

# Enterprise architect model of digital small and medium business

Andrey Kim

Postgraduate student  
National Research Nuclear University “MEPhI”, +7 985 2525383  
Adkim1194@gmail.com

Dmitry Kozhevnikov

Lecturer, National Research Nuclear University “MEPhI”, +7 916 135 9418  
dekozhevnikov@mephi.ru

## 1 Introduction

Nowadays economic subjects of small and medium business (SMB) playing a huge role in the economic development, giving up to 40% of the GDP and 80% of employment in developed countries [1]. At the same time the micro economical aspect of SMB in digital economy is not evaluated so far. The whole phenomena of digital economy is poorly described, there is even no common definition of such activity [2, 3, 4].

We will take the definition of digital economy unit (digital enterprise) as an organization creating value and profiting from use of digital technologies as the instrument of automation of the current activity and realizing transformation old or creation of essentially new business models on its basis[5].

The analysis of the digital enterprises [5], reflects the proliferation of large players, due to access to financial, organizational and intellectual investments. Therefore, the digital technologies allow them to reach the flexibility inherent in SMB, having at the same time huge economic, institutional, technological and intellectual potential.

Large industrial digital solutions, analytical systems and real time decision support systems, based on big data and the IoT, are costly and excessive for small and medium entrepreneurship. Currently, the vast majority of SMB uses the digital sphere only for social media [5], in the following areas: □ Building the client relations without CRM [6];

- The effective marketing campaigns in social media;
- Basic (mostly built-in) analytical and SMM instruments;
- Business opportunities for providing services and consumer goods connected to the social media;
- Attraction of the social capital, intellect and production capabilities in the forms of crowdsourcing, crowd funding, idea generation, etc.

It should be noted that in a paradigm of digital economy, social community members become both participants of business and consumers of its products [20]. Therefore the majority of digital SMB represents the community-linked business form designed and realized by members of certain communities for themselves. The community can be formed as within existing social network (Facebook, Instagram, VK and etc.), as on the specially developed web platform on SMB side.

In 2016-2017 we analyzed 37 organizations of SMB as in traditional industries (trade, advertising, tourism and leisure, education, manufacturing), and in the digitally-enabled areas (crowdsourcing, crowdfunding, text, video and graphic content creation, web development) to discover the role of social media in the corporate functions realization: business and personal communication, decision-making processes, marketing and lead(client) generation, task management, knowledge management, monitoring of various analytical metrics.

As a result the following functions appeared to be strongly (more than 30%) connected to the social media functionality: registration (68%), description of product and service offers (60%), processing of purchase (37%), quality feedback (52%), proposition delivery (39%), product delivery (32%), pre-sale (31%).

However, social networks act only as a platform of communication for organizational subjects. The majority of corporate functions automation is realized as cloud-based or in-house services and applications. Therefore, at the organization of digital SMB or attempt of transition to "digital", entrepreneurs face significant barriers, that we investigated in the research. We identify 3 groups of the barriers - technologic, organizational and legal-based. As a result, the business poorly designed, the output does not meet the needs of the community, or business is critically ineffective.

The legal issues are out of scope of this paper. We are going to propose a model of SMB architecture that is capable to reduce the organizational and technologic barriers to the formation and transformation of SMB unit to the digital form, to increase its survival rate, and grow its operation efficiency in the digital economy.

## 2 Service view for general architecture of digital SMB

The key to the effective business engineering is the proper selection of the points of view, that provide us with working managerial and organizational models and strategy. In other words, to be efficient in SMB design we need to implement enterprise architecture approach. To reduce the cost of this implementation one can use one of numerous reference architectures and frameworks. The implementation and interpretation is well described in works of such experts of architecture of the enterprise as J. Zachman[11,12], M. Lankhorst[21], E. Zinder[22], J. Ross[23].

In a digital century, activity of SMB during the forming and/or transition to digital space begins to gain the characteristics of an online service:

- For customers:
  - finding the most relevant service quickly, just specifying the set of requirements;

- providing re-defined information set as an input, receiving pre-defined configuration of the product in return;
- Availability of the service via wide range of channels and at any time.
- For digital SMB;
  - real-time collaboration with other business units to integrate the unique business process to provide a complex system of goods and services, requested by the customer, with manageable quality;
  - providing "minimum viable product", with iterations, for faster implementation of digital goods.

Taking in account the brief analysis of the popular architectural approaches made in [7], Service Oriented Business Architecture concept appears to be one of the most relevant to the described problems and current specifics of SMB.

This concept is based on the understanding of business as a set of services, provided by the business units, with pre-defined business interfaces (channels, information exchange formats, prices, etc) and the results in a clearly defined format. In addition, one of the principles is that the existing service cannot predict when customer will call it. In turn, the customer of service has no idea of its internal organization [8].

Figure 1 illustrates the suggested architectural model. Each service is presented by digital business unit of small and medium-sized businesses, which provides specific digital product to the end customer through various digital channels. In essence, each service is a certain small business in the digital ecosystem. This approach allows aggregation of various services to provide more complex product to the consumer, by the service cluster structure organization.

One of the key elements of the offered architectural model the digital platform which provides digital space for designing, transformation and an arrangement of the digital businesses, and providing of the integrated workspace for the participants of such activity. The functionality of this platform is defined on the organizational basis described below.

One of the most important architectural features for digital SMB is ability to integrate with various third-party digital services, such as electronic government, state registers, services of smart signature. The key advantage of the proposed architecture for the SMB is the combination of high cohesion and loose coupling principles, inherited from SOA programming as the key for proper organizing if the interactions. To get this advantage participating SMB should agree on the well-specified protocol of Digital ESB as on the business layer as well as on the technological and the organizational ones.

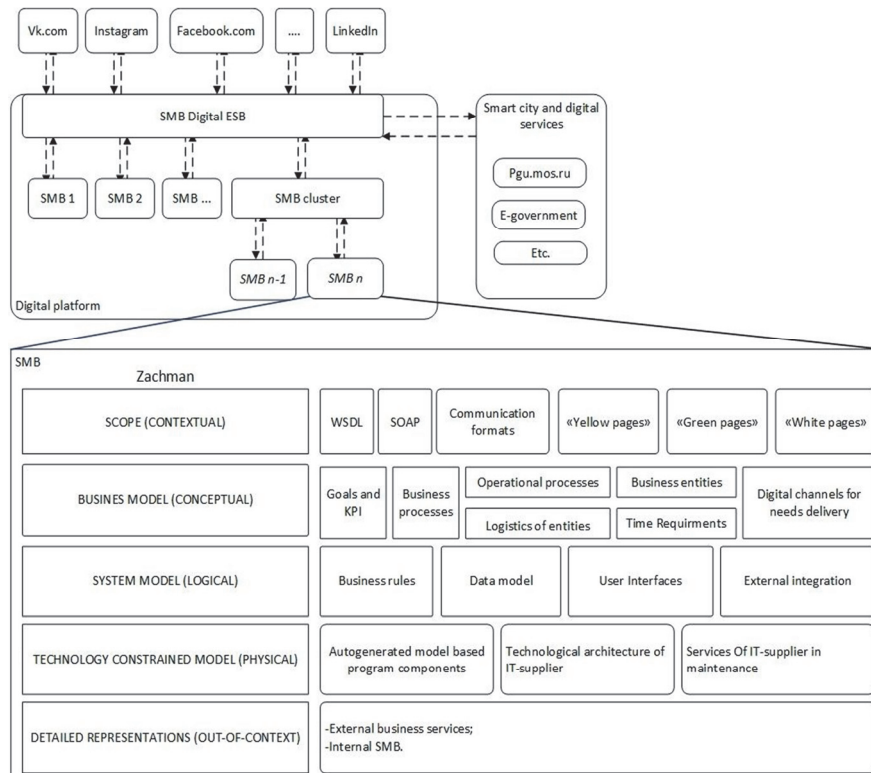
At the realization stage there appears another role - IT supplier – whose main functions are:

- Technological realization of the offered architectural model (platform);
- Maintenance of the provided solution implementation.

While our focus is not targeted to the business of IT supplier, we take it into the consideration only at the functional level.

### 3 Architecture of digital SMB unit

Based on the research result and taking into account the ideas from the previous chapter, we should offer a descriptive means, as complex as it is necessary to provide strict and clear definition of the business service interface. At the same time, as simple as it possible, taking into consideration lack of special professional knowledge and skills of the community members involved in the business service engineering. Digital nature of the service requires a model of the service providing process to be presented. One more requirement is the trace of changes between enterprise models, allowing participants easily manage changes in architecture, and allowing IT supplier to put logic into the software.



**Fig. 1.** Enterprise model of digital SMB

From the EA methodologies presented today, Zachman framework allows keep in mind all above requirements [11, 12, 13]. Considering that SMB has not so complicated business architecture, the application of the framework is not a sophisticated quest.

Let us briefly go through Zachman Framework layers in the given context.

## 4 Contextual layer

Normally, the contextual layer gives description of the main terms of business: services and products, clients, channels, structural overview, and strategy of business [12]. In the offered model, we need some additions:

- This layer is a reference point of the organization design describing the structure of business services;
- The layer should provide a description for the service modeling function, including models of service function, data, motivation, time, location and people involved;
- The contextual layer should set the standard for the service catalog for the subsequent search and interaction.

## 5 Conceptual and system layers

The layers determine the design and behavior of the individual service. In the context of modeling of the service organization, these layers should be enriched with the following features:

- The provided artifacts should be created in digital form on digital platform and, in the final stage, be directly interpreted to generate service application;
- Resulting set of architectural artifacts should be a reference for all the services in the given business context.
- The modeling instrument should have version tracking feature to provide an opportunity reverse and forward business model switching

The described layers define a skeleton of the organization. Therefore, the proper artifacts definition process here is really important and should be supervised and controlled by the platform supplier, but performed by participants of SMB.

### **Technology layer.**

This layer is rather traditional, except for the point that the technological layer should be designed once for all SMBs and provide a common set of architectural artifacts.

## 6 Managing changes in architecture of digital SMB and reusing existing business and system models

A successful organization adapts to changes in the external economic, social, political and technological environments quickly. This ability is a consequence of its architecture, is it conscious or not, the change management process, and the organizational unit managing architectural changes. The instrumental set is of great help here, which should be carefully selected, taking into account the discussed requirements. Most of

the basic enterprise architecture methodologies concentrate on the architectural artefacts [14] or the cascading architectural process [15,16].

In contrast, for the digital SMB organization, an agile approach could be recommended. Purposed for information systems development initially [17], this approach is currently implemented to the business transformation area [18]. A practical example of agile approach implementing is dynamic case management (DCM). It is well described [19] and implemented in the software products of Pegasystems Inc. One of the basic features of this approach is the ability to implement ad-hoc changes in the business model / case at the operation time.

The flexible change management model in the architecture of each service based on a dynamic case management, with the chosen simplest architectural meta-model and its implementation in the form of software components, also include strong degree of connectivity, provides members of the digital SMB with sufficient set of tools to make business agile and successful.

## 7 Conclusion

Our main task was to propose an architectural concept to make a process of SMB digital transformation smoother. Step-by-step walking through the SMB digital transformation we investigated the agile enterprise architecture approach, that helps us meet the requirements and overcome the barriers, found in the research of SMB in pre-transformation stage. The limits of the publication dictate the brief style of this description. The development of models of the architecture of digital enterprises of small and medium-sized entrepreneurship and their transformation into software components, on the other hand, requires from community members a certain level of system thinking, and implementing the digital platform by the qualified IT provider. The last point requires a separate study of the problem of organization activities and, in general, the EA of the IT provider itself. The above conditions and the complexity of the work entail a vector of transformation of the architects of system integrators and vendors of product solutions to the organization of a sustainable service model of business.

## References

1. Franovskaya G. (2010). World tendencies of developing of microentrepreneurship. *Sovremennaya Ekonomika: Problemy i recheniya* [Economics], no. 3(3) (in Russian).
2. Tadviser. (2017). Cifrovaya ekonomika Rossii[Govement, Business, IT], <http://tadviser.ru/a/343848> (in Russian).
3. Deloitte. (2017). *What is digital economy? Unicorns, transformation and the internet of things*, <https://www2.deloitte.com/mt/en/pages/technology/articles/mt-what-isdigital-economy.html>.
4. Tapscott D. (1997). *The Digital Economy: Promise and Peril in The Age of Networked Intelligence*. New York: McGraw-Hill.

5. Westerman G., Tannou M., Bonnet D., Ferraris P., McAfee A., Capgemini. (2012) *The Digital Advantage: How digital leaders outperform their peers in every industry*. Capgemini Consulting and the MIT Center for Digital Business global research.
6. Felix R., Rauschnabel P., Hinsch C., (2016) Elements of strategic social media marketing: A holistic framework, *Journal of Business Research*, vol.
7. Gromoff A. I., Kazantsev N., Kozhevnikov D., Ponfilenok M., Bilinkis (Stavenko) J. (2012). Newer Approach to Create Flexible Business Architecture of Modern Enterprise // *Global Journal of Flexible Systems Management*. No. 13. P. 207-215
8. Erl T. (2005). *Service-Oriented Architecture (SOA). Concepts, Technology and Design*. Boston: Pearson Education, Inc.
9. Majumdar B., Verma A., Mysore U. (2006). *Enhance UDDI to manage Web services. Add a security policy and configuration management solution*. IBM. <https://www.ibm.com/developerworks/webservices/library/ws-uddisecure/wsuddisecure-pdf.pdf>
10. Portier B. (2006). *SOA terminology overview, Part 1: Service, architecture, governance, and business terms*. IBM. <https://www.ibm.com/developerworks/webservices/library/ws-soa-term1/wssoa-term1-pdf.pdf>
11. Zachman J. (1987). *A Framework for Information System Architecture* // *IBM Systems Journal*, No.3. vol. 26.
12. Sowa J., Zachman J. (1992). *Extending and formalizing the framework for information systems architecture*, *IBM Systems Journal*, no.3 vol.3.
13. Sessions R. (2007). *A Comparison of the Top Four Enterprise-Architecture Methodologies*. Microsoft Developer Network, URL: <https://msdn.microsoft.com/en-us/library/bb466232.aspx>
14. Agievich V. (2014). *Matematicheskoe modelirovanie i mnogokriterialnaya optimizatsiya architekturnoy dorognoy karti krupnoy kompanii*, Dokt. Diss. [Mathematical model and multicriteria analysis of designing large-scale enterprise roadmap] (in Russian).
15. The Open Group. (2011). *Definitions. TOGAF 9.1*. URL: <http://pubs.opengroup.org/architecture/togaf9-doc/arch/chap03.html>
16. The Open Group. (2011). *Part II: Architecture Development Method (ADM)*. The Open Group Publications Server. URL: <http://pubs.opengroup.org/architecture/togaf9-doc/arch/toc-pt2.html>
17. Cobb Ch. (2015). *The project manager's guide to mastering agile. Principles and practices for an adaptive approach*, New Jersey: John Wiley & Sons, Inc.
18. Gromoff A., Kazantsev N., Kozhevnikov D., Ponfilenok M., Stavenko Y., (2013) Newer Approach to Create Flexible Business Architecture of Modern Enterprise. *Global Journal of Flexible Systems Management*, no. 13(4).
19. Shuerman D., Schwarz K., Williams B., (2014). *Dynamic Case Management for Dummies*, New Jersey: John Wiley & Sons, Inc.
20. SAP. (2015). *The Consumer-Driven Digital Economy. Creating value in a digital world where the consumer is in charge*, SAP Digital Consumer Products Whitepaper (01/16), <https://www.sap.com/assetdetail/2016/11/220f0923-997c-0010-82c7eda71af511fa.html>
21. Lankhorst M., (2009) *Enterprise Architecture at Work: Modelling, Communication and Analysis*, Heidelberg: Springer.
22. Zinder E., (2004) «3D-predpriyatie» - model transformiruyusheysya sistemi, [«3D-enterprise» - system transformation model], *Director informacionnoy sluzhbi* [Information Technology] (in Russian), No.4.
23. Ross J., Weill P., Robertson D., (2006), *Enterprise Architecture As Strategy: Creating a Foundation for Business Execution*, Harvard: Harvard Business Press.