



**System Integration and Data Guidelines  
for  
Construction Safety Management System  
(CSMS)**



**Ministry of Manpower**

**24 October 2018**

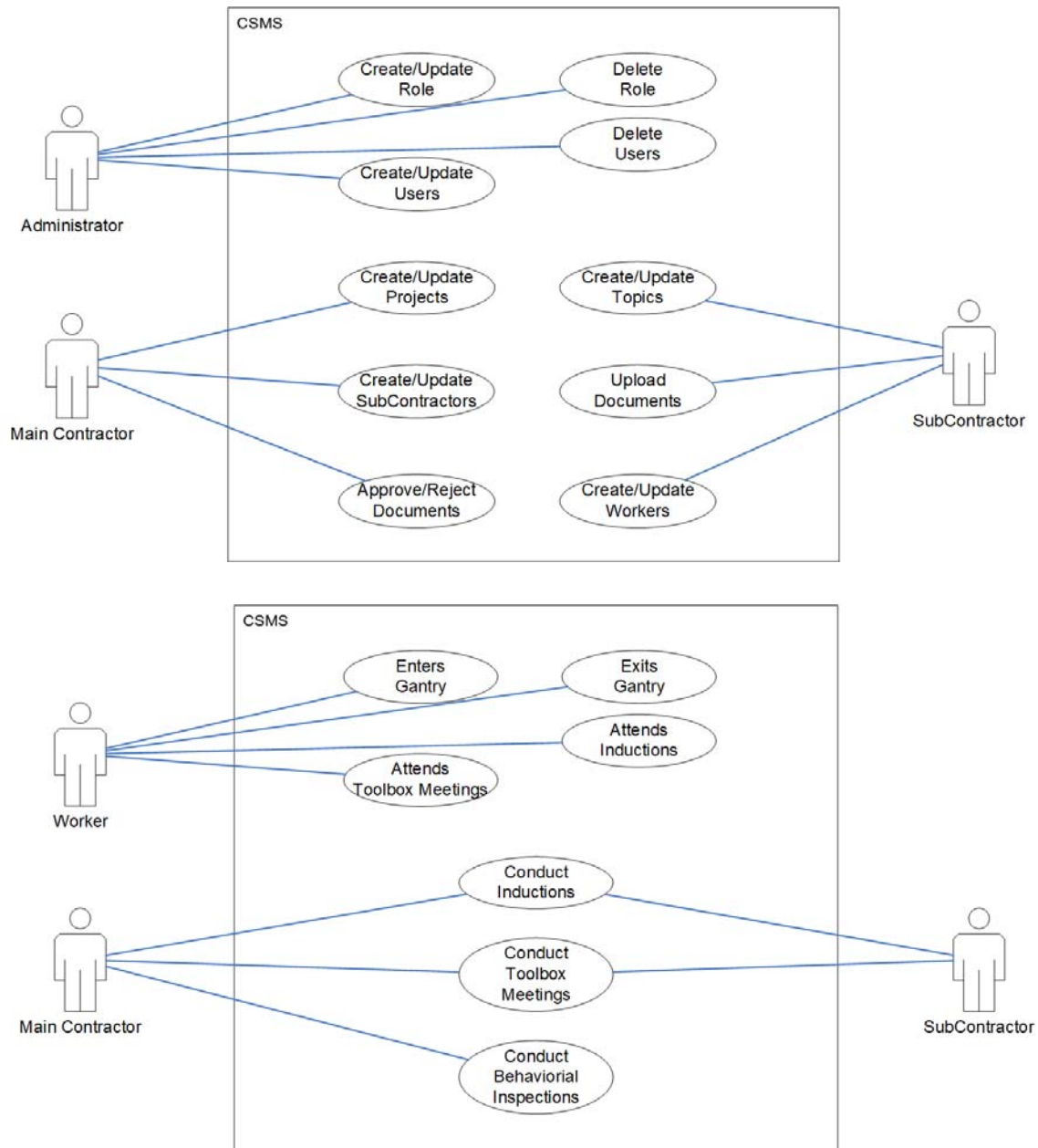
**Version 1.0**

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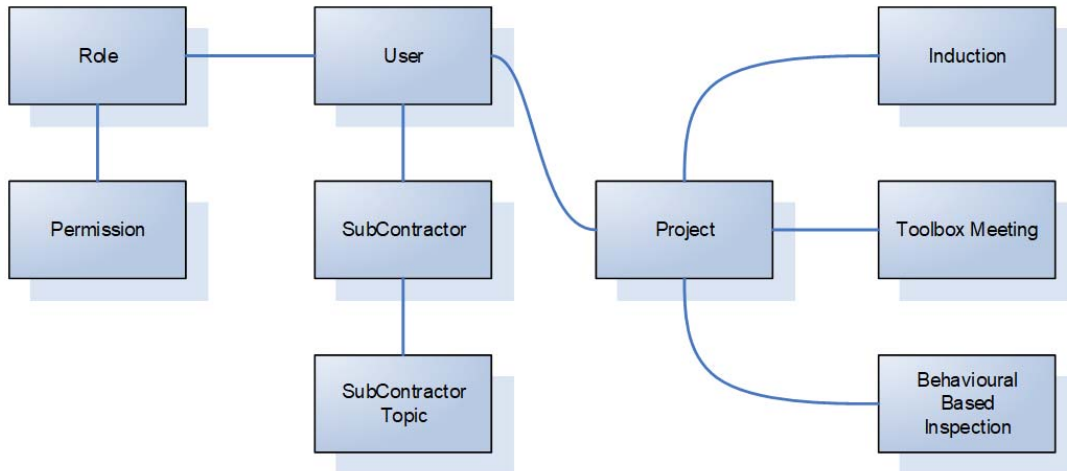
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# 1 Use Case Diagram



## 2 Key Entities



### 2.1 User

This entity represents all the users in CSMS.

**Prerequisites** – Appropriate **Roles** setup in system.

Data	Type
User ID	Number
Role ID	Role
SubContractor ID	SubContractor
NRIC/FIN	Alphanumeric
Work Permit Number	Alphanumeric
Username	Alphanumeric
Password	Alphanumeric
Photo	Image
Name	Alphanumeric
Birth Date	Date
Gender	Boolean
Nationality	Alphanumeric
Active	Boolean

## 2.2 Role

This entity represents all the roles in CSMS.

Each user is assigned a role.

**Prerequisites** – **Permissions** are defined in the system.

Data	Type
Role ID	Number
Role Name	Alphanumeric
Active	Boolean

## 2.3 Permission

This entity represents all the permissions in CSMS.

Each role can be assigned multiple permissions.

**Prerequisites** – NA

Data	Type
Permission ID	Number
Permission Name	Alphanumeric
Active	Boolean

## 2.4 SubContractor

This entity represents a subcontractor in CSMS.

Each subcontractor is a user and is part of one or more projects.

**Prerequisites** – Appropriate **Users, Projects** in the system.

**Flow** – Main Contractor completes subcontractor information in the system and creates SubContractor administrator IDs.

**SubContractor** administrators are required to submit safety documents for review and approval by the Main Contractors for a specific **Project**. Documents can include Organization Chart, BizSafe Certificate and Risk Assessment Plans etc.

Once the safety documents are all approved, **Subcontractors** will be allowed to register workers in the system.

Data	Type
SubContractor ID	Number
Company Name	Alphanumeric
Telephone Number	Alphanumeric
Email Address	Alphanumeric
Safety Documents	Document
Safety Documents Approved By	Users
Safety Documents Approved On	DateTime
MainContractor Remarks	Alphanumeric
SubContractor Remarks	Alphanumeric
Active	Boolean

## 2.5 SubContractor Topic

This entity represents the topics for selection for each subcontractor during Induction.

**Prerequisites** – **SubContractors** in the system.

**Flow** – **SubContractors** can create topics inside the system. These topics will then be available for selection during **Induction** to be briefed to the inductees.

Data	Type
SubContractor Topic ID	Number
SubContractor ID	SubContractor
Telephone Number	Alphanumeric
Email Address	Alphanumeric
Active	Boolean

## 2.6 Project

This entity represents a project in CSMS.

**Prerequisites** – Main **Contractor Users** in the system

Data	Type
Project ID	Number
Project Manager	User
Project Director	User
Name	Alphanumeric
Start Date	Date
End Date	Date
Address	Alphanumeric
Contract Number	Alphanumeric
Active	Boolean

## 2.7 Induction

This entity represents each induction in CSMS.

**Prerequisites** – **Users, Projects, SubContractors** in the system

**Flow** – Before **SubContractor** workers can start work, they are required to undergo **Induction**.

**Induction** is carried out using a mobile application which will capture the information (See table below for full list) such as

- Who and when conducted the Induction.
- Who attended the Induction.
- What topics were discussed

NFC or RFID tags can be used to uniquely identify a worker to capture his attendance as part of the Induction.

Data	Type
Induction ID	Number
SubContractor ID	SubContractor
Project ID	Project
Conducted By	User
Witnessed By	User
Conducted Date/Time	DateTime
Witnessed Date/Time	DateTime
Attended User IDs	Users
Induction Topics IDs	SubContractor Topics
Active	Boolean

## 2.8 Toolbox Meeting

This entity represents each toolbox meeting in CSMS.

**Prerequisites** –Users, Projects, SubContractors in the system

**Flow** – SubContractors are required to carry out a daily **Toolbox Meeting** before work starts.

A **Toolbox Meeting** is carried out using a mobile application which will capture the information (See table below for full list) such as

- Who and when supervised the Toolbox Meeting.
- Who attended the Toolbox Meeting.
- What topics were discussed.
- Each worker's mental and health status

NFC or RFID tags can be used to uniquely identify a worker to capture his attendance as part of the Toolbox Meeting.



Data	Type
ToolBox Meeting ID	Number
SubContractor ID	Number
Supervisor ID	User
ToolBox Meeting Date	Date
Start Time	Time
End Time	Time
Toolbox Meeting Topics IDs	Toolbox Meeting Topics
NearMiss	Boolean
NearMiss Remarks	Alphanumeric
Attended User IDs	Users
Health and Mental Condition IDs	Health and Mental Conditions
Active	Boolean

## 2.9 Behavioural Based Inspection

This entity represents each ad-hoc BBI in CSMS.

**Prerequisites** –Users, Projects, SubContractors in the system

**Flow** – Main Contractors can perform ad-hoc inspections on workers anytime in the project site using a mobile application.

Photos can be taken and Remarks written to provide a full account of the inspection.

NFC or RFID tags can be used to uniquely identify a worker as part of an inspection.

Data	Type
BBI ID	Number
Inspector User ID	User
Inspected Worker User ID	User
Project ID	Project
Remarks	Alphanumeric
Description	Alphanumeric
Photos	Photo
Is Non Compliant	Boolean
To Ban	Boolean

## 3 Gantry Integration Guidelines

### 3.1 General Guidelines

Integration to be performed through the use of Web Services.

Pros of using Web Services

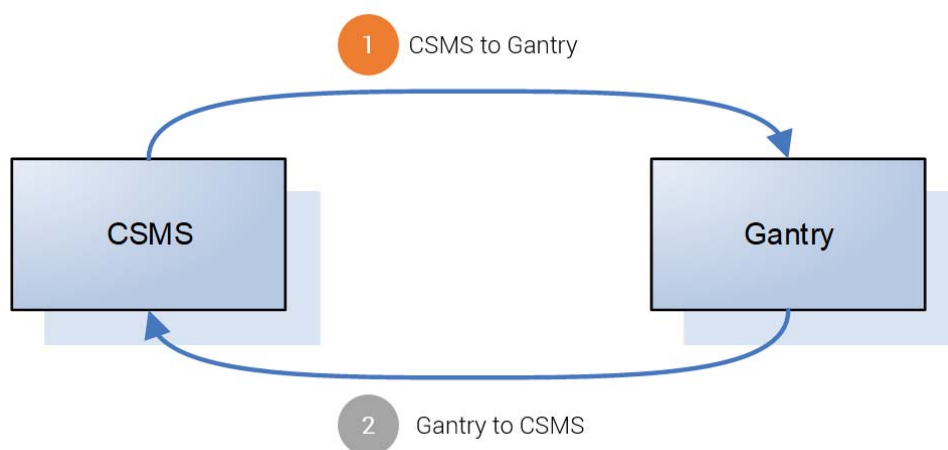
- Interoperability – Any application can communicate to one another and share data.
- Deployability – Deployed over standard Internet technologies. Using the Internet over HTTP protocol.
- Real-Time – Allows for real-time communications.
- Synchronous or Asynchronous capability – Flexibility in system design.

**Authentication** – Security is essential

- Various methods available – Token based, HTTP Basic etc

**Error Handling** – Each request and response should be tracked

### 3.2 Gantry Integration



#### 3.2.1 CSMS to Gantry – User Management

Register a new user to the Gantry.

Permit or Deny a user through the Gantry.

Unban a user and permit a user through the Gantry.

Data	Type	Remarks
User System Identity Number	Number	
User NRIC/FIN	Alphanumeric	
Permit to Enter	Boolean	

### 3.2.2 Gantry to CSMS – User Management

Acknowledges addition or update.

Data	Type	Remarks
Return Value	Number	1 – Success 0 - Failure

### 3.2.3 CSMS to Gantry – User In Site

Checks if a specific user is in site after passing through the gantry.

Data	Type	Remarks
User System Identity Number	Number	

### 3.2.4 Gantry to CSMS – User In Site

Replies whether user is in site or no.

Data	Type	Remarks
Return Value	Number	1 – In 0 - Out

### 3.2.5 CSMS to Gantry – Retrieve Access History

Retrieves the gantry access history for a list of users for a specific date and time.

This is used to determine the absentees for Daily Toolbox Meetings.

Data	Type	Remarks
User System Identity Numbers	Number	
Access Date	Date	
Access Time	Time	

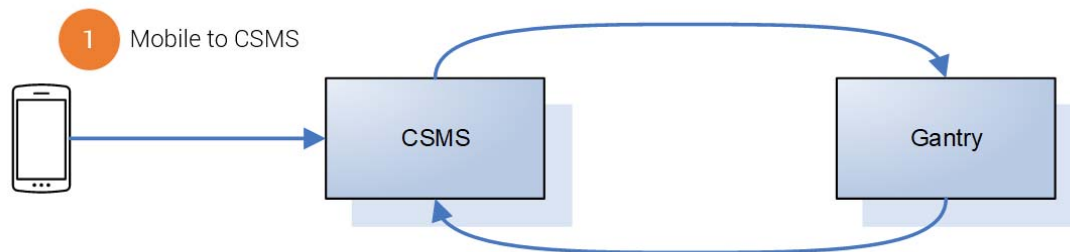
### 3.2.6 Gantry to CSMS – Retrieve Access History

Replies whether provided list of users were in site for specific date and time.

This is used to determine the absentees for Daily Toolbox Meetings.

Data	Type	Remarks
User System Identity Numbers	Number	
Return Value	Number	1 – In 0 - Out

### 3.2.7 Mobile to CSMS – BBI



Ad-hoc banning of user through mobile while conducting a behavioral based inspection.

Mobile will update CSMS backend which will in turn update user's gantry access

Data	Type	Remarks
User System Identity Number	Number	
User NRIC/FIN	Alphanumeric	
Permit to Enter	Boolean	To Ban/Deny

- End -