independent Pro User, and an independent Pro User gets access to all the module and all the features and will have 100 GB of storage space. Section 3.2 describes all the features a Pro User can utilize in addition to the Basic User features.

Alternatively, Customers can be added or invited to the system by Key Users (see below), Once this customer subscribes to the system (monthly fee) and maintains an active Pro account the primary contacts at this customer becomes a Pro Admins who can add more Pro Users to their account. Pro

Users added this way will have all the features of the system and will share 1TB of space between all the Pro Users in this account.

Key User:

Key Users are Schüco users (with valid Schüco email ids) responsible for adding customers, creating and pushing templates, tracking and analyzing customer progress and generating reports. Section 3.3 describes all the features a Key User can perform.

A Key user can only be added by the CMaCS Administration/Development team.

2.5.5 Dashboards

Dashboards will have standard viewing option as well as unique layouts depending on the activated sub-modules. The dashboard page will display a list of projects, each of which will feature a set of widgets which report information about the project's progress. The access control level will determine which set of widgets the user will be able to view.

For example: The Quality Control (QC) submodule's dashboard provides the user with information regarding how the customer is doing with the QC of windows and how efficient they are with them. Users with access to this information will be able to view the data in a way that allows for them to understand what is happening in the process and to determine if there is an area that can be improved.

2.5.6 Reports

Pro Users will be able to generate, view, download, save and share multiple reports—such as status of the project, health of the project with respect to the schedule, capacity plans, user/project tasks information, etcetera. Users will also be able to save these reports into multiple formats including pdf and excel.

2.5.7 Notifications

Notifications can be email based or push notifications. For any updates related to the user, whether having to do with tasks for the user or the projects s/he's involved with, there will be some push notifications on the banner. There will also be an entire page that lists out all the notifications s/he has received.

2.6 Document Control

This module provides users with all the necessary functionalities to share data, such as drawings, reports, documents and BIM Information. Users can upload/download various file formats with functionality such as sharing between all users or users of a project provided in this module.

The module easily manages, accesses and shares large quantities of documents, such as CAD drawings, BIM files, 3D visualizations, specifications, contracts, daily logs, and reports. The entire history of changes is logged and can be accessed as needed. With comprehensive document management, users can ensure consistent processes, keeping tasks on schedule, and gaining more control of their projects.

Users can effectively manage site progress by easily creating a photograph library. The integrated viewing feature makes it simple to distribute drawings to the project team and review documents with redline and mark-up tools. All these features in the platform enable users to get access to all related data in one location while also making it easy for users to get instantaneous updates and tracking of all activities of a document with holistic view at any time.

2.6.1 Basic Viewer

Viewer is the place holder:

- To centrally manage all documents/assets in the cloud
- To provide a file explorer functionality that enables user to organize all documents in a folder structure
- To create folders and sub folders
- To select a folder and upload files to that folder.
- To download single or multiple files
- To open the document in a web viewer with support for multiple file formats (View Mode)
 1. 2D CAD files (dwg, dxf)
 2. Office files (Word, excel, PowerPoint)
 3. Image formats (JPEG, PNG, TIFF)
 4. PDFs

2.6.2 Versioning

Platform will have versioning support so user can track different revisions of the document. This helps keep the entire team up to date with the latest versions of the documents and easy access to the history at all times.

2.6.3 Sharing

By default, files and folders will be private to the user creating them. The platform will provide users with the ability to share the documents and will always provide a Log of sharing information with other users (registered and non-registered).

In addition, the platform provides special functionalities such as:

- The ability to set validity of links
- The ability to set password for sharing

2.6.4 Markups/Annotations

High fidelity mark-up and commenting functionality for collaboration among team members will lead to quick turnarounds and a reduction in cost and time.

Features include:

- Adding notes (Sticky Note)
- Measurements (different UOM's)
- Red line
 1. Cloud
 2. Rectangle
 3. Text box
 4. Line
 5. Arrow
 6. Callout
 7. Highlight
- Hyperlink to another document/sheet
- Color option & font for all the above
- Search & retrieve documents based on annotations
- Search for annotation within the document
- History of all modifications
- Navigation (Pan/zoom, pervious/next page)
- Export annotation to excel
- Download / Download with annotations
- Show public markups (Checkbox)

2.6.5 Tasks

Annotations can be embedded in tasks to support custom workflows such as RFIs and Approval processes.

Each markup can be linked to tasks:

- Hovering over the markup will show a menu to setup link to tasks and comments
- You can create new task or link to existing tasks
- These tasks are generic objects that can be specialized to represent RFI etc. (support custom key-value object)
- By default, markups will be private (only user who created it and then shared with can see it as part of the task)
- User can mark an annotation as public and it will appear on the viewer when the "Show public markups" is checked in toolbar.
- The tasks related to the current document are listed on the left panel (provide filtering ability)
- Users will also have a threaded conversation style commenting system on each markup
- Sharing will be done through tasks, not directly on the markups.

The tasks will be supported by a workflow engine to determine the states these tasks go through, such as: Open, IN Review, Approved.

(In Phase 1, we will have predefined states and in phase 2, clients can determine workflows for their org/project.)

2.7 Manufacturing

This module will provide all the functionalities required by any and all Fabricators when releasing a Master Work Order: inventory, equipment list, a list of resources and their availability, and QC templates. All of these will help the Customer plan better, prepare better, and perform better.



Figure 2. 6.1 Manufacturing Module Components

Note: All the below submodules will come with a sample template to get the user started with the process. Templates for fabrication and assembly work order, fabrication and assembly QC, part and product time estimates

2.7.1 Inventory and PO Management

This sub-module will help Pro Users create an electronic Purchase Order for raw stock extrusions, thermal breaks, gaskets, sealants, etc. and send it to their suppliers (such as Schüco, Connor, or any other). A PO can be created using the system, or it can be imported from Excel. This PO will be automatically linked to the Schedule to help the user track all updates. This PO will also update the Inventory.

Inventory can be manually updated using the system, or it can be updated from the PO. Having an updated Inventory will be the key to creating fabrication work orders and getting an accurate estimate of the project at hand.

Suppliers who receive this PO can either export this PO to their ERP system or process it from CMaCS itself, which in turn updates the customer's Schedule and inventory.

2.7.2 Fabrication

Allows users to:

- Access raw stock list from Inventory
- Create/update Machine list for optimized cut-lists
- Create Fab Work orders
- Generate QR codes to track the life cycle of the part through fabrication and Fab Quality control process
- Access part drawings as and when the user needs them
- Create Sub-Assembly WO's for parts that need to be assembled as a small group before they go to the assembly line
- Receive automated notifications for production delay caused by Inventory issues/engineering issues

2.7.3 Assembly

Allows users to:

- Create Assembly work orders
- Generate QR codes to track the life cycle of the product/unit all the way from shop to field (assembly, bunking, shipping and installation)
- Receive automated notifications for production delays caused by Assembly WO (could be lack of available parts, sealants, etc.)

2.7.4 Quality Control

Allows users to:

- Create QC templates for various parts, SAs and products/units
- Assign them to individual components for tracking the QC
- Create QC reports
- Set up alerts for immediate attention
- Receive automated notifications for production delay caused by QC issues

2.8 Schedule / Time Management

- This module lets the user enter the resource list and their availability.
- Pro Users can generate automated schedules from work orders which in turn links the schedule to Master Work order to track the progress.
- In addition, Users can generate a manual schedule and link it to work orders.

3 Functional Requirements

This following section includes the requirements that specify all the fundamental actions of the software system. These requirements explain the features of the system in detail along with all its dependencies, business rules, pre and post conditions etcetera.

In order to identify the different parameters required for each functionality, the following sections are described based on features used by each type of user:

- Basic Users
- Pro Users
- Key Users

The following tables provide an overview of each feature organized by User and Status.

Table 3A organizes each feature by User Responsibility.

Table 3B identifies the user responsibility for each feature organized by Modules.

Table 3C shows the current status of each feature within the Modules.

Features Grouped by Role – Table 3A			
Description	Basic	Pro	Key
Basic User Registration	✓		
User Login	✓	✓	✓
Reset Password	✓	✓	✓
Reset Username	✓	✓	✓
User Logout	✓	✓	✓
Dashboard (changes based on user type)	✓	✓	✓
Create a Project	✓	✓	
Editing a Project	✓	✓	
Project Index	✓	✓	
Setting Project Image	✓	✓	
Project Information Page	✓	✓	
Deleting a Project	✓	✓	
Create/Set Reminders	✓	✓	✓
2D Viewer (pdfs, office)	✓	✓	✓
File System Functionalities	✓	✓	✓
Sharing a Document (public links only)	✓	✓	✓
Set Favorites (only files)	✓	✓	✓
Search Files and Folders	✓	✓	✓
Navigation Features	✓	✓	✓
Notifications	✓	✓	✓
Basic Support	✓		
Upgrade to Pro User	✓		
Pro User Registration		✓	
Add Pro Users (have to be pro admin)		✓	
Customer Logos		✓	
Multiple Languages		✓	
Creating Project Groups		✓	
Create/Update/Assign Permissions to Project Groups		✓	
Adding Members to Project Groups		✓	
Cloning Projects Groups		✓	
Manage Project Groups		✓	
Creating and Assigning Tasks		✓	
Notifications/Reminders for Tasks		✓	
Manage Tasks (link to documents and images)		✓	
Task History Log		✓	
Project Archive		✓	
2D Viewer (other formats to pdfs)		✓	✓
Private Folders		✓	
Zip/Unzip Folder		✓	

Features Grouped by Role – Table 3A			
Description	Basic	Pro	Key
View Pictures Folder		✓	
Create Annotations/Markups		✓	
Download Markups		✓	
Share Markups (as Link/Excel)		✓	
Comment On Markups		✓	
Manage Sharing Options (password, link validity, annotate rights)		✓	
Linking Markups to Tasks		✓	
Adding Stake Holder & Contacts		✓	
Update Stake Holder		✓	
Delete Stake Holder		✓	
Project Scope		✓	
Building Structure (creation)		✓	
SchüCal BOM Import (web service)		✓	
Create QC Template		✓	
Updating QC Template		✓	
Cloning/Copy QC Template		✓	
Assigning QC Template as QC Sheet		✓	
Sign Off QC Sheets		✓	
QC Reports		✓	
Create Equipment List		✓	
Update Equipment List		✓	
Create Resource List for Schedule		✓	
Update Resource List		✓	
Shop Capacity Calculator		✓	
Create Baseline Schedule		✓	
Update Schedule (dynamic schedule)		✓	
Material/Element Schedule		✓	
Available to Promise (ATP check)		✓	✓
Project Reports		✓	
Export Reports to Multiple Formats		✓	
Notification Settings		✓	
Pro Support		✓	
Training Videos		✓	
SchüCal Interface		✓	✓
ERP Interface		✓	✓

Features Grouped By Role – Table 3A			
Description	Basic	Pro	Key
Adding a Customer			✓
Add/Assign Pro Admins			✓
Editing a Customer			✓
Customer Reviews			✓
Customer Index (search/sort/filters)			✓
Deleting a Customer			✓
Customize Customer Template Packages			✓
Customer Reports			✓

Features Grouped by Module – Table 3B			
	Basic	Pro	Key
Access			
Basic User Registration	✓		
Upgrade to Pro User	✓		
Pro User Registration		✓	
User Login	✓	✓	✓
Reset Password	✓	✓	✓
Reset Username	✓	✓	✓
Add Pro Users (have to be pro admin)		✓	
Add/Assign Pro Admins			✓
User logout	✓	✓	✓
Customization			
Customer Logos		✓	
Multiple Languages		✓	
Document Control			
2D Viewer (pdfs, office)	✓	✓	✓
2D Viewer (other formats to pdfs)		✓	✓
File System Functionalities	✓	✓	✓
Sharing a Document (public links only)	✓	✓	✓
Set Favorites (only files)	✓	✓	✓
Search Files and Folders	✓	✓	✓
Navigation Features	✓	✓	✓
Private Folders		✓	
Zip/unzip Folder		✓	
View Pictures Folder		✓	
Create Annotations/Markups		✓	
Download Markups		✓	
Share Markups (as link/excel)		✓	
Comment on Markups		✓	
Manage Sharing Options (password, link validity, annotate rights)		✓	
Linking Markups to Tasks		✓	
Interface Management			
SchüCal Interface		✓	✓
ERP Interface		✓	✓
Project Management			
Create a Project	✓	✓	
Editing a Project	✓	✓	
Project Index	✓	✓	
Setting Project Image	✓	✓	
Project Information Page	✓	✓	
Creating Project Groups		✓	

Features Grouped by Module – Table 3B			
	Basic	Pro	Key
Create/Update/Assign Permissions to Project Groups		✓	
Adding Members to Project Groups		✓	
Cloning Projects Groups		✓	
Manage Project Groups		✓	
Deleting a Project	✓	✓	
Project Archive		✓	
Project Scope		✓	
Building Structure (creation)		✓	
SchüCal BOM Import (web service)		✓	
Stake Holder Management (Architects, GC, Investors)			
Adding Stake Holder & Contacts		✓	
Update Stake Holder		✓	
Delete Stake Holder		✓	
Manufacturing (Shop Management)			
Create Equipment List		✓	
Update Equipment List		✓	
Create Resource List for Schedule		✓	
Update Resource List		✓	
Shop Capacity Calculator		✓	
Schedule			
Create Baseline Schedule		✓	
Update Schedule (dynamic schedule)		✓	
Material/Element Schedule		✓	
Available to Promise (ATP check)		✓	
Quality Control			
Create QC Template		✓	
Updating QC Template		✓	
Cloning/Copy QC Template		✓	
Assigning QC Template as QC Sheet		✓	
Sign off QC Sheets		✓	
Dashboard & Reports			
Dashboard (changes based on user type)	✓	✓	✓
QC Reports		✓	
Project Reports		✓	
Export Reports to Multiple Formats		✓	
Customer Reports			✓
Tasks & Notifications			
Notifications	✓	✓	✓
Create/Set Reminders	✓	✓	✓
Features Grouped by Module – Table 3B			

	Basic	Pro	Key
Creating and Assigning Tasks		✓	
Notifications/Reminders for Tasks		✓	
Manage Tasks (link to documents and images)		✓	
Notification Settings		✓	
Task History Log		✓	
Customer Management			
Adding a Customer			✓
Editing a Customer			✓
Customer Reviews			✓
Customer Index (search/sort/filters)			✓
Deleting a Customer			✓
Customize Customer template packages			✓
Support			
Basic Support	✓		
Pro Support		✓	
Training Videos		✓	

Status Grouped by Module – Table 3C

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Access						
Basic User Registration	-	-	-	-	-	-
Upgrade to Pro User	-	-	-	-	-	-
Pro User Registration	1	1	1	1	1	1
User Login	2	2	2	2	2	2
Reset Password	2	2	2	2	2	2
Reset Username	2	2	2	2	2	2
Add Pro Users (have to be pro admin)	1	1	1	1	1	1
Add/Assign Pro Admins	-	-	-	-	-	-
User Logout	2	2	2	2	2	2

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Customization						
Customer Logos	-	-	-	-	-	-
Multiple Languages	-	-	-	-	-	-

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Document Management						
2D Viewer (pdfs, office files)	1	2	1	1	1	1
2D Viewer (other formats to pdfs)	1	-	-	-	-	-
File System Functionalities	1	2	1	1	1	1
Sharing a Document (public links only)	1	1	1	0	0	0
Set Favorites (only files)	-	-	-	-	-	-
Search Files and Folders	1	1	1	1	1	1
Navigation Features	0	0	0	0	0	0
Private Folders	-	-	-	-	-	-
Zip/unzip Folder	-	-	-	-	-	-
View Pictures Folder	-	-	-	-	-	-
Create Annotations/Markups	-	-	-	-	-	-
Download Markups	-	-	-	-	-	-
Share Markups (as link/excel)	-	-	-	-	-	-
Comment on Markups	-	-	-	-	-	-
Manage Sharing Options (password, link validity, annotate)	-	-	-	-	-	-
Linking Markups to Tasks	-	-	-	-	-	-

Legend:

- Did not exist for DPI; New for CMaCS
- 0 Was in Progress for DPI; To be reviewed for CMaCS
- 1 Released for DPI; Requires modifications for CMaCS
- 2 Released for DPI; Requires minor modifications for CMaCS

Status Grouped by Module – Table 3C

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Interface Management						
SchüCal Interface	-	-	-	-	-	-
ERP Interface	-	-	-	-	-	-

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Project Management						
Create a Project	2	2	2	2	2	2
Editing a Project	2	2	2	2	2	2
Project Index	2	2	2	2	2	2
Setting Project Image	2	2	2	2	2	2
Project Information Page	1	1	1	1	1	1
Creating Project Groups	2	2	1	0	0	0
Create/Update/Assign Permissions to Project Groups	2	2	0	-	-	-
Adding Members to Project Groups	2	2	2	1	1	1
Cloning Projects Groups	2	2	1	-	-	1
Manage Project Groups	1	1	-	-	-	-
Deleting a Project	2	2	2	2	2	2
Project Archive	-	-	-	-	-	-
Project Scope	-	-	-	-	-	-
Building Structure (creation)	-	-	-	-	-	-
SchüCal BOM Import (web service)	-	-	-	-	-	-

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Stake Holder Management (Architects, GC, Investors)						
Adding Stake Holder & Contacts	-	-	-	-	-	-
Update Stake Holder	-	-	-	-	-	-
Delete Stake Holder	-	-	-	-	-	-

Legend:

- Did not exist for DPI; New for CMaCS
- 0 Was in Progress for DPI; To be reviewed for CMaCS
- 1 Released for DPI; Requires modifications for CMaCS
- 2 Released for DPI; Requires minor modifications for CMaCS

Status Grouped by Module – Table 3C

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Manufacturing (Shop Management)						
Create Equipment List	-	-	-	-	-	-
Update Equipment List	-	-	-	-	-	-
Create Resource List for Schedule	-	-	-	-	-	-
Update Resource List	-	-	-	-	-	-
Shop Capacity Calculator	-	-	-	-	-	-

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Schedule						
Create Baseline Schedule	-	-	-	-	-	-
Update Schedule (Dynamic Schedule)	-	-	-	-	-	-
Material/Element Schedule	-	-	-	-	-	-
Available to Promise (ATP check)	-	-	-	-	-	-

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Quality Control						
Create QC Template	2	2	2	-	-	-
Updating QC Template	2	2	2	-	-	-
Cloning/Copy QC Template	2	2	2	2	2	2
Assigning QC Template as QC Sheet	2	2	2	2	2	2
Sign off QC Sheets	2	2	2	2	2	2

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Dashboard & Reports						
Dashboard (changes based on user type)	1	1	1	1	1	1
QC Reports	1	1	1	1	1	1
Project Reports	1	1	1	1	1	1
Export Reports to Multiple Formats	-	-	-	-	-	-
Customer Reports	1	1	1	1	1	1

Legend:

- Did not exist for DPI; New for CMaCS
- 0 Was in Progress for DPI; To be reviewed for CMaCS
- 1 Released for DPI; Requires modifications for CMaCS
- 2 Released for DPI; Requires minor modifications for CMaCS

Status Grouped by Module – Table 3C

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Tasks & Notifications						
Notifications	0	0	0	0	0	0
Create/Set Reminders	-	-	-	-	-	-
Creating and Assigning Tasks	2	2	2	1	1	1
Notifications/Reminders for Tasks	*	2	2	1	0	-
Manage Tasks (link to documents and images)	-	-	-	-	-	-
Notification Settings	-	-	-	-	-	-
Task History Log	-	-	-	-	-	-

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Customer Management						
Adding a Customer	1	1	1	1	1	1
Editing a Customer	1	1	1	1	1	1
Customer Reviews	1	1	1	1	1	1
Customer Index (search/sort/filters)	1	1	1	1	1	1
Deleting a Customer	-	-	-	-	-	-
Customize Customer Template	-	-	-	-	-	-

Description	Prototype	Algorithm	UI/UX	Developed	Tested	Released
Support						
Basic Support	-	-	-	-	-	-
Pro Support	-	-	-	-	-	-
Training Videos	-	-	-	-	-	-

Legend:

- Did not exist for DPI; New for CMaCS
- 0 Was in Progress for DPI; To be reviewed for CMaCS
- 1 Released for DPI; Requires modifications for CMaCS
- 2 Released for DPI; Requires minor modifications for CMaCS

3.1 Basic User Features

3.1.1 Basic User Registration

ID	FR1
Title	Basic User Registration
Description	A new user should be able to register themselves with the system.
Preconditions	Duplicate email Ids cannot exist at any given point.
Basic Steps	Simple form with information such as first name, last name, company, title, address, email, phone number etcetera is required. Ask for a secure password. Regular password rules apply.
Exceptions	N. A.
Business validations/Rules	Basic access to Global services that includes Projects, Notifications, Tasks & Dashboards and access to basic document control.
Post conditions	<ul style="list-style-type: none"> • Users added this way by default will be basic users and will have only 2GB of space for storage • They will have access to document module • Preview of all modules.
Dependencies	N. A.
Module	Global Services

3.1.2 User login

ID	FR2
Title	User Login
Description	The user logs in and the initial dashboard screen is displayed.
Preconditions	The user is already registered in the system.
Basic Steps	Entered Registered email and password.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	The widgets on the dashboard are shown as per the access control rights of the user.
Dependencies	N. A.
Module	Global Services

3.1.3 Reset Password

ID	FR3
Title	Reset password
Description	If the user forgets his password, it can be reset.
Preconditions	The user is unable to login to the system
Basic Steps	<ul style="list-style-type: none"> On submitting the registered email, a link is sent to the user to that email which will allow the user to reset the password and change it. For better security, 2 step authentication can be enabled where a OTP (one-time password) is sent to the phone number registered before resetting the password.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.4 Reset Username

ID	FR4
Title	Reset username
Description	If the user forgets his username, it can be reset.
Preconditions	The user is unable to login to the system
Basic Steps	<ul style="list-style-type: none">Set of questions that were answered during the registration process will be asked to validate the user and the username will be emailed to an alternative email on record or using OTP.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.5 User Logout

ID	FR5
Title	User Log Out
Description	After the user logs out, the system reverts back to the login page.
Preconditions	The user is already logged into the system.
Basic Steps	After logging out, the home page is displayed.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.6 Dashboard

ID	FR6
Title	Dashboard
Description	The dashboard will contain all the widgets corresponding to the user. The user will have the ability to minimize these widgets and these setting will be saved for the user.
Preconditions	The user is already logged into the system.
Basic Steps	<p>It contains the following</p> <ul style="list-style-type: none">• The list of projects in which the user is currently involved.• Open Items left in the project.• Gist of reminders set by the user.• Gist of completed/Incomplete tasks in the project (Pro user)• Any other performance metric showing the project's alignment with the schedule (Pro user)
Exceptions	N. A.
Business validations/Rules	Any changes made to the widget are saved for that particular user. The widgets on the dashboard are shown as per the access control rights of the user.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.7 Create a Project

ID	FR7
Title	Create a Project
Description	Ability to add a project with detailed project information.
Preconditions	The user must be logged in.
Basic Steps	<p>Project creation takes in the following information:</p> <ul style="list-style-type: none"> • Project ID, Project Name • Project Start and End dates • Currency • Project Architect, Owner, Address, Manager, etc. • Contract Details
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	On creation the project is marked as an active project and a project Id needs to be generated.
Dependencies	N. A.
Module	Global Services

3.1.8 Editing a Project

ID	FR8
Title	Editing a Project
Description	The information of the project can be edited.
Preconditions	The user has to belong to the project or the user should be the one who created this project
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	On editing a notification should be sent out to all the project members (if applicable) either in the form or an email or push notifications.
Dependencies	N. A.
Module	Global Services

3.1.9 Project Index

ID	FR9
Title	List of Projects
Description	<p>When the user logs in, the list of the projects which are active and in which the user is currently involved are shown.</p> <p>Project can be filtered based on various categories such as type of the system being used, location, project scope etcetera.</p>
Preconditions	The user is already logged into the system.
Basic Steps	If user is not part of any project, then the projects widget will be empty.
Exceptions	N. A.
Business validations/Rules	Any changes made to the widget are saved for that particular user.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.10 Setting Project Image

ID	FR10
Title	Setting Project Image
Description	The user is able to set and change the project image from the project settings menu.
Preconditions	The user should access to that project.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.11 Project Information Page

ID	FR11
Title	Project Info Page
Description	The project information page shows all necessary information about the page such as the people involved in the project, project documents, pending project tasks (pro user) and current status of the project and in addition can show news about project stakeholders, the weather at the project location.
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.12 Deleting a Project

ID	FR12
Title	Deleting a Project
Description	An existing project can be deleted in which case all the existing information is preserved by the project is not shown anywhere in the system.
Preconditions	The user logged in is a Power User or Key User
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	The project information is preserved even though it is not displayed anywhere.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.13 Create/Set Reminders

ID	FR13
Title	Create reminders
Description	User can create reminders to their personal or project calendar which will in turn be linked to notifications.
Preconditions	N. A.
Basic Steps	A corresponding chart is shown in the widget
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.14 2D Viewer

ID	FR14
Title	2D Viewer
Description	Ability to open all pdfs and office documents in a web 2D viewer
Preconditions	User should have access to those files/folders
Basic Steps	Opening a file by default be opened in this viewer which will have all necessary functionalities.
Exceptions	N. A.
Business validations/Rules	Ability to open file in the embedded 2D viewer Extensions Supported: PDF, XLS, XSLX, DOC, DOCX, PPT, PPTX, JPG, PNG, JPEG, TIFF, DWG, DXF
Post conditions	N. A.
Dependencies	N. A.
Module	Document Control

3.1.15 File system functionalities with version support

ID	FR15
Title	File system functionalities with versioning
Description	<p>All basic file system functionalities:</p> <ul style="list-style-type: none"> • Upload/download a file • Copy/move • Create/rename/delete files and folders • Manage files/folders structures • Support for multiple file upload • Dragging and dropping the file for upload • Etcetera
Preconditions	The user should be logged in
Basic Steps	A progress bar showing the file upload is displayed.
Exceptions	If the page is closed or if there is a loss of internet connection, then the file upload will not be completed and the partially uploaded file will be deleted.
Business validations/Rules	<ul style="list-style-type: none"> • Uploading file with same name under a folder will create revisions of the file • Special characters and OS specific string will be restricted • Duplicate names under same folder container are not allowed <p>Downloading a file/files to the local file system</p> <ul style="list-style-type: none"> • With multiple files, a zipped file with the selected files will be downloaded • These will be raw file download
Post conditions	
Dependencies	
Module	Document Control

3.1.16 Sharing a document (public links only)

ID	FR16
Title	Sharing a document
Description	<p>A document can be shared by creating a public link. A public link can be accessed by any one with the link.</p> <p>This link can be emailed/shared with anyone.</p>
Preconditions	The user should have the access rights to share the document
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	The link is valid until the document is deleted or the sharing is opted out. In any of the above scenarios link becomes inactive in the database.
Post conditions	
Dependencies	N. A.
Module	Document Control

3.1.17 Set favorites

ID	FR17
Title	Set favorites
Description	Users can add files to a favorites folder for easy access
Preconditions	N. A.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	Deleting the actual file should delete the favorites link.
Post conditions	
Dependencies	
Module	Document Control

3.1.18 Search files and folders

ID	FR18
Title	Set files and folders
Description	Searching a folder or entire project documents. Filters can be created to search based on filename, file size, created by, last accessed by etcetera.
Preconditions	N. A.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	Look into searching a file for content
Post conditions	N. A.
Dependencies	N. A.
Module	Document Control

3.1.19 Navigation Features

ID	FR19
Title	2D Viewer Navigation
Description	<ul style="list-style-type: none"> • Ability to navigate through the pages in the 2d viewer • Ability to zoom in & out in the viewer • Thumbnail view support for each page of the document
Preconditions	File conversion to PDF should be finished in backend to be able to open them in 2d Viewer
Basic Steps	
Exceptions	N. A.
Business validations/Rules	
Post conditions	
Dependencies	
Module	Document Control

3.1.20 Notifications

ID	FR20
Title	Notifications
Description	Any changes made as a result of the above functionalities, notifications should be sent out accordingly.
Preconditions	N. A.
Basic Steps	<ul style="list-style-type: none">• For any changes emails can be sent out which can be set in the settings.• Push notifications can be sent out.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.21 Basic Support

ID	FR21
Title	Basic Support
Description	Basic support will be videos and email support.
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	Notifications will be showed when support ticket has been opened. User can see the status and log of the ticket until the ticket is closed by the user.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.1.22 Upgrade to Pro

ID	FR22
Title	Upgrading to Pro license
Description	By paying a small fee basic user should be able to upgrade to Pro license and will have access to additional features.
Preconditions	Has to be a basic user.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	Payment processing has to be figured out.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2 Pro User Features

3.2.1 Pro User Registration

ID	FR23
Title	Registering a User as Pro User
Description	<ul style="list-style-type: none"> Existing basic user can subscribe to Pro account and pay to become an Independent Pro User
Preconditions	Duplicate email Ids cannot exist at any given point.
Basic Steps	<p>Simple form with information such as first Name, last name, company, title, address and phone number, email etcetera is required.</p> <p>Set a default password as Cm@csPr0</p>
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	<ul style="list-style-type: none"> Each Independent Pro Users can get up to 100 GB of space They will have complete access to all modules including Fabrication, QC and Schedule/Time management
Dependencies	N. A.
Module	Global Services

3.2.2 Add Pro Users

ID	FR24
Title	Registering a User as Pro User
Description	A Key user can add a Pro Admin who can add new Pro Users to their enterprise/business account
Preconditions	Duplicate email Ids cannot exist at any given point.
Basic Steps	<p>Simple form with information such as first Name, last name, company, title, address and phone number, email etcetera is required.</p> <p>Set a default password as Cm@csPr0</p>
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	<ul style="list-style-type: none">• Every Primary customer will get 1TB of shared space• They will have complete access to all modules including Fabrication, QC and Schedule/Time management
Dependencies	N. A.
Module	Global Services

3.2.3 Customer Logos

ID	FR25
Title	Customer Logos
Description	Pro Admins can replace the default CMaCS logo with their own logo.
Preconditions	N. A.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.4 Multiple Languages

ID	FR26
Title	Multiple Languages
Description	Application should support multiple languages such as English, German, French, Italian, Spanish etcetera.
Preconditions	
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.5 Create Project Groups

ID	FR27
Title	Creating project groups
Description	Project groups can be created, which contains project level access for users belong to a certain group.
Preconditions	The user logged in is a Pro User
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.6 Project Group Permissions

ID	FR28
Title	Create/Update/Assign permissions to project groups
Description	Project groups contains permissions such as read, write, edit, share can be created and assigned.
Preconditions	The user logged in is a Pro User
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.7 Adding users to group

ID	FR29
Title	Adding users to project groups
Description	User can be added to only group per project but can be assigned to different groups in different projects.
Preconditions	The user logged in is a Pro User and only pro users can be added to a group
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.8 Clone project group

ID	FR30
Title	Cloning project groups
Description	Project groups can be copied with one project or to other projects
Preconditions	The user logged in is a Pro User and only pro users can be added to a group
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	The users should get options to clone the groups with permissions and if they want to clone the users associated to the projects.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.9 Manage project group

ID	FR31
Title	Managing project groups
Description	All the functionalities such as changing users with a group, deactivating a group, deleting a group has to be handled.
Preconditions	The user logged in is a Pro User.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.10 Creating and Assigning Tasks

ID	FR32
Title	Creating and Assigning Tasks
Description	There will be a section for creating tasks. The tasks can be assigned to someone within the project group
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	<ul style="list-style-type: none">• All the information regarding the task can be entered.• Support for adding images and links to documents with in the task.• An end date for the task will be added to notifications.• All tasks will store the history of updates made to the tasks
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.11 Notifications for Tasks

ID	FR33
Title	Notifications for Tasks
Description	Any updates made to the tasks can be set up to be in the form of push notifications for the people involved in the task.
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.12 Manage Tasks

ID	FR34
Title	Managing tasks
Description	This will display a list of all tasks in one of the widgets on the dashboard where tasks status can be changed, changing task ownerships etcetera.
Preconditions	The user is already logged into the system.
Basic Steps	N. A
Exceptions	If there are no tasks pending or completed, this will remain empty. Otherwise it will show the first 5 tasks and at the bottom of the page there will be a link which will take the user to the remaining tasks page.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.13 Task History log

ID	FR35
Title	Task Log
Description	Entire lifecycle of the tasks can be retrieved
Preconditions	The user is already logged into the system.
Basic Steps	N. A.
Exceptions	Task history cannot be deleted.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.14 Project Archive

ID	FR36
Title	Project Archive
Description	Once a project is completed it is marked as archived and it is not shown in dashboard but Pro Admins will have access to the archives.
Preconditions	The user logged should be a pro user and should access to the project being archived.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.15 Project Scope

ID	FR37
Title	Project Scope
Description	Scope of the work to be done with detailed dates to be specified
Preconditions	
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.16 Building Structure (creation)

ID	FR38
Title	Building Structure (creation)
Description	Interface to enter building specs such as floors, type of glass, unit heights etcetera.
Preconditions	
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.17 SchüCal BOM Import (web service)

ID	FR39
Title	SchüCal BOM Import
Description	A web service to communicate information back to the product
Preconditions	
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.18 2D Viewer (All formats)

ID	FR40
Title	2D Viewer
Description	Support for converting most of drawing formats to pdfs and to view in the viewer
Preconditions	User should have access to those files/folders
Basic Steps	Opening a file by default be opened in this viewer which will have all necessary functionalities.
Exceptions	N. A.
Business validations/Rules	Ability to open file in the embedded 2D viewer
Post conditions	N. A.
Dependencies	N. A.
Module	Document Control

3.2.19 Private Folder

ID	FR41
Title	Private folder
Description	Every Pro User will have a private folder which only the user will have access to.
Preconditions	N. A.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	If the user is an independent Pro User or belong to a Primary Customer and closes his account, the private folder data is deleted immediately.
Post conditions	N. A.
Dependencies	N. A.
Module	Document Control

3.2.20 Zip/unzip Files and Folder

ID	FR42
Title	Zip/unzip
Description	Document control will have advanced features such as zip and unzip for files on the viewer.
Preconditions	User should have access rights to those files/folder.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Document Control

3.2.21 Pictures Folder

ID	FR43
Title	Default pictures folder
Description	<p>Every project or documents section will contain a pictures folder.</p> <p>Any pictures added to the documents or projects will automatically have a link in this folder for easy access.</p>
Preconditions	N. A.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Document Control

3.2.22 Annotations/Markups

ID	FR44
Title	Create Markups
Description	<p>Following commands will be available</p> <ul style="list-style-type: none"> • Add Note • Add Cloud • Add Rectangle • Add Text box • Add Line • Add Arrow • Add Callout
Preconditions	Document is loaded in 2d Viewer
Basic Steps	
Exceptions	N. A.
Business validations/Rules	<ul style="list-style-type: none"> • Ability to classify the markup as public/private • Only public markups are visible to all users • Private markups are only visible to user who created it and shared with.
Post conditions	
Dependencies	
Module	Document Control

3.2.23 Download Markups

ID	FR45
Title	Download with Markups
Description	<ul style="list-style-type: none"> • Ability to download PDF version of the file with markups. • Ability to select multiple markups to include in downloaded PDF
Preconditions	Markups should exist in Document; else vanilla document will be downloaded as PDF
Basic Steps	
Exceptions	N. A.
Business validations/Rules	
Post conditions	
Dependencies	
Module	Document Control

3.2.24 Share Markups

ID	FR46
Title	Share Markups
Description	<ul style="list-style-type: none">• Ability to share markups with other users as a link• Export to excel and email
Preconditions	Other users and/or groups that exist in the project will have access to these files.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Document Control

3.2.25 Comment on markups

ID	FR47
Title	Comment on markups
Description	<ul style="list-style-type: none"> • Ability to create comment on a markup • Conversation thread support for the comment to support a discussion around the markup
Preconditions	Markup should exist
Basic Steps	
Exceptions	N. A.
Business validations/Rules	For non-public markups, only user who created the markup or was shared with can participate in comments
Post conditions	
Dependencies	
Module	Document Control

3.2.26 Manage Sharing options

ID	FR48
Title	Sharing documents
Description	While sharing documents, Additional features will be provided such as specifying expiration date/time and/or password for additional access control.
Preconditions	Other users and/or groups that exist in the project will have access to these files.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Document Control

3.2.27 Linking markups to tasks

ID	FR49
Title	Linking markups to existing tasks
Description	Follow up on comments on the mark ups which will set notifications
Preconditions	Markup should exist
Basic Steps	
Exceptions	N. A.
Business validations/Rules	The notifications will be displayed for all parties involved with that markup and/or task.
Post conditions	N. A.
Dependencies	N. A.
Module	Document Control

3.2.28 Adding Stake Holder & Contacts

ID	FR50
Title	Adding Stake Holder & Contacts
Description	Adding Architect, General Contractors and their contact information
Preconditions	
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Stake Holder Management (Architects, GC, Investors)

3.2.29 Update Stake Holder

ID	FR51
Title	Update Stake Holder
Description	
Preconditions	Stake holder information needs to exist.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Stake Holder Management (Architects, GC, Investors)

3.2.30 Delete Stake Holder

ID	FR52
Title	Delete Stake Holder
Description	Deactivate all existing stake holders access.
Preconditions	N. A.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	
Module	Stake Holder Management (Architects, GC, Investors)

3.2.31 Create QC Template

ID	FR53
Title	Create QC Template
Description	Either import from Excel or Create using a form
Preconditions	If importing from Excel, QC's Excel template must be downloaded first
Basic Steps	Design the template and add the necessary groups and the steps for Fabrication or Assembly Quality Control process.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	The template should be replicated when assigned to a PO or Unit/Product.
Dependencies	
Module	Manufacturing

3.2.32 Updating QC Template

ID	FR54
Title	Updating QC Template
Description	Modifying an existing QC template
Preconditions	N. A.
Basic Steps	Modifying an existing template will reflect the new changes to all future assignments.
Exceptions	Any changes to the template do not account for units/products already undergoing QC process
Business validations/Rules	
Post conditions	The template should be replicated when assigned to a PO or Unit/Product.
Dependencies	
Module	Manufacturing

3.2.33 Cloning/Copy QC Template

ID	FR55
Title	Cloning/Copy QC Template
Description	Ability to make a copy without modifying the existing template.
Preconditions	
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Manufacturing

3.2.34 Assigning QC Template as QC Sheet

ID	FR56
Title	Assigning QC Template as QC Sheet
Description	Select product/s and assign to QC which copies the entire template as a QC Sheet (All groups and row items to be replicated as the template).
Preconditions	
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	Unique QR code to be generate if user wants to print it.
Dependencies	N. A.
Module	Manufacturing

3.2.35 Sign off QC Sheets

ID	FR57
Title	Access and Sign off QC Sheets
Description	QC can be accessed and synced from any and all devices (latest prevails). Users initials will be showed once a certain step in QC is signed off.
Preconditions	
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	Unique QR code to be generate if user wants to print it.
Dependencies	N. A.
Module	Manufacturing

3.2.36 QC Report

ID	FR58
Title	QC Report Generation
Description	There will be option to generate reports for various QC specific activities.
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	These reports can be directly saved as PDF's or can be printed.
Post conditions	The setting is saved.
Dependencies	N. A.
Module	Global Services/Manufacturing

3.2.37 Create Equipment List

ID	FR59
Title	Create Equipment List
Description	Either import from Excel or Create using a form
Preconditions	If Importing from Excel, Equipment Excel template must be downloaded first
Basic Steps	Enter the existing equipment with availabilities and exceptions
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	Run an algorithm to check if adding a new equipment can make existing schedules better and notify the team.
Dependencies	
Module	Manufacturing (shop management)

3.2.38 Update Equipment List

ID	FR60
Title	Update Equipment List
Description	Changes can be made to the existing equipment list.
Preconditions	An equipment list has to exists
Basic Steps	Deleting an equipment makes that equipment not available but does not delete it from DB
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	Run an algorithm to check if adding a new equipment can make existing schedules better and notify the team.
Dependencies	Create Equipment list
Module	Manufacturing (shop management)

3.2.39 Create Resource List for Schedule

ID	FR61
Title	Create Resource List for Schedule
Description	
Preconditions	
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	
Dependencies	
Module	Manufacturing (shop management)

3.2.40 Update Resource List

ID	FR62
Title	Update Resource List
Description	
Preconditions	
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	
Dependencies	
Module	Manufacturing (shop management)

3.2.41 Shop Capacity Calculator

ID	FR63
Title	Shop Capacity Calculator
Description	Ability to enter close fit estimates for fabrication on the floor which will be used for capacity planning.
Preconditions	Equipment information should exists
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	
Dependencies	
Module	Manufacturing (shop management)

3.2.42 Create Baseline Schedule

ID	FR64
Title	Create Baseline Schedule
Description	Tools to create a resource (employee and equipment) loaded schedule
Preconditions	A default schedule should be provided for all products with Pro accounts.
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	Employee and Equipment list needs to exists.
Dependencies	N. A.
Module	Schedule/Time Management

3.2.43 Update Schedule (dynamic schedule)

ID	FR65
Title	Update Schedule (dynamic schedule)
Description	Either import from Excel or Create using a form.
Preconditions	If Importing from Excel, employee Excel template must be downloaded first.
Basic Steps	Enter the existing resources with availabilities and exceptions.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	Run an algorithm to check if adding a new resource affects the schedules and notify the team.
Dependencies	
Module	Schedule/Time Management

3.2.44 Material/Element Schedule

ID	FR66
Title	Material/Element Schedule
Description	
Preconditions	
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	
Dependencies	Create Resource list
Module	Schedule/Time Management

3.2.45 Available to Promise (ATP check)

ID	FR67
Title	Available to Promise (ATP check)
Description	
Preconditions	
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	
Dependencies	N. A.
Module	Schedule/Time Management

3.2.46 Project Report Generation

ID	FR68
Title	Project report Generation
Description	There will be option to generate reports for project specific activities.
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	These reports can be directly saved as PDF's or can be printed.
Post conditions	The setting is saved.
Dependencies	N. A.
Module	Global Services, Manufacturing & Schedule/Time Management

3.2.47 Export Reports to Multiple Formats

ID	FR69
Title	Export reports to Multiple formats
Description	It shall have links of the page to export the customer list into different formats
Preconditions	N. A.
Basic Steps	<ul style="list-style-type: none"> • It shall support exporting of the customer information into PDF, Excel and CSV formats. • It should also directly support printing of the customer information. • Reports can be stored in documents and shared among other users.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.48 Notification Settings

ID	FR70
Title	Notification Settings
Description	In the setting menu which is part of the user profile, there is setting for the email based notifications to be turned off.
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	The setting is saved.
Dependencies	N. A.
Module	Global Services

3.2.49 Pro Support

ID	FR71
Title	Pro Support
Description	Pro users can request for in house support, Immediate support for critical issues and Support within 24 hours for non-critical issues.
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	Notifications will be showed when support ticket has been opened. User can see the status and log of the ticket until the ticket is closed by the user.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.50 Training Videos

ID	FR72
Title	Training Videos
Description	As part of the Pro User package, training videos showing how to use all the above features will be provided.
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	Ability to download the videos. These videos will not be part of the user work space (100 Gb or 1Tb provided) until they download the videos to their workspace.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.2.51 SchüCal Interface

ID	FR74
Title	SchüCal Interface
Description	CMaCS users should be able to import excel template from SchüCal for creating BOM, QC Templates and Schedules.
Preconditions	The user is logged into the system.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	This needs to be discussed and approved by SchüCal team.
Post conditions	N. A.
Dependencies	N. A.
Module	Interface Management

3.2.52 ERP Interface

ID	FR75
Title	ERP Interface
Description	
Preconditions	
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	
Post conditions	N. A.
Dependencies	N. A.
Module	Interface Management

3.3 Key User Features

3.3.1 Adding a Customer

ID	FR76
Title	Adding a Customer Account
Description	CMaCS development team and Key Users should be able to add a customer.
Preconditions	The user is already logged in as a Key User.
Basic Steps	<ul style="list-style-type: none"> • The Development Team or the Key Users can directly add a customer to the system, or they can invite them by sending them an email to sign up. • The system prompts the user to enter all the customer information. • The email address is used to uniquely identify the customer. If the username is already in use, an error message is shown. <p>The system creates the new customer account if everything is correct. Otherwise, the appropriate error message is shown</p>
Exceptions	The email Id's used to register must be unique.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.3.2 Add/Assign Pro Admins

ID	FR77
Title	Add or assign Pro Admin for customer accounts
Description	<p>Multiple of ways of doing this</p> <ul style="list-style-type: none">• Once the Key user adds a customer, A Pro Admin will be assigned by a Key User. User registering with that email is added to CMA^{CS} as a Pro Admin for that customer account• A Pro Admins can add more admins (up to 5) and unlimited Pro users to their account.
Preconditions	Duplicate email Ids cannot exist at any given point.
Basic Steps	<p>Simple form with information such as first name, last name, company, title, address and phone number is required.</p> <p>Set a default password as Cm@csPr0@dm1n</p>
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	Takes him to the Admin Portal
Dependencies	N. A.
Module	Global Services

3.3.3 Editing a Customer

ID	FR78
Title	Editing a Customer (Super User)
Description	The Key Users should be able to edit information about any customer and Pro Admins can edit their company accounts.
Preconditions	The user is already logged in is either a Pro Admin or Key User.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	The changes are saved in the database.
Dependencies	N. A.
Module	Global Services

3.3.4 Customer Reviews

ID	FR79
Title	Customer Reviews
Description	This shall provide a facility for all the Key Users to rate and write reviews about the customers.
Preconditions	The user is already logged in as a Key User.
Basic Steps	<ul style="list-style-type: none">• The customer rating is displayed in the customer index table.• The users can edit only the reviews and ratings that they added.• All the reviews and ratings can be viewed can be updated.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Global Services

3.3.5 Customer Index

ID	FR80
Title	Customer Index
Description	The main index page which will display the complete list of Customers. Filters can be added to show desired information about the customers.
Preconditions	The user is already logged in and is either a Key User.
Basic Steps	<ul style="list-style-type: none"> • This shall allow the user to select the number of customers to be displayed. • This shall contain multiple columns in the table containing the customer information. • This will include an ability to search for the customers.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	On Selecting a customer, the system will direct the user to a page which will list all the Pro Users within the customer account.
Dependencies	N. A.
Module	Global Services

3.3.6 Deleting a Customer

ID	FR81
Title	Deleting a Customer Account
Description	The development team or the Key Users can opt to deactivate a Customer's account. This by default makes the system inaccessible to the Customers.
Preconditions	The user is already logged in as a Key User.
Basic Steps	The Key User can delete the information of any customer.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	The customer is not able to login after this and is shown an error page
Dependencies	N. A.
Module	Global Services

3.3.7 Customize Customer template packages

ID	FR82
Title	Customize Customer template packages
Description	Key Users can select what a customer can access and cannot access by default. This can be changed later on as needed.
Preconditions	N. A.
Basic Steps	N. A.
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Manufacturing

3.3.8 Reports

ID	FR83
Title	Reports
Description	<p>Customer Reports generation</p> <ul style="list-style-type: none"> • Performance of a customer, Quality reports • Work order process • Schedule (status, predications) • Comparison between customers • Analytics
Preconditions	
Basic Steps	
Exceptions	N. A.
Business validations/Rules	N. A.
Post conditions	N. A.
Dependencies	N. A.
Module	Manufacturing

4 External Interface Requirements

This section provides a detailed description of all inputs into and outputs from the system. It also gives a description of the hardware, software and communication interfaces and provides basic prototypes of the user interface.

A first-time user of the system should see the log-in page when the application opens. If the user has not registered, they will be prompted to do that on the log-in page. Every user should have a profile page where they can edit their e-mail address, phone number and password. Also, the user can set the application to their preferred language.

Since neither the application nor the web portal have any designated hardware, there system does not have any direct hardware interfaces. The libraries will be managed by the IIS web server running on amazon EC2 and the hardware connection to the database server will be managed by the underlying operating system on the mobile phone/device and the web server.

5 Technical Requirements (Nonfunctional)

This section contains all of the performance and quality requirements of the system. It gives a detailed description of the system and all its features.

5.1 System dependability

Gist	The fault tolerance of the system
Scale	If the system loses the connection to the Internet or the system gets some strange input, the user should be informed.
Meter	Measurements obtained from 1000 hours of usage during testing
Must	N. A.
Plan	N. A.
Wish	N. A.

5.2 Reliability

Gist	Availability of the system without issues
Scale	The reliability that the system handles all sort's or error scenarios
Meter	Measurements obtained from rigorous testing in all cases to break the systems.
Must	Must be stable and should handle error scenarios and boundary conditions
Plan	Must be stable and should handle error scenarios and boundary conditions
Wish	Make it 100% robust

5.3 Platform Independent

Gist	Where the application can be accessed
Scale	If the system loses the connection to the Internet or the system gets some strange input, the user should be informed.
Meter	Measurements should be obtained by testing it on multiple platforms/devices and Operating systems
Must	N. A.
Plan	N. A.
Wish	N. A.

5.4 Security

5.4.1 Communication Security

Gist	Security of the communication between the system and server
Scale	The messages should be encrypted for log-in communications, so others cannot get user-name and password from those messages.
Meter	Attempts to get user-name and password through obtained messages on 1000 log-in session during testing.
Must	100% of the Communication Messages in the communication of a log-in session should be encrypted.
Plan	Every exchanged of information between client and server.
Wish	Make it 100% robust

5.4.2 User Login Account Security

Gist	Security for login process
Scale	If a user tries to log in to the web portal with a non-existing account, then the user should not be logged in. The user should be notified about log-in failure.
Meter	1000 attempts to log-in with a non-existing user account during testing.
Must	100% of the time
Plan	Must be stable and should handle error scenarios and boundary conditions
Wish	Make it 100% robust

5.4.3 User Account Security

Gist	Security of user accounts
Scale	The user and the IP address should not be able to log-in for a certain time period after three times of failed log-in attempts
Meter	1000 attempts to log-in during the lock period after user account has been locked because of failed log-in attempts of three times.
Must	The locking period should be half an hour, and during that period the log-in function is disabled.
Plan	Must be stable and should handle error scenarios and boundary conditions
Wish	Make it 100% robust

5.5 Maintainability

In order for future functions to be implemented easily to the application, the application should be easy to maintain, and the code should be written in a way that favors implementation of new functions with easy, object-oriented principles.

5.6 Multi lingual Support

It must support the following languages:

- German
- English (US)

5.7 Deployment requirements

The requirements in this section provide a detailed specification of the system's deployment.

5.7.1 System Deployment

There will be two servers hosted on Amazon AWS.

- Live/Management server
- Staging server.

The latest updates and changes will initially be deployed to the Staging server, thoroughly tested and later deployed to the Management server.

- The Servers are going to be running a version of Windows server 2012 along with Internet Information Service (IIS) version 8.0
- The Database is also on Amazon AWS running a version of MYSQL database. There are going to be separate databases for the management server and the staging server.

5.7.2 System Scalability

The system is going to be scalable. As the number of users increases we can increase the number of servers on Amazon AWS so that the users do not see any difference in performance.

- The same number of servers are added to both the management and staging servers.
- A load balancer can also be used if the number of users is pretty high.

6 Open Issues

<There could be open issues even at the end of the requirements elicitation. We should list all of them here so they can be tracked and closed later. Some of these issues may later become project risks as well.