

Requirements Specifications Document

Drywall Estimation System

Gulf Islands Consulting

Requirements Engineering Ltd
Group 8

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Revision History

Table 1: Revision History

| Name | Date | Reason for Changes | Version |
|------------------------------------|---------|--|---------|
| Requirements Engineering Ltd. Team | Feb. 5 | Created initial document | RD 1.0 |
| Requirements Engineering Ltd. Team | Feb. 6 | Edited initial document given client feedback | RD 1.1 |
| Requirements Engineering Ltd. Team | Mar. 12 | Added analysis models, use cases, use case model, sequence diagrams, ER diagrams, DFD and UI mockups to create initial RSD | RSD 0.9 |
| Requirements Engineering Ltd. Team | Mar. 19 | Edited initial RSD given client feedback. Improved readability of document and updated storyboards | RSD 1.0 |

1 Introduction

1.1 Purpose

This requirements specification document 1.0 covers the requirements for Gulf Islands Consulting's *Drywall Estimation System*. The estimation system is designed to reduce the time required to produce project cost estimations and will cover the drywall estimation process, from the initial measurements input to the final invoice creation.

1.2 Project Scope

The Drywall Estimation System is designed to provide support to the **Gulf Islands Consulting staff** by providing a faster project estimation process.

The Drywall Estimation System will improve drywall project estimation times and maintain the accuracy of current estimates. These include cost calculation and invoice creation. The project has a primary goal of reducing the time required to complete a drywall estimate and a secondary goal of maintaining the current estimate accuracy.

To accomplish these goals, the project will analyze the entirety of the estimation process to determine sub-processes that can be improved or eliminated. Given the non-technical background of **Gulf Islands Consulting's workers**, the project will pursue solutions that integrate into and improve the current process, rather than creating an entirely new process.

1.3 Glossary of Terms

Table 2: Glossary of Terms

| | |
|--------------------------|--|
| Drywall | A type of board used in the construction of internal walls and ceilings. |
| Framing | Fitting together components to create a defined shape and structure. |
| Building Materials | Materials used in the drywall installation process including but not limited to: drywall and insulation. |
| Quote | An approximation of the project cost calculated from the price and measurements of materials and labour costs. |
| Sage | Business assistance software used for generating and tracking invoices. |
| Slegg Building Materials | Building supply retailer located on Vancouver Island. |
| RONA | Retailer of home improvement and construction products and services. |
| Home Depot | Home improvement supplies retailing company. |
| Web Scrape | Extracting data from websites. |
| GIC | Gulf Islands Consulting. |
| Invoice | A finalized estimate in an emailable file type. |

1.4 References

- [1] Gulf Islands Consulting (22 Jan. 2019). Drywall Estimation System Request for Proposal [Online]. Available: <https://andysmit.github.io/SENG321/RFP-SENG321-Group4.pdf>. [Accessed 30 Jan. 2019].
- [2] Sage South Africa Pty Ltd. (2018). Sage One Invoicing [Online]. Available: <https://www.sage.com/za/products/accounting-software/sage-one-accounting/invoicing> [Accessed 5 Feb. 2019].
- [3] Government of BC (2019). *The Codes - Province of British Columbia* [Online]. Available: <https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/the-codes> [Accessed 5 Feb. 2019].
- [4] Islands Trust BC (24 Jan. 2019). *Gabriola Island Planning Bylaws* [Online]. Available: <http://www.islandstrust.bc.ca/islands/local-trust-areas/gabriola/bylaws/>. [Accessed 5 Feb. 2019].
- [5] City of Nanaimo (2018). *Bylaws Affecting Building Projects* [Online]. Available: <https://www.nanaimo.ca/property-development/building-permits/bylaws-for-building>. [Accessed 5 Feb. 2019].

1.5 Overview

There are **6 sections** and two appendices in this document. The following section, section 2, describes Gulf Islands Consulting's need for a new system to reduce the time to produce cost estimates of their potential projects and describes their current estimation process. System features that must be implemented with any proposed solution are highlighted in section 3. Section 4 covers the system's external interface requirements which is split into 4 parts: the user interface, the software interface, the hardware interface, and the communications interface. The **fifth section** breaks down the system's non-functional requirements into performance, safety, security, and quality requirements. Section 6 covers additional requirements requirements not covered in the previous sections. The first appendix contains outstanding questions regarding the current Gulf Islands Consulting Drywall Cost Estimation system are listed in this section. The second appendix, describes the formula that is currently used by Gulf Islands Consulting. Section 7 contains the analysis models for the system, including an entity relationship diagram, data flow diagrams 0, 1, and 2, and the use case model.

Inconsistent working

→ inconsistent w/ use
of oxford comma

2 Overall Description

2.1 Product Perspective

Currently, Gulf Islands Consulting measures and calculates the cost estimations of drywall installation using a measuring tape, pen-and-paper calculations and personal experience to determine a final estimate. Gulf Islands Consulting must also determine material price and stock data manually through internet searches or phone calls. These written calculations are then transferred into the Sage Invoice software to produce a final document for the customer [2].

The product being developed will streamline the cost estimation process by automating many of the manual cases including: price estimation, searching material costs, and the delivery of a price estimate to the customer.

2.2 Product Features

The system shall produce cost estimates for potential drywall work based on data entered by the user. The user will be able to input the pricing of the materials for calculation either manually or by letting the system web scrape hardware retailer websites to find the most current pricing on materials. The system will allow Gulf Islands Consulting to create and delete user profiles of the staff to allow for quick labour calculations. Finally, the system will produce a PDF version of the created invoice to send to the customers of Gulf Islands Consulting.

emailable document?

2.3 User Classes and Characteristics

Only staff members will have access to a potential software solution. Gulf Islands Consulting's two current staff members are drywallers with varying levels of experience. These staff members will share the 'Experienced Drywaller' user class.

2.3.1 The 'Experienced Drywaller' User Class

The 'Experienced Drywaller' user class is the only user class used for the system. Employees in the 'Experienced Drywaller' class should have one year or more of drywalling experience, and are the only Gulf Islands Consulting staff member who make estimates and use the system.

2.4 Operating Environment

A potential system must operate on PC and Android. Support should be given to all operating systems for these devices released in the last three years or the last release currently supported if a release has not occurred in the last 3 years. These operating systems include:

- Windows 10
- Android Version 9, 8, 7

2.5 Design and Implementation Constraints

A potential software solution must account for laws and regulations regarding drywall installation. These requirements are outlined in Safety Requirements - Section 5.2. Given the small maintenance budget, a potential solution must be maintainable from a system user with no programming experience and a general unfamiliarity with computers.

2.6 Assumptions and Dependencies

A-1: Experienced Drywallers have a basic knowledge of computer application use and the purpose of a potential solution system.

A-2: User inputs for cost estimations are correct regarding measurement and unit.

D-1: Retail websites specified for automated material price data scraping are accessible.

3 System Features

3.1 System Security and Access

3.1.1 Description and Priority

Allow an authenticated user to access the system functionalities.

Priority: Very High

3.1.2 Functional Requirements

R-F-01: Unauthenticated users cannot access the system functionalities.

3.1.3 Use Case(s) Associated with Feature or Functional Requirements

Table 3: Use Case 1: Login

| | |
|--------------------|--|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none">User is on the application login page |
| Steps | <ol style="list-style-type: none">User inputs login credentialsUser requests to loginSystem validates the entered user credentialsSystem displays application homepage |
| Success Conditions | <ul style="list-style-type: none">System homepage is displayed |
| Alternate Paths | <ol style="list-style-type: none">User account credentials are invalid.An invalid login error is returned.System displays login page. |

specify somewhere
just password

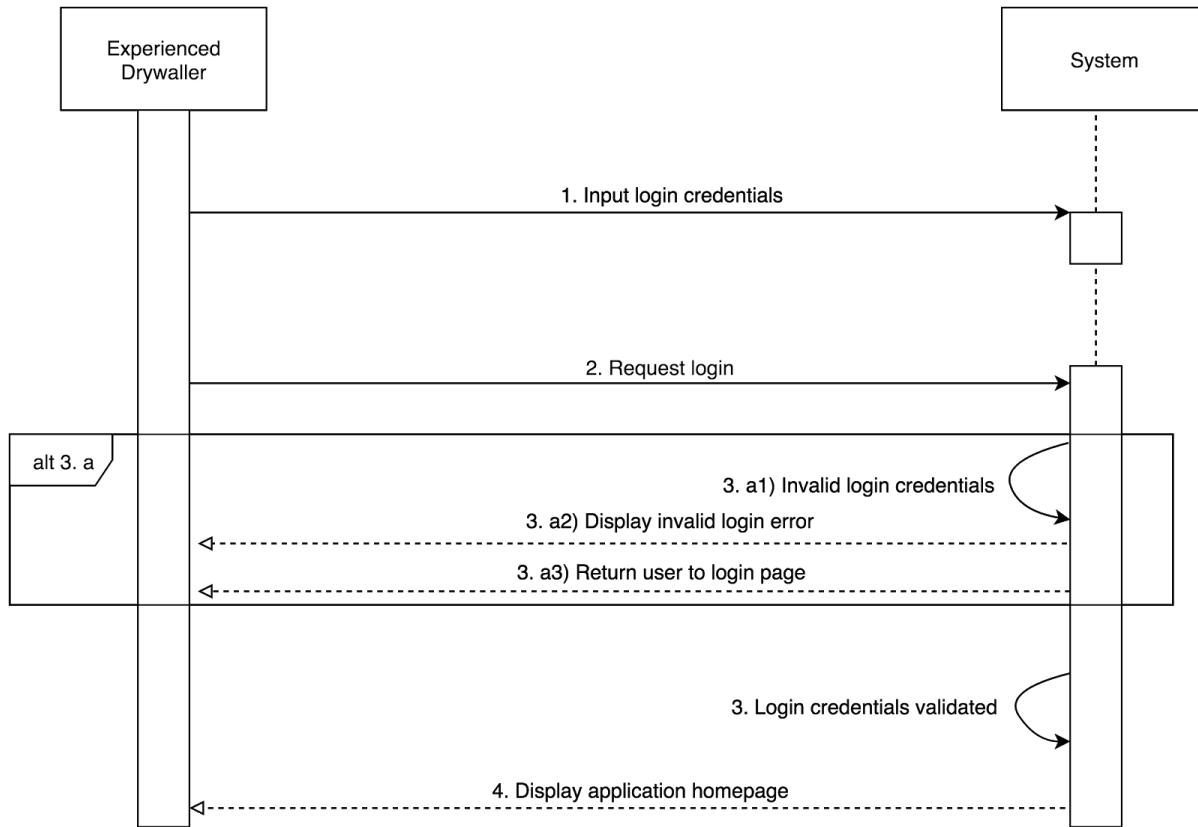


Figure 1: Sequence Diagram for Use Case 1

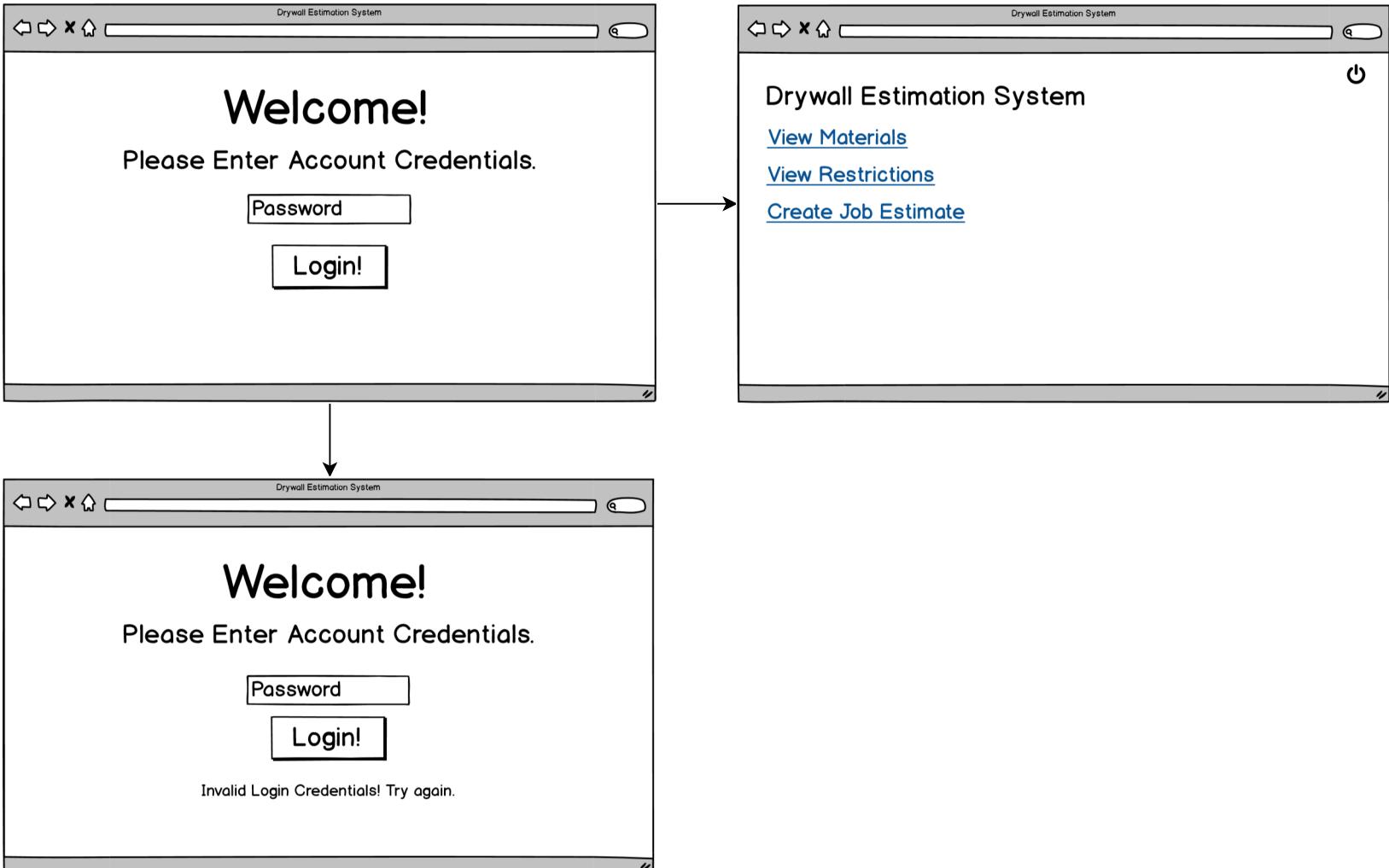


Figure 2: Storyboard for Use Case 1 (User Login)
The user enters login credentials and requests access.

Table 4: Use Case 2: Logout

| | | |
|--------------------|---|---|
| Actors | User (Experienced Drywaller) | consistency' |
| Preconditions | <ul style="list-style-type: none"> • User is logged in • User is on the application homepage | no valid account like in some use cases |
| Steps | <ol style="list-style-type: none"> 1. User requests to logout 2. System prompts user to confirm logout request 3. User confirms to logout 4. System displays login page | |
| Success Conditions | <ul style="list-style-type: none"> • User is logged out • The login page is displayed | |
| Alternate Paths | <ol style="list-style-type: none"> 3. a1) User requests to cancel logout 3. a2) System displays application homepage | |

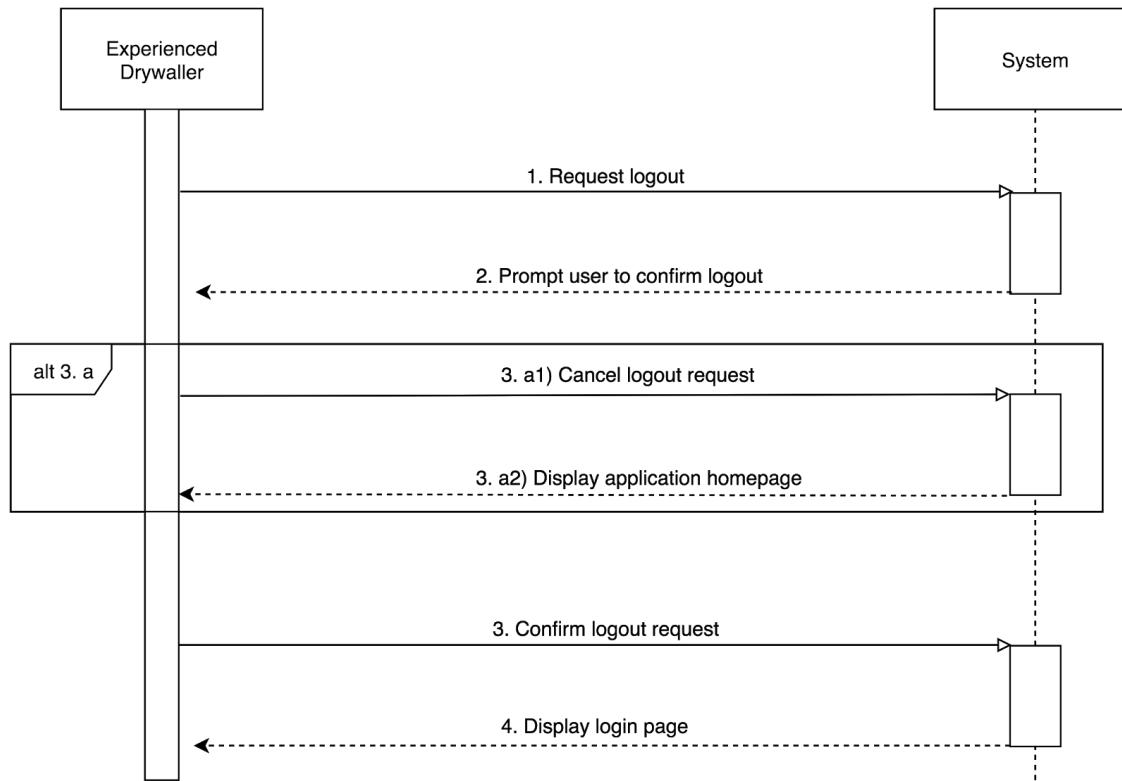


Figure 3: Sequence Diagram for Use Case 2

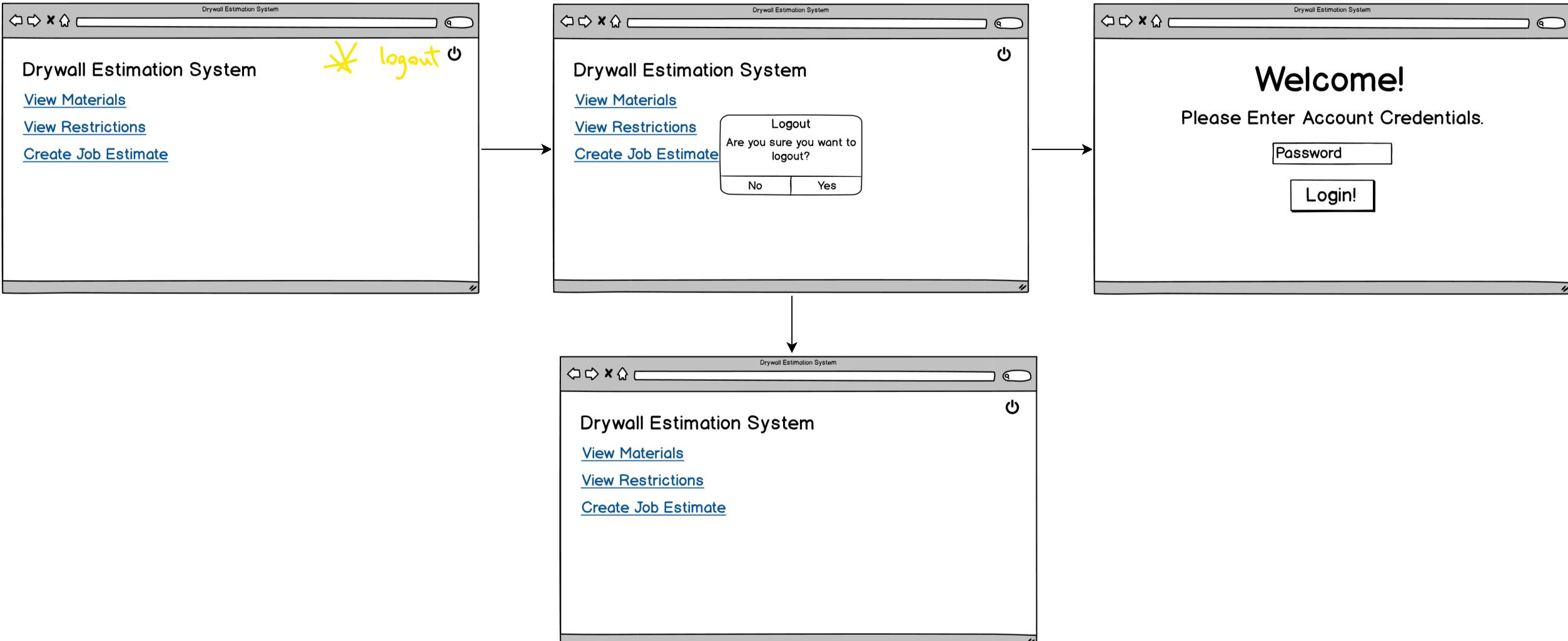


Figure 4 : Storyboard for Use Case 2 (User Logout)
The user requests to logout from the homepage.

3.2 Generating Drywall Project Estimate for Client

3.2.1 Description and Priority

Allow the user to input measurements of the job site, required materials, and estimated work hours needed. Each estimate is generated based off of the formula in Appendix B that considers the above factors and the cost of materials. Then, allow the user to format the price estimate into an invoice. The newly created invoice will be downloaded, and the user can then email the invoice to the client. This feature aims to reduce the user's reliance on a separate invoice formatting software such as Sage.

Priority: High

3.2.2 Functional Requirements

R-F-02: Cost estimates shall be produced based off of user inputted measurements.

R-F-03: Estimated employee working hours shall be inputted manually by the user.

R-F-04: The drywall estimation process shall be accessible through an internet connection.

may be
non-functional

R-F-05: Cost estimates shall be within a +/-10% range of the actual cost.

R-F-06: The user shall be able to make changes to the invoice prior to the finalization and approval of the invoice.

R-F-07: Inputted data shall be formatted to match the invoice template.

where do the templates
come from? specify

R-F-08: Generated invoices shall be emailable to the client.

3.2.3 Use Case(s) Associated with Feature or Functional Requirements

Table 5: Use Case 3: Generate and Download Invoice

| | |
|---------------|---|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none">User has a <u>valid account</u>User is logged inUser is on the application homepage |
| Steps | <ol style="list-style-type: none">User requests to create an estimateSystem displays the region selection pageUser selects region where the project is taking placeSystem displays any restrictions that apply to the selected areaSystem queries user for project attributesUser inputs project attributes. (<u>Dimensions</u>, material)User requests to generate a emailable estimate file |

didn't see
this option in
storyboard

| | |
|--------------------|--|
| | <p>8. A file preview of the completed estimate is displayed</p> <p>9. User requests download of the invoice file displayed</p> <p>10. The invoice file is downloaded</p> |
| Success Conditions | <ul style="list-style-type: none"> • Invoice file is successfully generated and downloaded |
| Alternate Paths | <p>6. a1) User requests to input a material which has fields that have been manually overwritten by the user previously</p> <p>6. a2) System displays project attribute list with requested non editable manually overwritten job attributes</p> <p>7. a1) User requests to cancel</p> <p>7. a2) User is returned to the homepage</p> <p>8. a1) The system displays an error message indicating either not all necessary fields are filled in.</p> <p>8. a2) The system indicates all necessary fields that still require input</p> <p>8. a3) The user is returned to Step 5</p> |

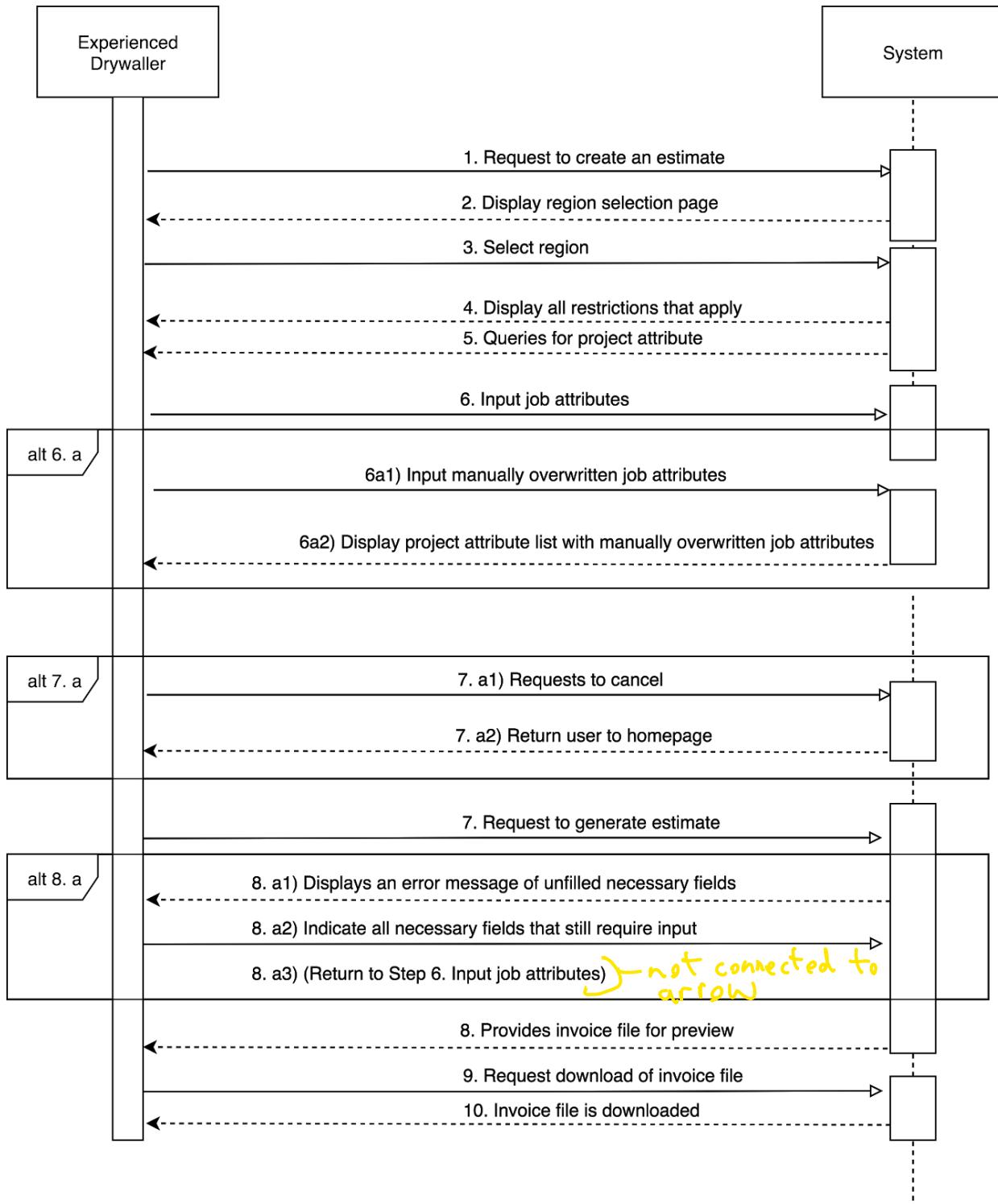


Figure 5: Sequence Diagram for Use Case 3

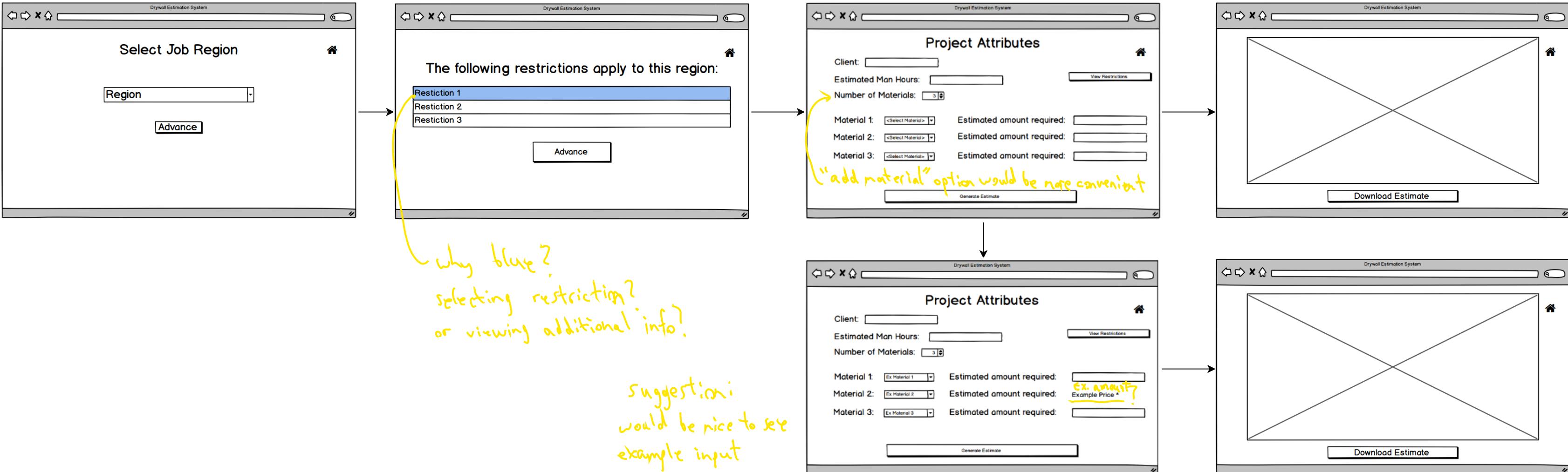


Figure 6: StoryBoard for Use Case 3 (User Generates and Downloads Invoice)

The user requests to generate and download an Invoice Estimate after entering project information.

3.3 Maintain an Inventory of Materials

3.3.1 Description and Priority

Materials and their corresponding pricing data is critical to produce the drywall cost estimate given the formula used, which is outlined in Appendix 1. These prices will come from user-defined building material website URLs, but will also allow for the override of these prices by manually inputting a price for the material.

Priority: High

3.3.2 Functional Requirements

R-F-09: The user shall be able to access an inventory of materials.

R-F-10: Each material shall allow for a URL from which pricing data can be automatically retrieved.

R-F-11: The user shall be able to view each material's name, price, supplier, URL, and notes.

R-F-12: The user shall be able to edit the attributes of materials in the inventory, including the price, using manual override.

R-F-13: The user shall be able to add new materials to the inventory.

R-F-14: The user shall be able to delete materials from the inventory.

3.3.3 Use Case(s) Associated with Feature or Functional Requirements

Table 6: Use Case 4: View Material

| | |
|--------------------|---|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none">User is logged inUser is on the application homepage |
| Steps | <ol style="list-style-type: none">User requests list of materialsSystem displays list of materialsUser requests for details on the desired material (from the displayed list)System displays details of desired material |
| Success Conditions | <ul style="list-style-type: none">Details of desired material is displayed |
| Alternate Paths | N/A |

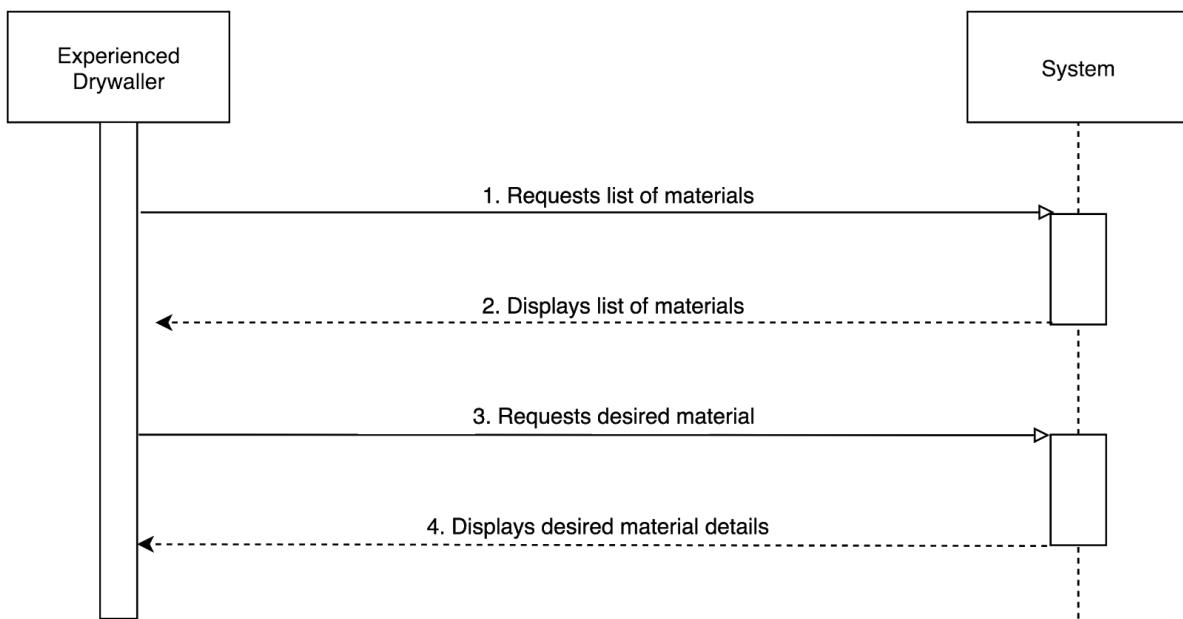


Figure 7: Sequence Diagram for Use Case 4

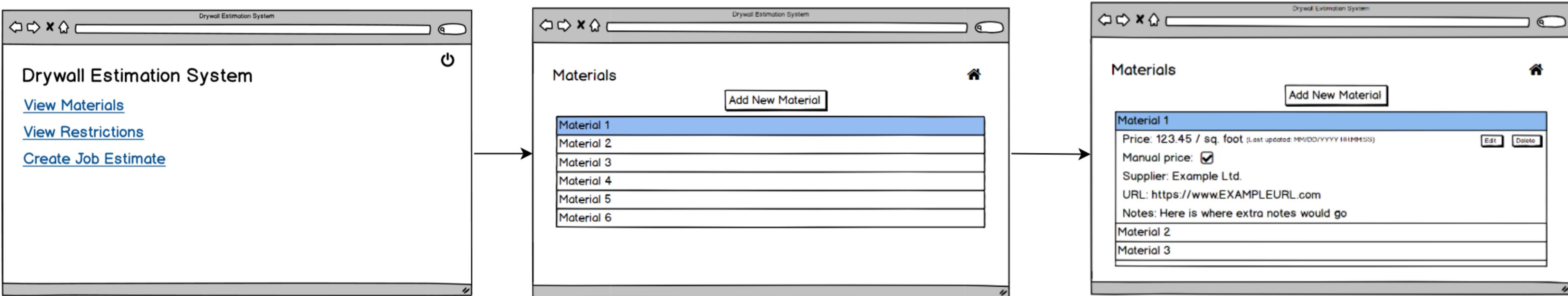


Figure 8: Storyboard for Use Case 4 (View Material)

The user begins at the home page, views the list of materials, then views an individual material's attributes.

Table 7: Use Case 5: *Edit Material*

| | |
|--------------------|--|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none">• User is logged in• User is on the application homepage |
| Steps | <ol style="list-style-type: none">1. User requests for list of materials2. System displays list of available materials3. User requests for details on the desired material4. System displays details of desired material5. User requests to edit desired material6. System queries user for edits to desired material7. User inputs desired edits8. User requests to save changes9. User is returned to an updated list of materials |
| Success Conditions | <ul style="list-style-type: none">• Details of desired material are updated• System displays the updated list of materials |
| Alternate Paths | <ol style="list-style-type: none">8. a1) User requests to cancel edits8. a2) User is returned to a list of materials |

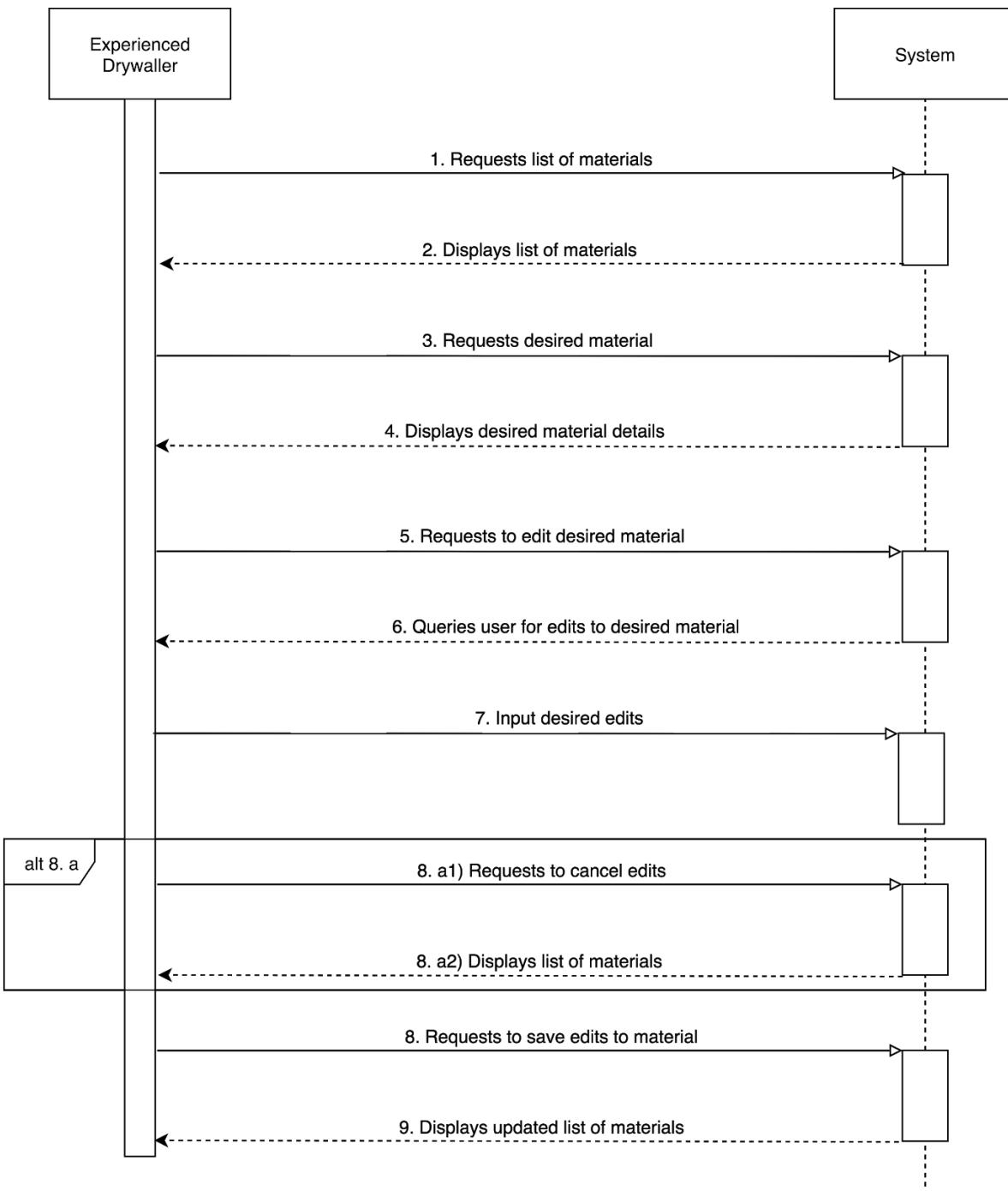


Figure 9: Sequence Diagram for Use Case 5

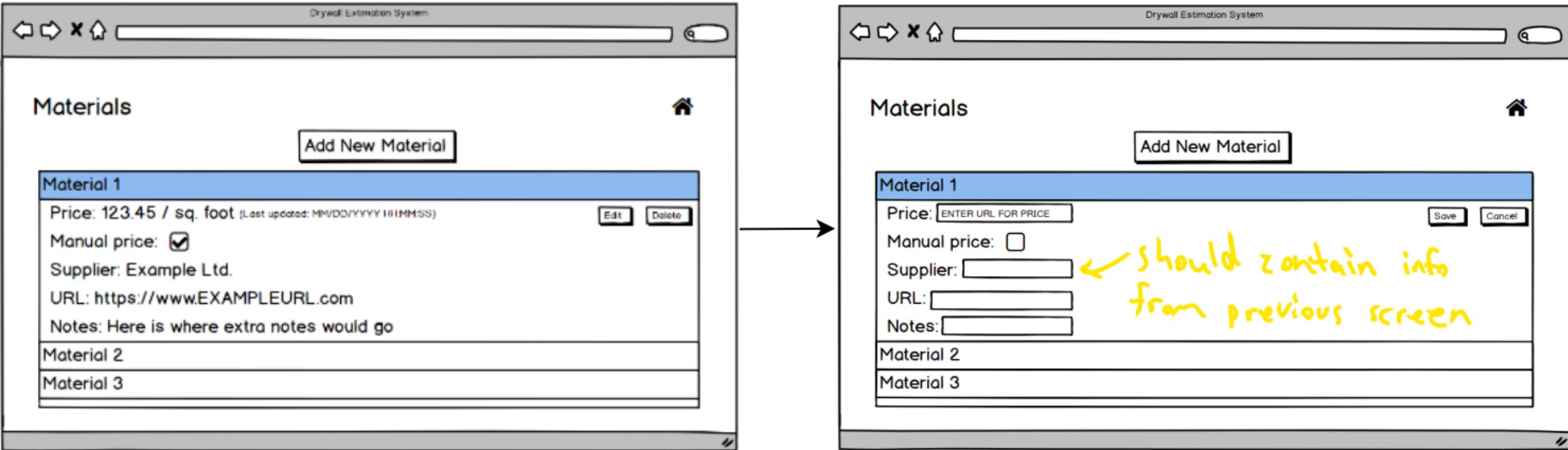


Figure 10: Storyboard for Use Case 5 (Edit Material)

The user views an individual material's attributes, selects the edit button, and is prompted to fill in new values

Table 8: Use Case 6: Delete Material

| | |
|--------------------|---|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none">• User is logged in• User is on the application homepage |
| Steps | <ol style="list-style-type: none">1. User requests for list of materials2. System displays list of available materials3. User requests for details on the desired material4. System displays details of desired material5. User requests to delete the material6. User is prompted to confirm the deletion of material7. User confirms to delete material8. System deletes material from list of materials9. User is returned to an updated list of materials |
| Success Conditions | <ul style="list-style-type: none">• Material is successfully deleted |
| Alternate Paths | <ol style="list-style-type: none">7. a1) User requests to cancel deletion7. a2) User is returned to the details of the selected material |

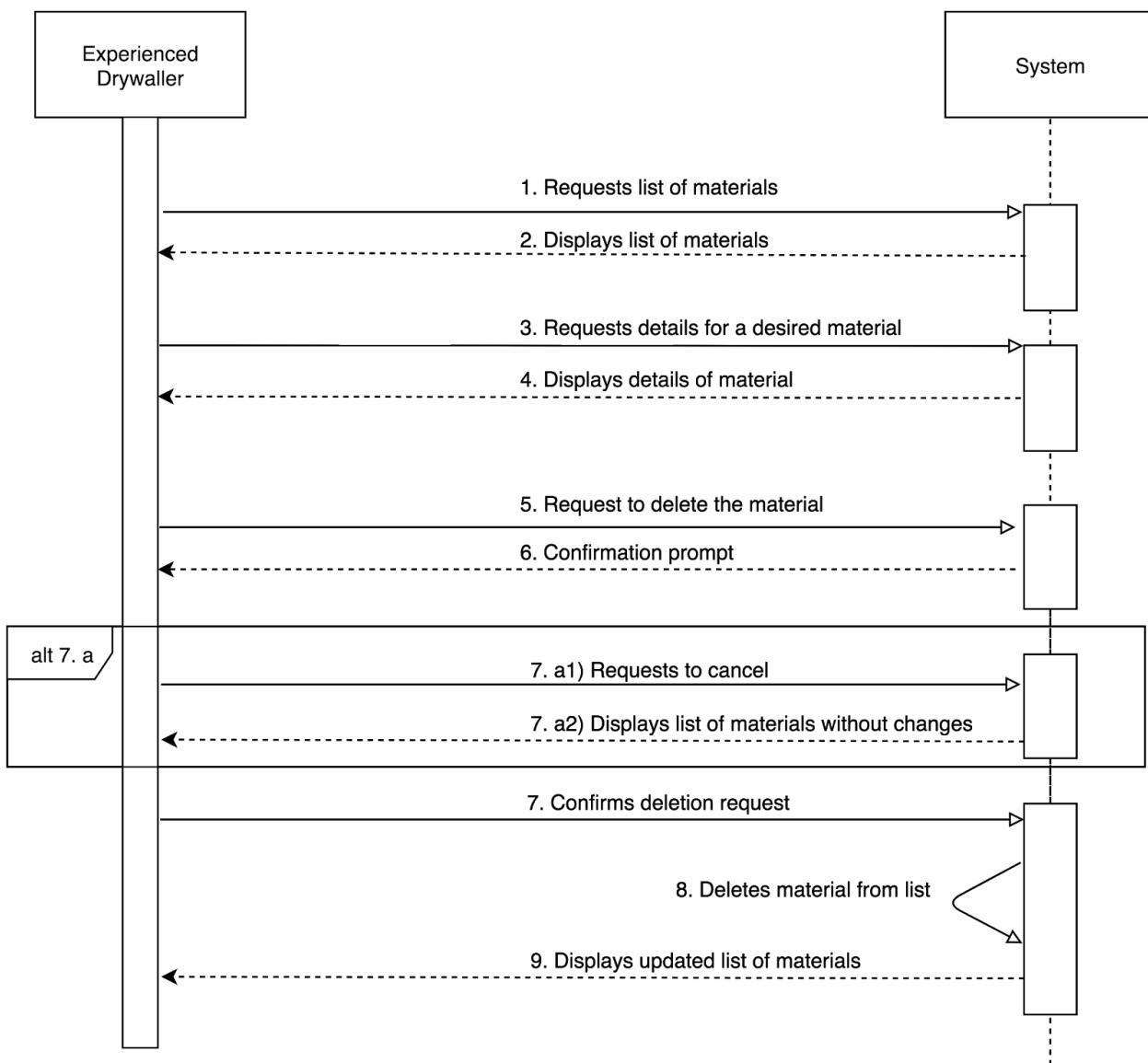


Figure 11: Sequence Diagram for Use Case 6

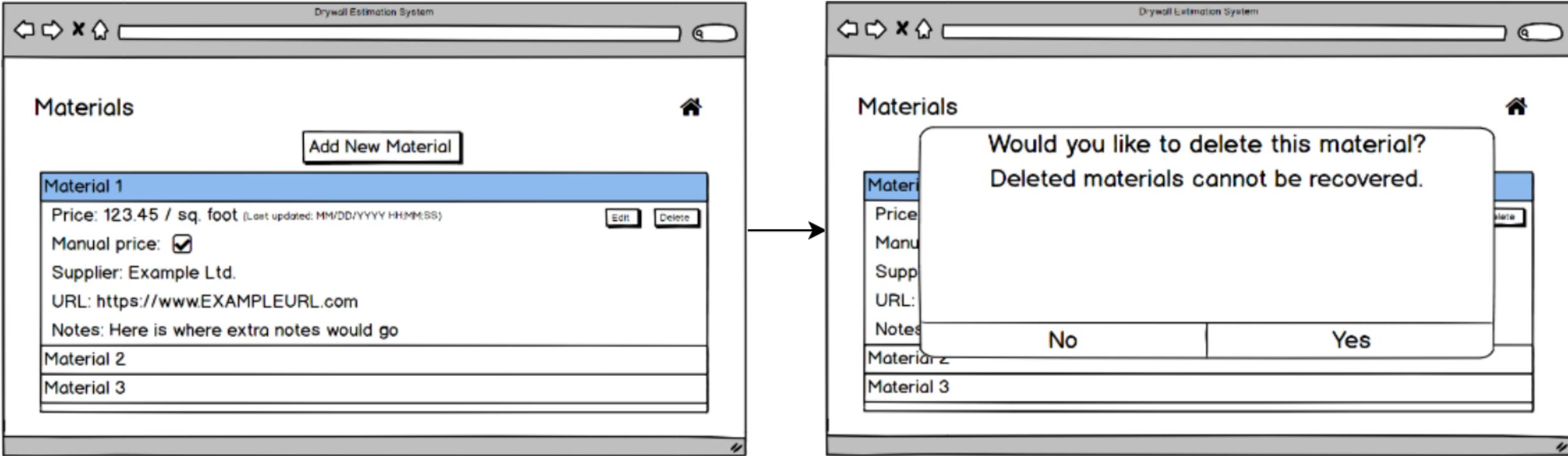


Figure 12: Storyboard for Use Case 6 (Delete Material)

The user views an individual material, selects the delete button, and is prompted to confirm their deletion

Table 9: Use Case 7: Add Material

| | |
|--------------------|---|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none"> • User has a valid account • User is logged in • User is on the application homepage |
| Steps | <ol style="list-style-type: none"> 1. User requests for list of materials 2. System displays list of available materials 3. User requests to add a new material 4. System queries user for material attributes 5. User fills in material attributes? Consistency 6. User requests to save changes 7. System adds new material into list of materials 8. User is returned to an updated list of materials |
| Success Conditions | <ul style="list-style-type: none"> • The new material is added to the system |
| Alternate Paths | 6. a1) User requests to cancel 6. a2) User is returned to the list of materials |

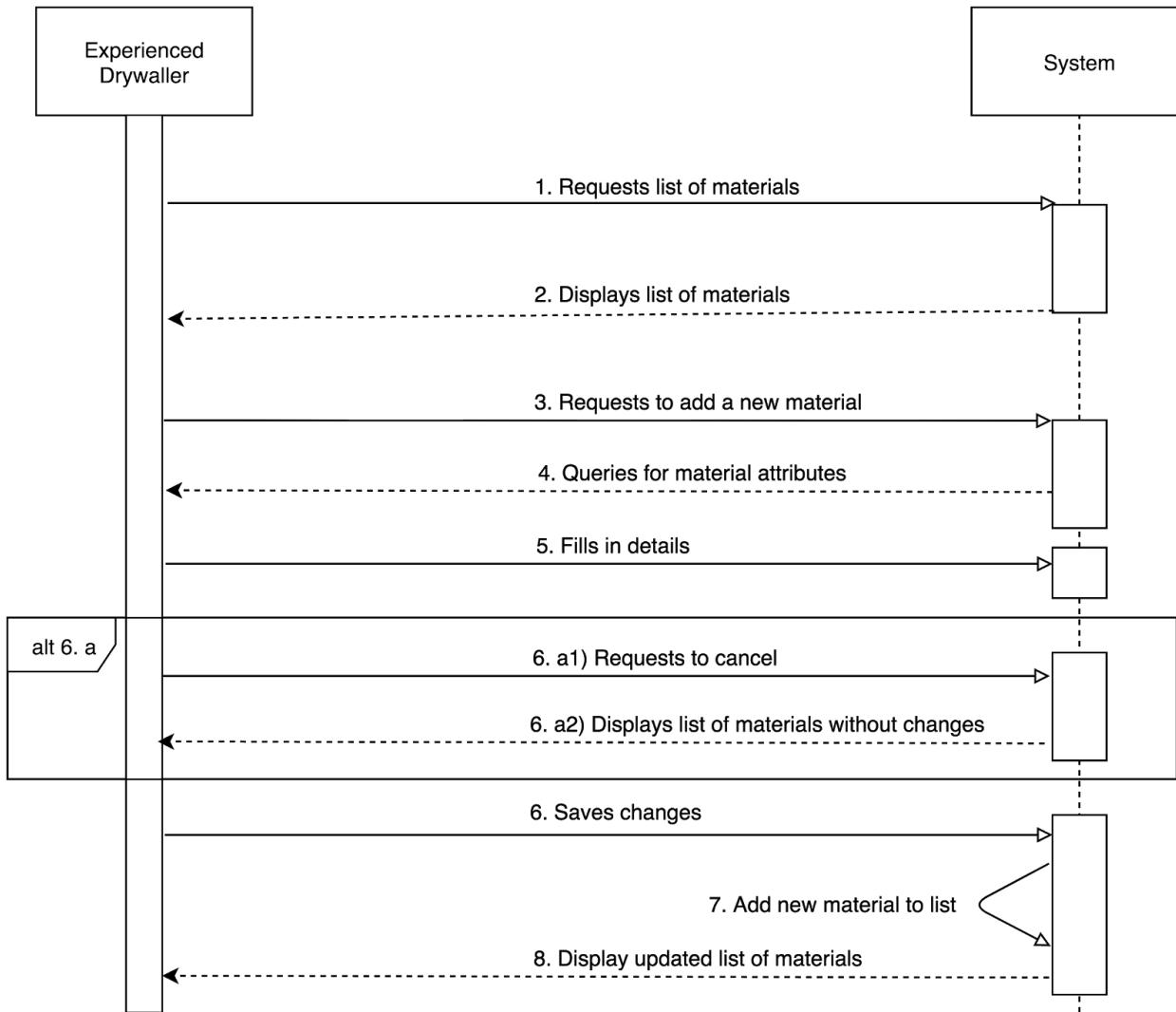


Figure 13: Sequence Diagram for Use Case 7

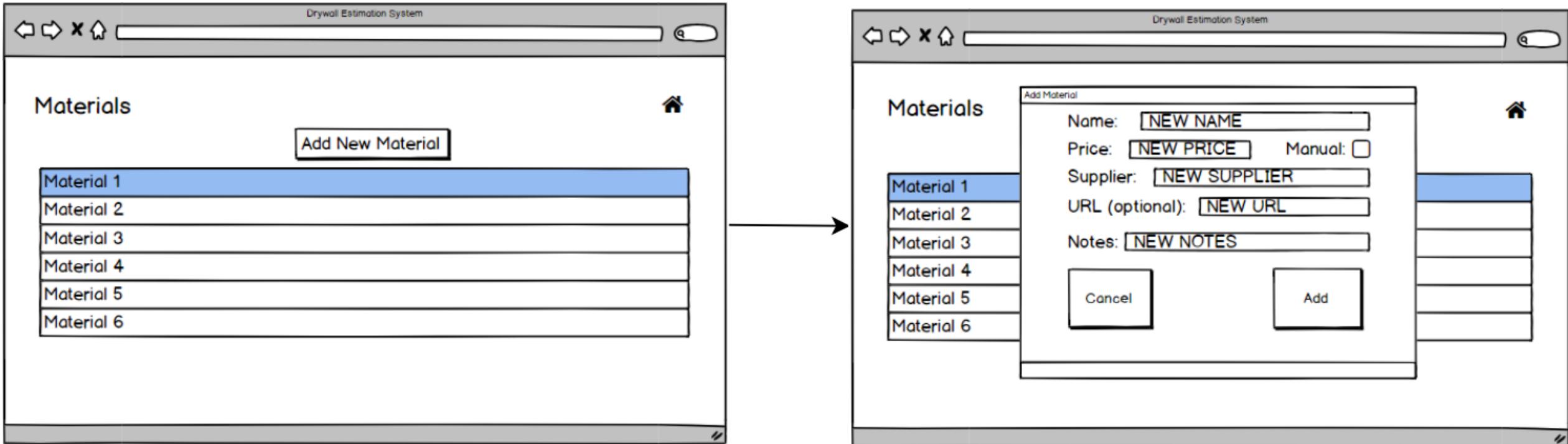


Figure 14: StoryBoard for Use Case 7 (Add Material)

The user views the materials list, selects the add new material button, and is prompted to define a new material and add it

3.4 Maintain an Inventory of Applicable Input-Restricting Legislation

3.4.1 Description and Priority

The system shall store an editable list of input-restricting legislation in the database. The system will then have the option to allow user to view the restriction list. At the beginning of each estimation, the user will see a list of all applicable legislative restrictions for the current estimation geographic region. This will **not restrict user inputs**, leaving the onus on the user themselves to follow each restriction.

Priority: Medium

3.4.2 Functional Requirements

R-F-15: The system shall store a database of input-restricting legislation.

R-F-16: The user shall be able to update the list of restrictions.

R-F-17: The system shall display the list of input-restricting legislation to the user prior to the start of an estimation.

3.4.3 Use Case(s) Associated with Feature or Functional Requirements

Table 10: Use Case 8: *View Input-Restricting Legislation*

| | |
|--------------------|---|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none">• User has a valid account• User is logged in• User is on the application homepage |
| Steps | <ol style="list-style-type: none">1. User requests to view the list of restrictions2. System returns a list of previously entered restrictions3. User requests for details on the desired restriction4. System displays details of desired restriction |
| Success Conditions | <ul style="list-style-type: none">• Details of desired restriction is displayed |
| Alternate Paths | N/A |

consider removing or reworking)
altudes to contradiction

contradict

legislation can glide over
input instead of restrict

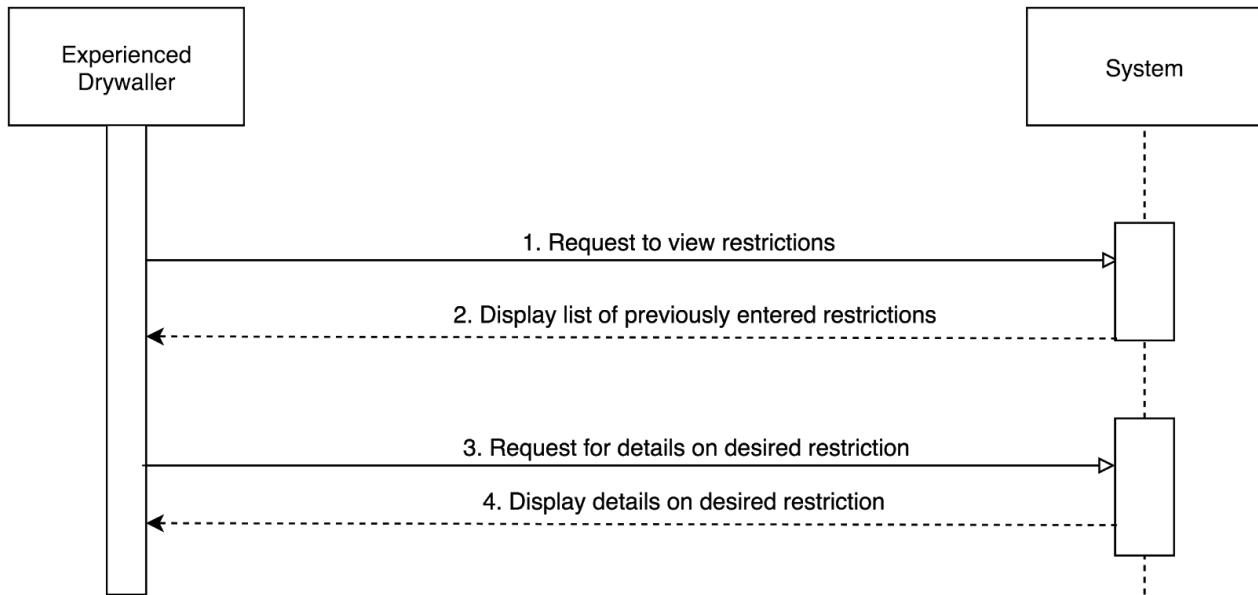


Figure 15: Sequence Diagram for Use Case 8

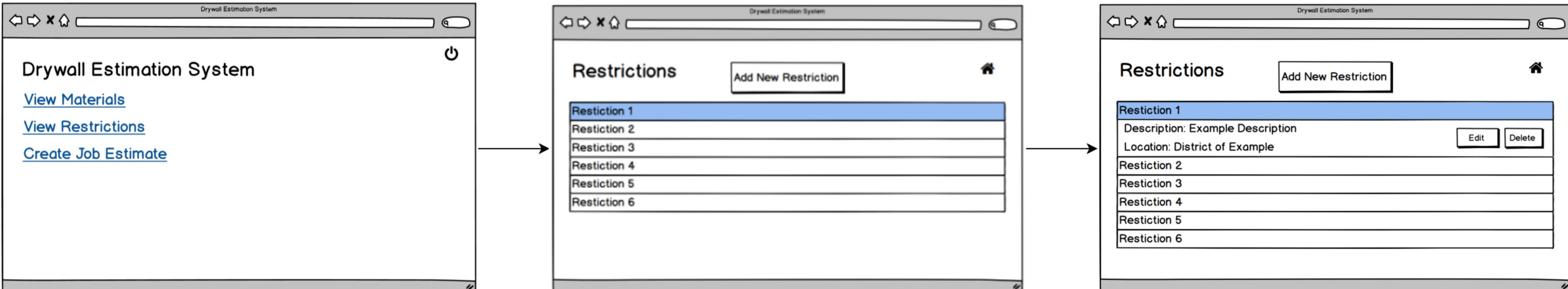


Figure 16: Storyboard for Use Case 4 (View Restriction)

The user begins at the home page, views the list of restrictions, then views an individual restrictions' attributes.

Table 11: Use Case 9: Edit Input Restricting Legislation

| | |
|--------------------|--|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none"> • User has a valid account • User is logged in • User is on the application homepage |
| Steps | <ol style="list-style-type: none"> 1. User requests to view the list of restrictions 2. System displays list of previously entered restrictions 3. User selects the desired restriction to modify 4. User requests to edit restriction 5. System queries user for restriction edits 6. User inputs edits to restriction 7. User requests to save the changes 8. System saves changes 9. User is returned to the list of restrictions system displays details? |
| Success Conditions | <ul style="list-style-type: none"> • List of restrictions is updated to reflect the changes made |
| Alternate Paths | <ol style="list-style-type: none"> 6. a1) User requests to cancel changes 6. a2) User is returned to the list of restrictions |

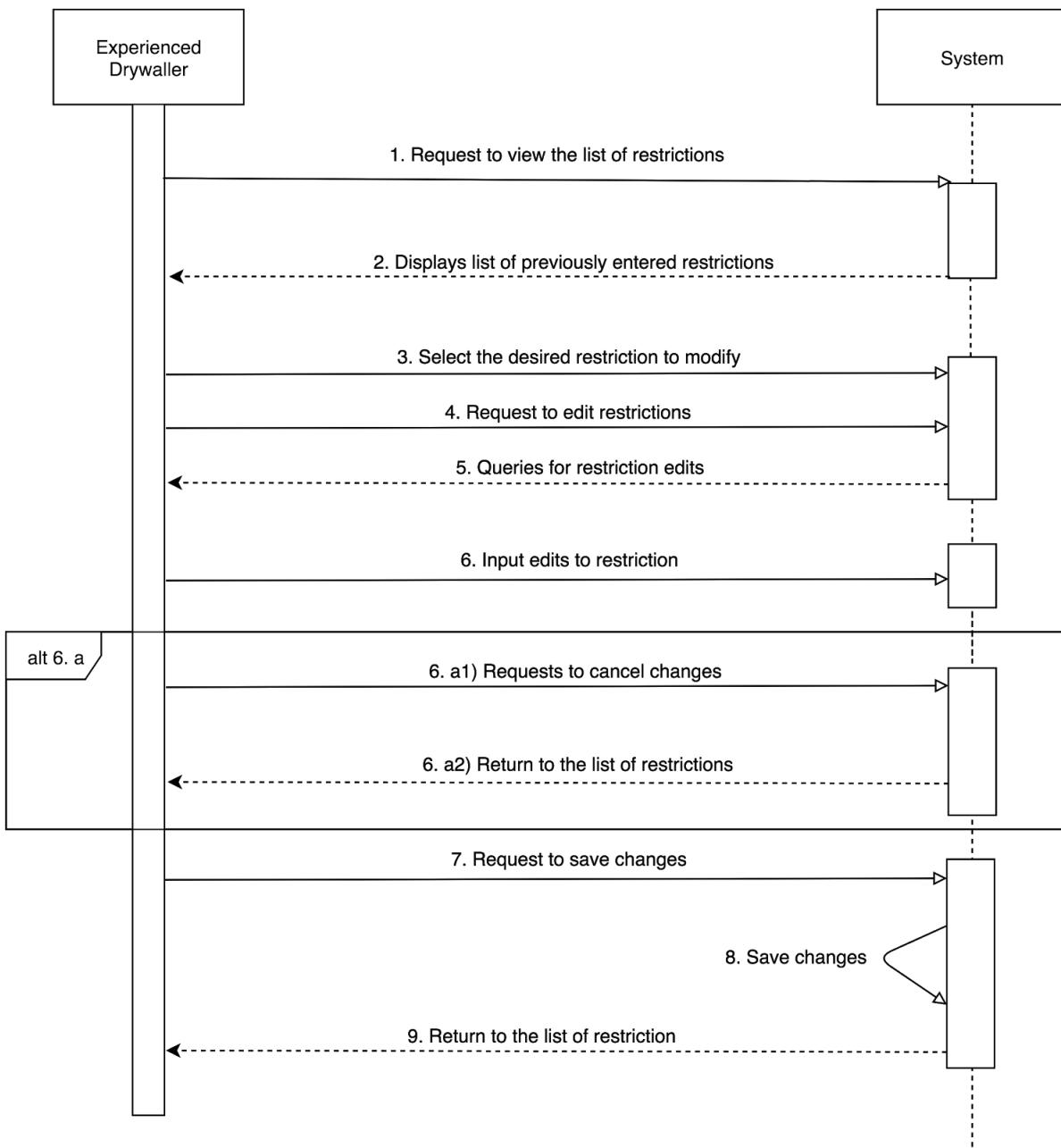


Figure 17: Sequence Diagram for Use Case 9

The storyboard illustrates the transition from viewing a restriction's attributes to editing them. In the first state, the user views 'Restriction 1' with fields for 'Description' and 'Location'. In the second state, after selecting the 'Edit' button, the 'Description' field is highlighted and contains the previous input 'Example Description', with handwritten notes indicating it 'should contain previous inputs'.

Drywall Estimation System

Restrictions

Add New Restriction

Home

Restriction 1

Description: Example Description

Location: District of Example

Edit Delete

Restriction 2

Restriction 3

Restriction 4

Restriction 5

Restriction 6

Drywall Estimation System

Restrictions

Add New Restriction

Home

Restriction 1

Description:

Location: Region

Save Cancel

Restriction 2

Restriction 3

Restriction 4

Restriction 5

Restriction 6

Should contain previous inputs

Figure 18: Storyboard for Use Case 9 (Edit Restriction)

The user views an individual restriction's attributes, selects the edit button, and is prompted to fill in new values

Table 12: Use Case 10: Delete Input-Restricting Legislation

| | |
|--------------------|--|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none"> • User has a valid account • User is logged in • User is on the application homepage |
| Steps | <ol style="list-style-type: none"> 1. User requests to view the list of restrictions 2. System displays list of previously entered restrictions 3. User selects the desired restriction to delete 4. User requests to delete selected material 5. System prompts user for confirmation 6. User requests to confirm the deletion 7. System deletes restriction 8. User is returned to the list of restriction |
| Success Conditions | <ul style="list-style-type: none"> • The requested restriction is deleted from the list |
| Alternate Paths | <ol style="list-style-type: none"> 6. a1) User requests to cancel the deletion 6. a2) User is returned to the list of restrictions |

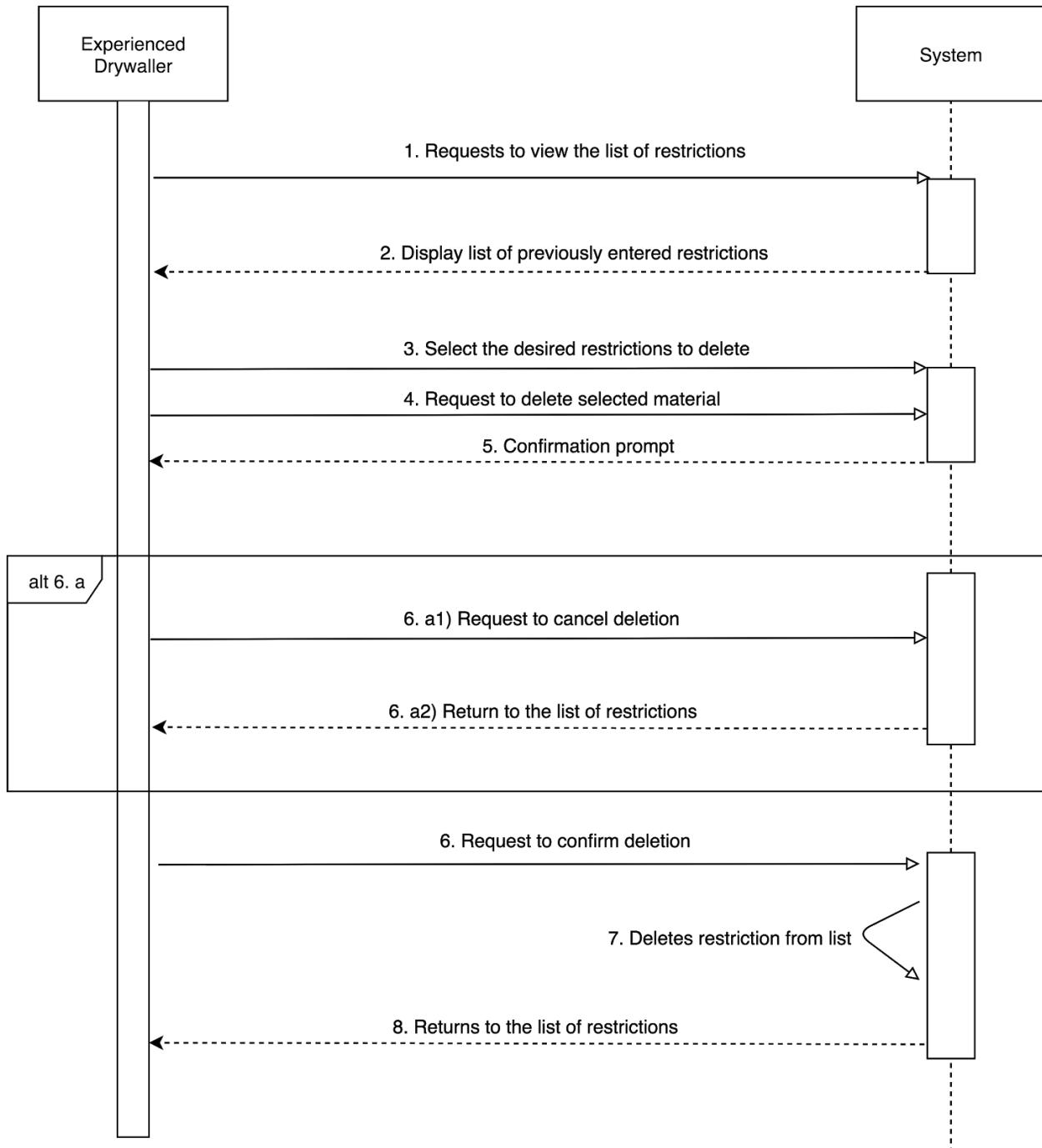


Figure 19: Sequence Diagram for Use Case 10

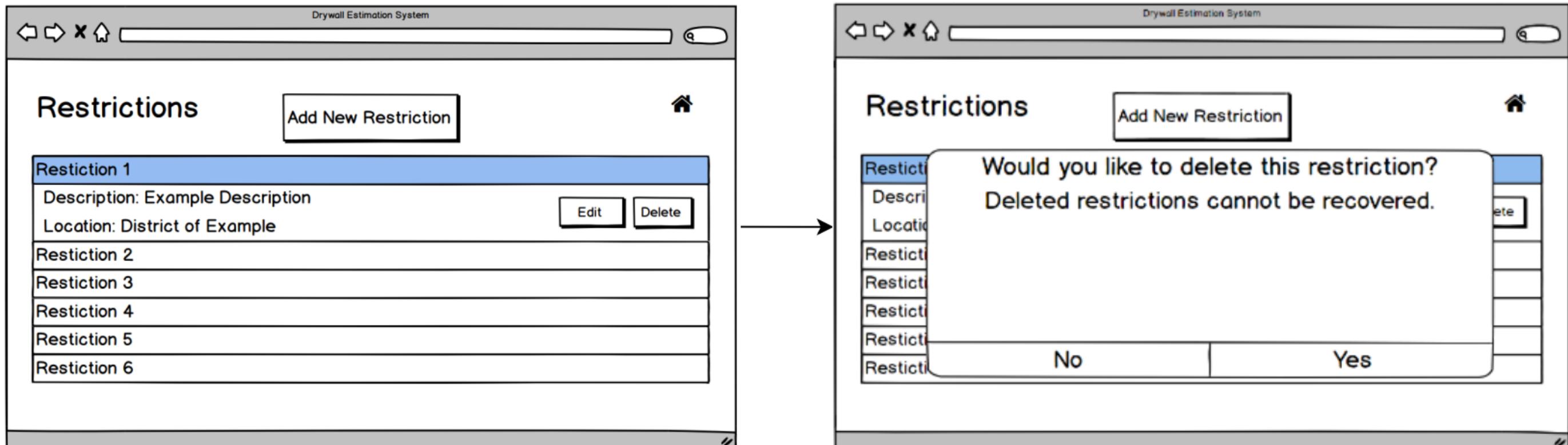


Figure 20 : Storyboard for Use Case 10 (Delete Input-Restricting Legislation)
The user selects a desired restriction to delete, and the system prompts for a confirmation.

Table 13: Use Case 11: Add Input-Restricting Legislation

may be better to list "add" after "view legislation"

| | |
|--------------------|---|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none">• User has a valid account• User is logged in• User is on the application homepage |
| Steps | <ol style="list-style-type: none">1. User requests to view the list of restrictions2. System displays list of previously entered restrictions3. User requests to add a new restriction4. System queries user for new restriction details5. User inputs new restriction data6. User requests to save the new restriction7. System adds new restriction to list of restrictions8. User is returned to the list of restrictions |
| Success Conditions | <ul style="list-style-type: none">• The new restriction is added to the list of restrictions |
| Alternate Paths | <ol style="list-style-type: none">6. a1) User requests to cancel adding new restriction6. a2) User is returned to the list of restrictions |

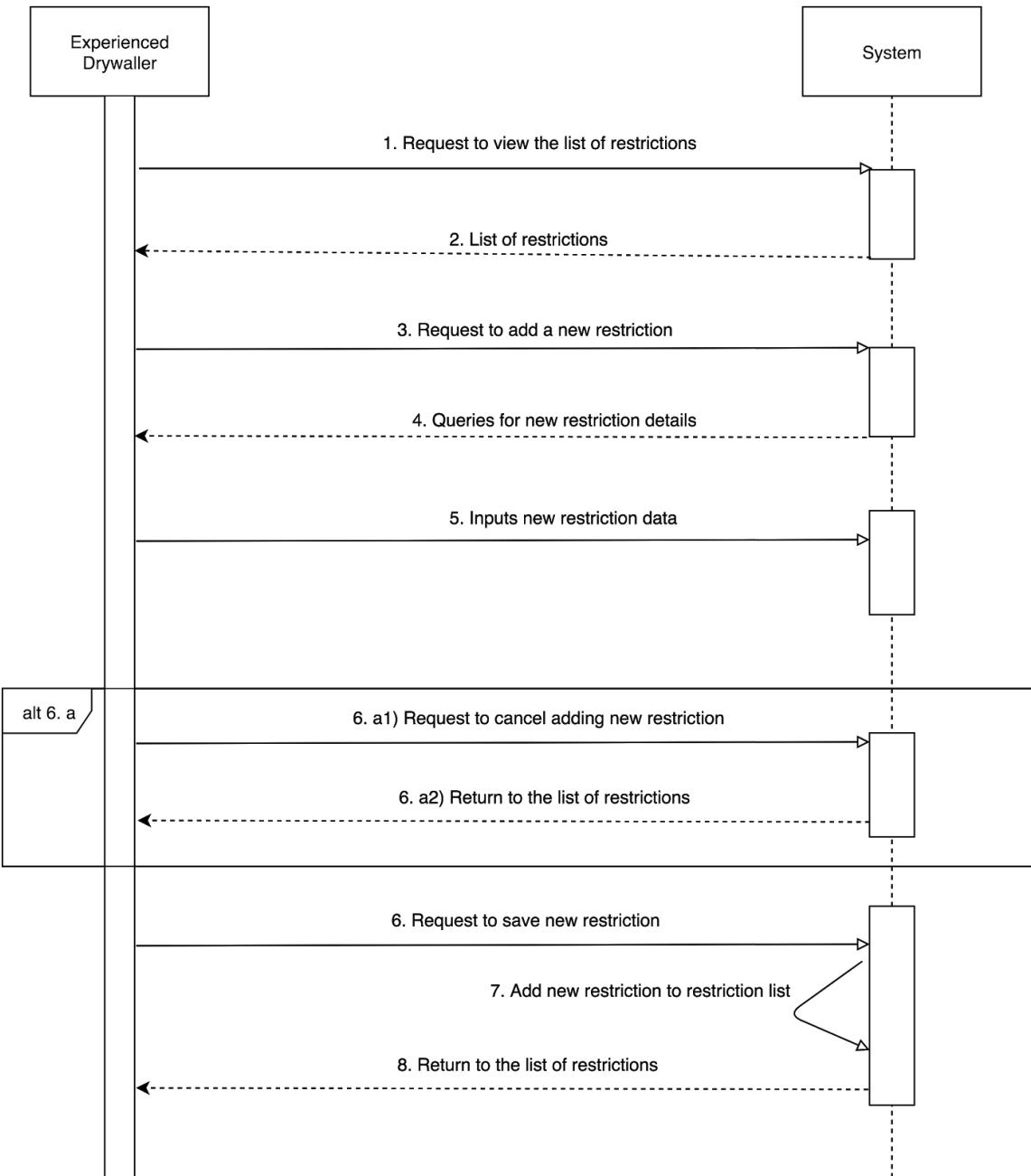
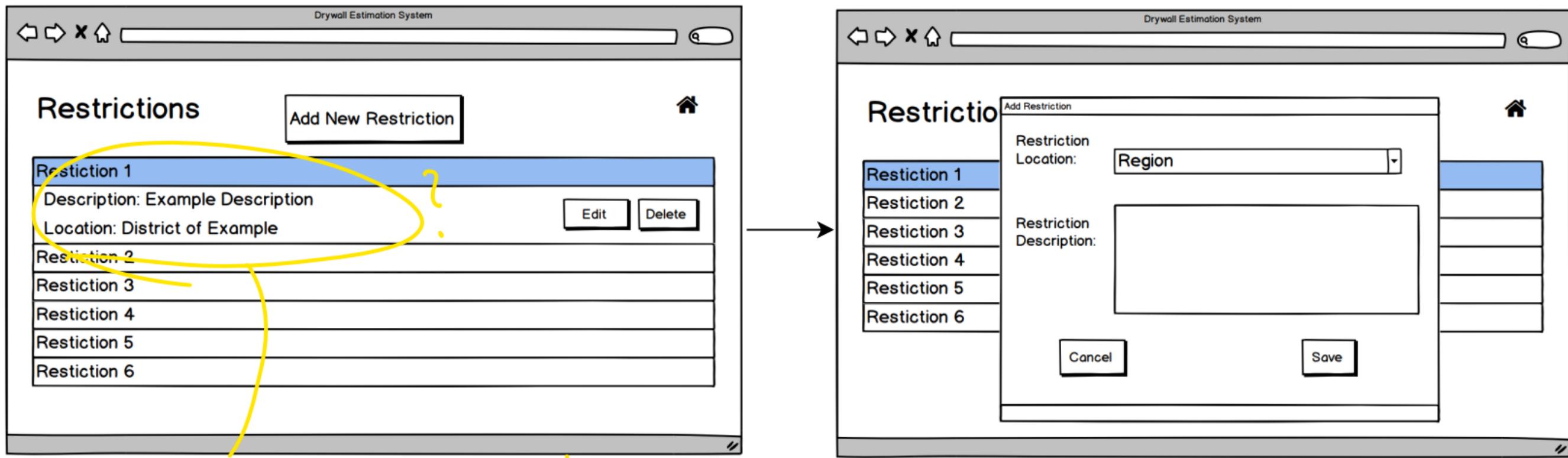


Figure 21: Sequence Diagram for Use Case 11



Why is pre-existing restriction
displaying additional info if not selected?

Figure 22 : Storyboard for Use Case 11 (Add Restriction)
The user requests to add a restriction.

3.5 System Interface Efficiency

3.5.1 Description and Priority

Allow the user to perform tasks more efficiently.

Priority: Low

3.5.2 Functional Requirements

R-F-18: Navigating to the homepage from any page requires maximum of 2 button inputs.

3.5.3 Use Case(s) Associated with Feature or Functional Requirements

Table 14: Use Case 12: Return to Homepage

| | |
|--------------------|--|
| Actors | User (Experienced Drywaller) |
| Preconditions | <ul style="list-style-type: none">• User has a valid account• User is logged in• User is on any page in the application |
| Steps | <ol style="list-style-type: none">1. User requests to return to the homepage2. System displays the homepage |
| Success Conditions | <ul style="list-style-type: none">• System homepage is displayed |
| Alternate Paths | <ol style="list-style-type: none">2. a1) System prompts for confirmation if any unsaved changes will be lost2. a2) User confirms to return to the homepage2. a3) System discards changes and displays the homepage2. b1) System prompts for confirmation if any unsaved changes will be lost2. b2) User cancels the request to return to the homepage2. b3) User is returned to the page that the user was originally in |

ambiguous wording:
“return to homepage”
can be interpreted
as request or action

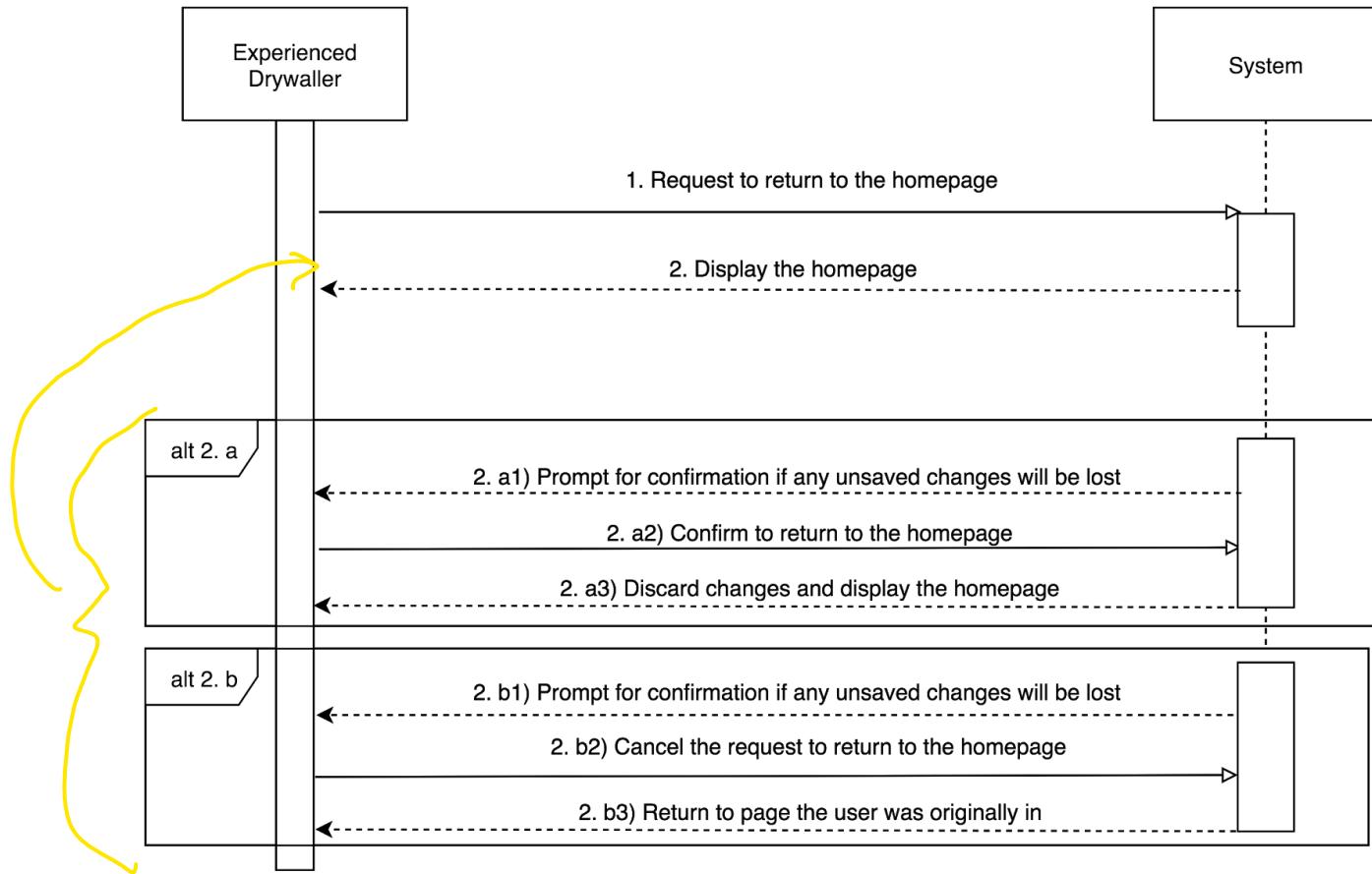


Figure 23: Sequence Diagram for Use Case 12

alternate paths
happen before homepage is displayed

Drywall Estimation System

Project Attributes

Client:

Estimated Man Hours:

Number of Materials: 3

Material 1: Ex Material 1 Estimated amount required:

Material 2: Ex Material 2 Estimated amount required: Example Price *

Material 3: Ex Material 3 Estimated amount required:

Drywall Estimation System

Project Attributes

Client: Client 1

Estimated Man Hours: 5

Number of Materials:

Material 1: Material 1 Required: 3

Material 2: Material 2 Required: 4

Material 3: Material 3 Required: 5

Return to Homepage?
Any unsaved changes
will be lost.

No Yes

Figure 24 : Storyboard for Use Case 12 (Return to Homepage)
User requests to return to homepage.

4 External Interface Requirements

4.1 User Interfaces

4.1.1 Description and Priority

The user interface must be designed to maximize the learnability and productivity of the system. This will reduce time spent on learning the system and provide a satisfactory user experience.

Priority: Medium

4.1.2 External Interface Requirements

R-EI-01: If the user provides an invalid input, the user is immediately notified.

R-EI-03: The user shall be able to efficiently navigate the GUI.

*might want to add to
glossary*

R-EI-04: The user shall be prompted for input.

R-EI-05: The user shall be able to edit any inputted data up to the point of estimate completion.

4.2 Hardware Interfaces

4.2.1 Description and Priority

The system must be built such that it is compatible with computers and mobile phones as defined in Section 2.4.

Priority: Low

4.2.2 External Interface Requirements

R-EI-06: The system layout shall be functional with all aspect ratios of the following monitor displays: 5:4, 4:3, 16:10, 16:9.

R-EI-07: The system shall support touch-screen input.

R-EI-08: The system shall support keyboard and mouse inputs.

4.3 Software Interfaces

4.3.1 Description and Priority

The system is required to be compatible with any software that ~~are~~ is currently used by Gulf Islands Consulting. Common file types should also be supported. Finally, the system must be compatible with all devices running the operating environment defined in section 2.4.

Priority: Medium

4.3.2 External Interface Requirements

R-EI-09: The system shall be able to extract building materials price information from retail websites specified by the user.

R-EI-10: Pricing data shall be imported from user-specified file types.

R-EI-11: The system shall export a detailed price quote as an emailable file.

R-EI-12: The system shall be compatible with any operating system versions released within the past 3 years (Android 7.0+, Windows 10).

4.4 Communications Interfaces

There are none at this time.

Consider removing
if nothing in section

5 Other Non-Functional Requirements

5.1 Performance Requirements

5.1.1 Description and Priority

The current estimation process for Gulf Island Consulting takes approximately 4 hours according to Gulf Island Consulting's customer's estimates. This process includes measurement, calculation, and invoice completion. The system should reduce the time taken by the complete process to half of what it currently is.

Priority: Medium

average

5.1.2 Non-functional Requirements

R-NF-01: The average estimation time, measured from the time the contractor logs onto the website to the time that the quote is finalized, shall last no longer than 2 hours.

5.2 Safety Requirements

sounds too definitive considering subject is the average time

5.2.1 Description and Priority

Drywall projects undergone by Gulf Islands Consulting take place in BC, primarily in the Gabriola Islands, and Nanaimo and must comply to all applicable laws. This always includes the BC Building, Fire, and Plumbing codes [3], and often will include local municipal bylaws, dependent on location.

Priority: Medium

5.2.2 Non-functional Requirements

R-NF-02: All estimations shall be compliant to the BC Building, Fire, and Plumbing Codes [3].

R-NF-03: All estimations shall be compliant to all municipal bylaws that govern drywall installation [4,5].

R-NF-04: In cases of conflict between BC code and municipal bylaws, the municipal bylaws shall take precedence over the BC code.

R-NF-05: All regulations that restrict user input values shall be made apparent to the user of the system.

affect

5.3 Security Requirements

5.3.1 Description and Priority

Currently, only the owner of Gulf Islands Consulting calculates drywall project estimates. However, it would be of benefit for all Gulf Islands Consulting staff to be able to complete estimates, thus a verification process should be in place to ensure only qualified staff may access and utilize the system.

Priority: Medium

5.3.2 Non-functional Requirements

R-NF-06: No individual, other than approved Gulf Islands Consulting staff with the authentication credentials, shall be able to access the system.

5.4 Software Quality Attributes

5.4.1 Description and Priority

The numbers used in drywall project estimation, including material cost and labor cost are subject to change at any time. Similarly, the provincial regulations that apply to drywall installation are typically updated yearly, while municipal bylaws can be updated multiple times per year. Therefore, it is important to allow these values within the system to be fluid. As well, errors in both regulation compliance and estimation results are possible, therefore the logging and correction of both is necessary.

Priority: Medium

5.4.2 Non-functional Requirements

R-NF-07: All automatically updated prices for: materials, labor, and other factors such as special equipment, shall be updated daily. — *would be better if updated whenever creating new estimate*

R-NF-08: The user shall be able to use the system within 1 hour of use and without formal training.

R-NF-09: All system errors including regulation errors, must be logged, stored, and accessible by the user.

6 Other Requirements

There are no other requirements that apply to the system at this time.

} empty → consider removing

7 Analysis Models

7.1 Use Case Model

This diagram shows the user, use cases, and relationships between them. Since there is only one actor (the user), the user is related to all use cases. The user is directly related to the first column (from the left) of use cases which, by includes and extends relationships, relates the user to all other use cases in the second and third columns. In Section 3 “System Features”, the requirements and a detailed sequence diagram are available for each use case listed in the Use Case Model.

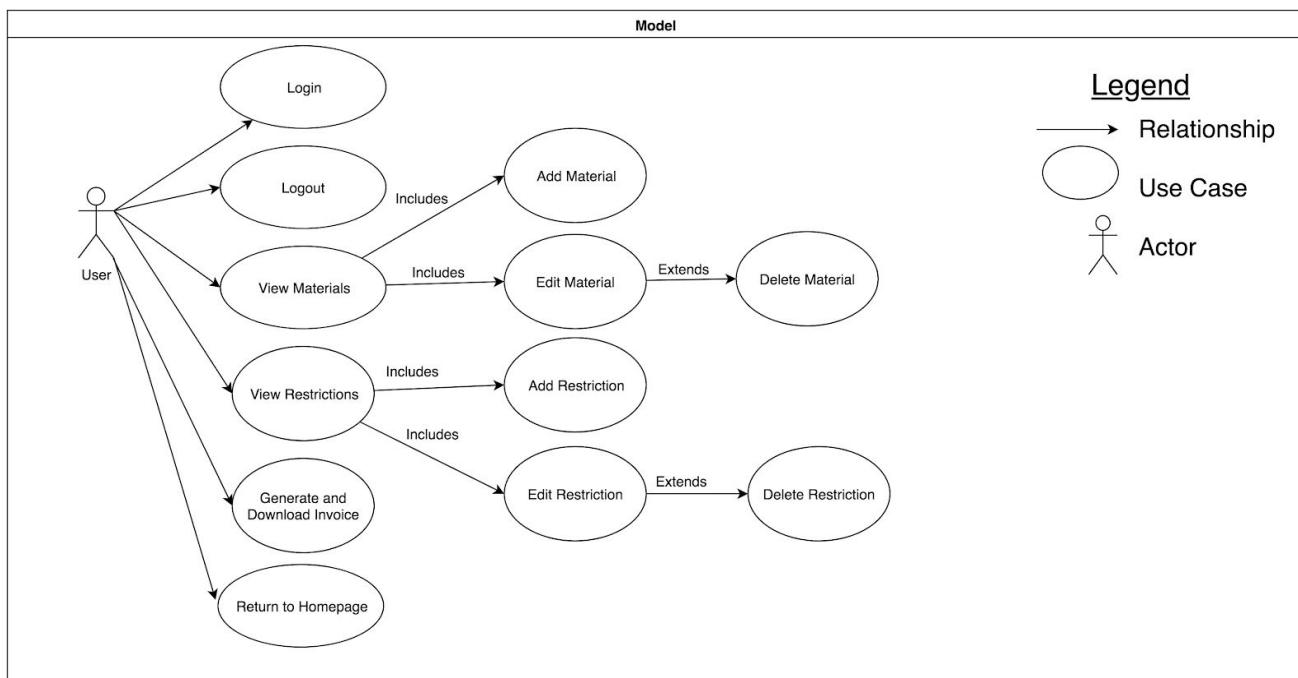
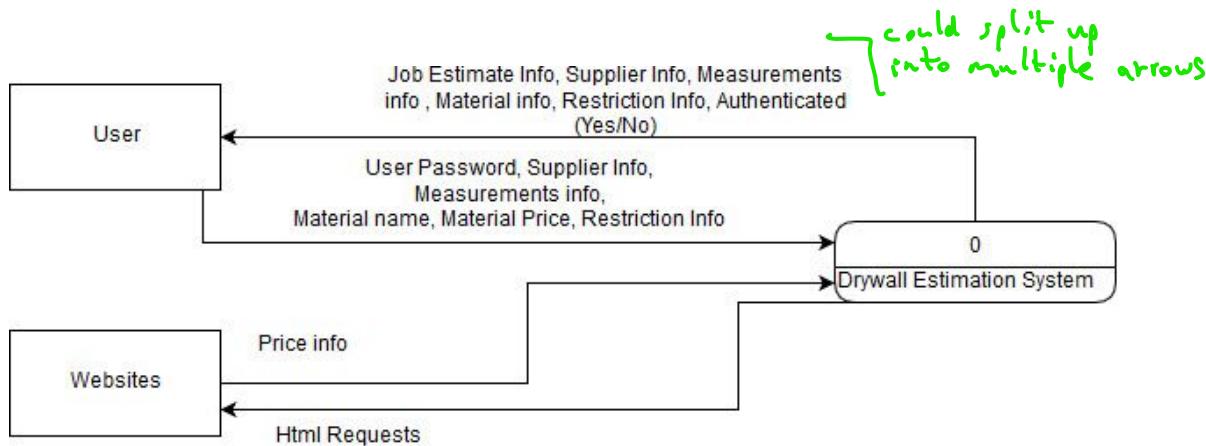


Figure 25: Use Case Model

7.2 Data Flow Diagram 0 (Context Diagram)

This diagram shows a high level representation of the Drywall Estimation System. The Drywall Estimation System is shown as the Drywall Estimation System. The external entities, the user, and the website, are shown with respective data inputs and outputs.



Legend

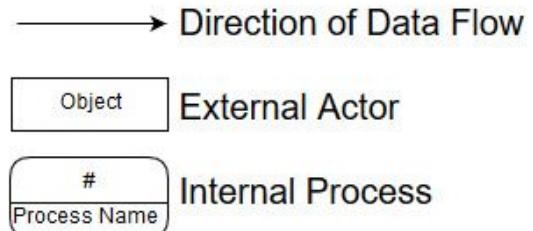
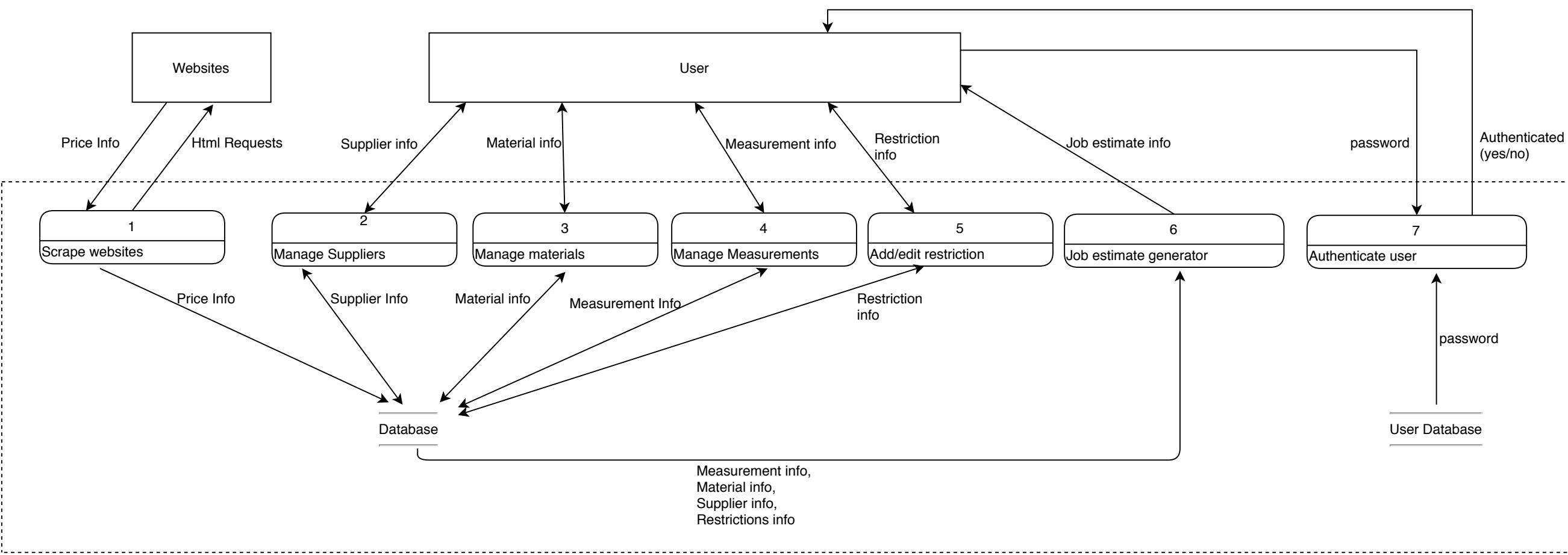


Figure 26: Context Diagram

7.3 Data Flow Diagram 1.0

This diagram shows a more detailed breakdown of the main processes that make up the Drywall Estimation System. The data is stored in the main database as well as in the user database. The processes represent the actions taken by the system and data flow direction is represented by the arrows.



Legend

→ Direction of Data Flow

Object

External Actor

#

Process Name

Internal Process

Datastore

Datastore

Figure 27: Data Flow Diagram 1.0

7.4 Data Flow Diagram 2.0

This diagram shows a more detailed breakdown of the processes in DFD 1 that has sub components broken down. The user authentication is not shown as it has no more steps to break down. The steps are broken down from manage [table name] to several functions that the manage function has.

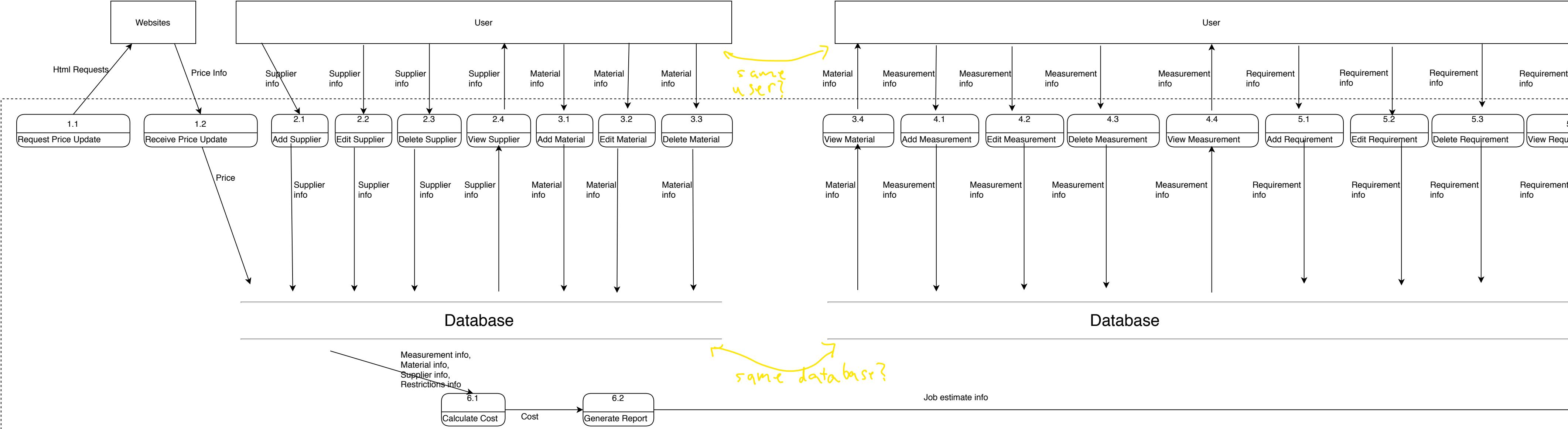


Figure 28: Data Flow Diagram 2.0

7.5 Entity Relationship Diagram

This Diagram shows the relation between the project the user inputted, measurements and the materials used with the measurements.

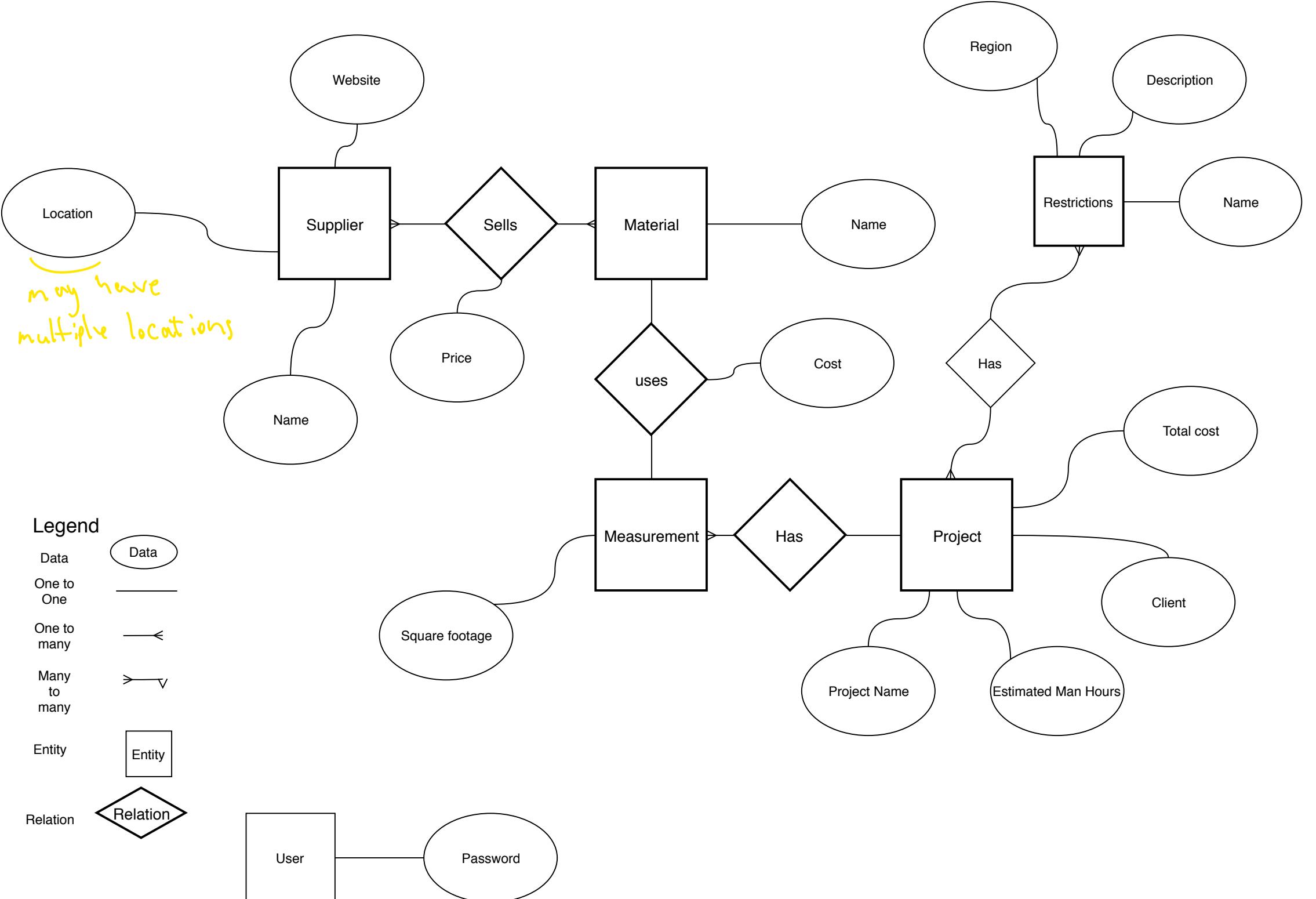


Figure 29: Entity Relationship Diagram

7.6 Data Dictionary

Table 15: Data Dictionary

| Table | Column | Data Type | References | Not Null | Description |
|--------------|---------------------|---------------|----------------|----------|--|
| Supplier | Name | String | | Y | Name of supplier |
| Supplier | Website | String | | Y | Suppliers website |
| Supplier | Location | String | | N | Location of supplier |
| User | Password | String | | Y | User's password |
| Restrictions | Description | String | | Y | Description of regulation or other limitation |
| Restrictions | Name | String | | Y | Name of restriction |
| Project | Name | String | | Y | Project name |
| Project | Client | String | | Y | The name of a Customer for a given project |
| Project | Total Cost | Double | | Y | Projects total cost |
| Project | Estimated Man Hours | Int | | Y | Number of man hours needed to complete project |
| Measurement | Square Footage | Double | | Y | Total square footage of a job |
| Measurement | Cost | Int double | Material | Y | Cost of a given measurement |
| Materials | Name | String | | Y | Name of a material |
| Materials | Price | Double | Supplier Price | Y | Price of a material |

Appendix A: Issues List

There are no issues at this time.

) empty → consider removing

Appendix B: Estimation Formula

The following formula is currently used by Gulf Islands Drywall to estimate project costs:

$$\sum(\text{all material})(\text{cost of respective material}) + (\text{estimated man-hours})(\text{hourly wage}) = \text{total project cost}$$

The system will calculate the material costs, but estimated man-hours are manually inputted.