Digital Products Design Pattern for Digital Platform

Evgeny Zaramenskikh and Maria Guseva

Abstract The article presents the possibility of application of modeling patterns when creating digital products. The research examines various aspects of digital products and constructs an appropriate modeling pattern based on the ArchiMate language. The study also demonstrates an example of its usage. The application of the digital product modeling pattern is illustrated by the example of the experience of a large Russian marketplace company operating in a highly competitive market in big Russian cities.

Keywords Design pattern · Digital product · Enterprise architecture

1 Introduction

The concept of a digital product has already become an important part of the definition of the digital economy, which some researchers comprehend as part of economic output derived solely or primarily from digital technologies with a business model based on digital goods or services [1].

In a rapidly changing global economic environment companies worldwide need easy-to-use tools for design, development and further implementation of the digital products. An architectural approach can be effectively applied for this purpose.

Digital products are offered to consumers in various business models because the very fact of their offering to the target audience allows solving the quite typical for digital enterprises problem of transition to the revenue growth from the audience growth [2].

Many companies start to design, develop and sell digital products within the framework of other business models. However, the presentation of digital products on the foundation of the enterprise digital platform looks especially perspective.

The appeal comes from the nature of the digital platform. The owner of the digital platform acts in the role of the "club owner" and receives commissions for the

E. Zaramenskikh (✉) · M. Guseva
HSE University, 100100 Myasnitskaya 20, Moscow, Russian Federation

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transaction costs reduction when platform users are interacting. At the same time, the cost of creating an additional transaction for the platform owner is zero.

Such phenomenon makes a digital platform similar to a digital product, the classical understanding of which assumes zero costs for a creation of an additional copy and for the delivery of the product to the consumer.

Quah [3] understood a digital product as "a sequence of bits, a sequence of zeros and ones that have economic value", additionally emphasizing on non-competitive access and unlimited scalability as the main characteristics of a digital product. The key characteristics of a digital product are arranged in such a way that the product can be effectively used within the frameworks of the digital platform as a business model.

The highest expenses in the digital product lifecycle are in the design and development phases. However, there is a reason to believe that the usage of modeling patterns will not only reduce these costs, but also make the product more transparent, manageable at all stages of the life cycle, as well as highly demanded among the target audience.

Despite the fact that a significant share of consumers consider digital products to be less valuable than physical products [4], there is a significant demand for digital products in the markets of developed and developing countries, especially among millennials [5].

The high demand for the digital products is confirmed by different studies, according to which the value received by consumers of digital products significantly exceeds the financial costs of purchasing them. Thus, according to research findings of Brynjolfsson [6], users of streaming platforms paid $120–$240 per year for access to Netflix, Hulu and HBO. However, survey participants agreed to reject access to streaming platforms only for an amount that exceeded their annual cost of access in 5–10 times.

Even higher is the value of digital products that do not have convenient offline substitutes and are regularly used by humans in daily life or when performing work functions. First of all it concerns search products, e-mail and electronic geographic maps.

It is important to understand that the reasons for buying a digital product usually are closely related to the digital platform where they are sold. The value of a digital product directly depends on the environment and conditions where the digital product can be used [7].

Thus, designing and developing a digital product in isolation from the components of the digital platform and in isolation from the architecture of the enterprise in general reduces the likelihood of getting a final product highly demanded by consumers. The usage of an architectural approach in combination with conceptual ontological modeling allows avoiding this problem.

2 Related Work

One of the options for applying conceptual ontological modeling was proposed by the author in his early work, where three levels of abstraction were considered that underlie the conceptual ontological modeling of enterprise architecture [8].

At the moment, research on the application of patterns mainly covers the issues of modeling enterprise services [9]. Nevertheless, the ArchiMate language has a Product element that includes a set of related services. In this regard, it seems possible to adapt distinct elements of service patterns in order to simulate digital products.

Directly related to the modeling of digital products and their corresponding value is research on consumer trust in relation to the architectural approach. The authors demonstrate the possibilities of modeling consumer trust using modeling patterns formed on the ArchiMate language (for example, the Trust Composition Pattern, The Intention Belief Pattern, etc.).The work demonstrates a high degree of adaptability and applicability of ArchiMate in modeling, including fairly abstract economic and social concepts in conjunction with the traditional concept of enterprise architecture [10].

A number of works indirectly consider the conceptual ontological modeling of products in the context of data modeling of a digital platform [11] and modeling of the consumers' economic behavior [12].

3 Digital Product Pattern

3.1 A Development of the Digital Product Pattern

Previously the author proposed a metamodel for modeling enterprise architecture. This metamodel was based on the ArchiMate language and included the various elements of the business layer, application layer, technology layer, motivation expansion and strategic expansion, and the links between them. Based on the metamodel a digital service modeling pattern was proposed. This pattern can be taken as a basis for creating a pattern for a digital product.

The previously developed digital service modeling pattern has some superfluity in case of its complete transfer as the basis of the digital product pattern. Pattern objects related to technological architecture may not be described within the generated pattern.

Figure 1 shows a pattern for modeling digital services with two areas marked.

One of them includes the elements of the pattern, which will be taken as a basis for the formation of a pattern for modeling a digital product. The second one includes elements of the pattern that will not be used within the framework of the pattern being formed.

The ArchiMate language contains a Product element that can be adapted to modeling digital products. Accordingly, within the framework of this article, a digital

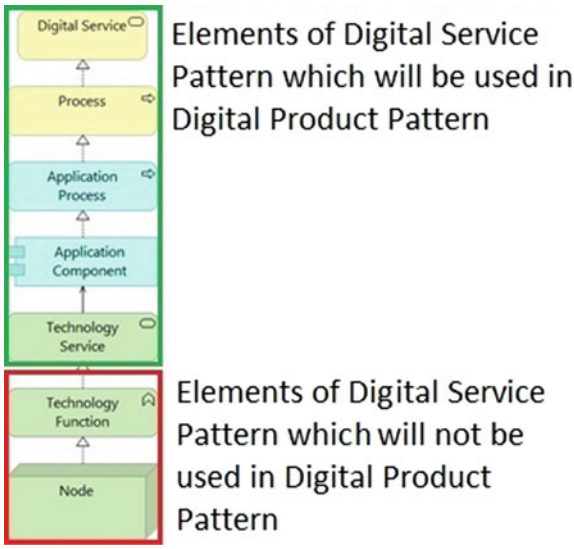

Fig. 1 Author's pattern for modeling digital services as a basis for developing a pattern for modeling digital products

product will be understood as "coherent collection of digital services and/or passive structure elements accompanied by a contract/set of agreements, which is offered as a whole to customers". Furthermore, basing on the presented definition, we will form a fragment of the developed pattern that reveals the content of the concept of "digital product" and will present it in Fig. 2.

The element Contract shown in Fig. 2 is also included in the ArchiMate notation and is defined as «formal or informal specification of an agreement between a provider and a consumer that specifies the rights and obligations associated with a product and establishes functional and non-functional parameters for interaction».

Contracts modeling in the context of enterprise architecture is discussed in detail in [13] and [14]. The authors note that effective modeling of contracts based on the ArchiMate language seems to be unrealizable without appropriate ontological extensions. However, within the framework of this study, additional detailing of the

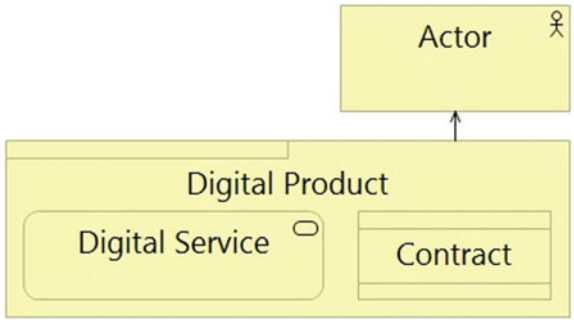

Fig. 2 A fragment of the developed pattern revealing the definition of the "digital product" concept

content of the element Contract is not required. Although in some cases it can be decomposed for ease of visualization.

Afterward, the element Value has to be defined. Some researchers believe that the concept of Value can have an association relationship both with elements of the ArchiMate core and with elements of motivation expansion. In fact, in the context of digital product modeling, the object Value becomes a kind of bridge between the business layer and the elements of motivation expansion.

Nonetheless, addition of a Value element is not a limit. To ensure the connection of a digital product not only with the architecture of the enterprise, but also with its strategic goals, the element Goal can be added to the pattern.

Figure 3 displays a BSVC Metamodel snippet illustrating the relationship of the Value element [15].

In case of need of a wider or more detailed modeling of the Value, the Value Pattern Language based on ArchiMate can be used [16]. Researchers have also noted an increasing interest in value modeling as part of an architectural approach in order to align the strategic objectives of an enterprise with its architecture. The authors offer several patterns (including Value Event Pattern, Value Subject Pattern, etc.). Based on it various types of value and their relationship with other objects of enterprise architecture can be modeled.

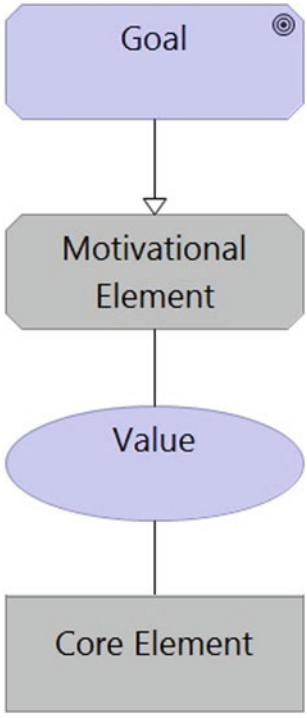

Fig. 3 A snippet of a BSVC metamodel, illustrating the relationship of the Value element

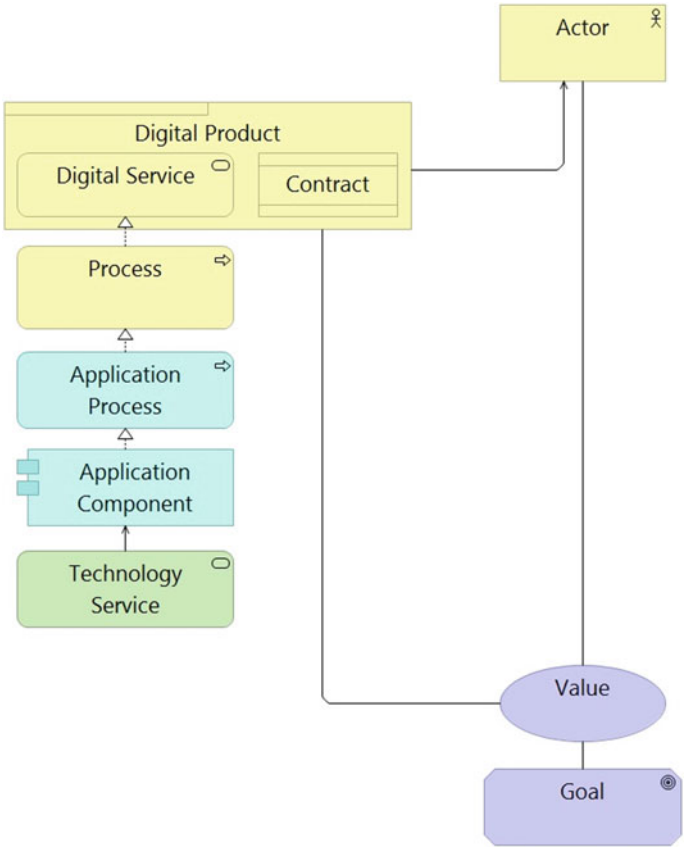

Fig. 4 Author's pattern of digital product modeling

Now, collecting all the information presented earlier, we will form a digital product pattern and represent it in Fig. 4.

The presented pattern makes it possible to trace the connection of a digital product both with the goals of the enterprise (and, accordingly, can be extended by other elements of expanding motivation), and with that segment of the enterprise architecture that ensures the value creation and delivery to the consumer within the framework of the modeled digital product.

3.2 Modeling of a Digital Product Based on a Pattern

The application of the digital product modeling pattern will be demonstrated on the example of a real Russian company under the conditional name LLC "Marketplace".

LLC "Marketplace" operates in a hyper-competitive market, and in some product categories the company is forced to compete with international marketplaces such as Amazon and AliExpress.

The main categories of counterparties that carry out transactions on the digital platform LLC "Marketplace" are buyers of goods, sellers and partner delivery companies. As of the beginning of 2021, the company has more than 3 million active buyers, more than 12,000 active sellers and cooperates with several hundred delivery companies operating in the largest cities in Russia.

Taking into account the hyper-competitive market environment the company's management is currently focusing on improving the customer experience and considering various options for using digital products as sources of competitive advantage.

During the analysis of the company's activities, a set of digital products recommended for implementation was formed, one of which was Premium Subscription for Consumers. The implementation of this digital product is expected to increase sales by 15% within two years of product launch.

The company's analysts predict that the closed sale model included in the product for premium subscribers will increase sales of low-demand items by providing additional discounts on them. It is expected that about 15% of sellers selling their goods through the digital platform of LLC "Marketplace" will eventually take part in closed sales at least once a quarter.

Analysts estimate that Premium Subscription for Consumers will prove to be a highly sought-after product with 500,000 active users within two years of product launch.

This digital product is also planned to be used as part of the company's advertising strategy. The Premium Subscription is expected to be played out among the company's social media subscribers. An option of launching an advertising campaign to promote the product on the popular Russian platforms Odnoklassniki and VKontakte is considered.

The Premium Subscription for Consumers is also planned to be used as compensation for consumers who have received negative customer experiences due to the fault of LLC "Marketplace". The company is currently offering its customers a 20% discount on their next purchase, but the premium status is expected to be more in demand and less costly for the enterprise in case of an incident.

Premium Subscription digital product will be sold to one category Actors—consumers. Consumers who purchase a Premium Subscription will receive 5% Bonus Points on each purchase they make. In 15 days from the date of purchase, Bonus Points can be used to pay up to 99% of the cost of a new purchase. Currently Bonus Points are credited only for certain categories of purchases for 1% of its value.

Consumers will also get the opportunity to participate in special closed sales where only premium subscribers will have access to.

At these sales low-demanded goods with big discount (up to 90%) and popular goods with a relatively small discount (10–30%) are planned to be offered for sale.

Consumers who purchase a premium subscription will be able to enjoy free shipping regardless of the purchase amount. At the moment, free shipping is carried

out only if the purchase price exceeds 1000 rubles. Otherwise, the cost of delivery varies from 99 to 500 rubles. At the same time, Consumers will be able to indicate a convenient delivery time. Ordinary buyers can choose only the desired delivery day, but not the exact delivery time.

Sellers are secondary clients of the digital product Premium Subscription for Consumers, who will receive a free opportunity to offer their products for participation in a closed sale. The participation in closed sale aimed to significantly increase sales, rise customer loyalty to a particular seller and provide an opportunity to sell unclaimed products.

Thus, a digital product Premium Subscription for Consumers can be represented as a combination of the following components:

- Service of Special Sales for Premium Subscribers;
- Bonus Points as a Service;
- Shipping Service;
- Commercial Agreement;
- Premium Status;
- Discount Sales for Premium Subscribers (only for Sellers).

Relating to the strategy planned the digital product Premium Subscription for Consumers is going to be used on the already existing digital platform of LLC "Marketplace". Nowadays various digital services are available to users of this digital platform. However, only a number of Application Processes of the digital platform will be used within the analyzed digital product: Sending Notifications about Special Sales, Shipment Management, Bonus Points Accounting, Personalized Catalog, Making Payments.

The indicated Application Process platforms are implemented through the corresponding components including Mobile Application, Marketplace Website, Payment System.

Consumers and Sellers are expected to use both personal computers and smartphones and/or tablets to access the services that are part of the digital product Premium Subscription for Consumers.

Figure 5 demonstrates an example of a model of a digital product for LLC "Marketplace" formed on the basis of the pattern proposed by the author earlier.

4 Conclusion

The example given in the article demonstrates the application of the digital product modeling pattern based on the ArchiMate modeling language, which is further used to build a digital product model. The presented pattern allows coverage of the relationship of a digital product with elements of enterprise architecture, as well as determination of its impact on the achievement of enterprise goals.

As part of this study:

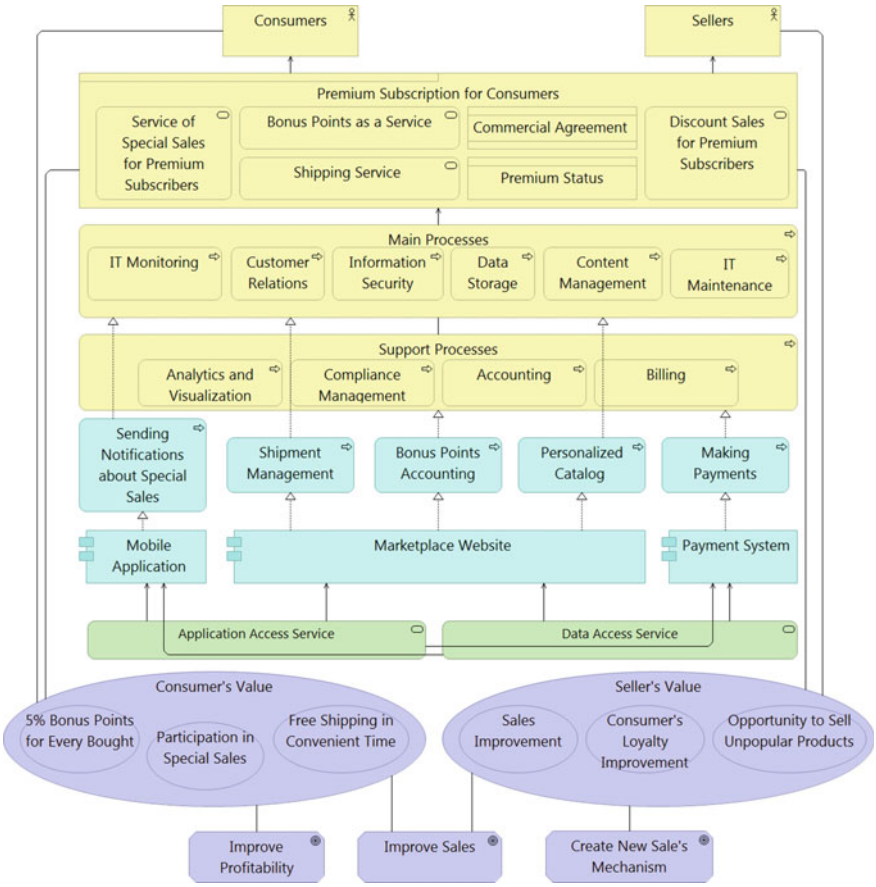

Fig. 5 Example of a model of a digital product for LLC "Marketplace"

- A practical example of a digital product pattern development is demonstrated.
- The case of a big Russian company LLC "Marketplace" and its digital platform is presented.
- An example of the application of the modeling pattern for the development of a digital product, which will be offered to users of the digital platform in the future, is presented.

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