EDUCATIONAL AND PRACTICAL VIEW OF KNOWLEDGE, SKILLS AND EXPERIENCE NEEDED BY A CHIEF DIGITAL OFFICER

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Abstract

A relatively new paradigm - called digital transformation (DT), is one of the key ways of empowering companies and their way of doing business using new information communication technologies (ICTs) and their application in new business models. Since a successful transformation requires the engagement of all organization resources, a special emphasis is placed on human resources, where a new role becomes important: the Chief Digital Officer (CDO).

The CDO in the process of digital transformation advocates a systematic approach, focusing on the transformation of the whole organization and mobilization of their resources through the entire organizational structure with the aim of business transformation with application of the corresponding modern ICT. As such, a CDO is considered to be a digital transformation specialist, responsible for digital initiatives, and cooperation with key business and technology domain experts, both within and outside the organization.

This paper deals with the literature review from the domain of knowledge and skills needed to successfully perform the role of CDO, as well as with the practical experience needed to do the job.

It describes the state of education system related to knowledge it provides to students (as a theoretical framework) and describes the practical experience and know-how, which the future CDOs must acquire in order to carry out DT in organizations they work in. Literature analysis takes into account papers related to education, development of new study programs, case studies of DT in practice and other relevant articles and sources that determine: Who is actually the CDO? What knowledge, skills and experience must the CDO have? How does it become a successful CDO?

Keywords: digital transformation, Chief Digital Officer, knowledge, skills, experience.

1 INTRODUCTION

Digital transformation (DT) becomes an increasingly important issue among companies around the world. It incorporates the use of technology to improve the company's efficiency. "DT is the deliberate and ongoing digital evolution of a company, business model, idea process, or methodology, both strategically and tactically [1]." Executives in all industries are using digital advantages (such as data analytics, social media and smart embedded devices) and encourage their use in business with the purpose of improvements customer relationships, internal business processes, and value propositions [2]. This is a process driven by digital technology, which puts special emphasis on managing people and business models. By using digital technology to foster innovation, organizations are moving away from the traditional capabilities provided by their IT department. In this way, organizations create new business opportunities and new values for their end-users whose expectations over time become ever greater and bigger.

With regard to market pressures, competition and the entire business environment, digital transformation becomes a strategic priority that businesses have to cope with. It requires the implementation and integration of new digital technologies and new business models of enterprises regardless of size. Thus, it is considered as a complex process in whose performance, in order to reach the best possible results, all available enterprise resources must be included - technologically, physically, financially and one of the most important – human resources. For this reason, in response to the current trend of digital transformation, organizations represent a new leadership role – the Chief Digital Officer (CDO).

The appearance of the CDO is linked to the year 2005, when MTV Networks employed a person at the mentioned job position [3]. Since then, its importance is increasingly mentioned in the context of digital transformation. Given the complexity of the DT process, the CDO not only needs to possess new knowledge and skills but must be capable of implementing different modes of operation. Its core
responsibility is the transformation of traditional organizations into digital with the help of digital technologies and processes. Consequently, it can be concluded that the CDO must have a wide range of knowledge, skills and experience to be able to create new business opportunities for organizations and provide users with new values. This article aims to discover and understand what set of knowledge, skills and experience such a new organizational role – CDO, should have.

The article structure is organized through the methodological approach about the source of data/articles and methods used. Afterwards, literature review has been performed in order to position CDO as new role in contemporary organizations. Finally, research findings and results follow to present and systematize results. Article ends with conclusion and references.

2 METHODOLOGY
Research on theme CDO was conducted on data firstly gathered from two previous literature review and bibliographical researches on digital transformation. This previous researches were based in first case on term “digital transformation” in the title of conference papers or journal article in databases WoS and Scopus (more than 400 articles was reviewed) and in second case on term “digital transformation” and “case study” to better understand the subject (88 articles including case studies were reviewed). In these researches the term “chief digital officer” was identified and idea for this paper was born.

After identification of term “chief digital officer”, term was searched in databases (WoS and Scopus), Google Scholar and general Internet search in Google. Synonym “digital transformation leader” was also used. Eleven papers independent on source, were discovered with direct link to CDO and his preferences/focus and main tasks; characteristics and skills. After that, 4 more sources were discovered that describes studies and correlation of CDO and CIO; or CDO and general leadership in digital era; that explains the correlation between current and new management roles and positions. All together 15 papers / studies directly involved in term CDO and its characteristics were reviewed in detail.

Research was divided into two parts. In the first part, literature review was provided, and that defines the term CDO, professional and educational aspects of current and future trends and needs recognized from educational perspective and perspective of professional associations related to skills and competencies monitoring new roles and jobs in ICT. Second part was focused on literature review of discovered papers directly linked to CDO; his characteristics; needed competencies; skills and finally experiences needed for the job. All results were summarized in the results section and conclusion as needed knowledge, skills and experience, according to authors of this papers and regarding all literature reviewed.

3 LITERATURE REVIEW
Term CDO was recognized through various synonyms in literature such as: digital transformation leader, digital transformation manager, digital transformation officer or last that prevails the chief digital officer (CDO). The first appearance of this term was in 2005 according to Horlacher and Hess [3] as job description in one large company. Since then, there have been several professional studies that present CDO as a new and legitimate managerial role in today’s companies. Strategy& [4] made study on 1500 large companies, and this study shows that 6% of them already have this new role / position of CDO in their organizational structure in year 2015. The mentioned study, also shows that this role is present in parallel with and distinguished from the CIO. McKinsey & Company [5] stated in their report that number of people in this role doubled from year 2013 to 2014 and emphasized symbolically that CDO is “transformer-in-chief” alluding to the symbolism of the American president that is known as “commander-in-chief”. Regarding the professional studies, APM stated [6] that SAP made in 2018 “SAP Digital Transformation Executive Study: 4 Ways Leaders Set Themselves Apart", noting that 84% of global companies leaders say that digital transformation is critical for their survival in the next five years. Study also reveals that those companies that made massive digital changes made more profit in 80% of cases and higher level of market share according to SAP in 85% of cases.

According to Catarino, Rosa and Mira da Silva [7], which identify the responsibilities of the CDO and CIO within the enterprise context, and use RACI matrix and COBIT 5 to compare and align two roles, chief digital officer was defined as a new CDO role concept and manager of digital transformation, grounded in governance principles. When governance provides direction and management provides operations - that leads to new vision of CDO role as a bridge between IT and the business.
When educational institutions turn to market demands and direct their activities to it, it is a clear path for students after graduation, from education institutions directly to the market. Research conducted in Croatia [8], on students who finished graduate study of Business Informatics, shows that educational institutions have recognized the trend of education for new professions, among other things, curricula that provide the development of competencies needed for the CDO. This survey shows that more than 50% of respondents found their first job within a month of graduation. Most of the students, 70%, are employed in the private sector, while most of them (two thirds) work on ICT-related jobs (developers, digital transformation leaders, business analysts, CIOs, etc.).

It is also important to note that the competencies that students receive after college education can differ from the actual market demands. For this reason, educational institutions must keep adapting their study programs by providing relevant knowledge and practical skills that can adequately meet market demand and thus empower students more compatible with practice – now, compatible with the growing trend of digital transformation.

In addition to formal education, there are also non-profit organizations that focus their business on improving and defining the skills and competences framework in the field of digital and information technology Skills Framework for the Information Age - SFIA [9]. New SFIA from 2018 defines key knowledge and skills that must have digital transformation leaders – CDO [9]. These are new (but also existing) skills that put emphasis on customer relations, collaboration, and cooperation throughout the supply chain.

Digital transformation represents an opportunity for educational institutions in terms of developing new study programs and promoting skills relevant to the new era of DT. Educational institutions must adapt to market trends and provide adequate and required education for development of experts with skills which will be relevant in response to digital transformation [10]. Example of this approach, was also a project of digital transformation of schools, as the digital transformation of educational institutions requires a high level of information-communication technology (ICT) integration at all levels of school business processes. Processes in educational institutions need to be improved in order for the education system to be ready for digital transformation and use of information-communication technologies in teaching processes. By improving their processes, institutions create a competitive position on the market by creating curricula according to market needs. Various stakeholders in educational institutions are ready to collaborate, plan and implement a digital transformation strategy with the promotion of an innovative culture based on the digital transformation [11].

4 RESEARCH AND RESULTS

Based on aforementioned research and the methodological approach used, eleven articles that deal with the topic of the Chief Digital Officer, were identified as relevant to this research. These articles are presented in Table 1, as an analysis of main focus and tasks of the CDO, characteristics of successful CDOs, and key skills and competencies that CDO make successful.

<table>
<thead>
<tr>
<th>Paper</th>
<th>CDO’s perspective /focus /tasks</th>
<th>Characteristics of a Successful CDO</th>
<th>Digital Capabilities of CDO /key CDO skills and competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Innovation and Institutional Entrepreneurship: Chief Digital Officer Perspectives of Their Emerging Role [12]</td>
<td>– Focus on management control; – Value orientation; – Goal achievement; – Reference field; – Location in value chain.</td>
<td></td>
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<tr>
<td>Three Types of Chief Digital Officers and the Reasons Organizations Adopt the Role [13]</td>
<td>– Has a focus on seizing new opportunities; – Examines the existing business model and evaluates customer centricity.</td>
<td>– Use of digital technologies to generate value; – Experimenting with a variety of digital technologies.</td>
<td>– Digital Innovation; – Data Analytics; – Customer Engagement.</td>
</tr>
</tbody>
</table>
– Creating a “digitally empowered and customer driven” company. | – Strong customer focus - aiming at the creation of seamless and personalized customer experiences to achieve their goals. | – IT knowhow;  
– Skills in strategy development;  
– Change management;  
– Communication. |
| --- | --- | --- | --- |
– Change Management Skills;  
– Inspiration Skills;  
– Digital Pioneering Skills;  
– Resilience. | – Strong customer focus - aiming at the creation of seamless and personalized customer experiences to achieve their goals. | – IT knowhow;  
– Skills in strategy development;  
– Change management;  
– Communication. |
– Executing the transformation;  
– Drawing a clear road map;  
– Aiming for unwavering management support;  
– Building a digital culture across the organization;  
– Seek input beyond the usual channels;  
– Evaluating success;  
– Align with business objectives;  
– Understand disruptive pressures;  
– Understand that the journey never ends. | – Development of a digital strategy;  
– Creating more efficient structures;  
– Supporting and leading a change process;  
– Maintaining and expanding internal and external networks;  
– The leader of digital projects. | – IT knowhow;  
– Skills in strategy development;  
– Change management;  
– Communication. |
– Creating more efficient structures;  
– Supporting and leading a change process;  
– Maintaining and expanding internal and external networks;  
– The leader of digital projects. | – Development of a digital strategy;  
– Creating more efficient structures;  
– Supporting and leading a change process;  
– Maintaining and expanding internal and external networks;  
– The leader of digital projects. | – IT knowhow;  
– Skills in strategy development;  
– Change management;  
– Communication. |
– Development of digital strategies;  
– Ensuring the organization keeps pace with changing technologies and consumer behaviour;  
– Responsibility for the corporate digital footprint. | – Connection with customers. | – Customer-centric focus;  
– Significant business and team management experience;  
– Consummate change leadership skills;  
– Deep understanding of social technologies. |
| 5 Skills Every Chief Digital Officer Needs [18] | – Storytelling;  
– Innovation;  
– Understanding new trends and products in technology;  
– Execution;  
– Be Influential. | – IT Competency;  
– Change Management Skills;  
– Inspiration Skills;  
– Digital Pioneering Skills;  
– Resilience. | – IT knowhow;  
– Skills in strategy development;  
– Change management;  
– Communication. |
Defining the Chief Digital Officer Using COBIT 5 [7]

- Define the digital strategy/vision;
- Align/converge the digital strategy with the corporate strategy;
- Create a digital culture in the enterprise;
- Disrupt, transform to digital;
- Change management.

- Business-oriented;
- Visionary;
- Higher risk profile;
- Strong relationship builder;
- Problem-solving attitude.

- Leadership skills;
- Strategic thinking;
- Reward assessment capabilities;
- Innate design/lean thinking;
- Deep IT knowledge.

Role of CDOs in the Digital Transformation of SMEs and LSEs. An Empirical Analysis [19]

- Creating a completely new digital ecosystem;
- Optimizing the networking with customers;
- Increasing the efficiency of processes over the entire product life cycle;
- Designing products, as well as all processes;
- Encouraging communication between participants in the company.

- Deep understanding of social media.

The Role of E-Leadership in Relation to IT Capabilities and Digital Transformation [20]

- Business plan development;
- Architecture design;
- Innovating;
- Business change management;
- Governance.

- Strategic thinking;
- Creating a meaningful and engaging culture;
- Investment in technology and digital transformation.

The results show that CDO must direct his action to the development of the digital strategy [15], [16], [17] that will enable the strategic growth of the organization [3] with the promotion of digital culture [15], [16] and create a closer relationship with the users [3], [17]. In generating value, successful CDO uses and experiments with digital technologies [13], finds new business opportunities and develops communication and management strategies for all changes in organization [3]. At the same time, inspirational, innovative, business and team experience and understanding of social technologies are considered to be key competencies of successful CDOs [14], [17], [18].

The study from Tumbas, Berente and von Brocke [13], found that there are three types of CDOs:

1 **Digital accelerator** - is the person who initiates digital innovation in the organization, complementing existing IT managers. As such, they are free to experiment with different digital technologies and are prone to achieve quick results.

2 **Digital marketer** - as the name suggests, it’s a person that implements the digital marketing in organization by emphasizing a personalized relationship with clients and processing relevant user data. He is responsible for the direct connection of the organization with the client, and he establishes digital communication channels.

3 **Digital harmonizer** - the CDO which connects all of the digital initiatives initiated by the organization. He is responsible for coordinating all these initiatives and placing them into the strategic plan of the organization.

In order to ensure a digital transformation of organization to be successful, and digital leaders adequately run a digital strategy and initiate the necessary changes in organizations, their roles and business priorities must be clearly defined. Several authors describe what the roles of the CDO are. Firstly, they have a role of entrepreneurs, spokespersons and leaders [3], while some authors [14], [21] point out the key role of the entrepreneur role, the digital evangelist role and the coordinator role. Entrepreneur CDO is responsible for setting up a digital transformation strategy, researching IT innovation, and focusing on establishing a strong digital organization. Such a CDO is responsible for adapting business models with focus on end users and meeting their wishes and needs. Furthermore,
the task of the digital evangelist is to inspire employees in organization and to create a business culture that will support digital transformation. Given the many challenges that come up with the change, evangelists must train employees well and offer them new perspectives to bridge the gap in transformation. The last, coordinator role, is the role of the responsibility of linking the entire organization to the process of transformation (from the lowest levels to the leading ones) and coordination of all activities related to the process of transformation.

Given the demands and responsibility of the job of CDOs, job positions for Chief Digital Officer require a wide range of knowledge, skills and experience. Below is a list of competencies and experiences that the person must satisfy when filing for the CDO job according to Walchshofer and Riedl [16], whose research has been made on 52 CDOs and whose results are presented in Table 2.

Table 2. Chief Digital Officer job requirements – education, experience and other characteristics

<table>
<thead>
<tr>
<th>Education required</th>
<th>Experience required</th>
<th>Other characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree in economics or engineering (ICT);</td>
<td>Several years of professional experience in a similar environment;</td>
<td>Deep technical and ICT competence;</td>
</tr>
<tr>
<td>Degree in business administration;</td>
<td>Professional experience;</td>
<td>Negotiating skills and mediatorial skills;</td>
</tr>
<tr>
<td>Expert in the digital field and knowledge of technological trends</td>
<td>Experience in change management;</td>
<td>Individual skills: tolerance for frustration, the willingness to continue with setbacks and high levels of self-motivation;</td>
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<tr>
<td></td>
<td>Experience in human resources management;</td>
<td>Openness and agility;</td>
</tr>
<tr>
<td></td>
<td>Experience in business process management;</td>
<td>Strong communication skills.</td>
</tr>
<tr>
<td></td>
<td>Experience in marketing and sales;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experience in implementing digitization strategies;</td>
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<tr>
<td></td>
<td>Leadership experience.</td>
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</table>

Source: according to Walchshofer and Riedl [16]

According to results of job descriptions, a person who is applying to CDOs job needs to be interdisciplinary educated. Mentioned degrees are from the field of economics, engineering (ICT) or business administration, but it could be suggested also as all-in-one degree of business informatics as previously suggested and researched by [10] and recognized in [8]. A right combination of informatics (ICT) and economics (BA) is a benefit so the person in job position gets all necessary knowledge basis in all aspects needed for the job from university and acquire experience through a couple of years in practise.

When speaking about experience, all job ads for CDO position, required some kind of professional experience from several years, in the context of job required competencies and skills. As mentioned in the Table 2, main experience is required in management and organizational competencies, not technical as can be assumed on first glance when we are re/thinking about “digital” transformation.

Deep technical and ICT competences are mandatory and we assume that it is normal to expect that; but on the other hand, when we look at Table 2 experience and education could mislead us to contradictory conclusions.

Based on the detail literature review, we summarize the research results. In Table 3 are listed knowledge, skills and experience for which authors think that are necessary for being successful CDO.
Table 3. Chief Digital Officer required knowledge, skills and experience

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Skills</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Business and ICT knowledge;</td>
<td>- Leadership skills;</td>
<td>- In implementation and integration of digital technology;</td>
</tr>
<tr>
<td>- Knowledge of digital technologies and their benefits;</td>
<td>- Change management skills;</td>
<td>- Business experience;</td>
</tr>
<tr>
<td>- Development of a digital strategy and business plan;</td>
<td>- Communication and cooperation skills;</td>
<td>- In change management;</td>
</tr>
<tr>
<td>- Development of communication strategy;</td>
<td>- Inspirational skills;</td>
<td>- Leadership experience;</td>
</tr>
<tr>
<td>- Use of digital technology;</td>
<td>- Technological skills;</td>
<td>- Team management experience;</td>
</tr>
<tr>
<td>- Knowledge of new business models;</td>
<td>- Negotiation skills;</td>
<td>- In human resources management;</td>
</tr>
<tr>
<td>- Analysis and conversion of a business model;</td>
<td>- Individual skills;</td>
<td>- Marketing experience;</td>
</tr>
<tr>
<td>- Human resource management;</td>
<td>- Sense for finding new business opportunities;</td>
<td>- Innovation implementation.</td>
</tr>
<tr>
<td>- Change management;</td>
<td>- Project management skills.</td>
<td></td>
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<tr>
<td>- Process/ product design.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>According to [3], [7], [14], [16], [17], [19], [20]</td>
<td>According to [3], [7], [14], [16], [17], [19]</td>
<td>According to [16], [17]</td>
</tr>
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</table>

5 CONCLUSIONS

Chief Digital Officer, by developing a digital strategy, begins the path of transformation in the organization. Using digital technology, he/she finds new business opportunities and focuses on continuous innovation in business by targeting customer needs. Along with the foregoing, CDOs knowledge must be also fulfilled with business model analysis and business model transformation methods to success in DT in accordance with the new business model. Digital transformation demands that CDO possesses a wide set of skills. He or she must be a leader, a generator of change in the organization, with inspiration in new business opportunities provided by technology and innovation. All this is not possible to gain in regular education programs or higher education programs, but needs to be tested and forged by some years of working experience in practice in order to get a broader picture and holistic approach to such a complex matter like digital transformation of enterprise.

According to our results, CDO tasks and everyday job routine is rather complex then simple, since he or she is in charge of digital organizational change and stands between two worlds management (economic experts / domain experts) and IT experts (technology experts) that are not always on same-page/side. Making the bridge between current and future organization, CDO walks on the path of digital innovation in organizational global environment alongside competition running faster every day. Because of all this, educational institutions in higher-education need to make effort to develop new curriculums to answer these new needs and make interdisciplinary education for future. These would enable new breed of IT evangelist and project managers that would be able to drive current and future companies in digital era. Digital era, that has already started, needs to be shake-up by the globally widespread process of digital transformation and aspiration to constant change in the future to meet customer needs and make profit from now possible completely new business models.

REFERENCES


