An Exploratory Study on the Communication Between Producers and Consumers of Use Cases

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Empirical Study: Communication Between Model Producers and Consumers

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Abstract: Effective communication is an important factor during the software development process since communication failures are the causes of productivity losses or even project failures. In this context, software models are commonly used to support communication among members of the software development team. Communication failures through software models may generate inconsistencies in software behavior, generating rework to correct them later. Aiming to understand communication between model producers and consumers, we investigate this type of communication. In this study, we used a UML use case provided by a software development team for our research. We invited 44 participants to carry out the development of mockups from the use case, the consumers of the use case in this research. This technical report presents the use case investigated in this study, including the mockups developed based on this model. In addition, this technical report presents the analysis of the mockups.
1. INTRODUCTION

In the software development process, communication is carried out through face-to-face discussions in co-located or distributed teams, as well as through mailing lists, forums, and so on. Software models, in addition to representing parts of the system, also aid in the communication of development teams [3]. Communication is an important factor during software development process, since communication failures are among the causes of productivity losses or even project failures [2]. In addition, communication management is a challenge in the development process [1].

We conducted an initial exploratory study to begin investigating communication between producers and consumers of a software model, i.e., indirect communication via the software model. We began investigating UML (Unified Modeling Language) use case, given that this model supports communication between different roles of development teams, such as system analysts, designers, and developers [1][11]. We used the support provided by Semiotic Engineering to start an investigation on this type of communication, [6][7], a theory that views the software interaction as a process of communication between designers\(^1\) and users through software.

2. UML USE CASE INVESTIGATED

In this section, we present the investigated use case (UC). We selected the use case diagram and a use case specification of the Elderly Care project. This project aimed to develop a mobile system to support family and professionals in the care of an elderly person. The models explored in this study focused on the reallocation of a certain commitment of family members/professionals with the elderly. Thus, there were the profiles of the person previously responsible for the commitment, the new responsible (the user who could take the commitment) and the coordinator (responsible for checking the impediments related to elderly care). This UC had the following information:

**UC Diagram** - the complete diagram of the interactive system. This diagram has seven use cases, such as Reallocate and Monitor Commitment and others, and three actors (Responsible\(^2\), Coordinator\(^3\) and Smartphone\(^4\)). Figure 1 presents this diagram. We have omitted other use cases from this diagram due to permission from the development team. However, we clarify that our participants used the diagram with all the use cases.

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\(^1\) We use the term designer for the Software Designer, also called Information Architect, i.e., the professionals involved in designing the software solution.

\(^2\) Responsible - actor who represents the person responsible for the commitment of the elderly.

\(^3\) Coordinator - actor who represents the person in charge of managing all the commitments of the elderly.

\(^4\) Smartphone - an actor who represents intelligent agents. It is represented in the UC specification as GPS and Schedule.
UC Specification - this use case is the Reallocate Commitment use case. This specification has the following tasks that the user can perform: (i) verification of new responsible parties to make a commitment, (ii) request for reallocation made by the person responsible for the commitment, (iii) request made automatically by the system. Below we present this specification.

GLOSSARY

The alert types defined for Use Case 03 were:

1. **Reminder**: The system uses reminders to report data about an activity related to the care of the elderly that should be performed.
2. **Warning**: The system uses warnings to inform data about activities related to the care of the elderly that were or will be performed.
3. **Notification**: The system uses notifications to inform data about activities related to the elderly care that were performed, which should be performed and which were not performed. The most important activities will be highlighted in orange and the other activities will be highlighted in blue.

For the Main Flow and Alternate Flow steps of Use Case UC03 - Relocate Commitment, the acronyms were used according to the profiles as:

- **FPRO**: Main Flow of Responsible
- **FARO**: Alternate Flow of Responsible
<table>
<thead>
<tr>
<th>Use Case Name</th>
<th>Reallocate Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>This use case is executed when the Main Responsible cannot attend to make the commitment to the elderly and the system will try to reallocate the commitment to a New Responsible.</td>
</tr>
</tbody>
</table>
| Functionalities: | • Check if the person who will accompany the elderly person (main responsible and new responsible) can participate in the elderly's commitment on the dates indicated.  
• Allow you to cancel a commitment for the senior citizen.  
• Relocate the elderly's commitments and/or who will accompany them (main responsible and new responsible) if necessary. |
| Actors:       | • Main Responsible.  
• Schedule.  
• GPS. |
| Precondition: | • The commitment data (such as Commitment Name, Description, Responsible Name, Date, Location, Time, Status, Phone, Mobile) must be registered to the system.  
• The Main Responsible will not be able to make the commitment (this information will be obtained through notifications sent by the system). |

### Main Flow

#### FPRO1. The system verifies that there are two or more users eligible to perform the Elderly Commitment.
- FPRO1.1. The system sends the Main Responsible a list of the users who can perform the Commitment through the Notifications screen titled "Selecting a New Responsible" [RN1].
- FPRO1.2. The Main Responsible selects a user and clicks the "Relocate" button [FARO1] [FARO3] [FE1].
- FPRO1.3. The system updates the Commit Status to "Waiting for Confirmation".
- FPRO1.4. The system displays MSG2 of type "Confirmation".
- FPRO1.5. The Notice is updated to the title: "New Responsible Suggested" [RN2].

#### FPRO2. If the system verifies that a user has agreed to make the commitment <Commitment Name> of the Original Responsible [FARO2].
- FPRO2.1. The system updates the commitment status to "Confirmed."  
- FPRO2.2. The system sends to the Main Responsible a Notification entitled "Commitment Reallocated" [RN3].  
- FPRO2.3. The system updates the Commitments listed.

#### FPRO3. The system verifies that there is only one user able to perform the Commitment of the elderly.
- FPRO3.1. The system updates the Commit Status to "Waiting for Confirmation".
- FPRO3.2. The system displays MSG2 of type "Confirmation".

#### FPRO4. The use case is terminated.

### Alternative Flow

[FARO1] The system verifies that in the time available, the Main Responsible did not select other user capable of performing the Commitment <Commitment Name> [FARO4].
- FARO1.1. The system updates the Notification with the title: "Selection of a New Responsible" for the Original Responsible [RN4].  
- FARO1.2. Go to the FPRO2.

[FARO2] The system verifies that no user has accepted the Commitment <Commitment Name> of the Main Responsible.
- FARO2.1. The system sends to the Main Responsible a Notification entitled "Unrecognized Commitment" [RN5].  
- FARO2.2. The system updates the Commit Status to "Not Reallocated."  
- FARO2.3. Go to FPRO4.

[FARO3] The user clicks the "View Details" button with the time available for selecting a new Responsible for the commitment [FARO4].
- FARO3.1. The system displays the Commitment Details screen [RN6] [FARO5].  
- FARO3.2. Go to the FPRO2.

[FARO4] The user clicks the "View Details" button with the time finalized to select a New Responsible for the commitment.
FARO4.1. The system displays the Commitment Details screen [RN7] [FARO5].
FARO4.2. Go to the FPRO2.

[FARO5] The user clicks the "Back" button.
FARO5.1. Go to the Notifications Screen [FPRO1.1] [FARO1.1].

<table>
<thead>
<tr>
<th>Business Rule:</th>
<th>System Messages:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RN1.</strong> The Notification titled &quot;Selecting a New Responsible&quot;, and the Reception Hours with: Commitment Image, MSG1, Commitment User List, Time Counter, and Reallocate and View Buttons.</td>
<td>MSG1. “The people below are available to replace you in the commitment &quot; &lt;CompanyName&gt; &quot; . Who do you suggest? &quot;</td>
</tr>
</tbody>
</table>
| **RN2.** The Notification with the title "New Responsible Suggested", and the Time Receipt, displays the: presents the Commitment Image, Image of the selected person and MSG7. | MSG2. “Request for relocation sent”.
| **RN3.** The Notification with the title "Compromise Relocated", and the Time Receipt, displays the: shows the Commitment Image and MSG3. | MSG3. "The <Commitment_Name> commitment that you were Responsible was reallocated to <Responsible_New_Name>.". |
| **RN4.** The Notification with the title "Selecting a New Accountant", and the Time Receipt, displays the: Commitment Image, MSG1, Commit List, Time Counter become opaque, and the Relocate button is disabled and the View Details button. MSG6 is displayed. | MSG4. "None of the eligible users agreed to take on the Compromise. The Coordinator will be notified." |
| **RN5.** The Notification with the title "Uncorrected Commitment", and the Time Receipt, presents the Commitment Image and MSG4. | MSG5. “Suggested time out.”. |
| **RN6.** The Commitment Details screen displays information for the <Commitment Name>, <Responsible Name>, <Status>, <Time>, <Date>, <Location>, <Phone>, <Mobile>, Commitment Image, MSG1, Appointment List, Available Time Counter, and Realloc and Back buttons. | MSG6. “Elderly Care Application will try to allocate the <Commitment_Name> commitment to <Responsible_New_Name>.". |
| **RN7.** The Commitment Details screen displays information for the <Commitment Name>, <Responsible Name>, <Status>, <Time>, <Date>, <Location>, <Phone>, <Mobile>, Commitment Image, MSG1, Appointment List, Expiration Timer, and Realloc (Disabled) and Back buttons. MSG6 is displayed. | |

**RN2. the user clicks the "Back" button.**

FARO5.1. Go to the Notifications Screen [FPRO1.1] [FARO1.1].
3. **MOCKUPS DEVELOPED FROM USE CASE**

In this subsection we present mockups produced by the 22 pairs.

**Pair P1 and P2**

**Pair P3 and P4**
Pair P9 and P10

Pair P11 and P12
Pair P13 and P14
Pair P15 and P16

Pair P17 and P18
• Pair P19 and P20

• Pair P21 and P22
• Pair P23 and P24
• Pair P25 and P26
• Pair P27 and P28

• Pair P29 and P30
- Pair P31 and P32
• Pair P33 and P34

• Pair P35 and P36
• Pair P37 and P38
• Pair P39 and P40

• Pair P41 and P42
• Pair P43 and P44
4. ANALYSIS OF THE MOCKUPS

Regarding the analysis of the mockups, a researcher analyzed the mockups, tracing their information in SFYI Message. This information was compared to the UC used as the basis for the construction of the mockups. The conclusion of this analysis by one researcher was discussed with two other researchers (also authors of this work). Below we present the analysis of each of the mockups and then we present the inconsistencies between mockups and use cases.

Figure 2 presents an analysis of the mockup produced by P1 and P2 with SFYI Message. Nós observamos as seguintes inconsistências entre os casos de uso e mockups: (1) The user is not informed of the reallocation request sent and the attempt to reallocate through the application; (2) The information to disable the reallocation button after the end of the time was not clear in the mockup; (3) The commitment details button was not expressed in the mockup.
Pair P1 and P2

SFYI Message: I. Developer’s beliefs about the user’s…

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

SFYI Message: II Developer’s intent and expectation with respect to the system…

The user selects a commitment and the system displays: commitment details, reallocate button and return to the previous screen button. Selecting the reallocate button, the list of family members and professionals available to make the commitment is displayed. The user can select a new responsible and reallocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. If this is completed, the user is informed of the new responsible for such commitment. The user may also not have made the attempt to reallocate. So, if the user tries to do the reallocation, the user is informed that the time to perform the reallocation to another responsible has ended (The mockups were not so clear when the user did not select a new responsible and an automatic relocation will be performed). If the commitment is not reallocated, the Coordinator is informed.

SFYI Message: III. Developer’s provisions and support...

Regarding commitment reallocation, if the user does not do it, the application will automatically attempt the reallocation. If the attempted reallocation is not completed, the Coordinator is informed. The Coordinator can solve the situation outside the system (making the commitment or calling for other people to do it).

Figure 2 Analysis of the mockup produced by P1 and P2 with SFYI Message.

Figure 3 presents an analysis of the mockup produced by P3 and P4 with SFYI Message. Nós observamos as seguintes inconsistências entre os casos de uso e mockups: (1) The user is not informed of the reallocation request sent and the attempt to reallocate through the application; (2) The completion time for the reallocation was not expressed, in addition to the other operations following this one; (3) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.; (4) The commitment details button was not expressed in the mockup.

Pair P3 and P4

SFYI Message: I. Developer’s beliefs about the user’s…

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

SFYI Message: II Developer’s intent and expectation with respect to the system…

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was not expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is not informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was not expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

SFYI Message: III. Developer’s provisions and support...

It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

Figure 3 Analysis of the mockup produced by P3 and P4 with SFYI Message.
Figure 4 presents an analysis of the mockup produced by P5 and P6 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) The user is not informed of the reallocation request sent and the attempt to reallocate through the application.

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<thead>
<tr>
<th>SFYI Message: I. Developer’s beliefs about the user’s…</th>
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<td>They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.</td>
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<th>SFYI Message: III. Developer’s provisions and support…</th>
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<tr>
<td>Regarding commitment reallocation, if the user does not do it, the application will automatically attempt the reallocation. If the attempted reallocation is not completed, the Coordinator is informed. The Coordinator can solve the situation outside the system (making the commitment or calling for other people to do it).</td>
</tr>
</tbody>
</table>

Figure 4 Analysis of the mockup produced by P5 and P6 with SFYI Message.

Figure 5 presents an analysis of the mockup produced by P7 and P8 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) The completion time for the reallocation was not expressed, in addition to the other operations following this one; (2) It was not stated that the Coordinator will be notified of the commitments that were not reallocated; (3) The commitment details are incomplete in the mockup; (4) The commitment details are incomplete in the mockup.

<table>
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<tr>
<th>SFYI Message: I. Developer’s beliefs about the user’s…</th>
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<tr>
<td>They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.</td>
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<td>The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is not informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.</td>
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<tr>
<td>It was not stated that the Coordinator will be notified of the commitments that were not reallocated.</td>
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</table>

Figure 5 Analysis of the mockup produced by P7 and P8 with SFYI Message.
Figure 6 presents an analysis of the mockup produced by P9 and P10 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) The user was not informed about the new responsible of commitment; (2) The information to disable the reallocation button after the end of the time was not clear in the mockup; (3) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

### Pair P9 and P10

**SFYI Message: I. Developer’s beliefs about the user’s…**

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

**SFYI Message: II Developer’s intent and expectation with respect to the system…**

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The completion time for the reallocation was expressed. The information to disable the reallocation button after the end of the time was not clear in the mockup. If the relocation is completed, the user is informed of the new responsible of such a commitment.

**SFYI Message: III. Developer’s provisions and support…**

It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

### Figure 6 Analysis of the mockup produced by P9 and P10 with SFYI Message.

Figure 7 presents an analysis of the mockup produced by P11 and P12 with SFYI Message. Nós observamos as seguintes inconsistências entre os casos de uso e mockups: (1) The commitment details button was not expressed in the mockup; (2) The user is not informed of the reallocation request sent and the attempt to reallocate through the application; (3) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

### Pair P11 and P12

**SFYI Message: I. Developer’s beliefs about the user’s…**

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

**SFYI Message: II Developer’s intent and expectation with respect to the system…**

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The commitment details are incomplete in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is not informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed. The information to disable the reallocation button after the end of the time was not clear in the mockup. If the relocation is completed, the user is informed of the new responsible of such a commitment.

**SFYI Message: III. Developer’s provisions and support…**

It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

### Figure 7 Analysis of the mockup produced by P11 and P12 with SFYI Message.
Figure 8 presents an analysis of the mockup produced by P13 and P14 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) It was not clear how the main responsible will select the user for the reallocation of the commitment; (2) The list of users is not displayed.

<table>
<thead>
<tr>
<th>Pair P13 and P14</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SFYI Message: I. Developer’s beliefs about the user’s</strong>…</td>
</tr>
<tr>
<td>They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.</td>
</tr>
</tbody>
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| **SFYI Message: II Developer’s intent and expectation with respect to the system**… |
| The user accesses the commitment that he/she wants to reallocate. The list of users is not displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. It was not clear how the main responsible will select the user for the reallocation of the commitment. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment. |

| **SFYI Message: III. Developer’s provisions and support**… |
| Regarding commitment reallocation, if the user does not do it, the application will automatically attempt the reallocation. If the attempted reallocation is not completed, the Coordinator is informed. The Coordinator can solve the situation outside the system (making the commitment or calling for other people to do it). |

**Figure 8 Analysis of the mockup produced by P13 and P14 with SFYI Message.**

Figure 9 presents an analysis of the mockup produced by P15 and P16 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) The completion time for the reallocation was not expressed, in addition to the other operations following this one; (2) The user was not informed about the new responsible of commitment; (3) The user is not informed of the reallocation request sent and the attempt to reallocate through the application; (4) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

<table>
<thead>
<tr>
<th>Pair P15 and P16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SFYI Message: I. Developer’s beliefs about the user’s</strong>…</td>
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| **SFYI Message: II Developer’s intent and expectation with respect to the system**… |
| The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button and reallocation button were not expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is not informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user was not informed about the new responsible of commitment. |

| **SFYI Message: III. Developer’s provisions and support**… |
| It was not stated that the Coordinator will be notified of the commitments that were not reallocated. |

**Figure 9 Analysis of the mockup produced by P15 and P16 with SFYI Message.**
Figure 10 presents an analysis of the mockup produced by P17 and P18 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) The completion time for the reallocation was not expressed, in addition to the other operations following this one; (2) It was not clear the completion of reallocation time through the mockup; (3) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

<table>
<thead>
<tr>
<th>Pair P17 and P18</th>
</tr>
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<tr>
<td><strong>SFYI Message: I. Developer’s beliefs about the user’s…</strong></td>
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<td><strong>SFYI Message: III. Developer’s provisions and support…</strong></td>
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<td>It was not stated that the Coordinator will be notified of the commitments that were not reallocated.</td>
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</tbody>
</table>

**Figure 10 Analysis of the mockup produced by P17 and P18 with SFYI Message.**

Figure 11 presents an analysis of the mockup produced by P19 and P20 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

<table>
<thead>
<tr>
<th>Pair P19 and P20</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SFYI Message: I. Developer’s beliefs about the user’s…</strong></td>
</tr>
<tr>
<td>They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.</td>
</tr>
<tr>
<td><strong>SFYI Message: II Developer’s intent and expectation with respect to the system…</strong></td>
</tr>
<tr>
<td>The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.</td>
</tr>
<tr>
<td><strong>SFYI Message: III. Developer’s provisions and support…</strong></td>
</tr>
<tr>
<td>It was not stated that the Coordinator will be notified of the commitments that were not reallocated.</td>
</tr>
</tbody>
</table>

**Figure 11 Analysis of the mockup produced by P19 and P20 with SFYI Message.**

Figure 12 presents an analysis of the mockup produced by P21 and P21 with SFYI Message. We do not observe inconsistencies between use cases and mockups.
Pair P21 and P22

SFYI Message: I. Developer’s beliefs about the user’s…
They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

SFYI Message: II Developer’s intent and expectation with respect to the system…
The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

SFYI Message: III. Developer’s provisions and support...
Regarding commitment reallocation, if the user does not do it, the application will automatically attempt the reallocation. If the attempted reallocation is not completed, the Coordinator is informed. The Coordinator can solve the situation outside the system (making the commitment or calling for other people to do it).

Figure 12 Analysis of the mockup produced by P21 and P22 with SFYI Message.

Figure 13 presents an analysis of the mockup produced by P23 and P24 with SFYI Message. We do not observe inconsistencies between use cases and mockups.

Pair P23 and P24

SFYI Message: I. Developer’s beliefs about the user’s…
They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

SFYI Message: II Developer’s intent and expectation with respect to the system…
The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

SFYI Message: III. Developer’s provisions and support...
Regarding commitment reallocation, if the user does not do it, the application will automatically attempt the reallocation. If the attempted reallocation is not completed, the Coordinator is informed. The Coordinator can solve the situation outside the system (making the commitment or calling for other people to do it).

Figure 13 Analysis of the mockup produced by P23 and P24 with SFYI Message

Figure 14 presents an analysis of the mockup produced by P25 and P26 with SFYI Message. We do not observe inconsistencies between use cases and mockups.
SFYI Message: I. Developer’s beliefs about the user’s…
They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

SFYI Message: II Developer’s intent and expectation with respect to the system…
The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallcation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

SFYI Message: III. Developer’s provisions and support...
Regarding commitment reallocation, if the user does not do it, the application will automatically attempt the reallocation. If the attempted reallocation is not completed, the Coordinator is informed. The Coordinator can solve the situation outside the system (making the commitment or calling for other people to do it).

**Figure 14 Analysis of the mockup produced by P25 and P26 with SFYI Message.**

Figure 15 presents an analysis of the mockup produced by P27 and P28 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) The user is not informed of the reallocation request sent and the attempt to reallocate through the application; (2) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

**Figure 15 Analysis of the mockup produced by P27 and P28 with SFYI Message.**

Figure 15 presents an analysis of the mockup produced by P29 and P30 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) The user is not informed of the reallocation request sent and the attempt to reallocate through the application; (2) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.
<table>
<thead>
<tr>
<th>Pair 29 and P30</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SFYI Message: I. Developer’s beliefs about the user’s...</strong></td>
</tr>
<tr>
<td>They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.</td>
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<tr>
<td><strong>SFYI Message: II Developer’s intent and expectation with respect to the system...</strong></td>
</tr>
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</tr>
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<td><strong>SFYI Message: III. Developer’s provisions and support...</strong></td>
</tr>
<tr>
<td>It was not stated that the Coordinator will be notified of the commitments that were not reallocated.</td>
</tr>
</tbody>
</table>

**Figure 16 Analysis of the mockup produced by P29 and P30 with SFYI Message.**

Figure 17 presents an analysis of the mockup produced by P31 and P32 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

<table>
<thead>
<tr>
<th>Pair P31 and P32</th>
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<tr>
<td><strong>SFYI Message: I. Developer’s beliefs about the user’s...</strong></td>
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<td><strong>SFYI Message: III. Developer’s provisions and support...</strong></td>
</tr>
<tr>
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</tr>
</tbody>
</table>

**Figure 17 Analysis of the mockup produced by P31 and P32 with SFYI Message**

Figure 18 presents an analysis of the mockup produced by P33 and P34 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.
**SFYI Message: I. Developer’s beliefs about the user’s…**

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

**SFYI Message: II Developer’s intent and expectation with respect to the system…**

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

**SFYI Message: III. Developer’s provisions and support…**

It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

**Figure 18 Analysis of the mockup produced by P33 and P34 with SFYI Message**

Figure 19 presents an analysis of the mockup produced by P35 and P36 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

**Pair P35 and P36**

**SFYI Message: I. Developer’s beliefs about the user’s…**

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

**SFYI Message: II Developer’s intent and expectation with respect to the system…**

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

**SFYI Message: III. Developer’s provisions and support…**

It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

**Figure 19 Analysis of the mockup produced by P35 and P36 with SFYI Message**

Figure 20 presents an analysis of the mockup produced by P37 and P38 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

**Pair P37 and P38**

**SFYI Message: I. Developer’s beliefs about the user’s…**

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

**SFYI Message: II Developer’s intent and expectation with respect to the system…**

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

**SFYI Message: III. Developer’s provisions and support…**

It was not stated that the Coordinator will be notified of the commitments that were not reallocated.
Pair P37 and P38

SFYI Message: I. Developer’s beliefs about the user’s…

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

SFYI Message: II Developer’s intent and expectation with respect to the system…

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

SFYI Message: III. Developer’s provisions and support...

It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

Figure 20 Analysis of the mockup produced by P37 and P38 with SFYI Message

Figure 21 presents an analysis of the mockup produced by P39 and P40 with SFYI Message. We notice the following inconsistencies between use cases and mockups: (1) It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

Pair P39 and P40

SFYI Message: I. Developer’s beliefs about the user’s…

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

SFYI Message: II Developer’s intent and expectation with respect to the system…

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

SFYI Message: III. Developer’s provisions and support...

It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

Figure 21 Analysis of the mockup produced by P39 and P40 with SFYI Message

Figure 22 presents an analysis of the mockup produced by P41 and P42 with SFYI Message. We do not observe inconsistencies between use cases and mockups.
Pair P41 and P42

**SFYI Message: I. Developer’s beliefs about the user’s…**

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

**SFYI Message: II Developer’s intent and expectation with respect to the system…**

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

**SFYI Message: III. Developer’s provisions and support…**

Regarding commitment reallocation, if the user does not do it, the application will automatically attempt the reallocation. If the attempted reallocation is not completed, the Coordinator is informed. The Coordinator can solve the situation outside the system (making the commitment or calling for other people to do it).

**Figure 22 Analysis of the mockup produced by P41 and P42 with SFYI Message**

Figure 23 presents an analysis of the mockup produced by P43 and P44 with SFYI Message. We note the following inconsistencies between use cases and mockups: Coordinator will be notified of the commitments that were not reallocated.

Pair P43 and P44

**SFYI Message: I. Developer’s beliefs about the user’s…**

They know that family members and professionals can reallocate a commitment of the elderly that they can not meet. This can be done manually or automatically on the system. If the attempt to reallocate is not performed, the user named as Coordinator will be informed that there is no responsible person to make a commitment.

**SFYI Message: II Developer’s intent and expectation with respect to the system…**

The user accesses the commitment that he/she wants to reallocate and the list of users who can make the commitment is displayed. The commitment details button was expressed in the mockup. The user can see the commitment details. From the commitment screen, it is possible the user sees the list of available users to make the commitment. User can select a user and relocate. The user is informed of the reallocation request sent and the attempt to reallocate through the application. The completion time for the reallocation was expressed, in addition to the other operations following this one. If the relocation is completed, the user is informed of the new responsible of such a commitment.

**SFYI Message: III. Developer’s provisions and support…**

It was not stated that the Coordinator will be notified of the commitments that were not reallocated.

**Figure 23 Analysis of the mockup produced by P43 and P44 with SFYI Message**

**REFERENCES**


