Inf2C Software Engineering 2018-19
Coursework 1
Capturing Requirements for an Auction House System

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1 Introduction

This document presents the requirements for the BidIT Auction House System. The System enables Auld Reekie Auction House to have an online catalogue of lots that can be browsed by the general public. In addition, by using the System during an auction, the Auction House wants to replace the traditional bidding way with bids submitted from electronic devices (smartphones or personal computers), allowing some Buyers to be off-site.

This document captures the stakeholders involved in the System, the System states and the use cases and includes non-functional requirements and ambiguities as well. More information about the functionalities of the System can be found in the coursework handout.

2 Stakeholders

This section describes the stakeholders of the application and their interests.

- *Members of Public:* who want to browse the lots that the Auld Reekie Auction House has for sale. They create interest in the Auction House and can be converted into Buyers. They want the app to be easy to use and to find relevant and accurate information about every lot.
- *Buyers:* who want to buy lots. They grow the customer base and offer income to the Auction House through the Buyer's premium. They want the app to have a simple bidding System and offer real-time updates on their bids/interests. They want the Buyer's premium to be low. They want to win their bid and collect the lot.
- *Sellers:* who want to sell objects at the Auction House. They supply goods for sale and offer income through the Seller's commission. They want the app to have a simple selling System and offer real-time updates on their sale. They want the Seller's commission to be low. They want to have successful sales and receive their payment.
- *Auctioneer:* who conducts auctions by opening and closing bids. They work for the Auction House to help lots get sold. They want the bidding System to be simple. They want to close a lot and know if it got above the reserve price. They want the app to be engaging and easy to use for the Buyers that are not on-site.
- *Staff Members:* who are working for the Auction House to help Sellers enter their lots. They offer help to Members of Public, Buyers and Sellers. They want the app to be easy to use and allow them to help the other users. They want the lot-adding System to be easy, straightforward and introduce accurate high/low price estimates.
- *Owners of Auction House:* who want the app to generate cash flows and have a large customer base and supply of goods. They provide the venue for all Members of Public, Buyers, Sellers, Auctioneers and Staff Members. They store all lots on its premises. They want as many lots getting sold at the highest price possible. They want Buyers and Sellers to be happy with their experience and attract more users. They want Auctioneers and Staff Members to be happy in their job.
- *The bank* wants the System to send requests for payment authorization to their server in a correct and secure way and to successfully pay the required person.
- *App provider:* who wants the app to function well for all users. They develop and provide maintenance for all components of the app: Systems, database and server. They facilitate for the bank the smooth financial cashflow which comes from collecting payments from Buyers, paying Sellers and collects income through premiums and commissions. They seek to have enough money and time allocated to app development. App provider contains multiple subcategories such as designers, coders, security, each with their own values and interests.

3 System State

Components of the state suggested by the coursework instructions include the following:

1. *Lots catalogue.* The System keeps a catalogue of all the lots registered by the Sellers. For each lot, the following information is captured: description with text and photos, opening price, low and high estimates, reserve price, Seller's commission, Buyer's premium. In addition, for each lot the System should include interested Buyers, current state: not open yet (unopenend), open, closed (and if closed, whether sold or not). For an open state, the System should know:

   - *The current state of the bidded lot.* This includes who is the highest bidder, what is the highest bid, whether the reserve price has been attained.

2. *Registered Buyers.* The System keeps track of the registered Buyers, with their personal details, bank account, current bids. There is no specification whether the System saves the Buyer's previous bids and won auctions. In addition, the System has:

   - *The lots of interest:* subset of the lots catalogue that is of immediate interest to the Buyer.

3. *Registered Sellers.* The System keeps track of the registered Sellers, with personal information, bank details, what lots they sell and their secret set reserve price and eventually Seller's commission for a lot.

4. *A current mode,* depending on the user of the System:

   (a) For Buyers
   - *Register:* with a registration form for Buyers or Sellers.
   - *Browse:* with a catalogue lots to browse.
   - *Read:* with the description of the selected lot for reading.
   - *Bid:* with the amount to bid on the selected lot for bidding.
     The last two states result in the System knowing:
     - *The selected lot* to *Read* or *Bid*.

   (b) For Staff
   - *Add:* with the form to add lot with description to catalogue. This has the substate:
     - *Incomplete lot* a partially completed lot, not yet in the catalogue. Further information may still need to be added after the current lot to be added to the catalogue, such as reserve price.

   (c) For Auctioneer:
   - *Open:* with the lot to open auction. This results in the System knowing:
     - *The current open lots*, includes all the lots open for auction if there are more auctions open in parallel.
   - *Close:* with the open lot to close. This results in the System knowing:
     - *All closed lots*, includes all the lots closed and the result of their auction.

5. *Display state:* what is currently shown on the smartphone or computer screen. It depends on the current mode of the System, as presented above. The display state can include the notification Buyers receive from the System.

4 Use Cases

This section describes ten use cases of the System, the first two following a more detailed template. The interactions between the users and the System presented through these use cases is summarized in Section 5, Use Cases Diagram.

4.1 Add Lot

Primary actor: Staff Member
Support actor: Seller
Summary: The Auction House Staff, collaborating with the Seller of a lot, introduces in the System a description of the Seller's items, with text and photographs. Staff includes low and high estimates for the hammer price as well.
Precondition: Seller must be registered with the System.
Trigger: Staff tells System that they would like to Add a new lot.
Success Guarantee: A new lot was added in the catalogue.
Main Success Scenario:

1. System goes into "Add lot" mode.
2. Staff adds name of lot.
3. Staff adds description text.
4. Staff adds photographs.
5. Staff adds low and high estimates of the hammer price.
6. Seller confirms information to Staff, and Staff tells System to add the new lot to the catalogue and set its state to 'unopened'.

Extensions:

1. At any step 2-5, the actor can cancel the action and go back to the main display of the System.
2. If actor jumps to Step 6 without adding information required in Steps 1-5, the System shall display an error and prevent the use case from succeeding.
3. The name added for the lot in Step 1 can already exist in the catalogue, at which point the System shall display an error after Step 6 and ask the user to input an accepted value.

Stakeholders & Interests:

- *Seller* wants to have the lot in the catalogue of the System to be able to have it sold during an auction.
- *Staff of the Auction House* need to add a lot to the catalogue and have items for auction as part of their job.
- *Owners of the Auction House* want to add the lot to the catalogue to have more items sold during an auction and make profit.

Notes:

- In order for the lot to be added to the list, the Seller and the items must be at the premise of the Auction House.
- There are no specifications for number of photos and maximum size, description length or whether some steps are optional. We are expecting those to be clarified at a later design stage, as they could impact the way the Use-Case behaves.
- It is ambiguous how the Seller adds its reserve price. We assumed the Seller adds its reserve price after the lot is created.
- Suggestion: The user might want to preview the information introduced before adding the data to the catalogue. As an extension, the Seller could choose to return to Step 2.

4.2 Close Lot Auction

Primary actors: Auctioneer
Support actors: Buyer of the hammer price, Seller of the lot
Summary: An Auctioneer declares a lot's auction closed. The lot is sold to the Buyer of the hammer price, and the System collects money from the Buyer and pays the Seller.
Precondition: Lot is in open-state and not in unopened or closed state. There exists a highest bidder.
Trigger: Auctioneer tells the System the lot they would like to close.
Success Guarantee: Lot was sold to the Buyer of the hammer price.
Failure Guarantee: Lot was not sold.
Main Success Scenario:

1. System sets the lot's state to closed.
2. System informs all Buyers who have noted interest in the auction of the auction's closure and the final agreed hammer price.
3. System checks that hammer price is at least the lot's reserve price.
4. System interacts with Buyer of the hammer price to collect payment equal to hammer price plus the Buyer's premium. Payment goes through.
5. System confirms the successful purchase to the Buyer of the hammer price.
6. System informs Seller of successful auction.
7. System pays the Seller the hammer price less the Seller's commission.
8. System confirms the successful payment to the Seller.

Extensions:
3a: Hammer price is lower than reserve price (see Notes for suggestions)

1. System informs Seller that auction has failed because of low hammer price. All other steps are skipped.

4a: System fails to collect payment (see Notes for suggestions)

1. System informs Buyer of hammer price that his payment failed.
2. System informs Seller that the payment failed for the Buyer of hammer price.

Stakeholders & Interests: *Auction House Owners, Seller, Buyer, Auctioneer* are interested in having a successful auction.
Notes: Issues with the provided System description:

- System should first execute Step 3 and 4, which are checking conditions for a successful auction, and then Step 2 where all interested Buyers are informed of the auction's outcome.
- In Extension 3a, it is unclear what happens after auction fails. A suggestion is: Seller should be allowed to change his reserve price and re-enter his lot in the Auction House, or cancel his lot and recover his objects.
- In case of Extension 4a it is unclear what happens after payment fails. Two suggestions are: Staff could contact Buyer of the hammer price to retry his payment; Or System could set the Buyer of the hammer price to be the previous highest bidder, and repeat Steps 3-7.

4.3 Register as Seller

Primary actor: Seller
Summary: Sellers are required to register with the System before they can offer lots for sale. When registering, Seller provides some personal information and details of a bank account into which they would like payments to be made.

4.4 Set Reserve Price

Primary actor: Seller
Support actor: Staff Member
Summary: The Seller of a lot sets a secret reserve price when its lot is added to the catalogue.

4.5 Open Lot Auction

Primary actor: Auctioneer
Summary: Auctioneer declares a lot open for bidding and sets the opening price after seeing the low-estimate of the hammer price in the lot description. Systems sets the lot's state to open and notifies all Buyers who have registered their interest in the lot that the lot is open. System might also want to notify Seller that its lot is open.

4.6 Browse Catalogue

Primary actors: Buyer or Member of Public
Summary: When the app is in Browse mode, the System presents Buyer or Member of Public with the list of all lots that are for sale: meaning lots that are opened or unopened, excluding closed lots. The user can then Read Lot Description for any of the listed lots.

4.7 Read Lot Description

Primary actor: Buyer or Member of Public
Summary: When the app is in Lot Description mode, the System presents the Buyer or Member of Public with information about the selected lot, including: description and hammer price estimates. If user is a Buyer, it can Note Interest in Lot. If user is only a Member of Public, it can Register as Buyer.

4.8 Register as Buyer

Primary actor: Member of Public
Summary: A person must register with the System before they can note interest in lots and make bids. Registration includes providing personal and bank account details and giving the Auction House authorization to collect payments for lots purchased.

4.9 Note Interest in Lot

Primary actor: Buyer
Summary: Buyer notes its interest in the selected lot. System adds Buyer to the list of Buyers interested in the lot.

4.10 Bid on Lot

Primary actor: Buyer
Summary: Buyer informs the System that they would like to make a bid on a lot. They choose whether they make an incremental bid, or a jump bid and add the amount of the bid. System sets the lot's highest bidder to Buyer and notifies all interested Buyers of the new bid. System could also send a special notification to the previous highest bidder.

5 Use-Case Diagram

The diagram in Figure 1 presents the relationship between the stakeholders and the uses cases of the System, as described in Section 4. Some assumptions have been made.

- Buyers are different from Members of Public, as presented in Section 2. A Member of Public becomes a Buyer after registering with the System as Buyer. Similarly, a Member of Public becomes Seller after registering with the System as Seller.
- We have not accounted for the case when a Buyer can register as a Seller or a Seller as a Buyer. The user involved in registration is initially a Member of Public.
- Only a Seller can add the reserve price to a lot, as this value is assumed secret for all the other stakeholders.
- The System should allow a Seller to browse a catalogue and read the description of a lot as well, but we did not consider this interaction at this stage. This use case was not explicitly presented in the description of the System as per the Coursework document.

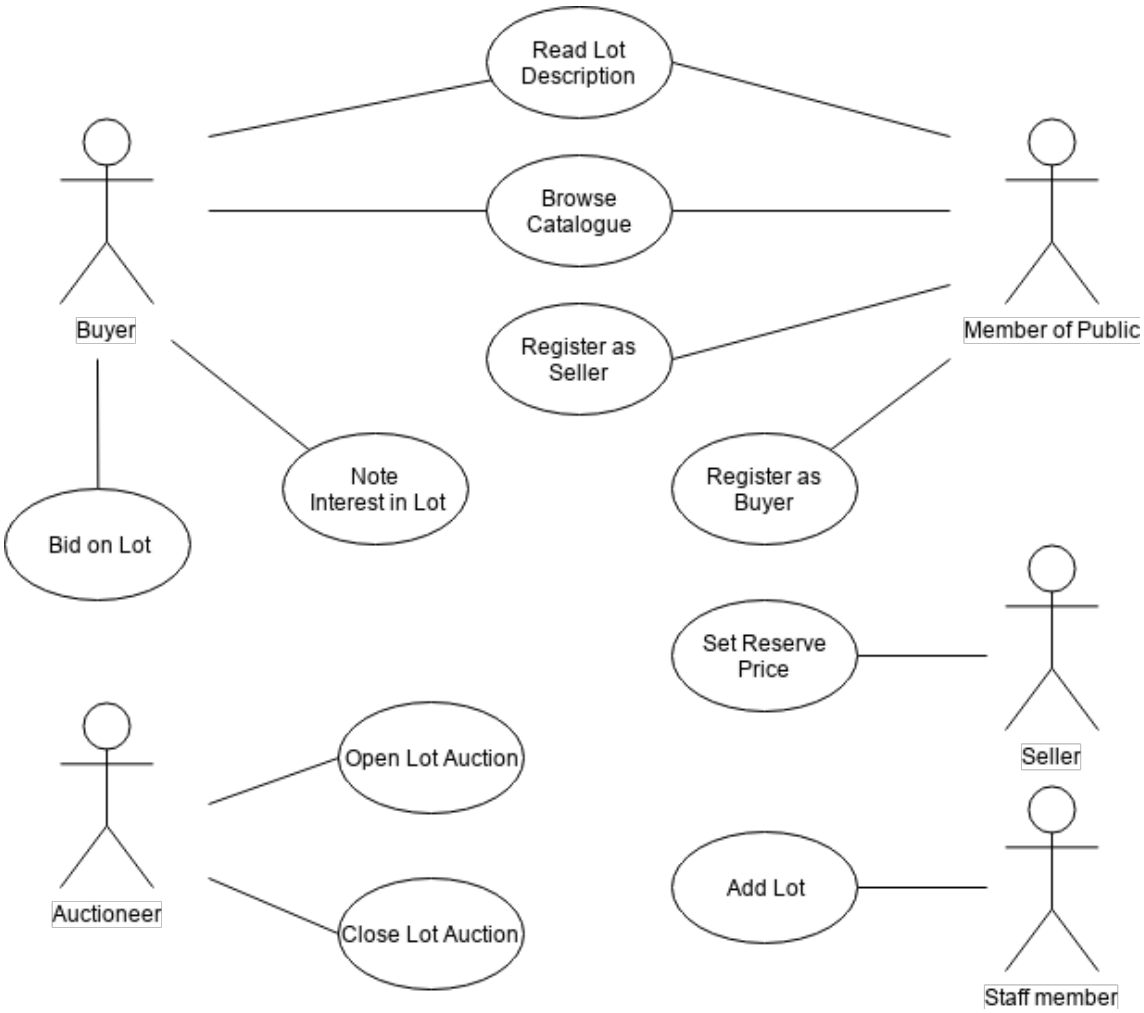

Figure 1: Use cases diagram

6 Non-Functional Requirements

6.1 Security

- **Buyers' and Sellers' personal details**. The System must ensure that the details saved on every Buyer and Seller at registration are kept private and secured against possible hacks and unauthorized use, in compliance with the General Data Protection Regulation. Hence, the Auction House must use the data only for the purposes known and agreed by the other party (Buyer or Seller) and it is not allowed to use it without the owner's accord. For example, unless explicitly stated from the beginners, sellers cannot see the personal details of the Buyers of their lots.

- **Bank details.** The bank details of each user (Buyer or Seller), including the account details of the Auction House, must be kept secure. Unauthorized payments and transfers other than the agreed transaction must not be made.

- **Secret reserve price.** The reserve price set by the Seller for its lot must be kept secret from the Members of Public, other Sellers, Auctioneer, Auction House Owners and Staff Members (where the last category is an assumption).

- **Secure against attacks.** The System must be secure against security attacks. Assuming the data on users and lots is saved in a database, System must be safe against SQL injection attacks such that the data is not compromised. The System must also be safe against attacks that try to trick the user to make unwanted actions without knowing (such as bidding).

6.2 Usability

- **Learnability.** The user application must be easy for users to accomplish basic tasks the first time they encounter the design, without further training. The user must find it straightforward to interact with the System. For example, it has to be clear how the search through the lot and select and item to bid on, where to add registration details, how to put any of the two different types of bid.

- **Satisfaction and accounting for special requirements.** The System must provide information easy to read. For example, text should be applied an appropriate font. Italic or capitalized words or some fonts are more difficult to be read by dyslexic people. The text and background color should work well together and be pleasant for the eye. Colours too bright or too dark might be hard to read. The text size should be neither too small nor too large. A good example is black text, normal Arial font, on a normal white or light background.

6.3 Performance

- **Fast response time.**All interactions should get responses within 1 sec. Most expensive might be search for lots in the catalogue according to some applied filters or authorizing payments.

- **Fast notifications.** All notifications that the System sends should reach the users in a fast time, with low latency. This is essential for a bid, when interest Buyers must know the state of their bid so that they can decide if they want to increase the bid. The auction cannot work well if the Buyers are not notified and do not reply in due time. The response time depends on the notification method implemented, but we can ask for 10 to 20 seconds notification messages via the application.

- **Battery consumption.** The power consumption of the application should be low in order to maximize battery life if smartphones or tablets are used.

6.4 Reliability

- The System should be able to handle failures such as information of a lot not being able to load or bank details not being added correctly, by displaying appropriate error messages. We can assume the System asks the user to redo an action that fails.

- The System should be able to notify the user appropriately if internet connectivity is lost.
- The System should act as desired when the bids of a lot are smaller than the reserved price. There is an ambiguity on what should happen in this case.
- The System should be able to report if a payment fails to go through (for example the transaction is refused as the Buyer does not have enough money to pay for a bid).
- The System should be able to correctly track the highest bid for a lot at a time during the auction.
- The System should acknowledge if the Buyer refuses to give initial authorization for payments to the Auction House to be accepted from the bank account and should decline the Buyer to take part in a bid in such a case.

7 Ambiguities, Subtleties, Incompleteness

The following questions were raised and they are categorized as ambiguities or incompleteness, as there was no clear explanation in the description of the System. If assumptions were made, they are presented next to the question.

1. Members of Public become Buyers and Sellers by registering. We have not accounted for the case when a Buyer can register as a Seller or a Seller as a Buyer. These assumptions are presented in Section 5 Use-Case Diagram as well.
2. Does the Seller add the reserve price to a lot? What does "secret" mean? Is the value secret for the Staff adding the lot in the catalogue as well? In this document we have assumed that the reserve price is secret for all the stakeholders apart from the Seller of the lot. Hence, only the Seller can add this value.
3. Are the owners of the Auction House members of the Staff as well? We have assumed that they are separate users.
4. How are the notifications sent? Are they just a pop-up of the application or can the user choose to receive them via phone texts (SMS)? Since an auction must have a really fast pace and notification via an online application can reach the other user faster than phone SMS, we have assumed that they are a better approach. However, the user might loose internet connectivity and miss an important notification about a current open bid, hence this raises reliability issues.
5. What happens if the Buyer who wins a bid does not have enough money to pay for the lot? Suggestions for failed transaction are in Section 4.2 Close Lot Auction Use Case - Notes.
6. When users register, do they create an account with user name and password? We have assumed yes. We are not extending in the coursework the scenario of forgotten login details.
7. Does the System check each user is registered once with the System with a Buyer/Seller account and did not create duplicate account? Does the System check accounts belong to legit people and not fake identities? For example, it could check an identification document.
8. How can the System check if the user's bank detail are accurate? Given user's details, a real System should expect a confirmation from the Bank.
9. Can Buyers become uninterested in a lot? This feature is not mentioned in the Coursework documentation, but a real System should provide it.
10. Does the System store any information about the auctioneers? We have assumed auctioneers do not register with the System as Buyers and Sellers do.
11. Who decides what are the low and high estimates and when must they be added in the System? We have assumed they must be added with the description of the lot by the Staff.
12. Does the auctioneer know there is a bid above the reserve price? Does the System confirm it to the auctioneer that this price was reached? These remain open questions.