Governance Consulting Services and Tools: Governance Model Design for Collaborative Networked Organisations in the Cyber Domain

Georgi Penchev [1,2] (✉), Velizar Shalamanov [2]

[1] Department of National and Regional Security, University of National and World Economy, Sofia, Bulgaria
https://www.unwe.bg/en/

[2] Institute of Information and Communication Technologies, Bulgarian Academy of Sciences, Sofia, Bulgaria
http://www.iict.bas.bg/EN

A B S T R A C T :

The article is based on a study conducted within the European network of Cybersecurity centres and competence Hub for innovation and Operations (ECHO) pilot project from the EU H2020 program. The study aims to develop a methodology for governance model design for Collaborative Networked Organisation (CNO) in the cyber domain. The focus is on the description of the identified services for governance consulting resulting from the study and the explanation of the developed proprietary tools to support them. Relation between the theoretical model for governance model design, required tools and design provided as a service is defined in order to support the exploitation strategy of the ECHO asset. Specific examples are given with support to the design of the processes and business model for the ECHO National Hubs and the potential federation of the National Hubs in the ECHO Network.

✉ Corresponding Author: Tel.: +35928195298; E-mail: gpenchev@unwe.bg

Introduction

Study efforts of the Work Package 3 (WP3) team under the ECHO[1] project in the period 2019–2022 were not just focused on the design and implementation planning of the Governance model for the ECHO Network but provided an opportunity through analysis of different network governance models to develop a general framework for the consulting of the customers aiming at establishing effective, efficient, adaptable, and resilient technology-intensive organisations.

The framework is based on the following key concepts:

1. Development of alternatives and their multicriteria assessment;
2. Selection of the optimal alternative and its further adaptation through qualitative consultations;
3. Optimal process design;
4. Optimal organizational design;
5. Comprehensive change management and transition planning;
6. Implementation of facilitation with a focus on customer and stakeholder relations management and satisfaction program;
7. Audit and correction planning for continuous improvement (of processes, organizational elements, network as a whole).

In this paper services and tools to support concepts, 1,2,3,4 and 7 are considered with concepts 5 and 6 presented in a separate publication.

These concepts are based on recognized models and best practices such as Analytic Hierarchy Process (AHP), Business Process Management (BPM), Control Objectives for Information and Related Technologies (COBIT), Capability Maturity Model Integration (CMMI), and others. The key focus of this paper is to define the services and related tools to support consulting of customers aiming to build technology-intensive organisations.

In the high-level Catalogue of services what is related to the scope of this paper could be defined as the following services:

1. Evaluation (audit) of existing Collaborative Networked Organisations (CNOs) or other organisations' Current Operating Model (COM) in order to identify similar cases, adequate to the needs and objectives of the customer;
2. Design of a CNO and its Governance model (GM) in the following aspects:
   - needs and objectives;
   - development of alternatives, assessment and selection;
   - Business Model Canvas;
   - process and organisational design;
3. Maturity assessment of the Governance model.

Developed framework and related services and tools are implemented for the design and transformation of the ECHO Project in the ECHO Network of

National Hubs and Service Groups facilitated by a Central Hub in a matrix and adaptive organisation. In the paper, an example is given with the design of the strategic planning process and central hub in a network of national hubs.

The nature of the proposed framework requires the development of a consulting team for the implementation. The team should be able to use the tools and adapt them to the specific requirements of the customer, working together on needs and objectives definition, alternatives development and assessment, selection and follow-on process and organisation design.

The process of transition planning and implementation is out of the paper's scope, but in the conclusion, the role of auditing of maturity of the processes and organisational elements is considered in order to support the process of continuous improvement.

Services and Tools for Governance Model Selection

Set up the Criteria Tools

The set-up of the new organisation requires evaluation of the best way to achieve its goals. There are many ways and options for achieving goals. Identification of the alternatives for the organisation and their evaluation against the criteria for effective achievement of the goals is the rational approach to deciding which Governance model to use in general. It is also an important task to decrease the complexity before going into details of processes and structure development.

The Analytical Hierarchy Process (AHP) method was chosen for alternatives evaluation and selection. The AHP is a multicriteria decision analysis method proposed by Tomas L. Saaty[2] in 1980 and developed ever since. The AHP was chosen because it is a popular and proven method which is well familiar to most managers.

The development of the Criteria hierarchy for achieving the goals is the first step of using the AHP. The initial step of setting up the criteria is not formalised and can be based on research or experts' opinion.

In this regard, we can consider *the setting up criteria hierarchy as a tool* consisting of the following steps:

1. Identification of relevant information about the decision;
2. Considering the goals and needs of the organisation; and;
3. Presentation and agreement of the criteria.

In the case of developing the ECHO CNO Governance model, the combination of these two options was used – the research was conducted on the existing organisations, it was considered by the Development team in regard to ECHO goals, and the resulted criteria were presented and agreed on experts workshop.

A study on the needs and objectives of the existing networks (mainly in IT and Cybersecurity), as well as on literature devoted to the principles of establishing networking organisations provides the list of most common criteria and

principles of successful organisations. The study was conducted under the deliverable *D3.1: Governance Needs and Objectives*.
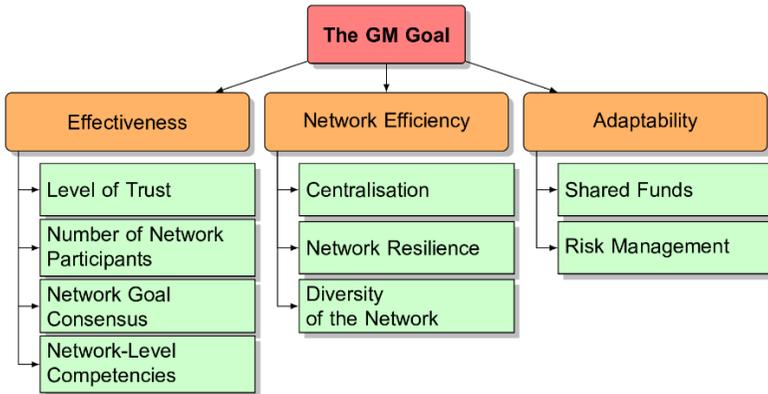
Figure 1: The Goal Criteria Hierarchy.

The analysis of the Mission, Vision and Strategic goals was conducted in relation to the study of needs and objectives. As a result, the hierarchy of criteria was created (see Figure 1) by the GM Development team and then it was presented to experts and managers for consideration and decision.

The AHP requires defining the importance of each criterion for goal achievement. The importance is defined by a comparison of each criterion against each other criteria on each level of the hierarchy. The comparison is done by experts within an ordinal scale from 1 to 9, where 1 means "equal" and 9 means "most preferable".

The size and diversity of the ECHO Partners pose a challenge to gathering the experts' opinions. That is why the online tool for criteria comparison was developed and used. The tool consists of comparison questions on a scale from 1 to 9 per each level of the hierarchy, help materials describing the criteria meaning and importance, as well as method and goal definitions.

Additionally, the consistency of the answers on each level is measured automatically by the application. The consistency of the answers is an internal AHP measure which provides an evaluation of whether the expert is consistent with his or her answers when more than two criteria are compared. It is an important interactive speed-up of analysis. If the comparison is finished and inconsistency is identified afterwards, the team conducting the analysis should contact again the expert to improve answers.

Development of the Alternatives

Identifying and evaluating the alternatives is another serious challenge in selecting the best suitable Governance model. The alternatives have to be

evaluated mostly in quality measures, especially in the networked organisations – more or less centralised GM, the type of representation and voting, type of funding, etc. When it is acceptable and not in contradiction with common sense the most suitable alternative could be a combination of the elements of the different alternatives, based on consultations and agreement.

In order to overcome this challenge as a first step 192 existing organisations analysed in D3.1 were additionally clustered based on profit orientation, type of funding, centralisation and coordination, representation and voting rules. Four clusters were identified, and four development teams were respectively tasked to identify the most common features of each cluster.

The alternatives were named as follows:

1. High degree of funding centralisation and business and governance decision centralisation (HH);
2. High degree of funding centralisation and middle business and governance centralisation (HM);
3. Balanced funding and a high degree of business and governance centralisation (BH);
4. Balanced funding and middle degree of business and governance centralisation (BM).

The exemplary organisations from each cluster were given to the four teams and they developed descriptions of each alternative concerning the criteria. In addition – the organisational structure diagram was developed.

Summarising the service for alternatives development (whether related to the use of some analytical method or not) will have the following main features:

1. Identification of main types of existing organisations. Here the tool for analysis and clustering is important. The developed and implemented tool within ECHO is based on the analysis provided by the deliverable D3.1 and on the k-means clustering method (the calculation and visualisation are provided by R packages FactoMineR[3] and factoextra.[4]
2. Analysing and selecting the main features of each cluster of organisations based on the most representative organisations;
3. Compiling the features in a structured description of the alternative. The description should be as close as possible to the criteria hierarchy but should not imply any strong suggestions which can influence the expert opinion.

This service and tools are adapted for the development of alternatives for the key elements of the overall design of the CNO within the following areas:

1. General Governance model;
2. Business model;
3. Key processes;
4. Key organisational elements;

5. Governance and management information system to support the above processes and organisational elements to work in a network under the general Governance model to implement the Business model.

The inclusive alternatives development process is the foundation for the shared understanding of the problem and preparation for key decisions to be made, incorporating all the important aspects. In order to cover all important aspects, we need a solid PEST analysis and foresight analysis.

Selection of the Most Suitable Alternative

Selection of the most suitable alternative (for governance model, business model and less for the process or organisational structure designed, following structured process) is based on formal quantitative process, but at the end could exploit the qualitative process of consultations and agreement.

To support this process of selection and initial description we developed two interactive tools as online applications.

The first one is very similar to the criteria ranking application described above. In this application, the assessment is done again according to the AHP approach by comparison of each alternative to the other against each criterion. The comparison is done again on a scale from 1 to 9, where 1 is "equal preference" and 9 is "absolute preference".

The task can become very complex with a big number of alternatives or criteria. The interactive application alleviates this complexity and also provides real-time assessment of expert opinion consistency.

The second tool is an application for calculating the results of the AHP application, such as alternatives preferences and ranking, experts' agreement, as well as visualisation of the results.

The procedure of selecting the most suitable alternative does not finish with an automatic acceptance of the AHP application results. These results should be considered by managers and people responsible for decision making, so the service for the selection of the GM has to finish with an event (workshop or seminar for decision-makers) to discuss and vote on the final decision.

Services and Tools for Process and Organisational Design

Approach to Process Design

With the selection of the Governance Model and Business Model, we could use reference frameworks such as COBIT[5] for process discovery to identify the key processes that will shape the future organization and provide an opportunity to increase effectiveness, efficiency, and resilience. We use Business Process Management (BPM) approach to the description of the processes and best practices to achieve business process excellence.[6]

The Business Process Management (BPM) framework is a popular and proven methodology for organisational analysis, design, and improvement. The BPM is a body of principles, methods, and tools to discover, analyse, redesign, implement, and monitor business processes.[7] The BPM also includes as the

main concept of organisational management a cyclic self-monitored and self-improved process with five main phases shown in Figure 2. The figure also presents the full cycle of the Business Process Management (BPM) approach for designing, modelling, implementing, and improving the business processes within the organisation.
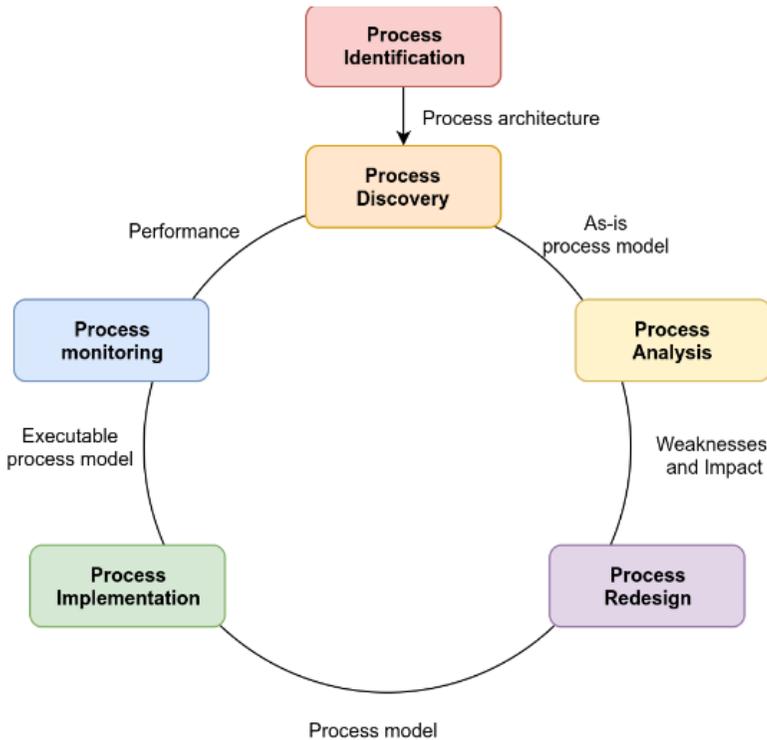
Figure 2: The Business Processes Management framework scheme.

The BPM foundations are based on processes models and performance measures which have to assist the managers in achieving managed processes. It can be argued that BPM is also supported and is "related" to other process-based disciplines, such as Lean Production, Six Sigma, Total Quality Management, Balanced Score Cards, COBIT and others.

Our approach to process design is comprised of:

1. Identify the key processes;
2. Align the processes with the key needs and objectives of the organisation;
3. Define the processes in BPM using a reference framework as COBIT
4. Develop a RACI matrix for the process with the key organizational elements of the Governance and Business model;

5. Optimize the processes, having in mind their interrelations and involved organizational elements.

It is important, especially when designing new processes to use standard practices and well-established examples. Thus, we are using the COBIT processes reference model to identify the future CNO processes.

The specific procedure (it can be considered as a structured tool) was developed during the analytical tool for mapping the COBIT reference model and Components to BPM's phases (see Figure 3).
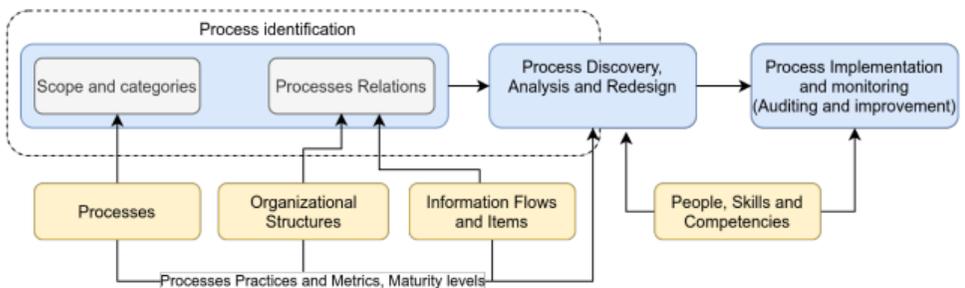
Figure 3: COBIT Components and process analysis phases.

Process Identification is not an ordinary task and requires both certain levels of knowledge about the methodology of the analysis and a certain level of experience within the organisation and with its processes. Thus, two fundamental roles were defined in a process identification: The Process Designer (the process analyst) and the Process Owner (the process domain expert).

Having the mapping procedure and the assigned roles the procedure for processes analysis is presented in Figure 4. This procedure can also be considered a tool for process design.
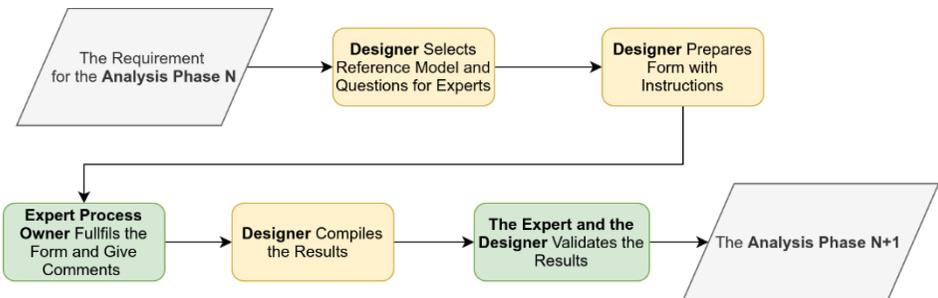
Figure 4: Workflow for gathering and use of Experts Processes Owners' Opinion

Design of Strategic Planning and Partnership Development Process for the future ECHO CNO

Two critical processes for the ECHO network are the Strategic Planning Process (SPP) and the Partnership Development Process (PDP). The former is to keep the organisation moving forward according to the agreed mission and vision agreed, and the latter has to have an optimal design in order to keep growing the network by joining new valuable members.

In order to design these two processes for the ECHO Network, we use the following workflow:

1. Identifying the process as phases and main activities;
2. Set up of main organisational bodies;
3. Identifying the process landscape – relation to other processes of the organisation – both core and supportive;
4. Decomposition of the activities among the organisational bodies;
5. Analysing the level of specialisation within the organisational bodies;
6. Mapping of existing documents and identifying needed documents for the phases and activities;
7. Breaking complexity of the process by analysing the Inputs, Products, and Actors of the Process;
8. Further detailed description of the Process Activities.

The main tools for Process Identification and Analysis were used for steps from 1 to 6. These tools are mainly visual, as in the example given in Figure 4 of SPP landscape initial identification. The novelty regarding the classic BPM is the use of the COBIT reference model.
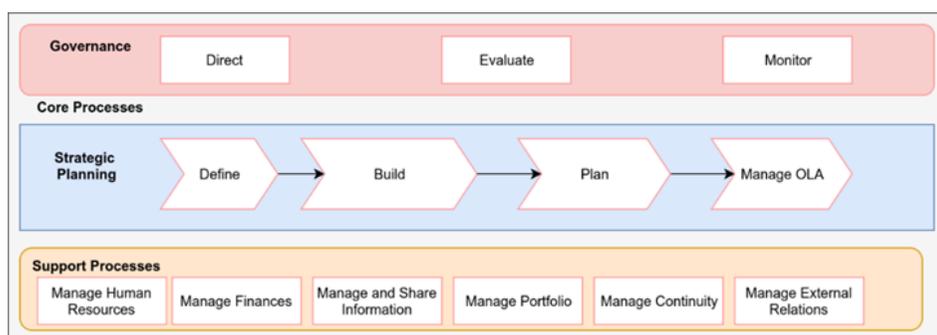
Figure 5: Initial SPP discovery

Finally, when the process is identified and its complexity is decreased a more detailed diagram of activities, actors and informational relations is prepared. The main tool used is again visual – the Business Process Modelling Notation (BPMN) visual editor. The resulting description and diagram are based on the BPMN standard,[8] developed by Object Management Group (OMG).

It has to be stressed that the workflow described above is not necessarily linear. It usually contains several improvements within the discussion between designers and experts. The discussion within the workflow also reveals many hidden issues, which facilities further discussion on other aspects of the future of the organisation.

Tools for Organisational Design

Organizational design is based on an approach from [2] selecting the most suitable organizational form for the respective element f the network and following steps of planning and sequencing the organizational design, measurement, stakeholder engagement, leadership and organizational design, culture development and group processes.

After the process preferences are cleared, the structure of the organisation can be further developed and organisational roles to be assigned. Here we use again the COBIT reference model and roles list. The roles were assigned according to the Responsible, Accountable, Consulted, Informed (RACI) matrix tool by assigning responsibilities for each process activity. The RACI matrices were prepared for each type of CNO's organisational unit – the Central Hub, National Hubs, and Service Groups.

Table 1: Example of RACI matrix for National Hub (truncated)

Procedures	Partners Assembly	Director	Chief Financial Officer	Management Officer	Sponsors	Partner (NH Member)
Understand enterprise context and direction	C	A	R	R		
Assess current and target capabilities	C	A	R	R		
Gap analysis	C	A	R	R		
Define and build the strategic plan and road map	C	A	R	R		
Approve and sent NH strategic documents to the CH	R	A	C	C		
……						

An example of a truncated RACI matrix for the ECHO National Hub is given in Table 1. The RACI matrix[9] came from the abbreviations of the management roles responsibilities – (R)esponsible, (A)ccountable, (C)onsulted, (I)nformed. Therefore, if we bound the activities in the first column with management roles on the first row, we will have a matrix of who is responsible or accountable, etc. for the activity execution.

The transition from the RACI matrix to Standard Operating Procedure or the development of internal procedures or regulations is easy. The adoption of the procedures is the point where the design and implementation phases end.

The Business Model Development Tools

Another important discussion for the rational and appropriate organisational design and development is related to the Business Model of the CNO.

For the Business Model development, we use almost the same workflow as for the Government Model – identify and prepare alternatives, then evaluate them against goals through gathering experts' and managers' opinion, and finally, collectively decided by Partners' vote

We presented four Business model alternatives to the Partners, and we used online questionnaires for gathering their opinion. The alternatives were identified regarding the Governance model in the dimension of centralisation–decentralisation of the CNO.

The alternatives were further developed and detailed with the use of the Business Model Canvas[10] method. The Canvas is a visual tool representing the nine important aspects of the Business model. Two of the alternatives were cancelled because they collected too few preferences.
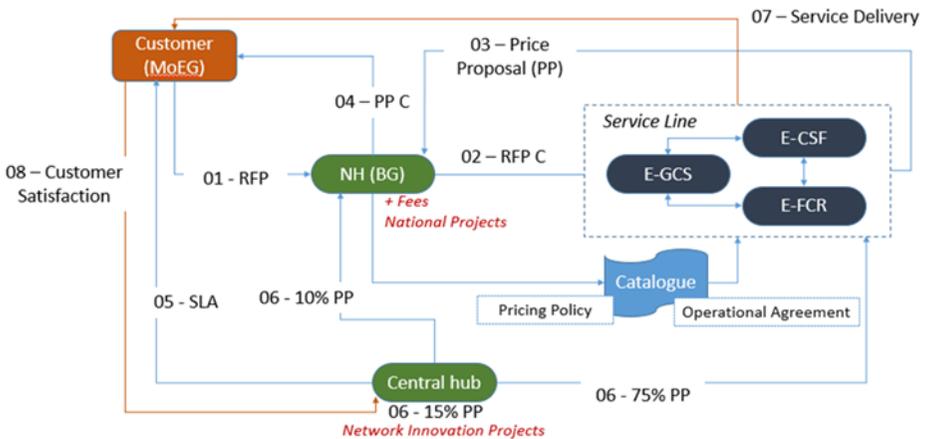
Figure 6: The Business model alternative with Central Hub.

Finally, the two alternatives were presented to the Partners as Canvas and as activities as it is shown in Figure 6. The Customer (in our example the Bulgarian Ministry of the E-Governance) sends a Request for Proposal (RFP) for training service to the National Hub (NH) of Bulgaria. The RFP is sent and is considered with the ECHO Governance Consulting Service (E-GCS), Federated Cyber Range (E-FCR) service and Cybersecurity Skills Framework (E-CSF) service. These three ECHO Service Groups form a Service Line for training and the Price Proposal is prepared based on the Catalogue of Services, Pricing Policy and on Operational

Agreement signed by SGs' Partners. When the Service-level Agreement (SLA) is signed the received payment (according to the Price Proposal – PP) is divided as is shown in Figure 6.

Selected Governance and Business model are based on a network (or facilitated federation) of National Hubs and a Central hub with a set of service groups (international by nature – around certain ECHO assets to be exploited through the offering of respective services) to support one or several sectors (or geographical regions).

The above-mentioned key processes of Strategic Planning and Partnership Development, as well as the core business process from Request for Proposal (RFP) to Customer Satisfaction Form (CSF), define the main requirements for the organizational elements to be designed. In addition, the method of inheritance of the elements as Chair, Executive secretary, General assembly, Board of representatives, Advisory Committee, Partnership Committee, Scientific and Technical Committee, and others as CEO, CFO, CTO, and COO are used to define the roles in the designed organisational structures and balancing these roles between the National Hubs and Central Hub concerning the key strategic processes and the main business process.

Based on the Governance model, a Business model and designed processes with respective RACI matrices, the induction training was developed. The induction training is intended for the people involved with the strategic and operational management of the organisation.

To support consulting services for the organisational design of the National Hubs and Central Hub we have demonstrated the use of generic tools to prove their applicability in the establishment of the National Hub in Bulgaria as a bottom-top approach. This endeavour can be considered a field test for the top-to-bottom approach used during the design.

Conclusions

Governance consulting services in support of CNO development is a very pragmatic effort and its success is measured by the achieved level of maturity of the processes and organizational elements of the established network. Transition is focused on planning and implementation with a strong focus on customer or stakeholder relations management and satisfaction program, but in order to assess the final result of the consulting support, we need an objective mechanism to measure the level of maturity through auditing of designed and implemented processes and organizational elements – in our model we use CMMI[11] and its modifications. The audit provides an opportunity not just to assess the achieved compliance with the design for Initial Operating Capability and Final Operating Capability of the Targeted Operating Model, but to identify measures for continuous improvement in the processes of the network development.[12]

Having in mind the need for the network to grow and adapt we need an audit of every new member of the organisation through the joining process and

periodically audit the key processes and organisational elements of the network to assess the maturity and identify correction measures for improvement.

There are specific tools to support the audit services for the assessment of the processes and organizational elements of the technology-intensive network organization. In our work we focus on the development of generic tools in the overall Governance and Business model design and it is as much science as the art of the people involved to guide the customer most effective way in developing desired organisation by agreed needs and objectives and following the best practices from various methodology and standards frameworks.

Acknowledgements

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About the Authors

Assoc. Prof. Dr Georgi Penchev works as a full-time lecturer at the Department of National and Regional Security, University of National and World Economy, Sofia, Bulgaria. He is teaching courses on Defence and Security Economics, IT in Nuclear Security, Defence Acquisition, and other security-related courses. He took part in several national and international research projects, including projects funded by NATO and EU programmes. https://orcid.org/0000-0001-9321-1357

Associate Professor Dr. **Velizar Shalamanov** – see the CV on p. 146 of this volume, https://doi.org/10.11610/isij.5309