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ADAPTIVE ORGANIZATIONS IN THE DIGITAL AGE: COMPLEXITY, CREATIVITY AND INNOVATION

Renata Petrevska Nechkoska¹, Olivera Kostoska²

Abstract:

Adaptive organizations are the contemporary kind of socio-technical systems derived from the need to respond effectively to changes in the dynamic and unpredictable landscape of the digital economy. These organizations are both internetworked and knowledge-driven, and thus responsive to challenges and opportunities of the digital age. The networking capability (e.g. ICT-enabled virtuality, organizational teaming, and knowledge hyperlinking) provides for the adaptive organizations to cope with one of the biggest challenges they face today – complexity. For a small number of businesses, embracing complexity yields a competitive edge in terms of creativity, innovation, information management, and human resources. If we consider our countries, unions, departments, projects as complex adaptive systems, then we need to take into account their specificities to address and guide them properly. This paper looks through the lens of system design, complex adaptive systems, and the tactical management adaptability and effectiveness to provide an analysis of the European (1) strengths in strategy and operations (2) problems in ‘silos’, matrix-organizations, insufficient information and communication flows, current project management and slow risk management (3) example of the freedom of movement for workers (4) ‘business model’, and (5) growth paradigm that need to be fundamentally redefined through the value co-creation and co-evolution. The solutions we provide here are both conceptual (e.g. greater effectiveness delivered through the existing governance structures by drawing attention to the missing link between tactics and empowered project management), and tangible (e.g. methods providing adaptability in dynamic and unpredictable environment that is preserved by continuous Sense-Interpret-Decide-Act (SIDA) Loop and Role-and-Accountability system design, with proper information sensors, emitters and risk management for strategy and tactics).

Key words: adaptive organizations, digital age, complexity, Denica method, sense-and-respond framework

¹Faculty of Economics-Prilep, “St. Kliment Ohridski” University, Bitola, North Macedonia; Faculty of Economics and Business Administration, Ghent University Belgium; e-mail: renata.petrevskanechkoska@ugent.be

²Faculty of Economics-Prilep, “St. Kliment Ohridski” University, Bitola, North Macedonia; e-mail: olivera.kostoska@uklo.edu.mk

1. Introduction

Planet, state, union, department – they all represent complex adaptive systems. The latter (planet excluded) stand for the lower level sub-systems which, as autonomous agents, are networked together and interact towards achieving their own and collective purposes (Gell-Mann, 1992; Garcia, 1999; Holland, 2010; Lichtenstein et al., 2006; Chan, 2001; Gintis, 2006; Eidelson, 1997; McGrath, Arrow and Berdahl, 2000; Higgs, 1999). By definition, a complex adaptive system (CAS) is a dynamic network of agents acting in parallel and always reacting to the actions of other agents, which in turn affects both the behavior and the network as a whole (Holland, 1975). Until we acknowledge that our societies, planet and many of its sub-systems are complex adaptive systems needed to be addressed properly, we will never punctuate the equilibrium (Gersick, 2009) that requires change to move to the next level. Complex adaptive systems are open, dynamic, self-organizing and non-deterministic systems having highly interactive elements and non-linear interactions, with small changes producing large effects. What's more, every single element of the system is affected by and also affects the other systems (Holland, 2010) which cause an emergent effect (Edson, 2010). The question that naturally arises is whether we take into account these scientific and practical findings when doing something that might affect them? How do we manage a particular complex adaptive system to accomplish a certain goal? What is clear is that we have to: 1) address it with both simple rules and human rules on how to detect and interpret information, as well as how to respond appropriately 2) create moderately dense connections (Waldrop, 2013).

It appears that we (as global citizens, as national governments, as Europe, as EU, and as a World) are rather good in making strategies and, to a certain extent, we are doing a good job in realizing those strategies. If they were all to be implemented in perfect conditions and non-dynamic, non-interrelated world, we would have been almost perfect. There are numerous examples of proper strategy setting, e.g. Millennium Development Goals (United Nations, 2000), post-2015 ambitious Sustainable Development Goals (United Nations, 2015a), Paris climate agreement (United Nations, 2015b), EU global strategy (European Union – Institute for Security Studies, 2015), Strategy for smart, sustainable and inclusive growth (European Commission, 2010), etc. Their strategic altitude (Strategy Management Group, 2016) follow-up occurs in the form of reports, findings or recommendations (United Nations, 2015c; European Commission, 2015a; European Commission, 2015b). There are also numerous EU institutions and bodies (European Commission, 2016a), as well as many acts, regulations, directives, and processes (European Commission, 2016b) in place. A number of guidelines and governing principles exist in the form of founding principles (European Union, 2019) or freedoms (European Policy Centre, 2019) prescribed in various strategic documents and actions. All of the above-mentioned entails the need to differentiate between strategy and operations. Adding onto the side of operations, there is extensive portion of accomplishments resulting in high quality and incredible intellectual real-life practical efforts and creations. However, these strategic guidelines, principles, goals and KPIs need to be implemented, monitored and sustained towards effectiveness, whilst at the same time the operations are doing their part of the work – quality and efficiency. The goal of this paper is actually to examine how we could steer a complex adaptive system towards a purpose, or a goal?! We will therefore throw light on tactical management (especially to adaptability, continuous context-scanning, responsiveness and dynamics) and, by looking at the freedom of movement for workers, provide a genuine, real-world example on the need for a system design, roles and accountabilities, 'silos' collaboration and process-flow design.

The rest of the paper is organized as follows. The second section refers to tactics and projects in terms of: helicopter authority and adaptability; information sensors; and risk management. The third section speaks of the system design and addressing. The fourth section provides an analysis of the freedom of movement for workers. The last section concludes and makes recommendations.

2. Tactics and Projects: helicopter authority, adaptability, information sensors and risk management

Tactical management (in the form of continuous institutional and organizational tactics) and the redefined project management (as one of tactic's most representative handlers) are of special importance. The tactical management we are referring to here is not what we call a 'mid-term planning' or regular follow-up that is exclusively too late for any corrective or timely action. On the contrary, the tactical management we are shedding light to refers to adaptability, continuous context-scanning, responsiveness and dynamics. Tactical management is a managerial function concerned with 'how to achieve what is expected by utilizing what is given and following certain governing principles in the current context of the organization and environment' (PetrevskaNechkoska, Poels and Manceski, 2015) (Petrevska Nechkoska, 2019). These are the residual choices open to a firm by virtue of the business model that it employs (Casadesus-Masanell and Ricart, 2010). Adaptability and context-capture are two essential components of this definition. Utilizing the givens and aiming for achieving expectations are another set. Employment of appropriate business model is an issue. And last but not least – 'how to achieve' the goals is the most important one. Regular planning and periodical evaluations are too late, simply concluding the discrepancies between planned (and actual) developments and KPIs. What every significant goal needs is a dynamic adaptability framework for a socio-technical system that is responsive to leader's guidance and actions. Tactics of this type introduces the concepts of customer-back system design, level of 'roles' and 'accountabilities', Sense-Interpret-Decide-Act (SIDA) Loop as adaptability engine connected with Plan-Do-Check-Act (PDCA) Loop as improvement engine (Haeckel, 1999; Crim, 2014; Nalchigar and Yu, 2013; Kapoor et al., 2005; Haeckel, 2004; Forno, 2012), each completed with information sensing, emitting and revisions, and continuous risk management (Petrevska Nechkoska, Poels, and Manceski, 2016). It's obvious that we need to change the paradigm of thinking and acting so we could solve the problems we've created with the same thinking. Moreover, we need to motivate ourselves to make sure that our efforts and deeds will not fail. Tactics 'are inexhaustible as Heaven and Earth, unending as the flow of rivers and streams; like the sun and the moon, they end but to begin a new; like the four seasons, they pass away to return once more' (Sun Tzu, Chinese philosopher, general and strategist). The intertwining of strategy, tactics, operations is still inseparable and necessary – yet, these 'islands' are drifting away from each other along with the expansion of universe. Project management (that steers while maneuvering these three managerial functions) is a managerial activity that should promise effectiveness. Instead, project management, especially in terms of non-purely business domains, where the profit is not the primary motivation, is 'stuck' in the matrix-organizational structures and silos, complex procedures, duplicated and redundant administrative steps, with both inappropriate authority level and information, as well as risk awareness and responsiveness. Likewise, even when chasing profits, most of the projects are over budget, over time, with compromised functionalities, over and over again (Flyvbjerg, 2011).

3. Systems Design and Addressing

After the important realms – complex adaptive systems, tactical and project management (reflected on strategy and operations) have been introduced, the next few paragraphs will provide a guideline on how we can assist and overcome them. It takes time to digest and reason, and then implement adaptable tactical management mindset from the highest level down and across. Primarily, we ought to address a CAS with simple rules. If a person makes just one step from the strategic guidelines, he/she will face mastered complicatedness and ambiguity of written recommendations, rules, guidelines, expectations, documentation, process flows and sequences. However, the things get even

worse if we try to address a complex adaptive system with complicated rules and unoptimised processes. In order to achieve big-picture overview and synergic effect, the governing bodies need to think in terms of system design, referring to socio-technical system that complies with the specificities of a complex adaptive system. A system is a collection of elements interacting to produce an effect that cannot be produced by any subset of those elements (Banathy, 1996, 2009). A properly designed system generates an effect, but also has a reason-for-being, no duplicated or redundant roles, sub-optimisation, and control mechanism. Most systems have waste management, information sensors, networks of channels, and elements for proper reactions. A car does not have ten engines; a body does not have two eyes for aesthetics, but to achieve three-dimensional vision; the planet does not have another planet to put the garbage on, but needs to establish/re-establish itself for properly containing it; an organism has immediate controls for temperature regulation, etc. We are spiralling into sub-optimisation and developing sub-systems looking from the middle-down or even lower level down. It is recommended that the tactical management systems should be designed from a higher level as possible. Indeed, our strategic thinkers provide appropriate guidelines, goals, recommendations, and follow-ups, but looking below the surface, we find that everything is blurry, segmented, duplicated, and ambiguous, with slow inter-communication and action channels in the network. Europe has the prevalence of ‘silos’ and matrix-organisational structures – the ‘nemesis’ of effectiveness, adaptability and empowered project management. However, for many situations, we have no proper controls in place. This goes along with the risk management that, in our opinion, should not be a separate function, but rather integrated in every single manager’s sense-making. It appears that governing bodies of developed countries are having the impression that any physical/legal person is decent and honest. Sometimes because of ignorance and un-familiarity, but many times as a result of ill-intentions, the world is populated with criminal entities and harmful actions, irrespective of whether the motivation is coming from the mind, body or soul. So, a good systems design has controls in place, and when it comes to socio-technical or natural systems, it also provides a ‘knows earlier’ (Haeckel, 2004) in order to take corrective or proactive action. Another important element to position the risk management reasoning from the very beginning is the necessity of continuous scanning throughout the lifecycle and beyond (Petrevska Nechkoska, Poels and Manceski, 2016). Information sensors, emitters, risks, roles, and accountabilities do not represent components to set-and-forget. On the contrary, they are dynamic and alive. The findings of a tactical management adaptability and information systems research with managers have shown that 87% of all information sensors and emitters contain qualitative information; 61% of incoming information is on-demand unstructured information, and only 39% of the information is provided through event-driven reports and regular ‘too late’ follow-ups; 48% change the frequency, while 13% change the manner of obtaining (Petrevska Nechkoska, Poels and Manceski, 2016). The important information is rather dynamic (not rigid and prescribed) and is coming in various forms, frequencies and modes of acquisition.

1. Freedom of movement for workers: a critical appraisal

If freedom of movement for workers is considered a developmental and altruistic principle that reflects to pro-growth immigration, labor-market flexibility, effective education, and that also contributes to innovation, competitiveness, digitalization and public sector productivity, the question that arises is what are the obstacles still in place preventing this principle from being alive to its full? An example using more extreme cases will be provided here to make a point of the necessity for a system design, roles and accountabilities, ‘silos’ collaboration and process-flow design, as well as (tactical) problems in its realization (even though well designed in strategy and nicely fulfilled

through operations). To find a job in Europe and increase chances of success, a person needs to register a profile in recruiting platforms, e.g. EURES, ESRA, CORDIS, EURAXESS, ORCID, LinkedIn, Research Gate (if in research), Xing, Google Scholar, Biblio, e-Prints of all kinds, Elsevier etc. Each of these platforms require manual one-by-one record input of each experience, language, profile, education, skill, motivation, publication and continuous update. EURES draws categories of skills, competences, qualifications and occupations from ESCO (European Commission, 2013) – excellent idea, especially for the focus on skills that are the future of HR management (Petrevska Nechkoska and Manceski, 2012). Overarching and encompassing, with remarkable thoughtfulness and directions – New Skills Agenda for Europe (European Commission, 2016d) is in place and action points are designated. And then it all goes into silos and matrix sub-optimisation, with almost no overlap and very little visible collaboration among the verticals – blurry and not very effective. The results are visible in projects and platforms with immense quality of realisation, reports, science, conclusions, significant intellectual input and output. The problem is that many of them have been doing things ‘in isolation’, as if everything/everyone else does not exist or is static. The collaboration and mutual awareness of synergy and problems appear to be missing. Top EU management should set up a tactical system of roles and accountabilities that will be populated by various resources (e.g. departments, bodies, experts, countries, etc.) and will incorporate collaboration; making a mandatory requirement for ‘silos’ to work together towards its purpose. That tactical system should be designed from a high level, not as it is now. The same goes through funding for academy-business projects, multi-disciplinary projects, or business-ecology projects. Let us get back to the workforce mobility recruitment stage. ESCO is a nicely designed platform, but its intuitive use and part of the database content and connections are discussable. The attempt to find relatively straightforward occupations (e.g. researcher, manager, lecturer, teaching assistant, or consultant) at first seems impossible. At second attempt, there are either huge details making a person not in a position to situate himself/herself, or a several-step quest for a strange category producing confusion to classify a person not to be mistaken for deception in his/her CV. The main purpose – the skills passport – to recognise skills – is not functional up to this moment. There should have been information sensors in place, to catch very early signal for such an important function. The existence of several others similar-but-slightly-different platforms confirm lack of system design and collaboration among members. This European Commission tactics seems like a model of disconnected and not-talking-to-each-other sub-systems aiming to their own goals.

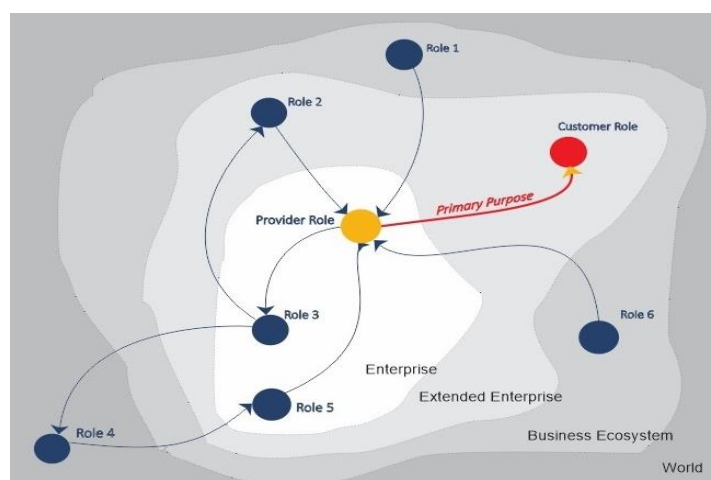


Figure 1. Role-and-Accountability system for tactical management achieving a purpose (strategic goal), with roles positioned throughout the widest business ecosystem (Petrevska Nechkoska, Poels and G. Manceski, 2016)

A person needs days to maintain his/her profiles in different platforms just to be visible on the job market. The discrepancies per countries' National Qualification Frameworks in the similarity of the European Qualifications Framework – EQF (European Commission, 2005, 2008) are still significant. Knowledge of local language, salary contributions recognition, local labor regulations and sometimes migration, housing or taxation rules and regulations are challenge on their own – and are mostly country-specific. The case of non-EU European countries is worth mentioning, with highly qualified workers moving to EU for positions of fast-food workers or drivers, up to level 4 in the EQF. In conclusion, the freedom of movement for workers is not facilitated yet. There are numerous efforts in this direction, e.g. EU Blue Card (European Commission, 2016c; 2016d); the aforementioned networks for connecting employers and job-seekers and other components. Some are duplicated and redundant, not designed from systems perspective, and thus not producing the expected effect. The knowledge triangle (European Institute of Innovation and Technology, 2012) should result into obligatory applicability of research and science in real-life (DG Education and Culture, 2010). If and when a job seeker finds a job, the family goes where? When? If not at home, everywhere else you are a stranger, it's a universe's spacetime fabric (Overduin, 2007) issue. The tenure jobs are rare as diamonds nowadays, increasing stress with 1+ year employment contracts migrating from one place to another living nomadic life with family in rented places and second-hand furniture. These proactive hardworking self-motivated workers are among the ones to engage and/or boost bolder action (Wessels, Maurer and Mittag, 1999) to the highly paid and more relaxed EU peers. The mobilization of the workforce is an underlying component for synergic effect. But it has to be directed from developed towards less developed European and EU countries for learning adaptability, challenges, real-life situations and boosting energy and competitiveness of the highly paid and highly skilled workers too (McKinsey Global Institute, 2015).

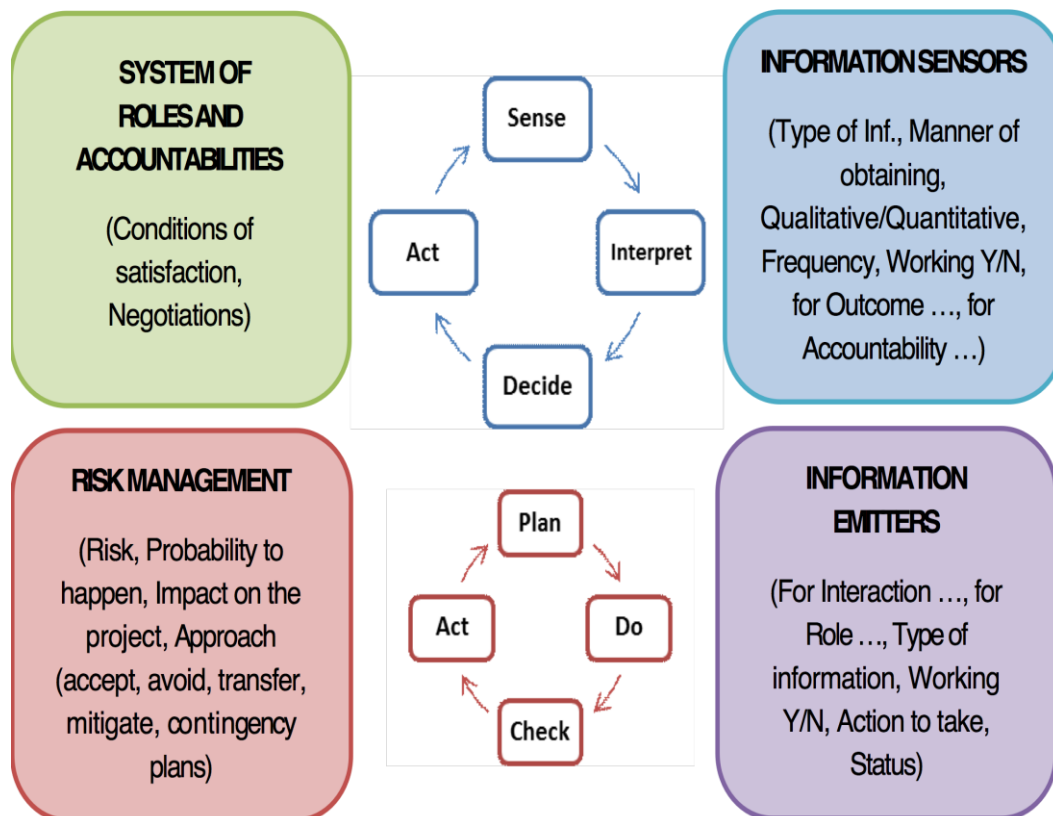


Figure 2. The main components of Tactical Management adaptability and information systems method for managers (Petrevska Nechkoska, 2019)

Co-evolving together for Europe means both the co-creating and growing together. We are far from European synergy and emergent effect. We have numerous valuable segments, departments, organs that have done decent job for their lower-level goals, but we are not facilitating a system of systems. We are designing projects and processes in silos, following job-descriptions (not skills or roles), rigid non-adaptive processes, following-up on plans too late, being very little aware of actual implementation contexts, run-time adjustments (Giannoulis, Petit and Zdravkovic, 2011; Bērziša et al., 2015; Zdravkovic et al., 2013) and risks (Baskerville, Pries-Heje and Venable, 2008; Miller et al., 2005). A project to accomplish the strategic goal of free movement for workers needs a tactical design, with: 1) facilitator (an empowered Project Manager) having proper authority level not just vertically, but also cross-sectoral and across-silos; 2) competent ‘team members’; 3) populating roles to achieve what they are accountable for, and 4) Sense-Interpret-Decide-Act (SIDA) Loop.

Figure 1 visualizes a generic Role-and-Accountability system diagram based on Sense-and-Respond framework for adaptability (Haeckel, 1999) for tactical management designed around a purpose (strategic goal), with roles positioned throughout the widest business ecosystem (Petrevska Nechkoska, Poels and G. Manceski, 2016) and the use of Social Network Analysis directed graph.

Figure 2 presents the main components of a method for the tactical manager (the person) that provides adaptability in unpredictable environment. It is consisted of System of Roles-and-Accountabilities, Risk Management, Information Sensors and Information Emitters. The adaptability engine is the SIDA Loop and the improvement engine is PDCA Loop.

2. Conclusions

Europe has what it takes to move to the next level - and take everyone along. Co-evolution is the goal, diversity is one input. Leaders, strategy and high quality operations are already in place being amazing. Effective and adaptable tactics is missing but there are directions where to search, all along with empowered project management, system view, system design, proper information settings, open communication channels and incorporated risk management. And, above all, awareness of the complexity, interrelatedness and fragility of the adaptive systems we are all part of. The intertwining of strategy, tactics, operations is still inseparable and necessary – yet, these ‘islands’ are drifting away from each other along with the expansion of universe. Project management (that steers while maneuvering these three managerial functions) is a managerial activity meant to promise effectiveness. Nevertheless, it is ‘stuck’ in the matrix-organizational structures and silos, complex procedures, duplicated and redundant administrative steps, with both inappropriate authority level (to ‘cut’ across them) and unsuitable information (or risk awareness and responsiveness). We are spiraling into sub-optimization and developing sub-systems looking from the middle-down or even lower level down. It is therefore recommended that the tactical management systems to be designed from a higher level as possible. It is also noteworthy to mention that a good systems design has controls in place, and when it comes to socio-technical or natural systems, ‘knows earlier’ in order to take corrective or proactive action. This goes in line with risk management that should not be a separate function, but integrated in the sense-making of every single manager. Finally, information sensors, emitters, risks, roles, and accountabilities are not components to set-and-forget. The important information is not rigid and prescribed; it rather comes in different forms, frequencies, and modes of acquisition.

References

- Banathy, B. H. (1996). *Designing social systems in a changing world*. Springer Science & Business Media.
- Banathy, B. H. (2009). Designing Social Systems. *Systems Science and Cybernetics*.II.
- Baskerville, R., Pries-Heje, J., Venable, J. (2008). Evaluation Risks in Design Science Research: A Framework. *Int. Conf. Des. Sci. Res. Inf. Syst. Technol.*, pp 329–334.
- Bērziša, S., Bravos, G., Gonzalez, T. C., Czubayko, U., España, S., Grabis, J., Henkel, M., Jokste, L., Kampars, J., Koç, H., Kuhr, J.-C., Llorca, C., Loucopoulos, P., Pascual, R. J., Pastor, O., Sandkuhl, K., Simic, H., Stirna, J., Valverde, F. G., and Zdravkovic, J. (2015). Capability Driven Development: An Approach to Designing Digital Enterprises. *Bus. Inf. Syst. Eng.* 57(1), pp. 15–25.
- Casadesus-Masanell, R., Ricart, J. (2010). From strategy to business models and onto tactics. *Long Range Plann.*, p. 45.
- Chan, S. (2001). Complex Adaptive Systems. *ESD.83 Res. Semin. Eng. Syst.*, pp. 1–9.
- Crim, T. A. (2014). Developing Sense-and-Respond Capability in a Mobile Service Firm Enabled by Dispatching Technology: An Action Research Study. Dissertation, Georgia State University
- DG Education and Culture.(2010). *6th University Business Forum report*. European Commission. Brussels.
- Edson, M. C. (2010). Group Development : A CAS Perspective. *Proc. 54th Meet. Int. Soc. Syst. Sci.*, pp. 1–23.
- Eidelson, R. J. (1997). Complex adaptive systems in the behavioral and social sciences. *Rev. Gen. Psychol.* 1(1), pp. 42–71.
- European Commission (2016b). EUR-Lex: Access to European Union Law. [Online]. Available: <http://eur-lex.europa.eu/browse/summaries.html>. (accessed 05.07.2019).
- European Commission (2016c). EU Immigration Portal. [Online]. Available: https://ec.europa.eu/immigration/node_en (accessed 05.07.2019).
- European Commission.(2005). *European Qualifications Frameworks National Qualifications Frameworks Higher Education State of Play*.
- European Commission. (2008). The European Qualifications Framework for Lifelong Learning (EQF). ... *Off. Off. Publ. Eur. ...*, pp. 1–4.
- European Commission. (2010). *Europe 2020: a strategy for smart, sustainable and inclusive growth*. Communication from the Commission, COM (2010) 2020. Brussels.
- European Commission.(2013). *ESCO – European Classification of Skills/Competences, Qualifications and Occupations*.
- European Commission. (2015a). *Evaluation and fitness check (fc) roadmap*.
- European Commission.(2015b). *Horizon 2020 - First Results*. Brussels: European Commission.
- European Commission.(2016a). EU Institutions and other bodies.[Online]. Available: <http://europa.eu/about-eu/institutions-bodies/>. (accessed 05.07.2019).
- European Commission.(2016d). *New Skills Agenda for Europe*.
- European Institute of Innovation and Technology. (2012). *CATALYSING INNOVATION IN THE KNOWLEDGE TRIANGLE - Practices from the EIT Knowledge and Innovation Communities*. Technopolis.
- European Policy Centre. (2019). Making the Single Market work: Launching a 2022 masterplan for Europe. [Online]. Available: https://www.epc.eu/pub_details.php?cat_id=17&pub_id=9310. (accessed 05.09.2019).
- European Union - Institute for Security Studies. (2015). *Towards an EU Global Strategy: Background, process, reference*. Paris.

- European Union.(2019). The EU in brief.[Online]. Available: https://europa.eu/european-union/about-eu/eu-in-brief_en. (accessed 05.09.2019).
- Flyvbjerg, B. (2011). Over budget, over time, over and over again: managing major projects. Peter W. G. Morris, Jeffrey K. Pinto, and Jonas Söderlund, eds. *The Oxford Handbook of Project Management*, Oxford: Oxford University Press, pp. 321-344.
- Forno, D. J. (2012). Applying Sense & Respond to Create Adaptive Organizations. <http://www.senseandrespond.com/downloads/AdaptiveEnterpriseExperience--Forno.pdf> (accessed 05.07.2019).
- Garcia, E. A. (1999). The use of complex adaptive systems in organizational studies.*Evol. Complex.*, pp. 281–306.
- Gell-Mann, M. (1992). Complexity and Complex Adaptive Systems.*The Evolution of Human Languages.(Santa Fe Institute Studies in the Sciences of Complexity.Proceedings Volume X)*. pp. 3–18.
- Gersick, C. J. G. (2009). Change Theories : Revolutionary Exploration of the Punctuated Paradigm. *Acad. Manag. Rev.* 16(1), pp. 10–36.
- Giannoulis, C., Petit, M., Zdravkovic, J. (2011). Modeling Business Strategy: A meta-model of Strategy Maps and Balance Scorecards.*Proceedings of the Fifth IEEE International Conference on Research Challenges in Information Science, RCIS 2011*. Gosier, Guadeloupe, France.
- Gintis, H. (2006). The Economy as a Complex Adaptive System.*A review of Eric D. Beinhocker.The Origins of Wealth: Evolution, Complexity, and the Radical Remaking of Economics*.
- Haeckel, S. H. (1999). *Adaptive Enterprise: Creating and Leading Sense-And-Respond Organizations*. Harvard Business Review Press.
- Haeckel, S. H. (2004). Peripheral vision: Sensing and acting on weak signals making meaning out of apparent noise: The need for a new managerial framework. *Long Range Plann.* 37, pp. 181–189.
- Higgs, B. D. (1999). APEC as a Complex Adaptive System APEC as a complex adaptive system: insights on the problem of multilateralism versus bilateralism from a new science. *Complexity*, no. 1999, pp. 1–12.
- Holland, J. H. (1975). *Adaptation in natural and artificial systems: An introductory analysis with applications to biology, control, and artificial intelligence*. University of Michigan Press.
- Holland, J. H. (2010). Complex Adaptive Systems.*Daedalus*, 121(1), pp. 17–30.
- Kapoor, S., Bhattacharya, K., Buckley, S., Chowdhary, P., Ettl, M., Katircioglu, K., Mauch, E., Phillips, L. (2005). A technical framework for sense-and-respond business management.*IBM Syst. J.* 44(1), pp. 5–24.
- Lichtenstein, B. B., Uhl-bien, M., Marion, R., Seers, A., Orton, J. D., Schreiber, C. (2006). Complexity leadership theory: An interactive perspective on leading in complex adaptive systems. *E:CO Issue.* 8(4), pp. 2–12.
- McGrath, J. E., Arrow, H., Berdahl, J. L. (2000). The Study of Groups: Past, Present, and Future. *Personal. Soc. Psychol. Rev.* 4(1), pp. 95–105.
- McKinsey Global Institute.(2015). A Window of Opportunity for Europe.[Online]. Available: <https://www.mckinsey.com/featured-insights/europe/a-window-of-opportunity-for-europe>. (accessed 05.09.2019).
- Miller, C. A., Funk, H., Goldman, R., Meisner, J., Wu, P. (2005). Implications of Adaptive vs. Adaptable UIs on Decision Making: Why ‘Automated Adaptiveness’ Is Not Always the Right Answer. *Proceedings of the 1st International Conference on Augmented Cognition*.Las Vegas, USA.
- Nalchigar, S. Yu, E. (2013). From Business Intelligence Insights to Actions: A Methodology for Closing the Sense-and-Respond Loop in the Adaptive Enterprise. In *The Practice of Enterprise Modeling: 6th IFIP WG 8.1 Working Conference, PoEM 2013, Riga, Latvia, November 6-7, 2013, Proceedings*, J. Grabis, M. Kirikova, J. Zdravkovic, and J. Stirna, Eds. Berlin, Heidelberg: Springer

- Berlin Heidelberg, pp. 114–128.
- Overduin, J. (2007). Einstein's spacetime. Stanford. [Online]. Available: <https://einstein.stanford.edu/SPACETIME/spacetime2.html>. (accessed 05.09.2019).
- Petrevska Nechkoska, R. (2019). *Tactical Management in Complexity: Managerial and Informational Aspects*. In the book series: Contributions to Management Science, SPRINGER NATURE Switzerland <https://www.springer.com/gp/book/9783030228033>
- Petrevska Nechkoska, R., Manceski, G. (2012). Specific Skill Set Training for Working Professionals by Faculties via e-Learning. In *ICT Innovations 2012 Web Proceedings*, pp. 527–536.
- Petrevska Nechkoska, R., Poels, G., Manceski, G. (2015). Bridging Operational, Strategic and Project Management Information Systems for Tactical Management Information Provision. *Electron. J. Inf. Syst. Eval. EJISE*. 18(2), pp. 146–158.
- Petrevska Nechkoska, R., Poels, G., Manceski, G. (2016). Identifying and Addressing Adaptability and Information System Requirements for Tactical Management. *CAiSE Radar 2016 - Conf. Adv. Inf. Syst. Eval.*, pp. 13–25.
- Strategy Management Group, "Strategic Altitude Definition - Balanced Scorecard Institute," *Definitions - Balanced Scorecard*, 2016. [Online]. Available: <https://balancedscorecard.org/Resources/About-the-Balanced-Scorecard/Definitions>. (accessed: 06.07.2016).
- United Nations. (2000). Millennium Development Goals. [Online]. Available: <http://www.un.org/millenniumgoals/>. (accessed: 06.07.2019)
- United Nations. (2015a). Sustainable Development Goals. [Online]. Available: <http://www.un.org/sustainabledevelopment/>. (accessed: 06.07.2019)
- United Nations. (2015c). *The Millennium Development Goals Report*. United Nations, p. 72.
- United Nations/Framework Convention on Climate Change. (2015b). *Paris Agreement*, p. 3.
- Waldrop, M. M. (2013). Complexity: the emerging science at the edge of order and chaos. *J. Chem. Inf. Model.* 53(9), pp. 1689–1699.
- Wessels, W., Maurer, A., Mittag, J. (1999). Governance in the European Union after Maastricht. In *ECSC Sixth Biennial International Conference*.
- Zdravkovic, J., Stirna, J., Henkel, M., Grabis, J. (2013). Modeling business capabilities and context dependent delivery by cloud services. *Lect. Notes Comput. Sci. (including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics)*. 7908 LNCS. pp. 369–383.