A Design Support Online Catalogue

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Abstract

This study presents the information requirements of an online catalogue toward different product types. The presented online catalogues integrates with product data management (PDM), and it will be both a repository for pooling engineering information generated in the product life cycle (PLC) and an information cargo for luring potential customers interest. By means of integrating with ample product engineering data and up-to-date information, the online catalogue is transformed from a simple information dictionary to a decision support portal that is nourished with timely and valuable information.

1. Requirements for designing an on-line catalogue

The information in traditional catalogue basically includes product specification and performance indices. Generally speaking, the design of a catalogue intends to cater for following demands:

I. For the customers who are not familiar with the product promotion, the catalogue provides a media to get acquainted with the products and, at the same time, to further lure their interests.
II. For the customers who are interested in adopting the products, the catalogue not only provides users to locate suitable components from the catalogues, but also further provides product specifications and test results so that the users can evaluate the feasibility of adoption.
III. For some special needs, the catalogue can further provide more knowledge, e.g. previous successful implementation cases, to assist users to properly utilize their product in order to increase the users' success of adoptions.

However, owing to different purposes and strategies taken by customers, the requirements of product information for catalogue will be different. Failing to recognize such subtle differences, the efforts for compilation of the catalogue or the dissemination of that will end up in vain. Generally, The purposes and strategies of seeking information will be determined by product design phases and characteristics of the components, which will be elaborated in the following two sections 1.1 and 1.2.

1.1 Different Requirements in Design Phases.

The purpose for developers to search components will be different according different design phases, therefore the requirements for product information will thus be different.

(1) Before design confirmation

In the very beginning phase of the product design, the most concern for a designer is to select the best sets of components from markets in order to fulfill specific requirements with good quality. This would consume a significant amount of developing efforts and time in arranging lab experimentations or pilot runs. Therefore, in the sense of saving efforts, designer would normally welcome complete tested results already available at the time he/she is thinking to try some components. This kind of demand might be different than simple testing reports. Moreover, it can even be a complete design, identical to the one that potential buyer is going to develop.

Normally, the enquiry of a designer is simply for clarifying the feasibility of using the promoted components. That is, the designer is simply looking for pioneering components. Owing to the severe competition of products, such as computer peripheral devices, wasting time on uncertain key components is equivalent to delay on the product developing champions. It would thus prevent company from enjoying higher marginal profit while the supply of the end product in the market is comparatively small in comparison with huge demand. Therefore, the vendor might need to, in some cases, invest time on developing the complete applicant products that utilize the promoted pioneering product. The adopters (buyers) then are convinced to try the pioneering components and also could leverage from piloting works done by vendors.

(2) After Design Confirmation

After confirming the basic design and the BOM of the products, the deployment on the catalogue has yet ceased. Companies normally have difficulty to find substitutable components for their key components. However, other than the key components, the developing teams will try their best to find out as many compatible components as possible from different vendors to prevent the possibility of shortage in market in following phases of the product life cycle.

However, for the compatible components collected by the development teams, some necessary testing procedures still cannot be skipped so that the guaranteed quality and quality assurance policy can be maintained. Therefore, designers will list all the compatible components beforehand so that they can be included in the prototype pilot run. This prevents the contingent activities from postponing the delivery commitment in production line, in case of the supply of components is found shortage later on in the procurement stages.

1.2 Different Requirements on the Components Characteristics

(1) Key components

As mentioned before, developers request different types of product information from catalogues in different designs stages. Furthermore, the product characteristics would also affect the way users request product information. For example, the key components supplied by limited vendors are normally applied to limited end products. When designers are forced to adopt such key components, they will invest every effort to know bottom up about the decisive components

To a company, the key component can be manufactured by itself or by purchasing from vendors. When a company decides to manufacture by itself, the normal consideration is to protect proprietary technology or to increase the product differentiation. On the other hand, if the company wants to purchase from vendors, it will assure the stable supply of the key components with satisfactory quality. In this case, the information about supply quantity in the market is relatively transparent compared with the non-key components. This is because product supply capacities of vendors could be estimated through tight relationship between supplier and buyers. For example, vendors could notify their clients actively about their forecast of the production plan, or about the new products development schedule (road map in the practitioner term). Similarly, the buyers can also estimate the supply steadiness based on the market survey. Then, the most concern for the adopters (buyers) will be whether or not the product can be perfectly embedded into their designs.

(2) Minor components

Unlike the key components, some other components can be considered as minor components. Note that, the problems of the minor component are different than key components. This kind of components normally has some characteristics: such as they are cheaper, they have plenty of vendors in market, and they can be applied to various applications. However, they are like screws and nuts in a product: i.e. the product cannot be completed without the minor components.

As we can see in the production line, the production sometimes is halted or postponed because of the temporary shortage of minor components. When this happens, designers have to turn to the compatible parts even those brands untouched previously. However, for those new compatible parts being adopted, the designer has to go through testing and experiment processes to assure they are compatible with existing system. A design support online catalogue can also provide sufficient information about testing results for reference and the detailed the better. Otherwise, when it goes to this point, the high cost for searching for compatible parts might endanger the commitment of filling the orders.

Listing out all the compatible parts in the very beginning of the designing phase is difficult for designers. To identify

compatible parts cannot simply look through catalogues provided by vendors. Normally design engineers can only list out those parts based on limited experience, and they request samples for further pilot testing.

To extend the knowledge about compatible parts to the engineers, the marketer of vendors normally sends physical copy of catalogues to the engineers. However, the physical catalogue can hardly satisfy the dynamic needs and interests of the design engineers. This is especially true when the engineers have so many projects at hands and do not consider finding the compatible parts is an urgent task. Then, the engineers have difficulty to locate the compatible parts from piles of catalogues when they need to have ones. In this case, a complete and updated list of compatible parts in an online design support catalogue can greatly help the design engineers.

(3) Design compliance according to product characteristics

It is also worth notices that if designers would like to purchase components from vendors for their designs, there are two situations: (1) for the key components, designers (buyers) comply their design to the key components; (2) for minor components, designer (buyers) choose suitable minor components to fit into their design.

It is interesting to note that the vendors who sell key components have higher negotiation power to force buyers to comply with their specification. This is because the key components normally are developed for special applications. They are relatively hard to customize their specifications. Also, fewer competitors in markets prevent vendors from catering buyers with diversified specifications.

In contrast, vendors for minor components have to prepare full series of product families in advance to cater diversified demands from buyers. Severe competition forces vendors to differentiate themselves from other by providing complete product lines. In this case, designers have higher chance to select the better components.

2. The evolution for catalogue

2.1 From Catalogue to Online Catalogue

Surfing with the evolution of Internet, the media of catalogue improves from printed-paper to online bases. The change of the media allows online catalogue to present information dynamically, i.e. high degree of customization information, and directly linkage toward legacy system, such as ordering, paying, and tracking.(Turban, Lee, King, & Chung, 2000)

However, the new presentation format may not bring much nutrition to the information functionality if not many benefits from the integration of information technologies are leveraged. Therefore, two improving approaches are adopted.

I. Researches from academics and industries tried to build up a shared content engine, which could intelligently import catalogue from various media formats and automatically transform them into an intermediate product schema. With accumulated product catalogue data, a personalized catalogue would be sent to client's portal through languages like XML. Such development aimed to enrich the content quantity of catalogue in an automatic mechanism, and, at the same time, clients could get target components from voluminous product data. (Fensel et al., 2001)

II. The other main stream is to add intelligence into the catalogue engine. Responding to customer requirements, a catalogue engine can either custom-made products for customers, or pick the most suitable components to embed into customers design. (Lee, Lee, & Lee, 1996; Trilogy Development Group of Austin, 1994)

2.2 Online Catalogue as a Design Supporting Tool

A new structure for online catalogue is proposed in this study: integrating Product Data Management with Object-Oriented Database to structure comprehensive Product Engineering Information which is available anytime through Internet for buyers. Unlike conventional online catalogue, only maintains descriptive data of products, a Online Catalogue proposed in this study would provide sufficient engineering information in order to render design engineering

ability to make design decision before a buyer approaching engineers of the vendors.

Basically, the product information will be organized into two forms.

I. Related Engineering Data, such as geometrical model, or electronic model, will be organized in the object form that would be exchanged through CORBA or XML.
II. Composition related knowledge, such as BOM, workflow, or engineering change, would be maintained in association with object classes, in which the knowledge of former applications could be facilitated.

New functionalities from this design, which is not delivered by traditional online catalogue, are follows:

I. Catalogue supported by engineering product data becomes the channel, from which buyers can pull out adequate engineering information they want.
II. Application knowledge could be coded in object, which provides more flexibility for buyers.

2.3 Online Catalogue as a Collaborated Development Channel

Integrating online catalogues with PDM allows the catalogues not only display information but also provide an interactive platform between buyers and vendors. That means, users could extract full engineering information, even includes geometric CAD files, from the catalogue portal. In case there are only similar components could be found in the catalogue and they are not perfectly match the needs, buyers still be able to revise the CAD files directly. This can be done through retrieving files from online catalogues, marking up requirement on the CAD files, and sending it back to the vendors. Then, the vendor can customize the product for the buyer.

The online catalogue integrated with a PDM system proposes a channel for buyers to exchange products design, even without collaborating relationship or collaborating system in advance, with vendors. Since the customer requests are added into product design and are transferred to vendors' internal PDM system. The requests for customization from customers are directly sent to designers and they are based on the existing design. Therefore, a new type of collaboration between buyers and vendors can be implemented.

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