

Core task: To model a management system for a fruit and vegetable store, to develop its architecture, to design the interface for clients, suppliers and suppliers, to calculate approximate costs of system creation, considering different development options.

Modelling of the following scenario:

A km-zero fruit and vegetable store wants to develop a management system for an Ethical Purchasing Group (EPS; in Italian, Gruppo di Acquisti Solidale, or GAS) that connects a number of customers (family groups or generally groups of people) and some farmers. The basic philosophy is a conscious approach to purchasing, involving knowledge of the origin, quality, and different types of products.

The supporting information system should provide service to customers, farmers, and store employees.

The operating cycle of the EPS is weekly:

- Starting at 12 noon on Friday and by 9 a.m. on Saturday morning, farmers provide an estimate of available products, in terms of types, prices, and quantities,
- Customer orders are accepted until 11 p.m. on Sunday,
- By 9 a.m. on Monday morning the farmers confirm the availability of products,
- At this point the system automatically performs payments from customers' virtual wallets,
- After payment has been made, customers can schedule times to pick up produce,
- By Tuesday evening, farmers deliver their products to the store,
- Pickups can take place from Wednesday morning to Friday evening.

The information system has a catalog of products that describes the characteristics, contains photos, and indicates the unit of measurement with which they are sold (for example: €/kg). In addition, a minimum and a maximum quantity that can be ordered is indicated.

The availabilities entered by farmers refer to a product in the catalog, specify the total quantity available and a price (with the same unit of measure indicated in the catalog). It is also possible to indicate crop characteristics, e.g., small size, excellent quality, very ripe, etc.

Customers can choose from all the offerings of the various farmers by specifying the quantity and completing an order. The order can be placed directly by customers via the web or by store employees at the customers' request. Once the customer confirms the product entry, the system verifies that the minimum quantities are met: if not, the customer must modify the order before it can be finally confirmed. Once the order is completed, a summary email is sent to the customer. Please note that the customer is a representative of a buying group, typically family groups or more generally groups of people. Therefore, only the group representative can enter group orders into the system.

Customer orders are in the "entered" state until the farmers confirm available quantities. If the available quantities are sufficient to cover the orders, the orders move to the "confirmed" status. If there is no availability for all orders of a certain product, according to the system's precedence rules, unavailable quantities are removed from lower precedence orders. Modified orders go into the "modified" status and must be viewed and accepted by customers. If all products in an order are unavailable, then the order is cancelled.

Upon delivery of the farmers' products, the clerk confirms receipt of the products in the specified quantity. If by 4 p.m. on Tuesday the goods have still not been delivered the system sends a reminder via SMS. If at the end of the day (8 p.m.) the goods have not been delivered, the system changes the orders related to delivery, re-credits the amount of goods not present with a bonus of 20% and reports the inconvenience to customers.

Payment of orders is made after confirmation of quantities by farmers, for the quantities actually in the order. Payment is made from a personal wallet that users can top up at any time through the store.

After order placement, if the customer's wallet balance is insufficient, a

warning is sent via email but the order is still accepted.

If the balance is insufficient at the time of payment, a message (SMS) is sent to the customer who has until Monday evening to top up their wallet. If the balance is not sufficient on Monday evening, the order is cancelled.

As soon as the payment is made (automatically by the system) customers can book an appointment to pick up their products at the store.

Store employees at the beginning of their shift view the pickup schedule and prepare packages for customers, when they arrive they register the pickup of products.

In case of failure to pick up on time, the system sends an SMS alert to the customer.

If the customer has not picked up their order by Friday, it is marked as "forfeited" and the customer's fair play score is updated as detailed in the following.

The system has a mean of evaluation the "fair play" of customers registered in the system. The customer's fair play score is a measure of how correctly the users behave regarding their orders. This score is maintained in the system and is used as a mean of precedence in case of limited availability of produce. The "fair play" score is computed based on four different indicators: O) number of computed orders; R) number of reminders received; F) number of forfeited pickups; M) number of modified orders. When there is not enough availability of produce for all orders, the customers with higher score are given precedence over those with lower score.

In the context of the scenario outlined above, define:

1. The conceptual information model (UML class diagram).
2. The process model (BPMN process diagram).
3. The use case model (UC UML diagram) at the summary and user-goal levels.

4. The narrative related to the user-goal level use cases identified in the previous point.
5. The graphical mock-ups related to the use cases from the previous point.
6. Were evaluated the advantages and disadvantages of developing a web system corresponding to the use cases described in step 4 by comparing two different alternatives.
 - a. The development is carried out by a team of 6 young people who have just graduated in computer engineering less than a year ago. Although they have excellent technical expertise in object-oriented programming and development languages, none of them has direct experience in the field. The lead analyst is the most senior colleague in the group. They estimate an average cost per person on the team of 250 euros per day and work on the project full-time.
 - b. The consulting firm is taking over the development by entrusting it to its own team of 8 off-shore developers. A senior analyst who has led more than 20 such projects is put in charge of the project, and half of the developers have experience in similar systems. The developers are located in different places on time zones of up to -6 hours. They have good experience in web programming and object-oriented development. They have been assigned to the project for 20% of their time. The average cost per person on the team is 100 euros per day.