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Methodology and diagnostics of digital transformation in the structures of the State administration

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Abstract

This work is devoted to the study of the methodological aspects for diagnosing the processes of providing e-services in the structures of the state administration and assessing the symmetry for the penetration of digitalization in terms of internal interactions and processes providing content for the presentation of e-services.

The aim of the study is, on the one hand, to form the methodological foundations for diagnosing the degree of digitalization and establishing the truth of the scientific hypothesis of asymmetry in terms of digital transformation - the provision of external/internal e-services.

The presented research and applied results can be considered as a step towards creating a unified tool for the state administration for assessment and self-assessment of the achieved phase in the process of digital transformation.

The development and implementation of a unified tool for the state administration for assessment and self-assessment of a phase reached in the process of digital transformation would have a significant monitoring effect and can provide an objective information base for taking targeted governmental management decisions.

Key words:
Digital transformation, Self-assessment, state administration, 360° methodology.

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1. Introduction

The goal of comprehensively expanding the presence of the e-state in the daily lives of Bulgarian citizens has been set and pursued actively in the last 20 years. Significant amounts of funds have been invested for its implementation and practically the entire resource of the administration at all levels of government has been involved.

This qualitatively new reform of the environment and the means of interaction of individuals and legal entities with the state in the context of the Bulgarian transition and the general level of digital skills of Bulgarians has been and is being carried out, going through many objective and subjective difficulties and repeatedly revised priorities.

At present, it can be confidently stated that the infrastructure backbone and the mandatory set of tools are operationally and functionally built and usable. The digital ecosystem for the development and provision of e-services in the state administration is an end-to-end fact.

And if in the last 20 years, successful projects have been developed for a secure electronic service system, an electronic payment system, the forthcoming launch of a National Electronic Identification Scheme, a unified environment for the provision of e-services – all key cornerstones tracing the way to a successful e-state, then the so-called internal, invisible to the applicants, generating the factual content in the process of providing e-services, remained in the background.

This work is devoted to the study of the methodological aspects for diagnosing the processes of providing e-services in the structures of the state administration and assessing the symmetry for the penetration of digitalization in terms of internal interactions and processes providing content for the presentation of e-services.

The aim of the study is, on the one hand, to form the methodological foundations for diagnosing the degree of digitalization and establishing the truth of the scientific hypothesis of asymmetry in terms of digital transformation - the provision of external/internal e-services.

2. Methodological aspects of the diagnosis of digital transformation

Considering the digital transformation of organizations as a technological process implies an expansion of the subject field for analysis and evaluation. If an activity/task/service has been performed at a past point in time without the application of information and communication technologies and solutions, and is currently being implemented using computer-based platforms and a working environment – is this a sufficient criterion and/or measure, that digital information has occurred? Definitely not, because digital transformation is a multidimensional process. It is no coincidence that in her review article "Digital Transformation: A Review and Research Framework", Xaioli Ji, Venking. Li [1], makes a retrospective analysis of the content of the concept – digital transformation, emphasizing the fact that the introduction of IT-assisted tools, without the development of new business models and adaptation of the organization of activities, is not enough to achieve measurable added value, both for the performers (within the organization) and for the users of the results of the completed task/activity and/or service. The complexity of the digital transformation process deepens when the scope of application is the interaction of state - business and state - citizens or by considering the process in the context of the digital transformation of the state administration and the activities specific to all its levels and structures. In support of this statement are the conclusions of a large-scale study by scientists from the Norwegian University of Science and Technology [2]. The adopted version of the Challenge/Risk Matrix in the process of digital transformation of the state administration is presented at fig.1

Topics for risk analysis	Technology/ Digital Platform Selection	Dependence on the results achieved	Lack of technical competence	Technological innovations	Challenges of progress	Technical results
Challenges of interaction	2	10	21	5	3	16
Financial dimensions	0	3	3	3	1	4
Legislative challenges	3	7	9	4	5	13
Governance challenges	5	9	13	6	7	10
Political challenges: limitations and sphere of influence	1	2	2	1	1	1
Challenge for the Stakeholder Group	2	5	5	13	2	11
Challenges of the organizational structure	0	0	2	1	1	0

Fig.1. Adopted Challenge/Risk Matrix in the process of digital transformation of the state administration
Source: Adopted by [2], cell values are coming from [2]

The information presented in Fig.1 is a confirmation of the complexity of the process of digital transformation in public administration, but it also raises two main problems with a high- risk potential:

1. The Personnel Problem and the Shortage of Technical Competence of the Employees in the State Administration

2. The measurability of the actual technical and technological results achieved in the implementation of digital transformation platforms.

In the process of reviewing studies similar to the topics of this work, it was found that a number of authors, including Z. Gobinese and E. Titko, put a major emphasis on the role of the human factor in the process of digital transformation of public administration[3]

From the review made, it can be deduced the need for methodological unification of the different types of approaches for analysis and assessment of the level of digital transformation into a single methodological unit with a clear structure and the possibility of applying to a large extent tools and approaches for self-assessment, on the basis of which to diagnose and only diagnose the current factual state of the target administration in the process of digital transformation. as well as to outline the system of short- and medium-term measures to achieve the normatively defined and socially useful level.

Definition of a generalized methodology for diagnostics and only diagnostics of the degree of digital transformation in the structures of the state and municipal administration.

In the overview part of this work, the need to summarize the approaches and methods for assessing the current level of the digital transformation process in the structures of the state administration is clearly outlined.

In order to achieve the comprehensiveness and effectiveness of the proposed methodology in the process of its compilation, it is necessary to assess the following principles and limitations:

- Taking into account the current regulatory framework as a minimum level of compliance with the scope and content of the electronic services provided by the respective administration;
- Applying relative evaluation indicators in relation to the transition period of joint provision of services

for companies and citizens in the traditional way and electronically;

• Reporting the average time for the provision of the service, taking into account all accompanying checks that need to be made;

• Diagnostics of the degree of integration of the platforms horizontally and vertically in order to minimize the volume of supporting documents, application when requesting the service;

• Priority analysis and assessment of the competence and motivation of employees, in accordance with their roles and the necessary degree of participation in the digital transformation process, as well as the degree of their involvement in the process activities;

• Assessment of the symmetry of penetration of digital transformation in terms of external and internal organizational processes and activities;

• Applicability of the diagnostic results for the purposes of planning corrective measures in the short and medium term;

• Ability to apply the methodology entirely electronically, without auditing requiring a significant deviation of participants from their operational duties and responsibilities in the specific administrative structure;

• Possibility for repeated and periodic application of a methodology for the purpose of comparative analysis of the application of the corrective measures;

Based on the generalization of the information from the review, the defined principles and limitations, and the application of the experience gained by the authors in real activities on digital transformation projects in the state administration, a Generalized methodology for diagnostics and only diagnostics of the degree of digital transformation in the structures of the state administration, presented in Fig. 2, is proposed.

The methodology presented in Fig. 2 has been developed in order to be applied as a stand-alone diagnostic tool and only diagnostics at the level of digital transformation and reflects the complexity of the problem [1], as well as the key indicators of the Challenge Matrix [2].

The scientific and applied contribution to the compilation of the methodology is concentrated in the non-traditional application of the 360° assessment approach at two levels:

- Assessment and self-assessment of the current personal level of digital competence (key risk factor[2]) – Fig. 3a;

- Assessment and self-assessment of the current institutional level of digital competence – Fig. 3b.

Stage 1, Stage 2 and Stage 5 are envisaged to be carried out by an external expert or internal auditor, as they require analysis of data from public sources (Stage 1) and data formed from the implementation of Stages 2 and 3.

For the purposes of the implementation of Stage 2, as an integral part of the methodology, a questionnaire for diagnostics of institutional key indicators for metric assessment of the degree of digital transformation of activities is proposed - Table 1. The questionnaire has been developed on the basis of the Challenge/Risk Matrix[1], specifying the topics for risk analysis and adapting them to the current regulatory framework in the Republic of Bulgaria.

The questionnaire from Table 1 is compiled in a way that implies the objective provision of key information, on the basis of which to derive basic indicators for the point reached by the process of digital transformation of the activities in the specific administration, namely:

KPI_1 – Relative share of fully electronically processed files to all processed files in the administration for a period of one year.

KPI_2 – Relative share of incoming correspondence received by e-mail to the total registered incoming correspondence from external persons and institutions to the specific administration for one year.

KPI_3 – Relative share of outgoing correspondence received by e-mail to the total registered outgoing correspondence to external persons and institutions of the specific administration for one year.

KPI_4 – Relative share of incoming electronic to outgoing electronic correspondence to and from external persons and institutions in the specific administration for one year.

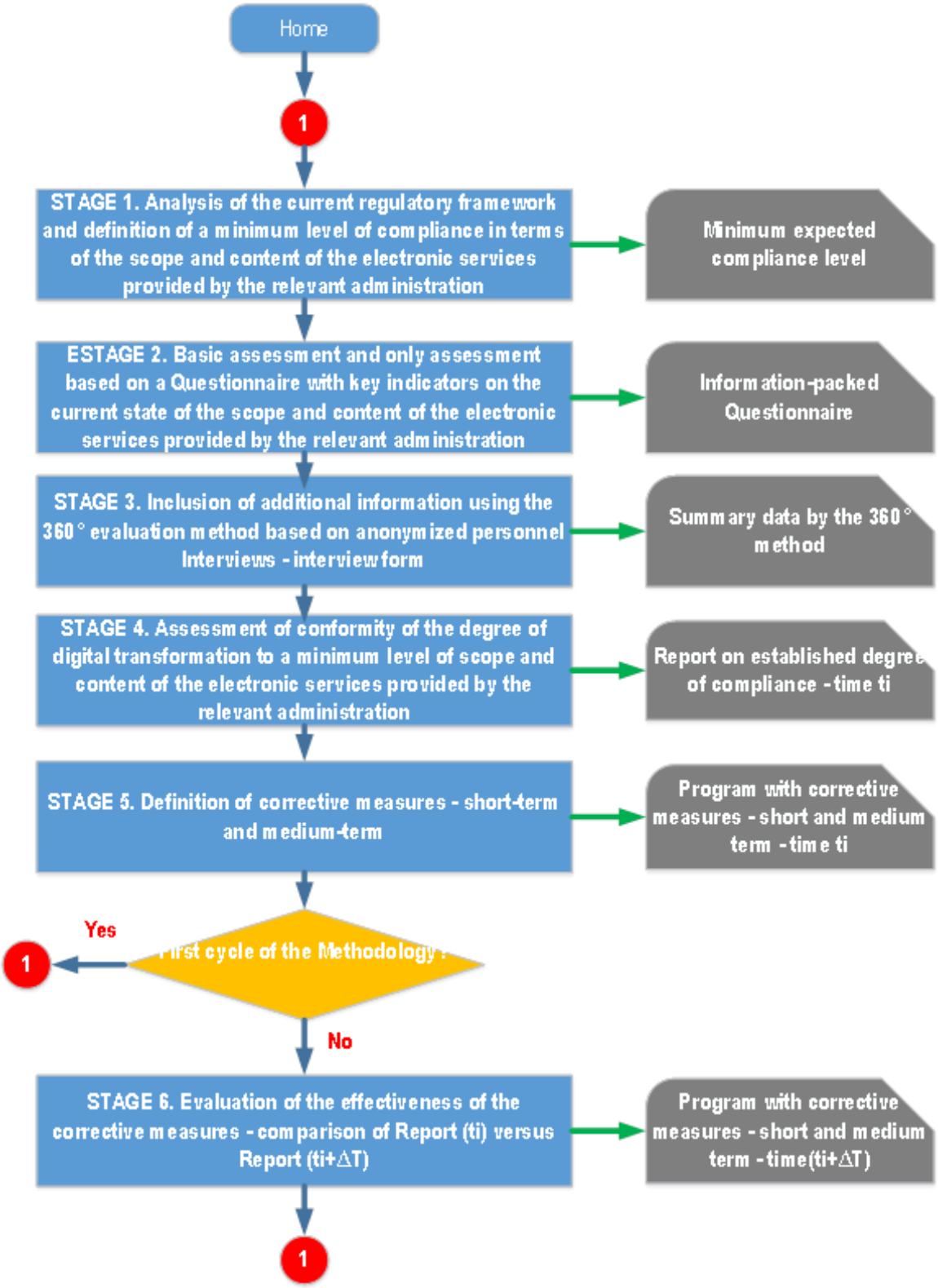


Fig.2. Generalized methodology for diagnostics and only diagnostics of the degree of digital transformation in the structures of the state administration

Source: Own elaboration

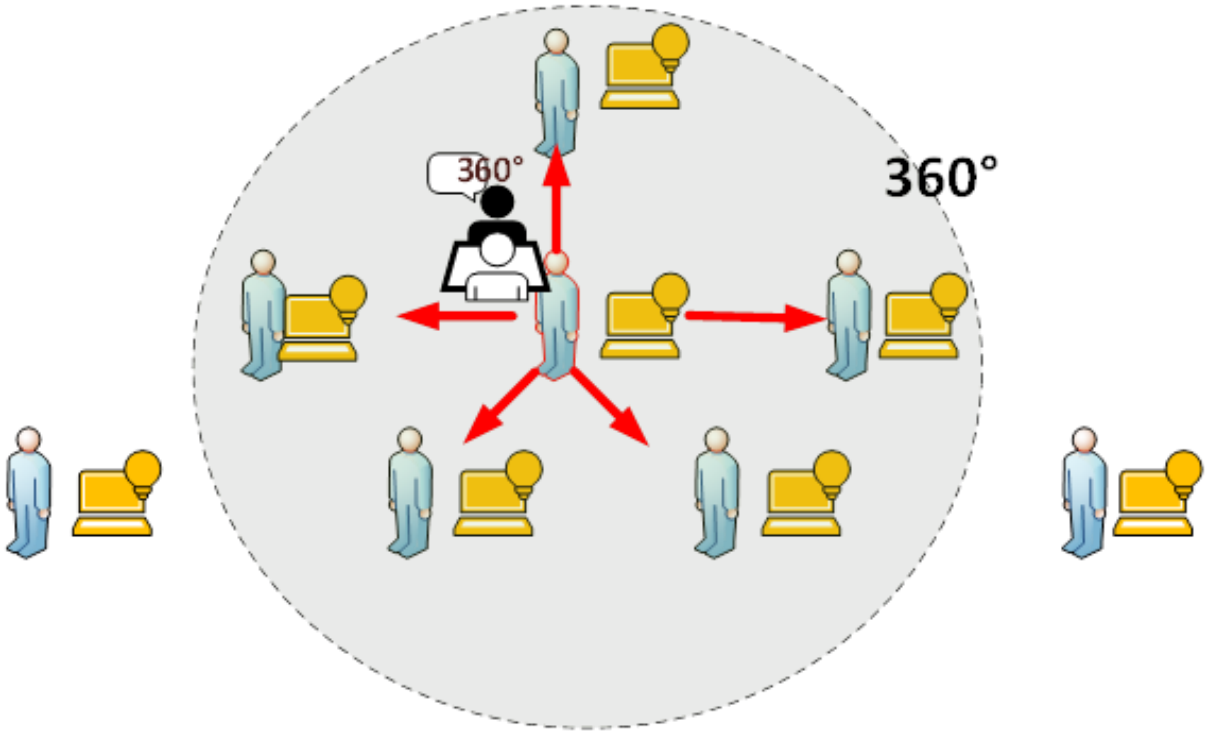


Fig.3a. Assessment and self-assessment of the current personal level of digital competence (key risk factor[2])
Source: Own elaboration

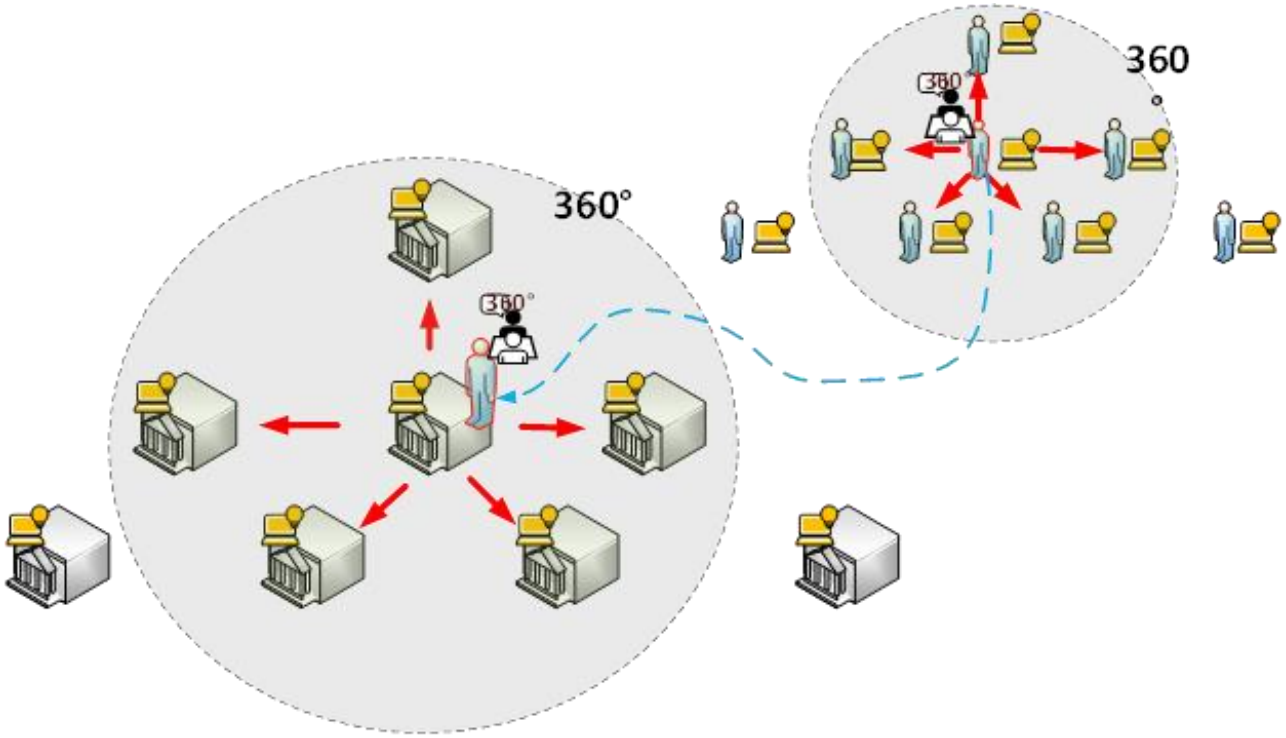


Fig.3b. Assessment and self-assessment of the current institutional level of digital competence
Source: Own elaboration

Table 1.

Questionnaire for Diagnostics of Institutional Key Indicators for Metric Assessment of the Degree of Digital Transformation of Activities

№	Key Indicators
1	Total number of employees on a basic employment contract
2	Number of employees with a documented (certified) level of digital skills
3	Number of employees in addition to item 2 with practical digital skills acquired through self-training
4	Number of files processed in the last year
5	Number of files processed for the last year entirely electronically – filing and providing information
6	Number of active business e-mail addresses used by the employees of the administration
7	Number of incoming emails total for the administration for the last year
8	Number of outgoing emails total for the administration for the last year
9	Volume (generally in number of pages) of the updated information on the administration's website over the past year – including news, publications about initiatives, etc.
10	Is the administration registered in the secure electronic service system: https://edelivery.egov.bg/
11	What case management system is used for the purposes of administration? How many active users there are and the number of jobs with access to this system.
12	Does the administration have a digital documentary archive?
13	What % of the statutory definition of services in relation to the activities of the administration are provided in full and electronically
14	What was the % of services provided electronically 12 months ago?
15	How many services are envisaged to be developed to be able to be presented electronically in the next 12 months?
16	Are electronic-based platforms used in the administration for assigning and controlling the implementation of operational tasks, managing internal projects and evaluating employee performance?
17	Number of PCs used by administrative staff
18	Number of office mobile devices used by employees in the administration
19	Number of printers used by employees in the administration. Is the "print consolidation" service used?
20	Paper and stationery expenditure for the last 12 months – total expenditure

Source: Own elaboration

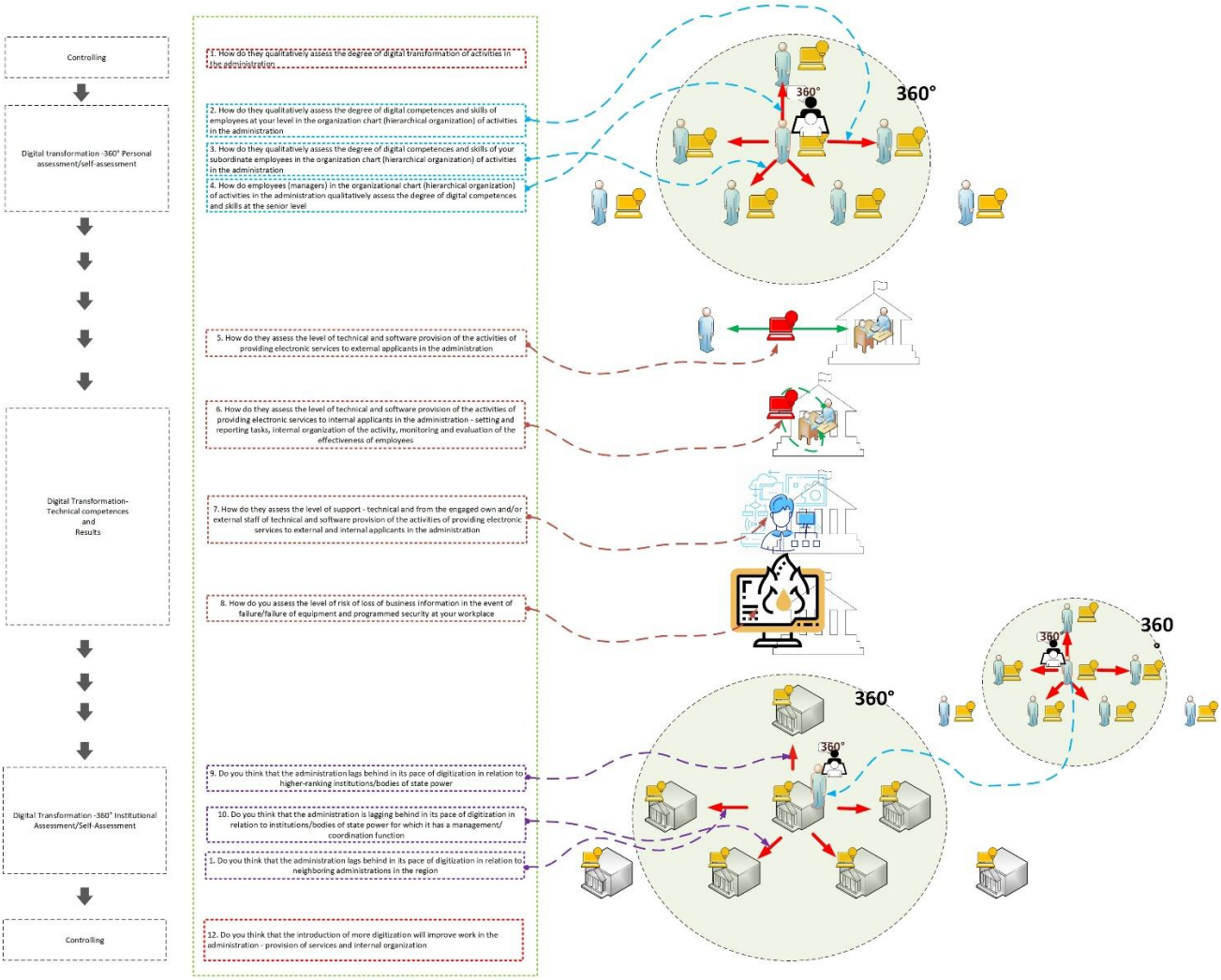


Fig.4. Diagnostic goals - 360° assessment/self-assessment form
Source: Own elaboration

- KPI_5 – Relative share of employees whose workplaces are equipped with means for digital processing of information to a reduced total number of employees in the administration (the reduced number of employees is a result of a reduction in the number of employees from the support staff).
- KPI_6 – Relative share of employees who have a documented assessed level of digital competence acquired as a result of training and/or self-training to a reduced total number of employees in the administration (the reduced number of employees is a result of a reduction in the number of employees from the support staff).
- KPI_7 – Relative share of the expenditure on stationery and consumables for one year to the total number of printing devices available and functioning for the needs of the administration.

The introduced system of 7 basic indicators forms the baseline for assessing the degree of digital transformation and develops into a matrix assessment operator – Table 2.

Table 2.

An initial version of a matrix assessment operator of the current level of digital transformation in the organization

Basic indicators of the point reached by the process of digital transformation of activities in the specific administration	KPI_1	KPI_2	KPI_3	KPI_4	KPI_5	KPI_6	KPI_7 BGN/printer
Administration at the Initial Stage of Digital Transformation	$< 0{,}20$	$< 0{,}20$	$< 0{,}20$	$< 0{,}50$	$< 0{,}75$	$< 0{,}50$	< 250
Administration in the process of active digital transformation	$0{,}2 \leq < 0{,}5$	$0{,}2 \leq < 0{,}5$	$0{,}2 \leq < 0{,}5$	$0{,}5 \leq < 0{,}75$	$0{,}75 \leq < 0{,}85$	$0{,}50 \leq < 0{,}75$	$250 \leq < 500$
Digitally transformed administration	$0{,}5 \leq < 0{,}75$	$0{,}5 \leq < 0{,}75$	$0{,}5 \leq < 0{,}75$	$0{,}75 \leq < 1$	$0{,}85 \leq < 0{,}9$	$0{,}75 \leq < 0{,}9$	$500 \leq < 750$
Proactively digitally transformed administration	$0{,}75 \leq < 1$	$0{,}75 \leq < 1$	$0{,}75 \leq < 1$	$1 \leq < 1{,}25$	$0{,}9 \leq < 1$	$0{,}9 \leq < 1$	$750 \leq < 1000$

Source: Own elaboration

The metric estimates for each of the 7 criteria have baseline initial values (Table 2), defined heuristics and subject to step-by-step correction and calibration in the process of applying the methodology. For the purposes of determining the point of the current development of the administration in the process of its digital transformation, 4 discrete levels (states) are defined:

- Administration at the initial stage of digital transformation;
- Administration in the process of active digital transformation;
- Digitally transformed administration;
- Proactively digitally transformed administration.

Each condition is diagnosed independently according to each of the criteria, and the general condition can be determined by summarizing the data extracted from the Questionnaire (Table 1), evaluated through the operator – Table 2.

The complementarity and detailing of the initial diagnostics achieved as a baseline result of Stage 2 of the Methodology is realized through Stage 3, implemented according to an original idea for applying the characteristic for the HR industry method in 360° (Source * (PDF) 360 Degree Feedback Appraisals - An Innovative Approach of Performance Management System) in the individual and indirect institutional assessment of the degree of digital transformation of the organization.

For the implementation of Stage 3 of the Methodology, an online interview form has been developed: (Visit the link to review the online interview forms along with pilot testing of the instrument in a real environment with real recipients:

https://docs.google.com/forms/d/1nPV5o5xa0iBkGG306onxodFUZmq5q1E056SnmiQvbxU/edit

The survey was conducted during the period 15.09-30.09.2024 with the participation of employees of the Varna Regional Administration. The sample in the survey covers 69.7% of the total list of employees on a basic contract in the Varna Regional Administration, and 23 verified questionnaires were received, each

questionnaire containing 12 closed questions with a symmetrical rating scale.

By all criteria, the sample is representative and the results can be used to form conclusions that can be applied in full with an expected deviation of no more than 0.5%, for the purposes of 360-degree evaluation, which is aimed at qualitative ratings, is statistically negligible

The mechanism for compiling the form and the approach by which the information is collected is presented graphically in Fig. 4. - Form for 360° assessment/self-assessment.

The format recreates the ideas of 360° assessment/self-assessment in two aspects: 360° individual assessment/self-assessment and mediated (through the interviewee) institutional assessment.

In the form, there are 4 sections of questions asked for the purposes of:

- Control of objectivity in the communication of information – Questions 1 and 12;
- 360° assessment/self-assessment - individual assessment/self-assessment - Questions 2, 3, 4;
- 360° assessment/self-assessment - mediated (through the interviewee) institutional assessment - Questions 9, 10 and 11
- Assessment of technical and operational results (Key risk element in Table 1 - Challenge/Risk Matrix) - Questions 5,6,7 and 8.

The implementation of Stage 3 is related to the diagnosis of the priority risk factor according to the Challenge/Risk Matrix [1] - Lack of technical competence, diagnosed comprehensively and multifacetedly through a 360° approach. The application of Stage 3 in the methodology is an innovation in the classic audit schemes, in which key indicators are defined and saturated with facts (Stage 2), and on the basis of them the analytical part of the audit is carried out (Stage 4 - Fig. 2) and corrective measures are identified and preventive measures (Stage 5 - Fig. 2). With the addition of Stage 3, the inclusion, the involvement of the subjective factor in the process of digital transformation is evaluated as a factor with the strongest risk potential for achieving measurable results in this process. The comparative analysis of the results of Stage 2 and Stage 3 provides a significantly higher degree of objectivity and comprehensiveness in the assessment of the current level of digital transformation of the processes in the specific administration. The comparison of quantitative (Stage 2) and qualitative (Stage 3) assessments is a condition for identifying the actual problems in areas (Stage 4) and directing efforts in these areas in the form of a system of corrective measures (Stage 5).

The analysis and comparison of the information obtained from the empirical stages in the methodology– Stage 1, 2 and 3 is implemented within Stage 4. In the initial audits, it is advisable to assign this stage to external auditors for the organization or to be carried out jointly with employees in the administration, who will periodically apply the methodological sequence of Figure 2 (at least once every 18 months). The output of Stage 4 is a Report to establish the degree of compliance with the minimum requirements and the achieved level of digital transformation – an example structure of this document is presented in Fig. 5. The report presents a quantitative and qualitative analysis of the state of the digital transformation process in the organization, as well as outlines in part "4. Conclusions" of the priority areas of impact. The report is the basis for the development of a Program of Short- and Medium-Term Corrective Measures - the baseline result of Stage 5 of the Methodology (Fig.2)

Table 3 presents the initial structure and content of the corrective measures developed in the priority challenges of the digital transformation process, identified during the overview of the problem area - Challenge/Risk Matrix Fig.1. (*Source: https://aisel.aisnet.org/ijispm/vol9/iss3/5/):

- Challenges of interaction;
- Technical challenges;
- Challenges of the necessary competence;
- Organizational challenges;
- Financial challenges.

For each area of challenge, indicative priority axes for corrective action have been proposed, and an attempt has been made to draw a meaningful boundary between short- and medium-term measures.

The information presented in Table 3 summarizes the authors' experience and provides an approximate

basis for the development of specific for each administration corrective measures, formed in a relevant programming document. This set of measures can also be considered as a minimum number of corrective impacts that would guarantee a sustainable path for each administration in the direction of an effective (and not an end in itself) digital transformation, in which the subjective fact of risk turns into a real driving force with a proactive role.

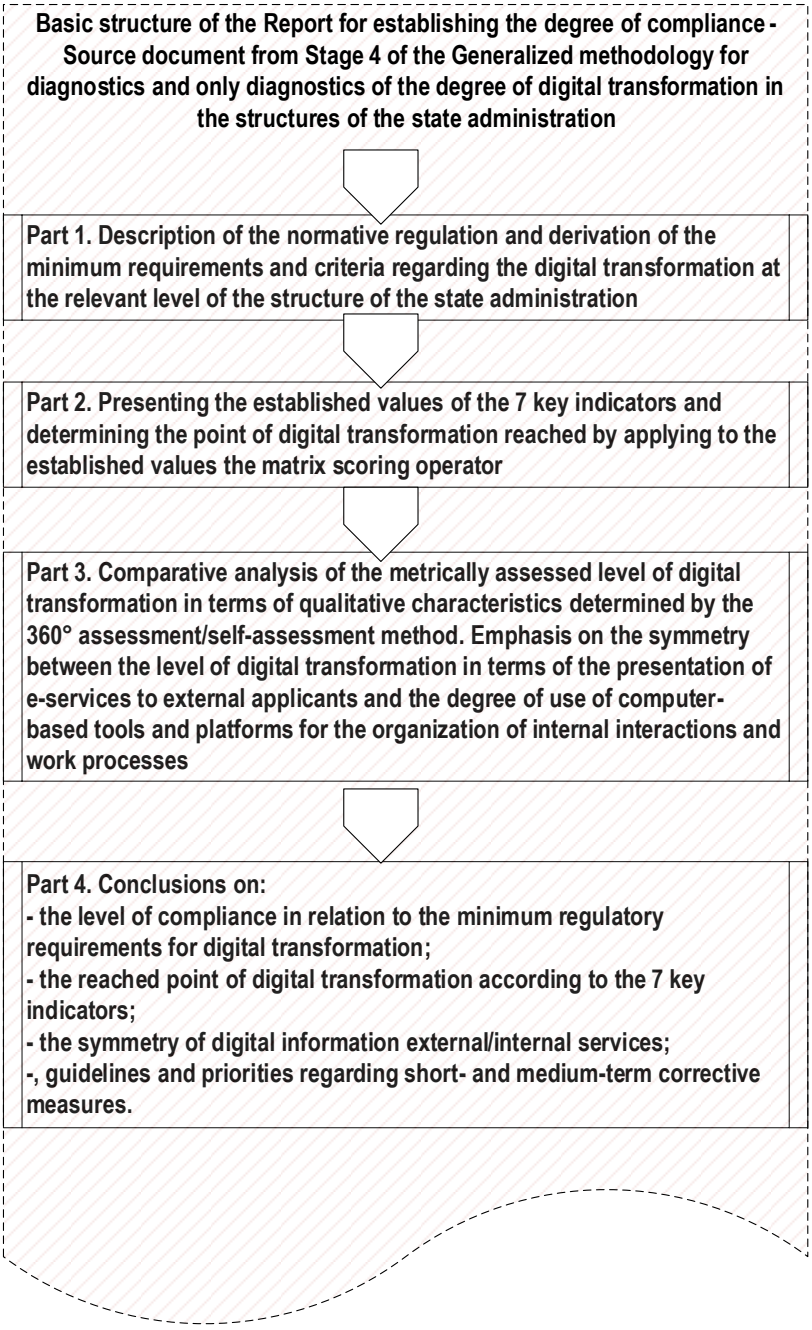


Fig. 5. Basic structure of the Report for establishing the degree of compliance – Source document from Stage 4 of the Summary Methodology for Diagnosis and Only Diagnostics of the Degree of Digital Transformation in the Structures of the State Administration

Source: Own elaboration

Table 3.

Typical directions of impact in defining remedial measures

№	Typical remedial measures	The priority of implementation over time	
		Short-term	Medium-term
1.	**Challenges of interaction**		
1.1	Symmetry of the channels for requesting e-services: www.eGov.bg, website of the administration, external links to the service, good practices of similar administrations	Inventory and "alignment" until standardized performance is reached	Control of deviations from standardized performance and correction
1.2	Achieving full G2G integration when requesting e-services: legitimacy, eligibility, integrity of the request	Inventory of all e-services for G2G data shortage (partial absence of integration with other administrations)	Gradual correction of G2G shortage until saturation point is reached (integration to the level of information exchange regulation)
1.3	Developing internal digital tools and platforms for tracking and ensuring the sustainability of the factual content generation process in the provision of external e-services.	Assessment of the non-symmetry in the degree of digital transformation of internal/external e-services	Improvement and/or introduction of new internal digital tools and platforms for content maintenance in the provision of e-services
2.	**Technical challenges**		
2.1	Delivery model management – centralized/on-premises IT resources and services in the provision of activities	Acquisition/configuration of technical solutions to provide tools for managing the delivery model – centralized/on-premises IT resources and services in the provision of activities	Acquisition of new technical support for effective and reliable functioning of the model for the provision of centralized/local IT resources and services in the provision of activities
2.2	Effective implementation of unified models for managing access to the necessary IT resources in the provision of e-services	Analysis for the implementation and implementation of a centralized platform for managing access to the necessary IT resources in the provision of e-services	Effective transformation of information service processes on the basis of an introduced and specifically configured platform for centralized management of access to IT resources used in the activities of the administration
2.3	Achieving information protection and cybersecurity standards	Conducting a targeted audit to establish the actual level of information protection and cybersecurity in the organization	Planning and implementation of organizational and technical measures to achieve the uniform state requirements in the field of information protection and cybersecurity applicable to the organization
3.	**Challenges of the required competence**		
3.1	Developing the capacity to upgrade individual digital skills without detachment from work processes	Development of individual plans for the employees to increase and/or maintain the level of their digital skills necessary for the performance of their duties	Periodic control and the level of digital skills. Update of individual plans on an annual basis
3.2	Enable your own covers for duplication	Assessment of the emerging	Supplementing individual plans

№	Typical remedial measures	The priority of implementation over time	
		Short-term	**Medium-term**
	of administrative roles in the process of granting and managing access to IT resources	need for duplication of administrative roles in the process of providing and managing access to IT resources	of selected employees in order to acquire additional competence to perform an IT administrative role
	Complementing the knowledge and skills of employees to work in a secure information environment (information and cyber security)	Assessment of the individual and team level of knowledge and skills of employees to work in a secure information environment (The proactive idea is the introduction of an **e-passport for the digital skills of employees in the state administration**)	Complementing individual digital competence plans for all employees in order to achieve sustainable knowledge and skills for working in a secure information environment
4.	**Organizational challenges**		
4.1	Transformation from functional to role-based organizational structure of administration	Development of a plan for the migration of an organizational structure from functional to role-based with consideration of the impact of the deepening digital transformation on work processes and interactions	Development and adoption of a new establishment plan and system of job descriptions, taking into account the impact of digital transformation processes on the performance of official duties
4.2	Objectification of employee performance assessment - migration to digital metrics	Supplementing the employee assessment system with objectively derived metric measures for their activity in the processes of digital transformation	Development and implementation of program components for the extraction of metric meters, employee participation in digital transformation processes
4.3	Introduction of new roles in the organizational structure in relation to the processes of information and cybersecurity and protection	Review and update of the establishment plan in relation to the introduction of new functional roles engaged in monitoring and control of access to information and cybersecurity	Effective introduction into the activities of the administration of the new functional roles engaged in monitoring and control of access to information and cyber security
5.	**Financial challenges**		
5.1	Prioritization and planning of budget expenditures for bringing and maintaining the local IT resources in line with the current requirements and criteria for reliability, fault tolerance, data protection and cybersecurity	Assessment of the possibilities for restructuring of budget priorities in order to provide the necessary funds in relation to the technical and organizational support of the digital transformation processes	A reasoned request to the budget allocator for a permanent change in the structure of the administration's budget in order to provide the necessary funds for the technical and organizational support of the digital transformation processes
5.2	Incentivize employees who proactively develop their digital skills and/or develop the potential to perform substitute IT administrative roles	Exploring the possibilities for introducing additional criteria in the process of additional material incentives for employees who proactively develop their digital skills	Sustainable application of additional criteria in the process of additional material stimulation for employees who proactively develop their digital skills – in the formation of periodic evaluations by the manager
5.3	Attraction of extra-budgetary funds for	Exploring the possibilities of	Development of project

№	Typical remedial measures	The priority of implementation over time	
		Short-term	Medium-term
	the development of IT resources and pieces of training in digital competence from donor programs – national and/or international	participation in projects for technical provision and development of digital competencies of employees	proposals for participation in donor programs for technical support and development of digital competencies of employees

Source: Own elaboration

3. Conclusion

The presented research and applied results can be considered as a step towards creating a unified tool for the state administration for assessment and self-assessment of the achieved phase in the process of digital transformation. The process is considered a key factor in increasing the efficiency of the administration itself, both in terms of providing modern e-services and in terms of establishing a sustainable trend for the application of information technologies to improve the internal interactions of the administration, including the administration-administration interactions, to achieve better service to citizens and businesses and also to reduce the time for processing and providing electronic and administrative services.

The development and implementation of a unified tool for the state administration for assessment and self-assessment of a phase reached in the process of digital transformation would have a significant monitoring effect and can provide an objective information base for making targeted management decisions. Solutions to help achieve a uniform quality of e-services not only as a spectrum of services but also as a substantive and procedural aspect of the internal interactions in their provision of time and with sustainable quality for the benefit of society

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