Research Article

Implementation Hierarchy and CIO Organization in Bulgaria's Public Administration

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A B S T R A C T :

This article presents results from the analysis of the CIO functions, role and responsibilities in the public administration, serving as a basis for establishment of a common profile of CIOs. This is expected to reduce the obstacles and facilitate the digital transformation in the public sector in line with the modern technological progress and management approaches, which are applied to meet the requirements for effectiveness and efficiency of e-government. The author suggests a new hierarchical structure of the management bodies, including CIOs, in public administration of Republic of Bulgaria, and elaborates on the pros and cons of this proposal.

The approach is tested in the development of CIO function in Institute of Information and Communication Technologies and the Bulgarian Academy of Sciences as a federation of more than 40 entities. Core elements of the approach are tested in the framework of the ECHO project under H2020 for development of a governance model of the European cyber security collaborative trusted network organization.

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Introduction: CIO role, Responsibilities and Functions in the Public Administration

Chief information officer (CIO), chief digital information officer (CDIO) or information technology (IT) director are job titles commonly given to the most senior executive in an enterprise who works with information technology and computer systems in order to support enterprise goals.

Typically, the CIO reports directly to the chief executive officer (CEO), but may also report to the chief operating officer (COO) or chief financial officer (CFO). In military organisations, the CIO reports to the commanding officer. The role of chief information officer was first defined in 1981 by William R. Synnott,[11] former senior vice president of the Bank of Boston, and William H. Gruber, a former professor at the Massachusetts Institute of Technology Sloan School of Management.[12] A CIO could sometimes serve as a member of the board of directors.

Role of the CIO

Synnott and Gruber first coined the term CIO in 1981 as the "senior executive responsible for establishing corporate information policy, standards and management control over all information resources."[12] Hence, the CIO was described as a manager, and not just a technical expert. Since the CIO was an amalgamation of both the IT specialist and a management guru, the literature has identified several attributes that CIOs must have. According to Rockart, Ball and Bullen (1982) an important attribute is that of manager as well as technical expert.[36] Other attributes include political, organisational and communication skills; involvement in, understanding of and experience in the overall management of the business; understanding of and ability to manage technological experts; development of appropriate human resource management skills; planning skills with particular importance on strategic planning and management of change; and sensitivity to the human, organisational and social impacts of new technology, and ability to proactively plan . This view indicates that the CIO is seen firstly as a management executive, and then technical expert. Passino and Severance [32] further corroborate the findings of Rockart and co-authors by suggesting that the new executive was firstly a business generalist and secondly a technology specialist.[36] This confirms that the CIO role will always be associated with technological issues. Feeny, Edwards and Simpson [26] advocate that the following are ideal for a CIO profile:[26]

- Honesty, integrity, sincerity, openness;
- Business perspective, motivation, language;
- Communicator, educator, motivator, leader, politician, relationship builder;
- Continuously informed on developments in IT, able to interpret their significance to the business; and
- Change oriented team player, catalyst to business thinking.

The above attributes are in some ways similar to those first identified by Rockart et al. (1982) discussed earlier.[36] The only component missing is the notion that the CIO must have the skills to be a manager of managers, which is acknowledged by Feeny et al.[26]

Another description of the CIO by Remenyi, Grant and Pather's is that of 'chameleon' with regard to their attributes and required skills.[35] Four specific characteristics identified are believed to be attributes of both the CIO and the chameleon. They are: ability to change; ability to see in multiple directions; to strike fast when required and the ability to hang on when the going gets tough. This description suggests that the role requires the ability to (a) adapt to a constantly changing environment, (b) able to envision the organisation in a holistic manner, (c) remain ahead of the game on technological development, and (d) endure the tough times when unrealistic expectations and failures occur.

From the discussion of the attributes and skills of the CIO it is apparent that the CIO, to successfully integrate with the organisations executive team, cannot purely be a technology expert, but must also have sufficient managerial skills. It is via the managerial skills that the CIO can effectively exploit the information technology within an organisation and gain credibility for further such investment.

Responsibilities of the CIO

The literature presents a variety of perspectives on what constitutes the responsibilities of the CIO. Rockart et al. identified the role as having three, increasingly significant parts: diminishing direct line responsibilities; increasing staff orientation; and corporate responsibility for information resource policy and strategy.[36] Highbarger (1988) is of the opinion that CIO responsibilities entail cost effectiveness, technological competitiveness and organisation.[28] They also contentious issues of the CIO role such as struggle for tenure, a lack of financial support, and determining value add from IT investments. Overall CIOs are required to have strong organisational skills, as at the end of the day they are an executive manager first and foremost. Six long term areas of responsibility suggested by Stephens, Ledbetter, Mitra and Ford[38] are: policies, procedures, guidelines or standards for information resources; strategic planning for information resources, linked to business planning, to provide improved organisation functions and competitive advantage; approval/ acceptance of expenditures; coordination of information technology, functional units, environment; education of management, especially top management, on potential uses of technology; and environmental scanning. More recently, Polanksy, Inuganti and Wiggins[33] identify CIO responsibilities to be IT strategy, IT governance, IT organisation and staffing, technology architecture, technology awareness, corporate governance, business intelligence, business transformation, customer care and Internet and e-business.

The above CIO responsibilities indicate that the CIO is an information technology and communications executive, with finance and human resources as a flow-on effect, not a driving factor. The above overview of the literature high-

lights the nature of the roles and responsibilities, and that the role has evolved considerably since its formation in the early 1980s. However, the future of the CIO role remains questionable.

CIO Functions

The chief information officer of an organization is responsible for several business functions. First and most importantly, the CIO must fulfil the role of a business leader.[13] The CIO makes executive decisions regarding matters such as the purchase of IT equipment from suppliers or the creation of new IT systems. Also, as a business leader, the CIO is responsible for leading and directing the workforce of their specific organization. A CIO is typically "required to have strong organizational skills."[10] This is particularly relevant for the chief information officer of an organization who must balance roles and responsibilities in order to gain a competitive advantage, whilst keeping the best interests of the organisation's employees in mind. CIOs also have the responsibility of recruiting, so it is important that they work proactively to source and nurture the best employees possible.

CIOs are directly required to map out both the ICT strategy and ICT policy of an organisation. The ICT strategy covers future-proofing, procurement, and the external and internal standards laid out by an organization. Similarly, the CIO must develop the ICT policy, which details how ICT is utilized and applied. Both are needed for the protection of the organization in the short and long term and the process of strategizing for the future. Paul Burfitt, former CIO of Astra-Zeneca, also outlines the role of the CIO in IT governance, which he refers to as the "clarifying [of] accountability and the role of committees."[14]

In recent years, CIOs have become more closely involved in customer-facing products. With the rising awareness in organizations that their customers are expecting digital services as part of their relationship with an organization, CIOs have been tasked with more product-oriented responsibilities. A clear example of this can be seen at facilities management company Mitie where former CIO of energy firm Centrica Davi Cooper is the CTIO and has an agenda to create online services for their customers.[15]

Supporting Hierarchical Structures of CIOs in the Public Administration on National Level

The hierarchy that should be established in support of role, responsibilities and functions of CIOs in public administration is as following:

- National Chief Information officer (NCIO), reporting directly to the Prime Minister of the Republic of Bulgaria or one of Deputy Prime Ministers;
- Deputy National Chief Information officer (DNCIO) and National Chief Technology Officer (NCTO), reporting to NCIO directly;

- Deputy Chief Information officer on Information Security (DCIOIS), reporting to NCIO and DNCIO or National Chief Information Security Officer (NCISO);
- Deputy Chief Information officer on General Services (DCIOGS) administration, reporting to NCIO directly and if he is absent to (DNCIO).

To achieve effective co-ordination of CIOs throughout the public administration, effectiveness and interoperability of national Communications and Information systems (CIS) is necessary to be established strong hierarchy and the following council and committees:

- *National CIO council (NCIOC).* The chairman of NCIOC is National CIO and deputy chairman is Deputy NCIO. Members of the NCIOC are all CIOs of direct reporting to the Council of Ministers public administrations (ministries and national/government agencies).
- *National Chief Information Security Officer (CISO) Council (NCISOC). It is chaired by* Deputy Chief Information officer on Information Security (DCIOIS) or National Chief Information Security Officer (NCISO).
- *National CIO department (NCIOD).* The head of NCIOD is National CIO and deputy head is Deputy NCIO.
    - Innovation Committee to the National CIO council. Innovation Committee is chaired by the Deputy National Chief Information officer (DNCIO);
    - Services, Strategy, and Infrastructure (SSI) Committee to the National CIO council. It is chaired by the CIO of E-government Agency;
    - Workforce committee to the National CIO Council. It is chaired by the Deputy Chief Information officer on General Services (DCIOGS).

On the Fig. 1 below are shown the structures that support National Chief Information officer (NCIO) on national level. These structures should be a part of supporting administration of Council of Ministers of the Republic of Bulgaria.

About the NCIO Council

The National Chief Information Officer (NCIO) Council is the primary body for interagency CIO collaboration and communication. The Council is led by the National CIO, and deputy chair is Deputy National Chief Information officer (DNCIO).

The NCIO Council is dedicated to improving the design and development of communications and information systems of the Republic of Bulgaria through:
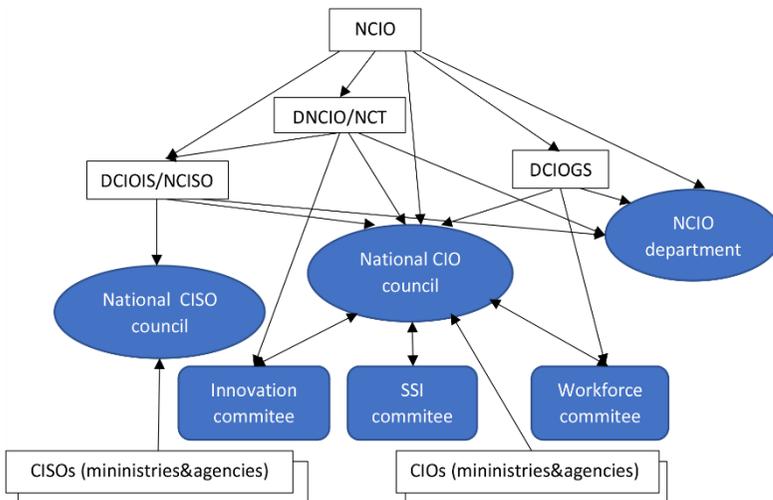
Figure 1: Structures in hierarchy in support to National Chief Information Officer (NCIO).

- Communications and information systems (CIS) strategy and policy development;
- Strategic hiring and training of communications and information technologies professionals;
- Sharing of best practices; and
- Promotion of shared services.

The Council promotes collaboration and community building among the public administration (ministries and national/government agency) CIOs for the purposes of openly sharing information, transferring knowledge, and developing a unified approach for addressing National Communications and information systems challenges and handling prominent.

Strategic Focus Areas are:

- Strategy and policy development in the area of CUS systems in the Republic of Bulgaria;
- Management and development of CIS systems in the country;
- Comprehensive Risk Assessment & Framework of the CIS systems in the country;
- Shared Services;
- Performance Metrics.

About the NCISO Council

The National Chief Information Security Officer (NCISO) Council is the primary body for inter-agency CISO collaboration and communication. The Council is led by the National CISO, who is and Deputy National CIO on Information Security (DCIOIS), and co-chair who's a member of the Council, elected to serve in that role.

The NCISO Council is dedicated to improving the cybersecurity posture of the Republic of Bulgaria through:

- IT security policy development;
- Strategic hiring and training of cybersecurity professionals;
- Sharing of best practices; and
- Promotion of shared services.

The Council promotes collaboration and community building among the public administration (ministries and national/government agencies) CISOs for the purposes of openly sharing information, transferring knowledge, and developing a unified approach for addressing National IT security challenges and handling prominent.

Strategic Focus Areas are:

- Identity Management;
- Comprehensive Risk Assessment & Framework;
- Vulnerability Response;
- Shared Services;
- Performance Metrics.

About the NCIO Department

The National Chief Information Officer (NCIO) Department is the supporting body for National Chief Information Officer (NCIO). The department is led by the National CIO, and deputy chief is Deputy National Chief Information officer (DNCIO).

About the Innovation Committee

Innovation can bring about both incremental growth and radical change in how we use technology to serve the American people. The Innovation Committee, which operates under the authority of the National CIO Council, helps ministries and agencies to speed the adoption of new practices, processes and technologies. It is chaired by Deputy National Chief Information officer (DNCIO) and NCTO.

Strategic Focus Areas are:

- Investigating Emerging Technology;
- Innovative Acquisition Efforts;

- Data Analytics and Big Data;
- Sharing Best Practices;
- Transforming Mobility.

About the Services, Strategy, and Infrastructure (SSI) Committee

The SSI Committee operates under the authority of the CIO Council. In furthering the Council's goals, the Committee addresses topics with the area defined by the Committee's Purpose through:

- the application of Council resources to develop strategies and policy advice and to sponsor or host events;
- the participation of Committee members;
- coordination with the Office of Federal CIO; and
- communication to the Federal IT community.

Strategic Focus Areas are

The committee focuses on acquisition reform and National Communications and IT infrastructure through execution of the following policies and initiatives:

- National Communications and Information Technology Acquisition;
- Technology Business Management (TBM);
- Data Centre Optimization Initiative (DCOI);
- Capital Planning and Investment Control (CPIC);
- Information Resource Management (IRM);
- Enterprise Architecture (EA);
- Shared Services.

About the Workforce Committee

The Workforce Committee's agenda encompasses the full employment life cycle: workforce planning, recruitment, retention, and career development. They work with the HR community to develop, implement and communicate strategies to recruit, retain, and manage a fully trained and qualified IT workforce that meets current and future mission requirements. The Workforce Committee is committed to its strategic goal of providing the National Government with a cadre of highly capable IT professionals with mission critical competencies to meet ministries and agencies goals. It is chaired by the Deputy Chief Information officer on General Services (DCIOGS).

Strategic Focus Areas are:

- Multi-Agency and ministries Recruitment and Hiring Event;
- IT Track of the Council of Ministers' Management Council Interagency and ministries Program for workforce development;

- Position Description Library;
- Strategic Career Roadmaps.

Conclusions: CIO Hierarchical Structures in the Public Administration on National Level and Digital Transformation

Establishment of new CIOs hierarchical structure in public administration can be done after the institution of Chief Information Officers is established in the Republic of Bulgaria.

There is a strong need of reform in the area of management, design and development of Communications and Information systems (CIS) in the country. The proofs for this need are recent faults in the CIS systems of public administration of Bulgaria and data leaks.

The institution of CIOs is established in the countries of European Union and North America long time ago and Bulgaria is delayed in this process. This is important and crucial to ensure and guarantee effective data transfer and communications between Bulgarian and Euro-American CIS systems.

The institution of CIOs is fundamental to guarantee continuous digital transformation of CIS systems. This transformation will lead to effective E-government, improved interoperability between the CIS systems of public administration, improved efficiency of the CIS systems and big savings of spent funds, because there will be avoided duplications of systems and functions in different bodies of public administration.

Acknowledgements

References

1. Velizar Shalamanov and Todor Tagarev, *Information Aspects of Security*, ProCon, Sofia – 1996. In Bulgarian.
2. "C4 Study," US DoD – MoD-Bulgaria, 2000
3. *Regulations for the Life Cycle Management of the Command, Control, Communications, Computers, and Intelligence Systems (C4I) in the Ministry of Defense and the Bulgarian Armed Forces* (Sofia: Military Publishing House, 2000).
4. Velizar Shalamanov, "Institution Building for IT Governance and Management," *Information & Security: An International Journal* 38 (2017): 13–34.
5. "State e-Government Agency," Republic of Bulgaria, August 2019, https://www2.e-gov.bg/en/1.

6. United States General Accounting Office, "Maximizing the Success of Chief Information Officers: Learning from Leading Organizations," Executive Guide, GAO-01-376G, 2001, https://www.gao.gov/assets/80/76558.pdf.

7. Velizar Shalamanov, Vladimir Monov, Ivo Blagoev, Silvia Matern, Gergana Vasileva, and Ivan Blagoev, "A Model of ICT Competence Development for Digital Transformation," *Information & Security: An International Journal* 46, no. 3 (2020): 269-284.

8. Velizar Shalamanov, Vassil Sabinski, and Trayan Georgiev, "Optimization of the Chief Information Officer Function in Large Organizations," *Information & Security: An International Journal* 46, no. 1 (2020): 13-26.

9. Daniela Borissova, Zornitsa Dimitrova, and Vasil Dimitrov, "How to Support Teams to be Remote and Productive: Group Decision-Making for Distance Collaboration Software Tools," *Information & Security: An International Journal* 46, no. 1 (2020): 36-52.

10. Rachel Lawry, Dianne Waddell, and Mohini Singh, "Roles, Responsibilities and Futures of Chief Information Officers (CIOs) in the Public Sector," 2007.

11. William H. Gruber, "Strategic Information for Competitive Advantage," 2019, https://www.williamgruber.com/strategic-information.

12. William R. Synnott and William H. Gruber, *Information Resource Management: Opportunities and Strategies for the 1980s* (New York: Wiley Interscience, 1981).

13. Joe Peppard, "Unlocking the Performance of the Chief Information Officer (CIO)," *California Management Review* 52, no. 4 (August 2010): 5, https://doi.org/10.1525/cmr.2010.52.4.73.

14. "What Exactly Does a Chief Information Officer Do?" *Computer Weekly*, interview with Paul Burfitt, July 22, 2005, https://www.computerweekly.com/news/2240061366/What-exactly-does-a-chief-information-officer-do.

15. Horizon CIO Network, "CIO Interview: David Cooper, CTIO of Mitie," horizon cio.network, 23 April 2018.

16. J. Norman Baldwin, "Public versus private: not that different, not that consequential," *Public Personnel Management* 16, no. 2 (1987): 181 – 193.

17. Gary Bouma and Rod Ling, *The Research Process Fifth Edition* (Oxford University Press, 2004).

18. George Boyne, "Public and Private Management: What's the Difference?" *Journal of Management Studies* 39, no. 1 (2002): 97-122.

19. Barry Bozeman and Gordon Kingsley, "Risk Culture in Public and Private Organisations," *Public Administration Review* 58, no.2 (1998): 109-118.

20. Pawan Budhwar and George Boyne, "Human Resource Management in the Indian Public and Private Sectors: An Empirical Comparison," *International Journal of Human Resource Management* 15, no. 2 (2004): 346-370.

21. Sue Bushell, *Government CIO Role Still Developing, But Australia Ahead of Pack,* 2006, https://www.cio.com/index.php?id=401118652&eid=601.

22. Jaime Capella, "The CIO's First 100 Days," *Optimize* 5, no. 3 (2006): 46-51.

23. Department of Premier and Cabinet, *About the Office of the Chief Information Officer*, 2006, http://www.dpc.vic.gov.au/.

24. Michael Earl and David Feeny, "Is Your CIO Adding Value," *The McKinsey Quarterly* 2 (1995): 144-161.

25. David Farnham and Sylvia Horton, "Managing public and private organisations," in *Managing the New Public Services*, edited by Daniel Farnham and Sylvia Horton (London: Macmillan, 1996).

26. David Feeny. Brian Edwards, and Kep Simpson, "Understanding the CEO/CIO Relationship," *MIS Quarterly* 16, no. 4 (1992): 439 – 448.

27. Chris Hart, *Doing a Literature Review* (London: SAGE Publications Limited, 1998).

28. J. Highbarger, "What's the Proper Role for the CIO?" *Management Review* 77, no. 3 (1998): 53-54.

29. Denise G. Jarratt, "A Comparison of Two Alternative Interviewing Techniques Used within an Integrated Research Design: A Case Study in Outshopping Using Semistructured and Nondirected Interviewing Techniques," *Marketing Intelligence and Planning* 14, no. 6 (1996): 6-15.

30. Euripidis Loukis and Niki Tsouma, "Critical Issues of Information Systems Management in the Greek Public Sector," *The International Journal of Government and Democracy in the Information Age* 17, no. 1 (2002): 65-83.

31. M.P.G. Nairn, *New Australian Government Chief Information Officer*, Media Release, Senator the Hon Eric Abetz, Special Minister of State, Australia, 2005.

32. Jacque Passino and Dennis Severance "The changing role of the Chief Information Officer," *Planning Review* 16, no. 5 (1988): 38-42.

33. Mark Polansky, Tarun Inuganti, and Simon Wiggins, "The 21st Century CIO," *Business Strategy Review* 15, no. 2 (2004): 29-33.

34. Michael Porter and Victor Millar, "How information gives you competitive advantage," *Harvard Business Review* 63, no. 4 (1985): 149-174.

35. Dan Remenyi, Kenneth Grant and Shaun Pather, "The Chameleon: A Metaphor for the Chief Information Officer," *Journal of General Management* 30, no. 3 (2005): 1-11.

36. John Rockart, Leslie Ball and Christine Bullen, "Future Role of the Information Systems Executive," *MIS Quarterly* 6, no. 4 (1982): 1-14.

37. Debora Schneider and Bobby Vaught, "A Comparison of Job Satisfaction between Public and Private Sector Managers," *Public Administration Quarterly* 17, no. 1 (1993): 68-83.

38. Charlotte Stephens, William Ledbetter, Amitava Mitra, and F. Nelson Ford, "Executive or Functional Manager? The Nature of the CIO's Job," *MIS Quarterly* 16, no. 4 (1992): 449-467.

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