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**Introduction**

In this project, we will help our customers to manage and arrange the construction workflow process. Using the application, the contractors and managers can update the construction status, share proofs of certain stages, and automatically generate documentation documents. Our application would be user-friendly, intuitive and all text would be in Hebrew.

**The Problem Domain**

The problem domain of the project is **Construction,** **Work Management and Workflow tracking**. In general, the construction industry is focused on the construction, demolition, renovation, maintenance or repair of building and infrastructure. It covers a wide range of services, from planning and surveying to structural construction to finishing services such as painting and decorating.

Context

The system we will develop will be a part of the day-to-day work of work managers. During construction the work managers will update, on site, their progress using their mobile phones and notify the higher management in real time.

Vision

A construction project contains a lot of complex stages, missions, and many nuances that the work manager isn’t always familiar with. Our application aims to simplify the complexity of managing construction work by defining strict workflows. The contractor defines the workflows, and the work manager follows it.  
Another objective of the app is to provide proof for the completion of important missions and stages in the project, by storing photos of completed missions, uploaded by the work manager on site. These proofs can later be presented to the security inspector, potential buyers, authorities, or anyone who inquires.  
An important goal in this project, is that the app will be intuitive and simple to use, for every type of user, since we wouldn’t want to frustrate the end user (usually a work manager working in the site) and make his work harder.

Stakeholders

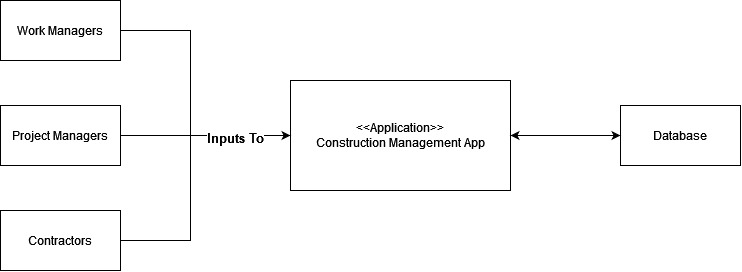
Liron Hart – Customer

Contractors, Construction work managers – Users

Oded Gal, Hadar Ovadia, Ilay Gov – Developers

Software Context

Our system will consist of a mobile application that will operate on the user’s phone and a remote data storing server.



User Profiles

**Contractors**Users that create workflows to be executed physically by the work managers in the site.  
They have a lot of responsibility; they must verify that all the stages are completed according to the requirements.  
The application helps them view all the progress in the site and see photos and proofs of the completed missions.

**Project Manager**Only exists if the project is considered a big project. Assists the contractor in managing a project.

**Work Managers**Users that physically work in the construction site. They are responsible for documenting each mission's states and uploading photos from the site as proof.  
Usually don’t have great technological skills, the application should make their life easier by defining the missions they are responsible for, with an intuitive and user-friendly interface.

User Profile Permission Hierarchy

Diagram

Description automatically generated

Use cases

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | Login | |
| **Actors** | User | |
| **Parameters** | ID, Password | |
| **Preconditions** |  | |
| **Actions** | The user starts the system  The system presents a “Login Screen” to the user  The user inserts his ID and Password  The user presses the “Login” button  The system verifies the user’s input | |
| **Result** | The system grants permission to log in or raises the relevant error | |
| **Data** | | **Result** |
| The user is registered and inserts his ID and the correct password | | Pass |
| The user is not registered | | Fail |
| The user is already logged in | | Fail |
| The user inserts his ID and an incorrect password | | Fail |
| The user inserts incorrect ID and the correct password | | Fail |
| The user inserts ID that is shorter or longer than a valid ID number | | Fail |

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| --- | --- | --- | --- | --- | --- |
| **Use Case Name** | | Register a new user | | | |
| **Actors** | | Project Manager / Contractor | | | |
| **Parameters** | | User ID | | | |
| **Preconditions** | | The project manager / contractor is logged in | | | |
| **Actions** | | The project manager / contractor is typing the user’s ID | | | |
| **Result** | | A new user is created | | | |
| **Data** | | | | **Result** | |
| The project manager / contractor types a valid ID | | | | Pass | |
| The project manager / contractor types a wrong ID | | | | Fail | |
| **Use Case Name** | Assign a role to a user | | | |
| **Actors** | Project Manager / Contractor | | | |
| **Parameters** | User ID | | | |
| **Preconditions** | The project manager / contractor is logged in | | | |
| **Actions** | The project manager / contractor is typing the user’s ID and assigning a new role to it | | | |
| **Result** | The user is assigned to a new role | | | |
| **Data** | | | **Result** | |
| The project manager / contractor types a valid ID and choosing a role | | | Pass | |
| The project manager / contractor types a wrong ID | | | Fail | |

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | Unassign a role to a user | |
| **Actors** | Project Manager / Contractor | |
| **Parameters** | User ID | |
| **Preconditions** | The project manager / contractor is logged in  The user has a role | |
| **Actions** | The project manager / contractor is typing the user’s ID and unassigning its role from it | |
| **Result** | The user is unassigned from its role | |
| **Data** | | **Result** |
| The project manager / contractor types a valid ID and choosing a role | | Pass |
| The project manager / contractor types a wrong ID | | Fail |

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | Create a new project | |
| **Actors** | Contractor | |
| **Parameters** | Project name | |
| **Preconditions** | The contractor is logged in | |
| **Actions** | The contractor clicks the “Create a new project” button and enters its name | |
| **Result** | A new project is created | |
| **Data** | | **Result** |
| The contractor clicks the “Create a new project” button and enters a valid name | | Pass |
| The contractor clicks the “Create a new project” button and enters a non-valid name | | Fail |

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| --- | --- | --- |
| **Use Case Name** | Create a project template | |
| **Actors** | Contractor | |
| **Parameters** | Project, template name | |
| **Preconditions** | The contractor is logged in, there is at least 1 project | |
| **Actions** | The contractor chooses a project  The contractor selects “Save as a template” | |
| **Result** | A new project template is created | |
| **Data** | | **Result** |
| The contractor clicks the “Save as template” button and enters a valid name | | Pass |
| The contractor clicks the “Save as template” button and enters a non-valid name | | Fail |

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| --- | --- | --- |
| **Use Case Name** | Create a new project from a pre-defined template | |
| **Actors** | Contractor | |
| **Parameters** | Project name, old template | |
| **Preconditions** | The contractor is logged in, the new project’s name is valid | |
| **Actions** | The contractor clicks the “Create a new project from template”  The contractor selects requested template and enters a new name | |
| **Result** | A new project is created | |
| **Data** | | **Result** |
| The contractor selects “Create a new project from template” but none exists | | Fail |
| The contractor clicks the “Create a new project from template” button and chooses a template | | Pass |

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| --- | --- | --- |
| **Use Case Name** | Edit a project | |
| **Actors** | Contractor | |
| **Parameters** |  | |
| **Preconditions** | The contractor is logged in | |
| **Actions** | The contractor chooses one of its projects  The contractor clicks the “Edit the project” button  The contractor edits the wanted details | |
| **Result** | The project is newly edited | |
| **Data** | | **Result** |
| The contractor clicks the “Edit the project” button and edits the wanted details with valid datum | | Pass |
| The contractor clicks the “Edit the project” button and edits the wanted details with non-valid datum | | Fail |

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | Add a new stage to a project | |
| **Actors** | Contractor | |
| **Parameters** | The contractor is logged in | |
| **Preconditions** |  | |
| **Actions** | The contractor clicks the “Add a new stage” button  The contractor writes the wanted details and adds the stage | |
| **Result** | A new stage is added to the project | |
| **Data** | | **Result** |
| The contractor clicks the “Add a new stage” button and writes the wanted details | | Pass |
| The contractor clicks the “Add a new stage” button and does not write the wanted details | | Fail |

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| --- | --- | --- |
| **Use Case Name** | Edit a stage in a project | |
| **Actors** | Contractor | |
| **Parameters** | The contractor is logged in | |
| **Preconditions** |  | |
| **Actions** | The contractor chooses a project  The contractor chooses stage  The contractor selects edit stage and edit with non-empty datum | |
| **Result** | The stage is newly edited | |
| **Data** | | **Result** |
| The contractor edits a stage with the wanted details | | Pass |
| The contractor edits a stage with empty data | | Fail |

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| --- | --- | --- |
| **Use Case Name** | Removes a stage from a project | |
| **Actors** | Contractor | |
| **Parameters** | Stage | |
| **Preconditions** | The contractor is logged in | |
| **Actions** | The contractor chooses a stage  The contractor clicks the “Remove the stage” button | |
| **Result** | The selected stage is removed from the project | |
| **Data** | | **Result** |
| The contractor clicks the “Remove the stage” button | | Pass |
| The stage doesn’t exist | | Fail |

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| --- | --- | --- |
| **Use Case Name** | Add a new mission to a stage | |
| **Actors** | Contractor | |
| **Parameters** | Mission details, stage | |
| **Preconditions** | The contractor is logged in | |
| **Actions** | The contractor enters to a stage  The contractor clicks the “Add a new mission” button  The contractor writes the wanted details and adds the mission | |
| **Result** | A new mission is added to the selected stage | |
| **Data** | | **Result** |
| The contractor clicks the “Add a new mission” button and writes the wanted details | | Pass |
| The contractor clicks the “Add a new mission” button and does not write the wanted details | | Fail |

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | Edit a mission in a stage | |
| **Actors** | Contractor | |
| **Parameters** | The contractor is logged in | |
| **Preconditions** |  | |
| **Actions** | The contractor chooses a project  The contractor chooses stage  The contractor chooses mission  The contractor selects edit mission and edit with non-empty datum | |
| **Result** | The mission is newly edited | |
| **Data** | | **Result** |
| The contractor edits a mission with the wanted details | | Pass |
| The contractor edits a mission with empty data | | Fail |

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| --- | --- | --- |
| **Use Case Name** | Removing a mission from a stage | |
| **Actors** | Contractor | |
| **Parameters** | The contractor is logged in | |
| **Preconditions** |  | |
| **Actions** | The contractor enters to a stage  The contractor chooses a mission  The contractor clicks the “Remove the mission” button | |
| **Result** | The selected mission is removed from the stage | |
| **Data** | | **Result** |
| The contractor clicks the “Remove the mission” button | | Pass |
| The mission doesn’t exist | | Fail |

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| --- | --- | --- |
| **Use Case Name** | Updating Mission Status | |
| **Actors** | Contractor, Project Manager, Work Manager | |
| **Parameters** | Project | |
| **Preconditions** | The actor is logged in | |
| **Actions** | The actor chooses a project  The actor chooses stage  The actor chooses a mission  The actor selects "Update mission Status"  The actor selects new status | |
| **Result** | The mission status will change accordingly | |
| **Data** | | **Result** |
| The actor has access to the project | | Pass |
| The actor doesn’t have access to the project | | Fail |
| Work Manager sets status from “invalid” to “Done” | | Fail |
| Project Manager/ Contractor sets status from “invalid” to “Done” | | Pass |

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| --- | --- | --- |
| **Use Case Name** | Viewing Project Information | |
| **Actors** | Contractor, Project Manager, Work Manager | |
| **Parameters** | Project | |
| **Preconditions** | The actor is logged in | |
| **Actions** | The actor selects a project | |
| **Result** | The actor receives all the project information | |
| **Data** | | **Result** |
| The actor has access to the project | | Pass |
| The actor does not have access to the project | | Fail |

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| --- | --- | --- |
| **Use Case Name** | Uploading proof to a mission | |
| **Actors** | Work Manager | |
| **Parameters** | proof file, project, mission | |
| **Preconditions** | The work manager is logged in and has access to the project | |
| **Actions** | The work manager selects a project  The work manager selects a stage  The work manager selects a mission  The work manager selects “upload proof”  The work manager selects and uploads the proof file from his device | |
| **Result** | The proof file is uploaded and saved for the specific mission | |
| **Data** | | **Result** |
| The work manager uploads a file with a decent size | | Pass |
| The work manager uploads a file with a very large size | | Fail |
| The work manager uploads an empty file | | Fail |

Requirements

**Functional Requirements:**

**1. User Requirements:**

1. The system requires login on start up.
2. When the system initializes there must be at least 1 registered Contractor user.

**2. Work Manager Requirements:**

1. The Work Manager can only do actions in the projects he is assigned to.
2. The Work Manager should be able to update missions’ status.
3. The Work Manager should be able to view all the stages and missions and their statuses.
4. The Work Manager can add comments and documentation / proof to missions.
5. The Work manager can mark missions as "Invalid" if a mission was completed unsuccessfully and needs corrections.

**3. Project Manager Requirements:**

1. The Project Manager can only do actions in the projects he is assigned to.
2. The Project Manager should be able to register new users to the system.
3. The Project Manager should be able to assign / unassign roles to users.
4. The Project Manager can do any action a Work Manager can.
5. The Project Manager can change the status of an "Invalid" mission to "Done".

**4. Contractor Requirements:**

1. Only Contractor can create a new project.
2. Contractor can view and edit his existing projects and their stages and missions.
3. Contractor can add and remove stages and missions from his project
4. The Contractor can do any action a Project Manager can.

**5. Project Requirements:**

1. When all the missions in a stage are completed, the stage is considered complete. When a mission in stage becomes “In Progress”, the whole stage is marked “In Progress”.
2. Missions can be marked as “Green Building”.
3. Every project should consist of Unit Stages and Project Stages, every stage should consist of missions.
4. Each Mission has status, links, documentation / proof and notes (description).
5. Projects should save documentation - stage completion times, who completed which stage, files uploaded for each mission.
6. The system can generate and export a unit documentation report from any project.

The unit documentation report contains files uploaded, mission completion times, name of user that marked as “Done”, status of missions.

1. A project can be created from a predefined template or past project. Retaining the same structure (stages / missions' hierarchies) with all the missions marked as “To Do”, but number of units can be changed.

**Non-Functional Requirements:**

1. The system should be able to support 50 users with up to 1 second reaction speed.
2. The system should be compatible with Android and iOS.
3. The system should support text in Hebrew (see “Dictionary” below).
4. The system should support saving at least 500 previous projects.

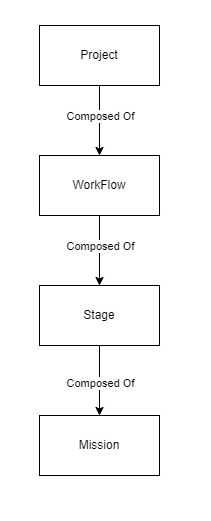
Platform and SE Project Constraints

The mobile application is required to operate on Android and iOS; therefore, we will need to use technologies that support both.

Risk assessments and POC plan

Our biggest concern for this project is that the application will be an annoying overhead for the work managers, which will cause them to neglect the use of the system and make it irrelevant. Therefore, to prove our concept we plan to develop a small-scale mobile application that will have the final interface, so we will be able to ascertain that it is intuitive and fits our users’ needs. To test that the interface is well received, we will pass survey between the users that will evaluate their experiences.

Object Hierarchy



Glossary

|  |  |
| --- | --- |
| **Term** | **Definition** |
| **Work Manager** | Works at the **project**’s site, responsible for updating **mission** statuses and **proof**s. |
| **Project Manager** | Helps the **contractor** manage **project**s. Not every **project** has one. |
| **Contractor** (יזם או קבלן) | The person responsible for initiating **project**s. |
| **Project** | a construction project flow in need of managing, consists of **unit stages** and **project stages**. |
| **Stage** | Aggregated **mission**s with a common goal. |
| **Mission** | Small tasks that are required to complete in order to complete a **stage**. Some missions require **proof**. |
| **Unit** | Apartments that are part of the construction project. |
| **Unit stages** | A type of **stage** that keeps track for a specific **unit**. |
| **Project stages** | A type of **stage** that is relevant to the entire **project**. |
| **Proof** | A file that proves that a **mission** was done. |

Dictionary

|  |  |
| --- | --- |
| **English** | **עברית** |
| Done | הסתיים |
| In Progress | בתהליך |
| To Do | לא בוצע |
| Invalid | לא תקין |
| Project | פרויקט |
| Stage | שלב |
| Mission | משימה |
| Work Manager | מנהל עבודה |
| Project Manager | מנהל פרויקט |
| Contractor | קבלן |