The formalization of knowledge in agricultural industry business processes

Formalizace znalostí v podnikových procesech zemědělského průmyslu

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Abstract: This article deals with the most important part of business modelling, with business process modelling. The presented process models are achieved by using common and special UML diagrams. The business process is one of the four basic business concepts creating complex business architecture and it is dynamic, structured and complicated part of the business. In business process, there are stored significant rules and knowledge of the business. Those issues could be applicable to the knowledge formalization in the agricultural business.

Key words: Business architecture, business resource, goal, process, rule, knowledge, UML, activity diagram, assembly line diagram, information system

Abstrakt: Článek pojednává o formalizaci a modelování podnikových procesů, použitím základních a rozšířených diagramů UML. Podnikové procesy jsou jedním z nejsložitějších podnikových konceptů a jejich nedílnou součástí jsou pravidla a znalosti podniku. Modely se týkají procesů v oblasti zemědělství.

Klíčová slova: Podniková architektura, podnikový zdroj, cíl, proces, pravidlo, podniková znalost, UML, diagram aktivit, assembly line diagram, informační systém

Identification of improvement areas and utilization of information and communication technologies in agriculture, as the support of the agricultural development in line with environmental sustainability criteria, have gained importance and priority in our knowledge driven society.

Access to relevant, accurate and complete knowledge and availability of this knowledge has been the central problem in all human activities within organisational and inter-organisational context. New approaches to human development concepts and increasing problems at community, national, regional and international levels require effective problem solving strategies to be adopted by all institutions in agriculture as well as in other business areas.

This article is in connection with another my article in the Agricultural Economics (Rábová 2004), that dealed with the possibilities of analyzing and modelling of the actual state of business. It focused on static parts of business such as goals, problems or resources and dealt a bit with business processes. But business processes are dynamic and complicated part of the business modelling and they are connected in particular with the rules. Rules define constraints, conditions and policies of how the business processes are to be performed but they also affect the behaviour of the resource and facilitate strategic business goals achieving. They control the business and represent business knowledge. In this paper, I will describe one of the possibilities how to present the rules and knowledge in the business by using business process models. My models of business processes would serve as means of visualisation and formalisation. By integrating business processes effectively, enterprise could gain competitive advantage, increase organisational efficiency and provide timely, controlled responses to the customer, supplier and internal processing requests.

MATERIAL AND METHODS

Business process and its position in the general business architecture

Business processes are the active part of the business. They describe the functions of the business

and involve resources that are used, transformed or produced. They emphasize how the work is performed rather than describing the products or services that result from the process. They also have goals and are affected by events occurring in the external world or in other processes. A business process consists of steps or activities and could also have feedback that controls or evaluates process results and influences it (as shown in Figure 1, 2 and 3). All of this is governed and controlled by the business process rules.

There are other concepts that describe the business situation. For example, the State change concept presents that a process changes state of resource and the Event concept presents that process is affected by events in the surrounding environment or generated by other processes that cause the process to be activated, interrupted, finished or controlled.

Figure 1 shows a common business model with its concepts. Figure 2 shows the same model but in the particular business in agricultural area. I chose a company of the milk industry and its business process Milk production that proc[cd BPM] raw milk and executes the milk delivery. The common concepts from Figure 1 are loaded with particular specification in Figure 2. This process Milk production is modelled by using two approaches and appropriate diagrams below.

The business process modelling

The business process modelling is the most difficult and the most important part of the business modelling. The models not only present the activities that must be undertaken to achieve an explicit goal, but they also present their relationships with the resources (people, material, energy, information and technology) participating in the process. There are also relationships between different processes that interact with each other and there is the connection of the processes to goals.

There are several techniques used to perform business process modelling and most of them are rather customer-oriented. They are supported by some editor or CASE software. In my earlier contributions (Rábová 2003, 2004) or dissertation work (Rábová 2002), I presented business modelling with the UML notation. UML is the standard modelling language for

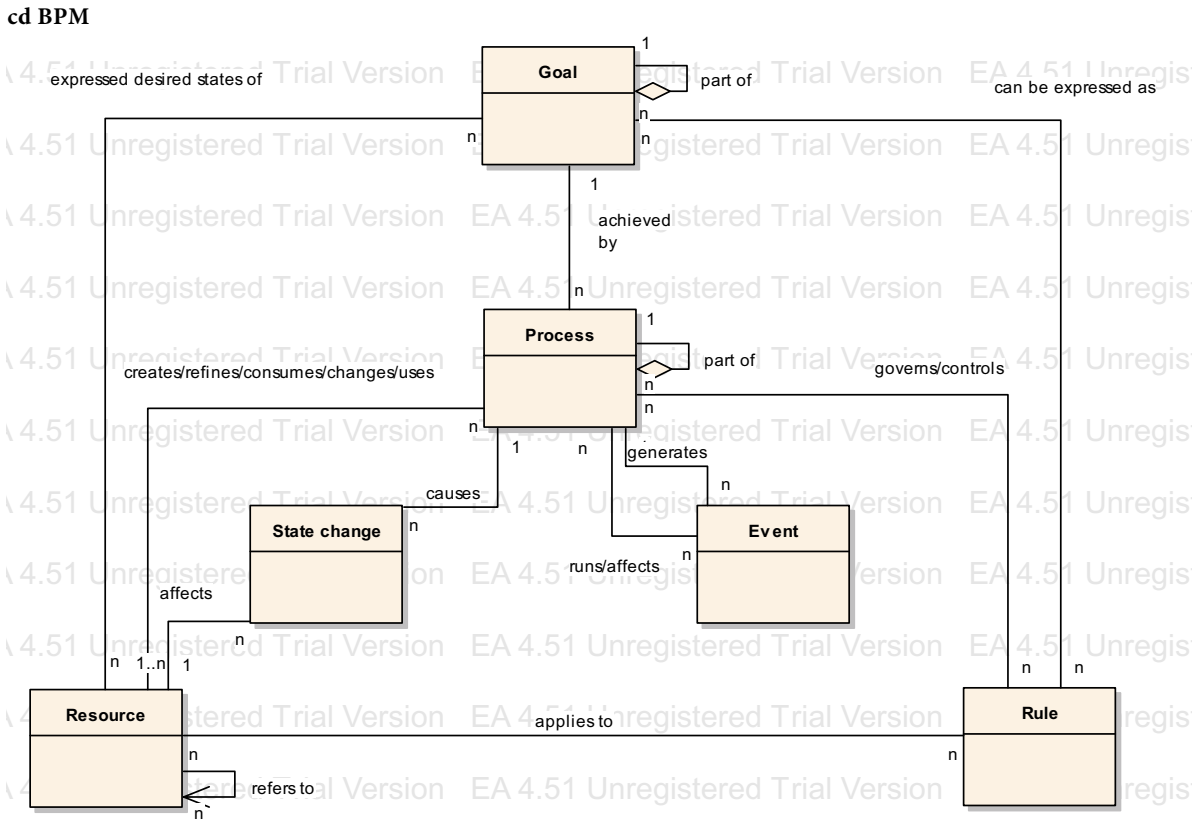

Figure 1. Business process and other business concepts

Source: Rábová (2002)

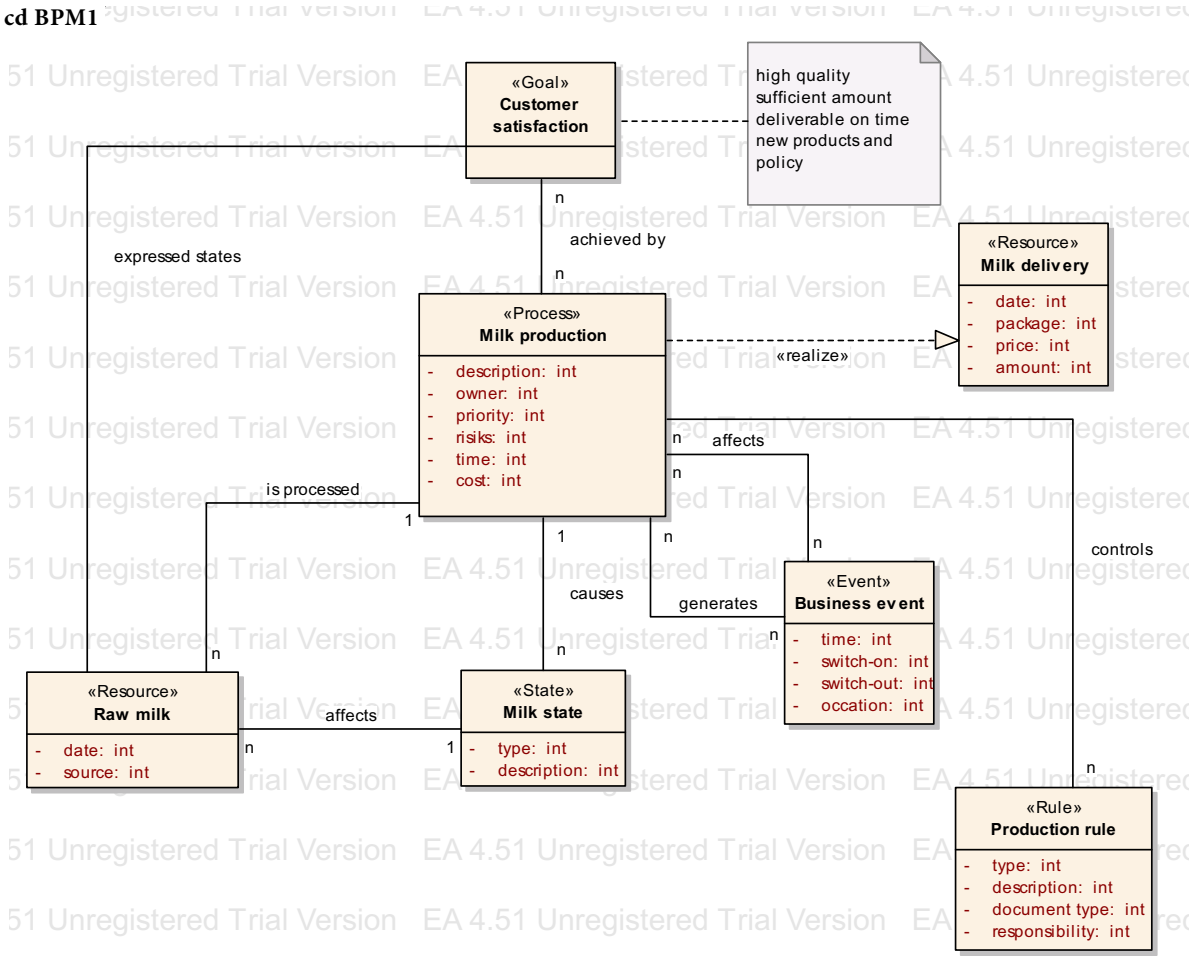

Figure 2. Milk production process with other business concepts

software development and its extensions make the usage of UML for business architecture modelling possible. In this case, I prefer and recommend two approaches presented by two types of UML diagrams for the process modelling. A process diagram as UML activity diagram in Figure 3, 4 and its unique extension – assembly line diagram in Figure 5. The diagrams are presented with supporting of CASE Enterprise Architect (its trial demo version).

RESULTS

Assumption has results in many different diagrams. There are presented only the most important ones.

Process diagram in Figure 3 is the UML activity diagram that describes the core business process Milk production. There is cow's milk with its parameters as the input resource and milk delivery as the output resource. Milk is made with any flow line technology, supported by people and controlled by the amount of the relevant business rules. The whole model in Figure 3 presents the basis of the important knowledge in business. There is also presented the feedback evaluated business process results and the goal of the core process that is customer satisfaction. Diagram in Figure 3 presents the business process environment and participant concepts such as goal, resources and rules. It is complex and consists of many activities. Its structure will be presented in my next contribution. In this article, there is only a demonstration of the possible knowledge formalisation as a process description by using diagram activity.

It is quite important to fit this process into the whole customer relation management process. The example of the activity diagram shown in Figure 4 presents this process in the context of the two common business processes of CRM such as Product to Market and Product to Customer. The Product to Customer process comprises Production and Delivery and this process has the goal to sell as many products as possible. The process Product to Market involves the market prediction, the development of new products and their implementation. Its purpose

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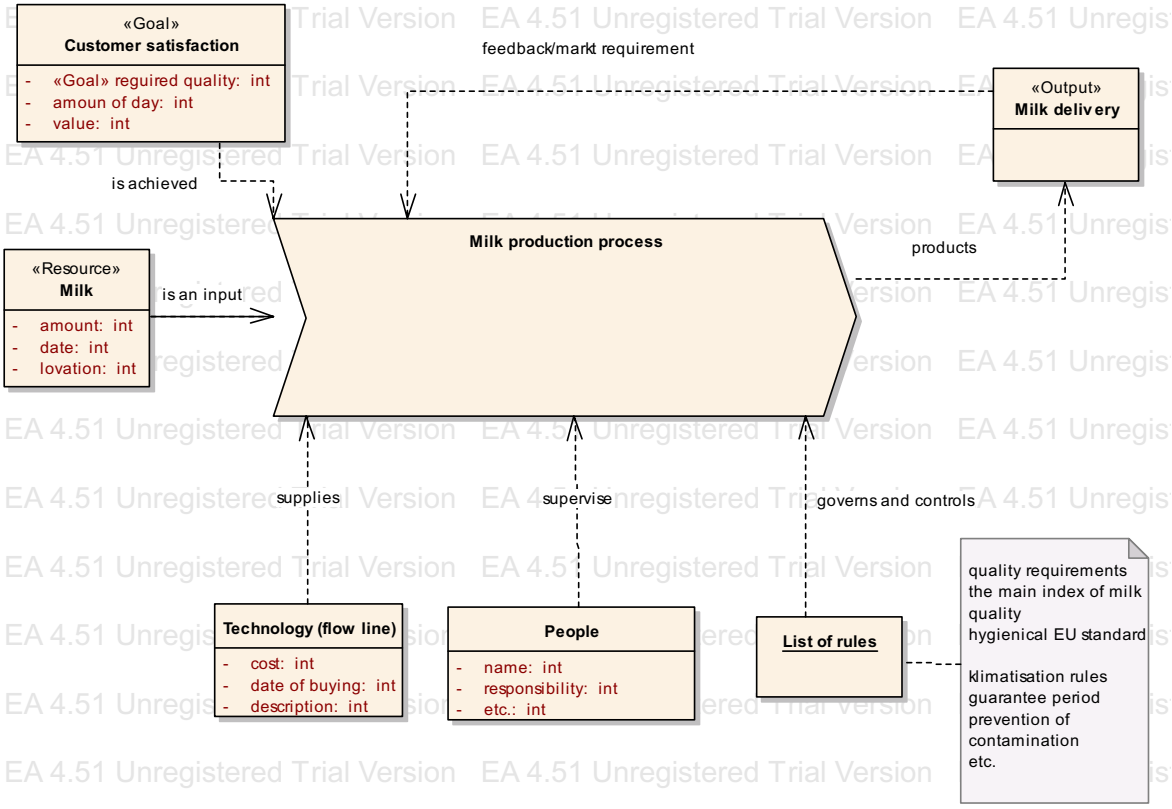

Figure 3. Milk production process in agriculture industry

is to make sure that the right products reach the market in time.

Assembly line diagram is based on the UML activity diagram. It has been successfully used for process modelling, particularly when the purpose of modelling is the innovation or improvement of the information system that supports the processes. There is a process diagram in the top half of the diagram and number of horizontal packages that are called assembly line packages, each of them representing a group of objects from specific class, from information system or subsystem in the lower half of diagram. The purpose of this diagram is to demonstrate how the processes in the upper part handle (write or read, modified or created) objects in the assembly line. The objects could be resources, people, information or subsystem in the software application. Reference is indicated by using dashed line (object flow) between the process and object within the assembly line.

Figure 5 is an example of the assembly line diagram that shows the processes and its references to different subsystems of information system. The basic business process consists of the three subprocesses (Input order, Register transaction and Milk delivery). These subprocesses support three different subsystems (Accounting system, Sales system and Inventory system). The diagram shows the relationships between the real business process and the information in the supporting software application.

DISCUSSION AND CONCLUSION

If some organisation wants to improve revenues, profits or customer relationship management, these formalized diagrams are helpful to recognize risks, threats and the gap in the business processes. Nowadays, the most of the business reengineering processes involve the transition of the data to the information and to the knowledge.

This article could help agricultural businesses in solving of the problems regarding restructuralisation or in taking the competitive advantage and to contribute to the restructuring in response to the European Union directives. The major knowledge management areas include rural community development, property management systems, agricultural effectiveness and socially and environmentally sustainable development. Although the information and communication technologies provide enormous possibilities for effective

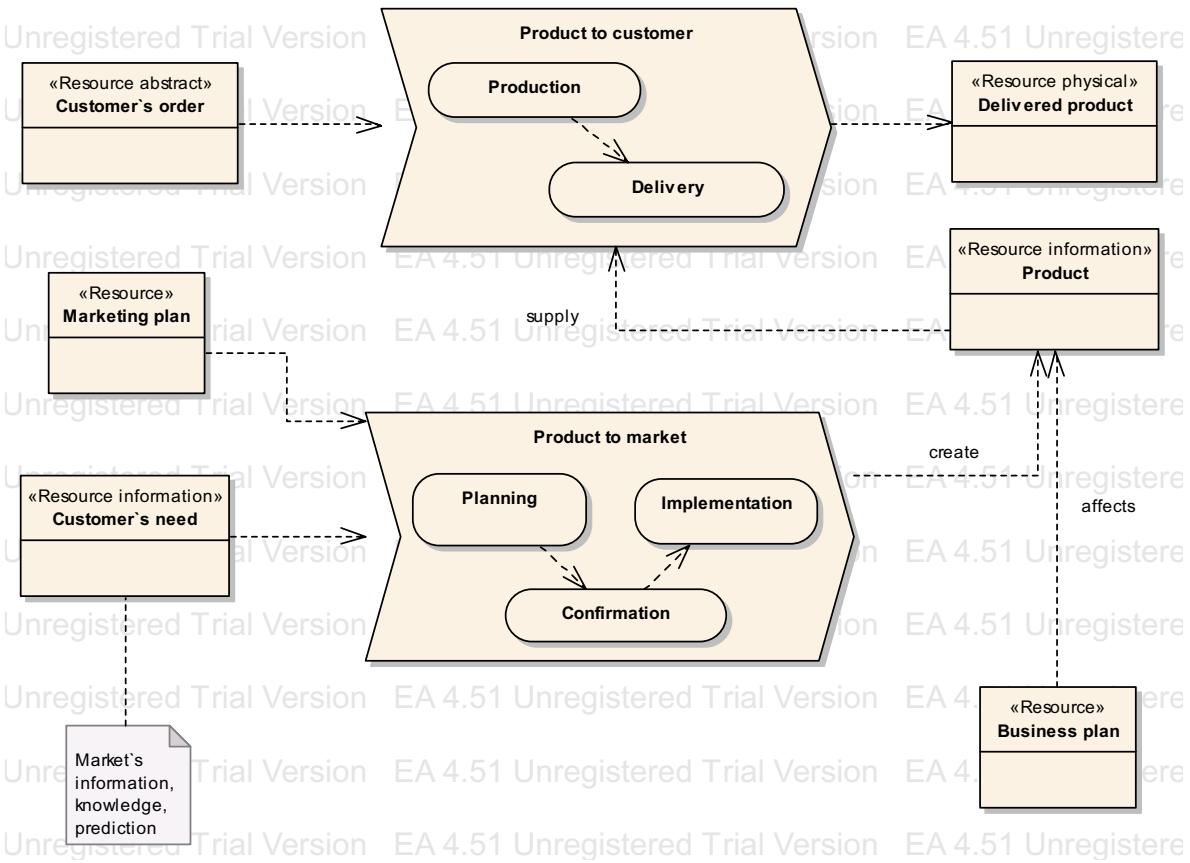

Figure 4. Business model of the particular business process

usage and sharing of information and knowledge by and between the organisations or individuals, current organisational approaches to intra-organisational and inter-organisational work flows hinder organisational effectiveness at all levels in rural and regional contexts (Rábová 2004).

In order to do it, the organisation must address people that are the foundation of every knowledge initiative. By using these diagrams they can communicate problems, create, share and document their rules and knowledge with high attention. They all must focus on the cooperation throughout the whole organisation because the knowledge is multidisciplinary, and consists of experts, information management professionals, executives, managers and everyday users. Human element is essential. To contribute to the knowledge-focused culture, business processes must support the entire knowledge lifecycle.

These business processes must be the actual business processes where knowledge is created and consumed and placed in the delivery of the product or service and they are incidental to the work people do. The effective knowledge must always be grounded in the reality of the business needs and goals that are also presented in diagrams.

Systems and technology are indispensable to achieving the economies of scale, which allow proprietary knowledge to be fully leveraged. They allow the access to the knowledge artefacts, enable further knowledge creation, improve the speed and quality of the knowledge capture, allow real-time knowledge sharing.

One of the primary motives for developing any business model is to increase the understanding of the business and facilitate communication regarding the business. A visual model is easier to comprehend and discuss than a textual description. However, knowledge formalisation is in other words the proclamation to create extreme models with many rules and guidelines and with all the above addressed concepts.

Business architecture is the basis for describing and understanding an enterprise and it is the best knowledge basis of business (Eriksson, Penker 2000). However, because an organizational chart is usually the only description available of the business, many of the situations and structures in it have never been documented or visualized. Documenting the business makes it easier to perform improvement or innova-

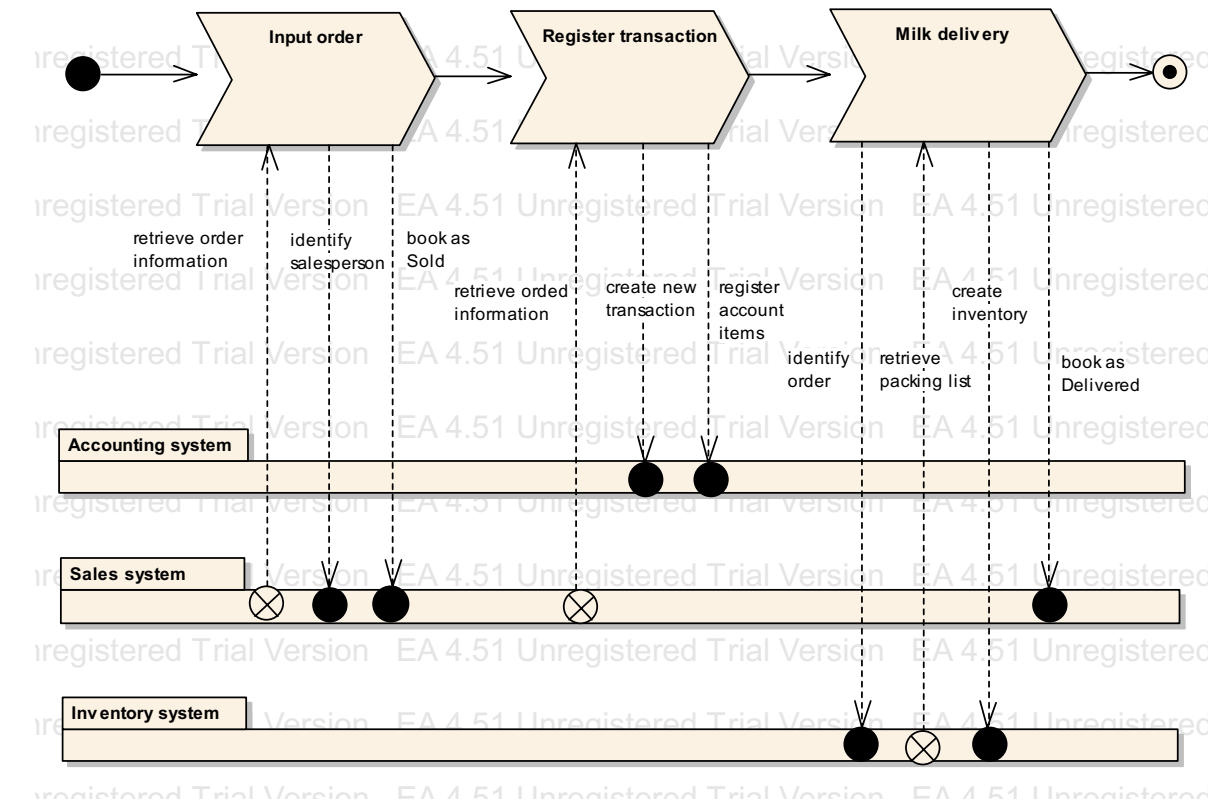

Figure 5. Assembly line diagram of concrete business process

tions to the business and to identify new business opportunities.

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