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ORGANIC GROWTH STRATEGY AS THE FOUNDATION FOR AN AGILE INFORMATION SYSTEM

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Abstract: the paper proposes an executive approach to the digitalization of business processes by bimodal separation into a business level and an IT level. These levels are served by separate teams to enable the business analysts and the process owners to develop business applications with a low-code platform in real-time to support an organic growth strategy. The IT level is involved only to develop the platform by conventional methods.

Keywords: high availability management systems, low-code digital platforms, Comindware business application platform, ontology platforms, organic growth strategy, digitalization of business processes.

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СТРАТЕГИЯ ОРГАНИЧЕСКОГО РАЗВИТИЯ КАК ФУНДАМЕНТ ГИБКОЙ ИС

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Аннотация: в статье предлагается организационный подход к цифровизации бизнес-процессов би-модальным разделением на уровень бизнеса и на уровень ИТ, которые не объединяются в единые команды, а, напротив, разделяются с целью дать возможность бизнес-аналитикам и владельцам процессов развивать бизнес-приложения с помощью лоукод платформы в режиме реального времени и в стратегии органического роста. Уровень ИТ подключается только для развития платформы путём классических подходов.

Ключевые слова: системы управления высокой степени готовности, лоукод цифровые платформы, Comindware business application platform, онтологические платформы, стратегия органического роста, цифровизация бизнес-процессов.

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Introduction

The complexity of existing corporate information systems (InfSys) requires to reconsider their development strategy and the conventional approach to IT management [1].

A hierarchical structure is at the heart of each approach to IT management (e.g., ITSM, IT4IT or Prince2.) It defines all the IT deployment project management models, their agility, and prioritization.

This paper presents an original approach to InfSys development by implementing a 2-tier IT management model. Its concept was proposed by the Gartner analytical agency in 2014 [11] and matured to a ready-to-use level based on the IT management experience in a large oil company.

Conventional Approach to InfSys Development Management

Large corporate information systems over the past decades of intensive development reached a high level of complexity. It leads to a range of problems that require special solutions [2]. Started as a set of simple computational programs, information systems evolved into a complex multi-component system. As part of such a system, every medium or large company runs many servers and other hardware components, a large number of databases and DB management systems, numerous applications integrated with end-to-end business processes, business process monitoring, analysis, and management tools [3].

Conventionally, the cascade approach is used to manage complex InfSys development. The development process is a flow consistently passing through such phases as requirements analysis and approval, design, coding, testing, integration, and support.

The established InfSys project management practices may seem to enable the control of budgets, deadlines, resources, to assure predictable project results. At the same time, these practices have several drawbacks [4]:

- It is impossible to verify if the solution meets the business goal before a pilot operation
- Specification freeze for the duration of the project
- high efforts when making adjustments to the already approved specification
- The solution shall be detail designed as early as at the planning stage
- The high level of detail leads to huge documentation volumes and high upgrade efforts.

Such an inflexible approach to InfSys project management often slows down the attempts to keep up with emerging technologies and results in more business problems. The key problems are:

- low InfSys adaptability to external changes: as the corporate business environment changes continuously, the actual requirements for information processing often go beyond the InfSys functionality [5]
- internal InfSys rigidity: not all emerging needs of the InfSys users can be satisfied within the conventional architecture [6], which often covers individual corporate functions, while the processes are supported through e-mail, Excel files, paper stickers, regulations, and document flows (paper or electronic.) In this situation, it is not always possible to retrieve the information the user needs, even if it is available in the system. In can happen, for example, for non-trivial composite queries [7]
- poor software usability: the developers do not always pay proper attention to ergonomics and UX; the user interface is often overloaded with graphics. Therefore, each time it takes a lot of time for the user to learn the software and get used to it. This factor reduces productivity leading to irritation and fatigue
- high labor intensity and low development rate: requirements management practices and a multi-step approval process enable to control budgets, deadlines, and resources, but widen the gap between business and technology, and significantly slow down the development process. The deceleration varies directly with the number of affected systems [8].

The problems listed above are more evident in the digitalization environment. Gartner gives this definition: “Digitalization is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business” [9].

Today, a large company urgently needs a new approach to InfSys development to solve its pressing business problems and support its digital transformation and operations in a fluid economic reality [10]. Below we propose an original approach to managing InfSys development with a 2-tier IT management model. The concept was proposed by Gartner [11] and matured to a ready-to-use level based on the IT management experience in a large oil company.

InfSys Organic Growth Strategy

InfSys Organic Growth Strategy Concept Compared to the Conventional Step-by-Step Growth

What is the conventional approach to creating corporate management InfSys? A description or model of business processes is compiled, appropriate software components are selected (often together with consultants and integrators.) The components are delivered to a private data center or made available on the “cloud” with a set of pre-configured “best practices”. They are subsequently adapted to the needs of a particular company and supplemented with program code to implement the features not initially available [12].

The step-by-step process of developing such a system includes programming, purchasing new modules and systems supporting new ”best practices” and implementation of applications managed with a cascade model. Creating new IT solutions and making changes, even the smallest ones, to existing solutions is done by programmers assisted by IT experts. The IT expert converts a request into a product specification, the programmer converts the request into a language that the system understands. After “translating” the request from the business language to the IT language it often turns out that the final solution only approximately meets the original request [13].

To fix the low InfSys adaptability, intrinsic rigidity, and improve UX there shall be a direct interaction between the InfSys and the business people The InfSys should “understand” humans in any intuitive interaction format, for example, through customized process flowcharts [14].

In any case, there is some intermediary (non-human) between the human-understandable representation and the machine code. On the one hand, it operates with concepts (entities, properties and relations),

while on the other hand, with machine language commands. Ontology can serve as a universal interface language[1]. An ontology engine can be used as an intermediary. In the current context, we can skip the implementation details of such a digital intermediary and focus on the fact that the modern approach to InfSys development requires a direct interaction between InfSys and business people.

If the InfSys "understands" a business person, then to create an applied IT solution we need only the first step of the conventional approach: representing the solution in terms understandable to both the InfSys and the business people (an ontological model). The description added to the InfSys immediately reveals the required IT solution. It is a foundation for further organic growth when InfSys is developed together with the corporate processes.

For example, when designing a simple maintenance request management process, the business user initially generated a simple process and commissioned it (Fig. 1). During the implementation, the process became more complicated through successive iterations and now it looks much more complex (Fig. 2).

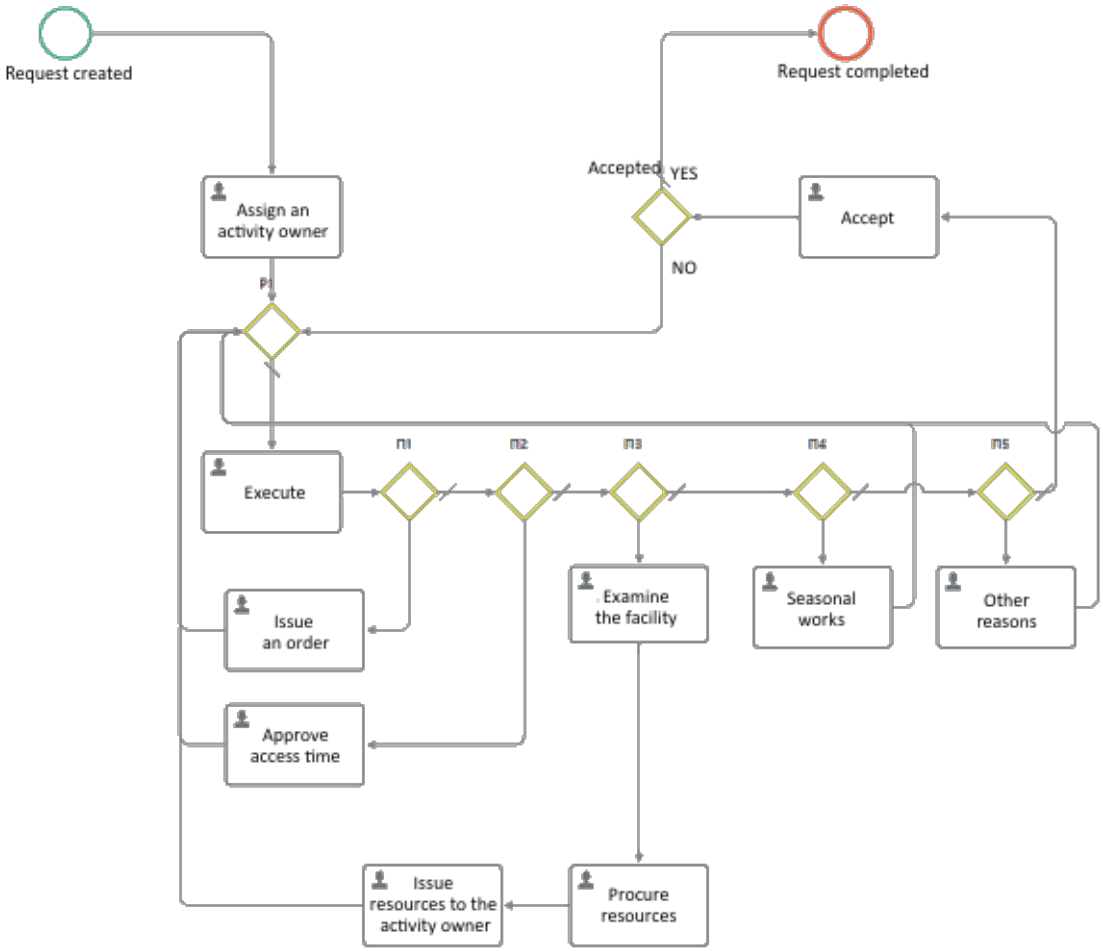

Figure 1. *A simple process, initially generated by the business user*

Further optimization, reengineering will be required: not of the programs and applications, but the ontological models and solutions based on them. You still can not do without coding, but the efforts sharing between business analysts and programmers will be changed, and the IT management model will be transformed to meet the corporate approach to implementing an organic IT growth strategy.

Two-tier IT as an Approach to Implementing an Organic InfSys Development Strategy

Two-tier IT is a management model used to create both sustainable and predictable IT systems and

[1] Ontology is a formal specification of a shared conceptual model, where "conceptual model" means an abstract model of a subject area describing its system of concepts, "shareable" means an agreed understanding of the conceptual model by a certain community (group of people), "specification" means an explicit description of the system of concepts, "formal" means that the conceptual model is defined in a formal language [16].

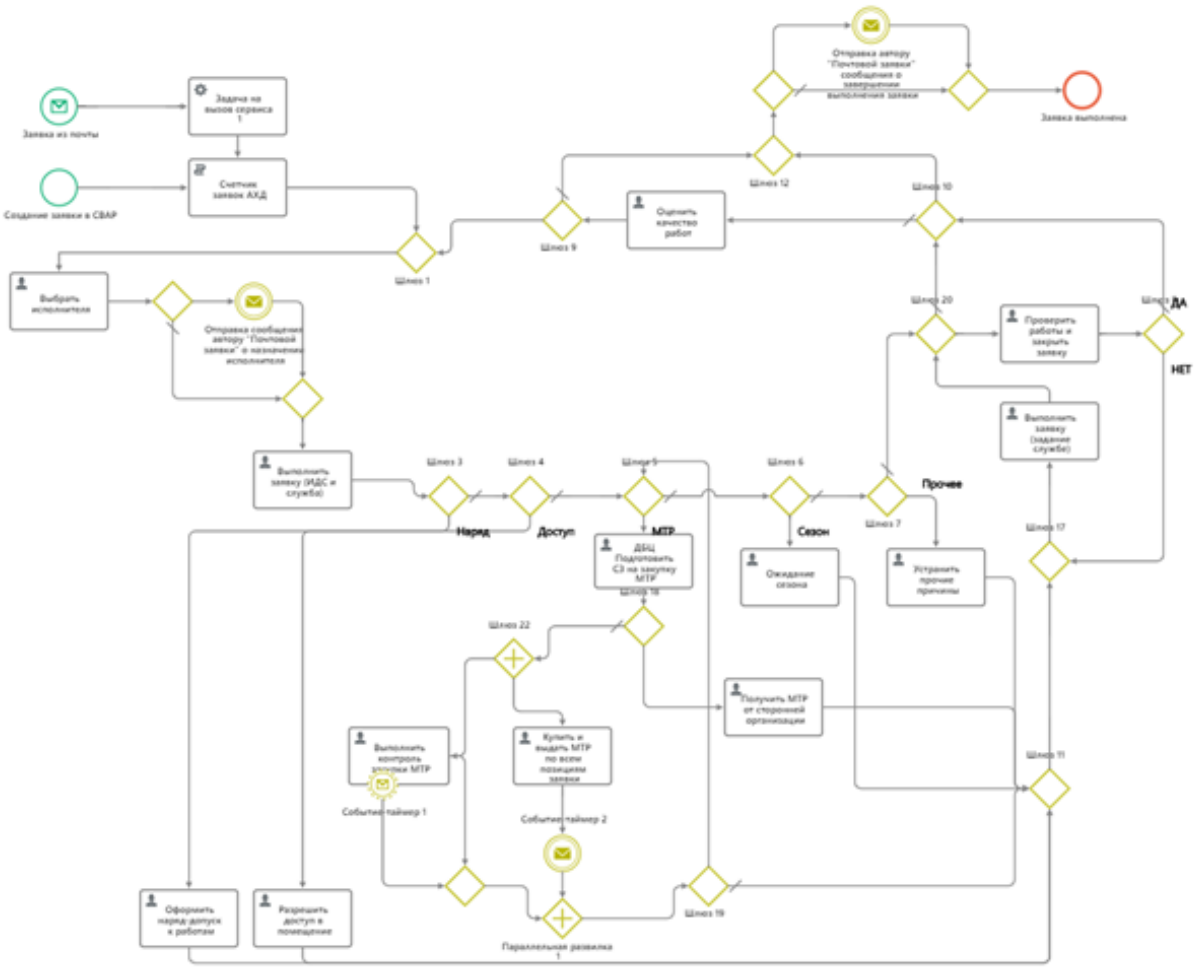

Figure 2. *During the implementation, the process became more complicated*

point IT solutions to quickly solve urgent business problems. Gartner defines the two tiers of IT management as follows: "Tier 1 is conventional and consistent, ensuring safety and accuracy. Tier 2 is research and non-linear, providing agility and speed" [9]. This combination of consistency and non-linearity supports basic business processes and encourages continuous optimization of all corporate business processes.

This IT management model is already used by Russian and international companies. In some companies, this idea was transformed into a two-speed model with a "rapid response team" within the existing IT department. Such a group focuses on one or two most significant business areas. Sharp focusing enables to quickly transform the InfSys in the most significant areas, and then apply the results to the other IT applications.

The second IT tier is organizational. It does not require a physical or administrative resource reallocation. Any of the tiers can be enhanced by outsourcing, contracting integrators or vendors at any stage of the solution development.

The approach used by a major oil company is an illustrative example of a two-tier IT management model to implement the InfSys organic growth strategy.

Case Study: InfSys Organic Growth Strategy at Surgutneftegas, PAO

The IT/InfSys solutions development process is divided into 2 tiers:

- second tier. The tier includes business analysts and business users. A fast evolutionary development methodology (agile) with frequent releases is used. Creating an IT solution at this tier follows the Deming-Shewhart cycle and generally looks like this:

- a graphical business process model is developed by iterative edits to make a minimal viable product (MVP) based on a self-documenting software platform that "understands" business people.

Figure 3. *Case Study: InfSys Organic Growth Strategy at Surgutneftegas, PAO*

- MVP is launched and improved on the fly, taking into account the real practice with specific business processes and the interactions between them.

• first tier. The programmers work at this tier. They receive requests from the second tier when there is a need to develop specific business logic, data processing, and integration with other systems. conventional ITSM methodologies, change management and a corporate release strategy are used.

For the successful application of organic InfSys growth strategy with a two-tier IT model, the right choice of the platform is paramount. Business process management systems created with a configurable platform (hereinafter called a High Readiness Enterprise Management System, or HREMS) should enable a human to describe the required solutions in an intuitive format and automatically convert such descriptions into machine code [16].

We tested the above two-tier IT model at Surgutneftegas enabled by Comindware Business Application Platform, a commercially available HREMS platform closest in its concept and functionality to the InfSys organic growth concept and can operate as an ontological engine [17].

The key criteria to evaluate Comindware Business Application Platform as a product suitable for building an HREMS were [18]:

• The versatility of the platform enables the building of any function-oriented corporate IT solutions using built-in tools. For second-tier development, there are low-code tools for building ontology models of business applications and user interfaces. For first-tier development, there are general-purpose coding tools in common programming languages

• The adaptability of the digital platform and its IT solutions to continuous changes in subject areas. This means that the solution model can be created, verified for compliance with the business problem and approved on the second tier. As early as at this stage the requirements are adjusted to the solution and the business logic taking into account the system user feedback. The requirements are not frozen at the high tier, and the requests passed to the first tier are verified and do not require adjustments.

• Highly flexible data processing. The platform enables the user to perform any unstructured and non-standard information processing. This is achieved with a graph database and the platform's ability to handle the semantics (meaning) of user queries in a given context supported by the ontology. The platform can find the necessary concepts and relationships in the ontology, create a set of them that meets the query, and perform the operations that yield the result (answer) [19].

• Excellent UX. The user interfaces and forms are created and adapted to the needs of users in the second tier. In this way, the UX is continually improved to lower the IT solution learning curve.

For the above model of InfSys development can be recommended as the key enterprise-wide strategy, we had to prove its feasibility for both technically complex projects, and projects with relatively simple business logic.

A technically complex pilot project was creating a new petroleum products customer relations management system (CRM) to replace a legacy solution. This project includes a customer web site, digitalization of end-to-end business processes from requisition to shipment, integration, analytical reporting and much more. As one could expect, implementing such functionality took a lot of first-tier resources. We managed to significantly reduce the IT department efforts, reach a sustainable short release cycle and reduce the total cost of creating and aftersales support. As a result, we proved the viability of the proposed management model and platform for large projects, and the developed CRM system has been successfully growing and developing to meet the business needs since 2016.

To test the proposed approach for smaller-scale IT solutions without using the first-tier resources, we launched the projects to develop solutions for business processes and IT projects portfolio management. These IT solutions were successfully implemented by the business analysts and are in commercial operation.

The proposed approach to managing the InfSys organic growth was implemented, yields a tangible economic effect, and can be recommended for large companies.

Conclusion

The application of the organic growth strategy to the InfSys development with two-tier IT management is a modern approach to solving the problem of InfSys complexity in large companies. It enables fast response to business needs. The technology behind the InfSys organic growth strategy and the modern approach to simplifying large corporate InfSys is a high-availability enterprise management system. A significant part of the HREMS activities is at the level of individual experts and business unit managers. It increases the IT projects efficiency, reducing project costs and total system ownership costs through the ability to develop IT solutions code-free and documentation-free, minimizing approval procedures, as well as making changes to the applications without adjusting the infrastructure. It is the key to the organic and dynamic development of a corporate InfSys.

REFERENCES

1. Ananyin V. I., Zimin K. V., Lugachev M. I., Gimranov R. D., Skriprin K. G. Digital Organization: Transformation into the New Reality. *Business Informatics*. 2018;2:45-54. DOI: 10.17323/1998-0663.2018.2.45.54. (In Russ.)
2. Gimranov R. D., Lugachev M. I. Introducing a Digital Enterprise with Emergent Stratification of Information Systems. *Proceedings in Cybernetics*. 2016;2:166-169. (In Russ.)
3. Belaichuk A. *DBM Evolution in 1990-2020. Infographic.* Available at: https://www.comindware.com/ru/blog-%D0%B8%D0%BD%D1%84%D0%BE%D0%B3%D1%80%D0%B0%D1%84%D0%B8%D0%BA%D0%B0-%D1%8D%D0%B2%D0%BE%D0%BB%D1%8E%D1%86%D0%B8%D1%8F-bpm-1990-2020/. (In Russ.)
4. Belaichuk A. *The Second Coming of DBM.* Available at: https://www.itweek.ru/management/article/detail.php?ID=200028. (In Russ.)
5. Hiatt J. M., Creasey T. J. *Change Management. The People Side of Change*. Loveland: Prosci Research; 2003.
6. Anan'ev V., Chernov A. *The Architecture Difference between Automation and Digitalization.* Available at: https://www.cnews.ru/articles/2019-06-03_chem_otlichayutsya_arhitekturnye_podhody_pri_avtomatizatsii_i_tsifrovizatsii. (In Russ.)
7. Kemsli S. *Conway's Law and End-To-End Business Processes.* Available at: http://bpms.ru/post/20200426-conway-law.
8. Aldzhanov V. *IT Architecture. A to Z Practical Guide*. 2018. 1380 p. (In Russ.)
9. How to Revitalize a Stalled Digital Transformation. Available at: https://www.gartner.com/smarterwithgartner/how-to-revitalize-a-stalled-digital-transformation.
10. Andersson H., Tuddenham Ph. *Reinventing IT To Support Digitization.* Available at: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/reinventing-it-to-support-digitization#.

11. Gartner Says CIOs Need Bimodal IT to Succeed in Digital Business. Available at: https://www.gartner.com/en/newsroom/press-releases/2014-11-10-gartner-says-cios-need-bimodal-it-to-succeed-in-digital-business.
12. Rybal'chenko M. V. *IT Systems Architecture.* University Textbook. M.: Yurait; 2018. 91 p. (In Russ.)
13. Mikhailov A. *IT Strategy: Best Russian and International Practices*. M.: Konsalting po upravleniyu IT; 2018. 450 p. (In Russ.)
14. Lewis B. *IT-as-a-business is Dead. Long Live BusOps.* Available at: https://www.cio.com/article/3445899/it-as-a-business-is-dead-long-live-busops.html.
15. Gavrilova T. A., Kudryavtsev D. V., Muromtsev D. I. *Knowledge Engineering Models and Methods: Textbook*. SPb.: Lan'; 2016. 324 p. (In Russ.)
16. Belaichuk A. *Fast Software Development in the Digital Age.* Available at: http://mainthing.ru/ru/item/795. (In Russ.)
17. Gimranov R. D., Kholkin I. N. *Inventing the Information Systems of the Future. Theories and Applications*. Surgut, 2017. 192 p. (In Russ.)
18. *Low-Code in Action.* Available at: https://www.comindware.com/ru/low-code-development-platform. (In Russ.)
19. *DBM for Rednecks: What Real Low-Code Is.* Available at: https://www.comindware.com/ru/blog-what-is-true-low-code. (In Russ.)