Information system UML-model development by OMG RUP technology for Food industry enterprises

G A Blagodatsky, S V Vologdin, M M Gorokhov, D E Dokuchaev
Information systems Department, Izhevsk State Technical University, Studencheskaja, 7, Izhevsk, Udmurt Republic, Russia, 426069

E-mail insys2005@mail.ru
As a result of a research it is revealed that as a part of a production system there are 15 active elements which interact among themselves as a part of 3 subsystems of the main system (10 main packages of precedents of subject domain are revealed). The production system represents (1):

\[ S = \{\bar{y}, Q, \bar{B}\} \]

where \( \bar{y} = \{y_i\} = \{1, m\} \) - product assortment, \( Q = 16625 \) - release volume (depends on needs of consumers), \( \bar{B} = \{B_j\}, j = 1, n \) - realization points.

Restrictions are imposed on system (2):

\[ \{v, \bar{r}, \bar{\tau}, e_\tau, e_s, g\} \]

where \( v \) - capacities of places of storage, \( \bar{r} = \{r_i\}, i = 1, n \) - times of deliveries, \( \bar{\tau} = \{\tau_i\}, i = 1, n \) - periods of storage of materials, \( \bar{s} = \{s_i\}, i = 1, m \) - periods of storage of finished product, \( e_\tau = 128 \) - car capacity, \( e_s = 16 \) - tray capacity, \( g = 3 \) - vehicle fleet volume [14].
1. Delivery system
The enterprise actually works on the JIT system. Therefore, at automation it is necessary to consider that the main process is strongly connected with results of auxiliary processes [15] (it is necessary to deliver reliably and in due time raw materials and materials and to quickly carry out delivery of finished goods to realization points), and the system (1) represents difficult, multilevel system with active elements. We will consider process of delivery of finished goods to realization points (see fig.1).

Figure 1. Collaboration diagram of “Car park”
These actors conduct activity connected not only with delivery of the goods, but also with service and car repairs which are available at the enterprise. These are such actors as: "Driver", "Director", "Service stations", their activity is directed to maintenance of ability of the enterprise to carry out delivery to the made production. The driver receives a task to make service of the car from the director. After that the driver on the car goes to service station where makes all works then the service station makes out the director a bill for the performed works are necessary.

Figure 2. Sequence diagram "Delivery"
In the course of delivery classes have been allocated: "Driver", "Car", "Service station", "Client". The main participants of this process are "Driver" and "Client". "Driver" carries out delivery by means of "Car". One "Driver" uses for delivery one "Car" for delivery of production to a quantity of clients, about 40 shops for one route.
2. **Production and purchase systems**
   In the figure 4 actors and their interactions in the enterprise are marked out.

![Collaboration diagram of "Production system"](image)

Figure 4. Collaboration diagram of “Production system”

These actors participate directly in production. These are such actors as: baker, oven, dough dividing machine, warehouse. These actors are the main in the course of production. The baker receives a task from the technologist, to make necessary quantity of production, after that the baker goes to a warehouse behind necessary raw materials and begins process of production of production, using the equipment which is available for this purpose on production.
Figure 5 – Sequence diagram of "Production System"

On the basis of the provided diagram class diagram is developed for production (see fig. 6).
In the course of production the following classes have been allocated: "Baker", "Technologist", "Client", "Equipment", "Production". To start production the client does the application, further the baker under control of the technologist and by means of the equipment turns out products.
Figure 7. Collaboration diagram of “Purchase system”

In the figure 7 suppliers of the resources providing works of the enterprise are marked out, such resources are flour and other goods are necessary. The technologist analyzes the remains of flour and other goods in a warehouse then he reports about results to the director, that in turn contacts suppliers and does the order of necessary goods. Further suppliers fill a warehouse with flour and necessary goods.
Figure 8. Sequence diagram of "Purchase system"
On the basis of the provided diagram the classes model is developed for production (see fig.9).

Figure 9. Class diagram of "Purchase system"

In the course of "Purchase" the following classes have been allocated: "Director", "Technologist", "Flour provider", "Joint products provider", "Warehouse". "Director" and "Technologist" fill a warehouse with necessary goods using for this purpose classes: "Flour provider" and "Joint products provider".
3. Conclusion
As a result of a research it is revealed that the structure of data will consist of 3 main sections providing information requirements of production, management and delivery of finished goods to realization points. The minimum quantity of basic classes of the entities of subject domain grouping tables in the principle 1 to many not less than 15 that speaks about high complexity of the projected database of subject domain.

Based on use-case diagrams, a UML - model of classes for production has been developed. An approach is proposed to solve the problem of designing the structure of an information system based on the UML - classes model of the subject area. The RUP approach to the development of the model of an information system for managing auxiliary business processes of an industrial enterprise was implemented.

As a result of the research it was revealed that the data structure will consist of 3 main sections providing information needs of production, management and delivery of finished products to implementation points. The high complexity of the information system's database is indicated; because of the minimum number of basic classes of domain entities that group tables according to «1 to - n» - connections is not less than 15.

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