

# Network-centric organization of supervisory and regulatory processes in the banking system of the European Union

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## Summary:

The need for the transformation of the financial institutions during the current crisis requires that new approaches for ensuring stability and efficiency of the financial system are sought and implemented.

The purpose of this article is to describe the need for enhanced transformation of supervision and regulation of the EU banking system, as well as show the possibility of achieving a decisive efficiency and stability through the introduction of concepts related to the network approach and the treatment of the system as a critical infrastructure. Drawing on means related to the construction of high operational safety systems, the paper outlines ways to transform the financial (banking) system, from a structure with subsequent (delayed) regulation and management into an operational self-regulating system (system of systems) operating in near real-time. This transformation would presumably allow for a sharp increase in the system's stability and operability.

The prerequisites for achieving network-centric supervision and regulation in transforming the EU banking system are discussed.

**Key words:** financial system, network, transformation, critical infrastructure, supervision

**JEL:** G28: G21, G15

## Introduction

The issue about the structure of the supervisory process is always escalated during crises moreover this is the time when most of the reallocation of supervisory responsibilities is carried out at an institutional level. At this stage, in contrast to previous financial crises, the discussion has a global nature. Coordination at international level rises as a priority as internationally active financial institutions (mainly banks) achieve a global reach through their subsidiaries and international branch network.

The development of the supervisory processes at European level is directly related to the priorities for development of the single European financial market established in 1999. The financial crisis prompted a reconsideration of the structure of financial supervision and regulation and boosted their improvement initiatives. Leaders of the G-20 meeting in Mexico agreed on the need to transform the financial institutions and in particular to increase the regulation of the financial system. EU leaders expressed their satisfaction that the group of 20 has

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confirmed its commitment to "fully and quickly launch a financial reform to build a strong and responsible international financial sector". This transformation will open up new opportunities for prevention and will ensure sustainability and viability of the system of financial institutions. In this respect the possibility to search and implement new approaches to ensure the system's stability and efficiency is presented. Such a possibility could occur with the use of innovative tools within the scope of network-centric systems, typical of the area of national and international security.

At the summit in June 2012 the European Union agreed to create a new centralized European banking supervisor (step towards establishing a European Banking Union) to supervise and recapitalize banks in Europe. It will provide direct assistance to banks not through the governments, so as to prevent any further increase in national ineptness. Hence by setting goals and establishing a new management framework, national supervisors will be provided additional powers for closer monitoring of banks and the chance to take any restrictive measures to avert risks.

### **1. The need for network supervision and methodological prerequisites for its implementation**

The new organization for unified banking supervision, a new pan-European deposit guarantee scheme and the single European framework for restructuring and recovery of the institutions proposed by the European Commission can be effective only at high operability, the achievement of which requires appropriate methodological prerequisites for implementing the network-centric approach.

The effective implementation of the above plans and proposals suggested by the European Commission will obviously require a new methodology for the intended activities. Here the operability (fast operation)

becomes of prime importance. Accordingly, a new model is needed for the hierarchical system, corresponding to other operating systems, for example in the field of security, in particular the military systems.

In this respect we examine the applicability of basic methodological aspects of the network-centric approach (Ahvenainen, 2003), typical of highly operative and responsive systems, including business systems operating in near real time. We pay attention to specific aspects concerning applications in the financial (banking) structure, to which our interpretation is directed.

Most network organizations reduce the number of organizational levels and create a direct link to the source of information, increasing the pace of operations.

The pace (time) is central to success, as it ensures that most network organizations become better adapted to the complex and dynamic situations. Fast operation is crucial to success, especially if the organization has room for competition. The network allows for increasing the pace when the level of management and control is low (insufficient). In this case, the information disseminated throughout the network compensates the lack of administrative guidance. The management is transformed into dissemination of necessary information and thus the information is a substitute for other resources.

The interaction within the network and the cooperation at the horizontal level is a basic requirement. The cooperation produces a concentrated effect of distributed power (Ahvenainen, 2003). At the horizontal level there is opportunity for management and control, information exchange, congruent goals of the agents (in winning situations) and division of labor and responsibilities.

The network-centric approach involves primarily the application of new information and communication technologies, as well as a new doctrine and new ideas for operation.

New organizations using these technologies and doctrines are being created. The modern complex and dynamic systems require more information and knowledge, and the process of transformation requires the necessary self-organization and fast operation.

The network-centric approach works primarily bottom-up, while the hierarchical system works in the reverse order. The information comes from the bottom or from the neighbors with a possibility for self-synchronization between them. The possibility to share information is central to achieving shared knowledge based on advanced technologies in communications. This approach is essentially an integrated communication, integrated interaction and appropriate management and control, providing for distributed interactions in the system. "Distributed" means the distribution of management and control over the entire network and an integrated use of resources.

The essence of the network-centric approach is the possibility to exchange information in the composition of the so-called "influence networks". This is of key importance for the achievement of shared knowledge in the executive departments as an opportunity for cooperation and synchronization.

Based on the modern information technologies it is necessary that the information from the operational level is combined with the information coming from the hierarchy. This gives full awareness of the system and its necessary networking capabilities, securing operational compatibility.

In summary, we should point out that the required fast operation is achieved by:

- reducing the levels of management;
- increasing the network activity;
- self-synchronization, in terms of achieving the objectives of the hierarchy by reducing the number of levels of interaction;
- self-synchronization requires the presence of advance information and achievement of higher quality of the operations.

## **2. Network approach and network-centric architecture**

The network approach is connected with the introduction of the paradigm for security and stability of the financial system, including key elements such as banking and financial supervision and regulation. The ideas presented in this paper with regard to network approach and network-centric architecture as prerequisites for achievement of supervision and regulation in network-centric environment for the transformation of the banking system of the European Union are more elaborated upon in other articles of the author (Mirchev, 2012, p. 110 -119).

The use of a network approach can improve the functioning of financial systems. Applying this approach to financial systems is essential in the assessment of financial stability. For instance, the resilience of the banking system to shocks can be assessed according to the network structure which links financial institutions. The need for network implementations in the financial domain arises from the Memorandum of understanding on cross-border financial stability, signed in June 2008 by the financial supervisory institutions, central banks and finance ministers from the EU, and from the general practical guidelines for crisis management.

The main goal is to make effective organizational and functional transformation, so the system could achieve greater sustainability and efficiency. Such a possibility seems to be the adoption of the banking system as a separate critical infrastructure (Mirchev, 2009, p. 38-44) and the inclusion of banking and financial supervisors as key elements in a self-synchronizing network for financial supervision and regulation at a supranational level. The critical infrastructure in this area is important to national and international security and the efficiency and accuracy of decisions in critical situations are crucial for the stability of the

financial system. A possibility to coordinate and facilitate the work of national supervisors and synchronized financial regulation and supervisory practices that are the basis on which the integration of financial markets is outlined. A network connecting hierarchically or geographically distributed organizational structures allows for the exchange of operational information, collaboration and sets a centralized shared awareness. This in turn leads to self-synchronization of the system as a whole. The result is increased efficiency, improved resistance to destructive influences and viability in times of crisis.

The network-centric concept is based on the experiences of organizations and economic sectors that have successfully adapted to the challenges of the information age. This concept is applicable to network-structured organizations. A feature of systems built on network-centric concept is distributed (decentralized) decision making responsibilities in critical situations. Based on the shared common operational information field, decisions in critical situations are taken close to real time.

The vision of network-centric enterprise (Alberts/Gartsk /Stein, 2000, p. 36) is associated with awareness and appropriate information management, creating the opportunity for self-synchronization. Such management produces several effects such as increased efficiency (pace) and responsibilities, reduced risk and costs and higher results (profits). The results are largely due to the opportunities for virtual organization, cooperation and integration in network-centric environment.

The network-centric concept is based on the principle of self-synchronization specific to the theory of complex systems. The essence is that complex phenomena and structures are best organized bottom-up. It is necessary that this process is kept within the accepted standards and regulatory requirements in the financial sector.

Achieving greater efficiency in network-centric organization can be central to solving the "Financial trilemma" (Schoenmaker, 2011). The problem is raised by Vitor Constancio - Vice President of the ECB (Constancio, 2012) in relation to the need for a European Banking Union. The trilemma illustrates the inability to simultaneously achieve three important objectives within the environment of global financial markets. These objectives are: financial stability, financial integration and maintenance of national financial policies. The logic is that with increasing financial integration, the pursuit of national financial policies will not lead to financial stability. National policies aim to ensure national prosperity without taking into account external supervisory practices of other countries. This leads to a lack of financial stability as a public good. The problem is exacerbated by the fact that the measures taken are implemented slowly, leading to the accumulation of negative results.

The proposals made by the European Commission with regard to a new unified organization for banking supervision, a new pan-European deposit insurance and a European framework for institutional restructuring and reorganization can be effective only at high efficiency, eliminating the effects of the trilemma.

The nature of the network-centric approach is the ability to exchange information in the composition of the so-called "influence networks". This is essential for achieving shared awareness in the executive departments as an opportunity for cooperation and synchronization. The influence network theory has numerous and significant applications. This theory is based on the theory of stability (Lewis, 2009, p. 338).

Based on the new information technologies it is possible for the information from the network structure of interdependent supervised banks to be combined with the information coming from the Single Supervisory Mechanism. This would

achieve the full awareness and necessary networking capabilities of the system, including ensuring interoperability.

Setting new requirements for the financial system in the EU in relation to new structures and new relationships, especially those for adapting the existing Regulation of the European Banking Authority to the new regime for banking supervision leads to the upgrading of the hierarchical system but also to increasing its complexity. We must add the fact that the Single Supervisory Mechanism (in ECB) will monitor about 6,000 banks in the euro area. Strengthening the centralization of the management structure, headed by the ECB, is likely to result in delayed reactions through the hierarchical administrative structure, respectively, downstream regulation-supervision. In order to avoid these undesirable effects it is appropriate to introduce a modern approach and means to achieve interoperability (speed, pace) in the financial system.

In the existing European banking architecture the influence network is formed by autonomous agents - the European Systemic Risk Board and the European and national supervisory authorities. Interdependencies between the agents in the influence network determine the relationships between the agents from the second level (the banking network). These are relationships within the influence network in terms of the magnitude of the risk, the necessary regulations, capital adequacy, and others.

The future network-centric organization of influence network regulation and supervision reveals the possibilities for dissemination of information on banking transactions on a daily basis, while forming the so-called common awareness. So far this technology has been introduced only for the participants of the stock market. The opportunity stems from the fact that each bank calculates their balance parameters

every day. Practically this allows the supervision and regulation to be performed near real time, which transforms the banking system, ensuring its high efficiency. Furthermore the decision making process is dynamic, i.e. depending on the size and location of existing problems, different centers of decision making are formed. In the current system (hierarchical structure) most of the important decisions must be coordinated with the European supervisory institutions. There are certain procedures requiring considerable time, including for appeal procedures. The system falls short of the desired efficiency.

### **3. Network supervision – new organization of supervision process in a network-centric environment**

One of the basic principles in the field of Critical infrastructure protection (Lewis, 2006, p. 12-27) is that: "You need a network to fight a network". Applied to the banking system, this principle would have the following two meanings:

(1) The systemic instability in the banking market has a network character, so the means to oppose it should also have a network character.

(2) Due to the size of the European and the international banking market only the network approach would be effective. It is not economically feasible to protect every link in the system. The European Commission studies show that the national Deposit Guarantee Schemes in the EU would not withstand a shock where several hubs (large, systemically important banks) fail.

The new type of organization of the influence and control processes is a prerequisite for a network-centric supervision and regulation. It is a promising alternative to the institutional, functional and targeted supervision models. As such, it complements and builds on them.



The current financial system relies heavily on institutional regulation and supervision (Heremans, 2000). Banks, investment firms and insurance companies are supervised by different institutions. The situation is getting more complicated when market participants expand their activities and their interconnectedness. In such case, a close coordination of the supervisory requirements is required in order to avoid regulatory arbitrage. The network supervision based on consistent prudential requirements for the institutions in the network, could offset this drawback of institutional oversight.

The organization and distribution of supervisory functions and these for restructuring of troubled banks are essential to the effectiveness of network supervision. In this regard, the following main features for the new organizational framework of supervisory processes in network-centric environment are outlined in the following paragraphs.

Depending on the network structure, different relatively independent parts of the network could be covered by different supervisors. These segments can be built around large, systemically important banks or covering a concentration of connections without the involvement of a hub. The factor for segmentation is that sub-networks should be relatively autonomous, i.e. the internal borders of the network should be identified - areas with a low concentration of connectivity.

The network segmentation determines also the range of countries that participate in the network supervision. If there is more than one sub-networks (segmented network), a specific country can be covered by two or more network supervisors.

Regarding the network dynamics, if the network is volatile, one should be looking for the stable connections and trends that could accordingly ensure the adequate allocation of supervisory responsibilities. A review of the network topology is conducted within a specified periods (for example – one year),

and the distribution of the supervisory responsibility is reviewed accordingly.

The network supervision is a new way of distributing the supervisory functions and responsibilities in which the individual networks: payment systems, capital markets, debt markets, investment markets, etc. are based on different functions of banks. Given that some networks are interconnected or are overlapping institutionally, they can be regulated from one network supervisory authority.

All financial institutions involved in the network should fall within the scope of supervision. Extending the network supervision beyond banks would allow for the coverage of other non-bank financial institutions (insurance, investment companies, etc.) involved in the network. Thus a regulatory arbitrage will be avoided as market participants will transfer parts of the banking activities to non-banking ones. The unification of supervisory treatment would reduce the value of such activities and will deal with the problem of "shadow banking".

The idea launched in this paper is that the definition of the network supervision scope should be closely linked with the concept of the interruptibility. The supervisory authority is appropriate to cover all financial institutions (banks, insurance companies, investment companies, etc.) which are materially interconnected, irrespective of whether they belong to a group or are connected to each other by exposures or otherwise.

"Material interconnection" can be defined as a link between individual companies, which could not be broken up without causing negative effects on the activity of at least one of these companies.

Upon determining the scope of the network supervisor, the actual topology of the network and the essential linkages between financial institutions should be analyzed. If one can demonstrate that a connection can be interrupted without negative consequences, the company at the

end of connection could be left outside the scope of the particular network supervisor.

Traditional hierarchical systems have limited internal interconnectedness and therefore are easily interruptible (Haldane, 2009). Modern financial systems evolve in the opposite direction, increasing its internal complexity and interconnectedness, and thus reducing its discontinuity. Structured financial products also help enhance the relationship between institutions and sub-structures in the network, making it virtually not interruptible.

Metaphorically, we can say that the scope of the network supervision depends on the boundaries of the different risk areas, determined by the structure of the financial market.

Figure 1 presents a sample structure of a network supervisory architecture. One of the main characteristics of the network supervision is its close position to

the network, i.e. knowing its peculiarities and having updated information about its condition would allow the supervisor to react promptly to a problem occurring in one of the nodes.

This structure can be applied both domestically and within a cross-border context. At international level (e.g. EU level) the day-to-day oversight of individual financial institutions, i.e. operational supervisory activities could be handled by the network supervision authority using the expertise of local supervisors. This will overcome the potential problems arising from the fact that the supranational body may lack the most detailed knowledge about the peculiarities of individual institutions.

The network supervisor could overcome the serious problem of coordination and distribution of responsibilities between

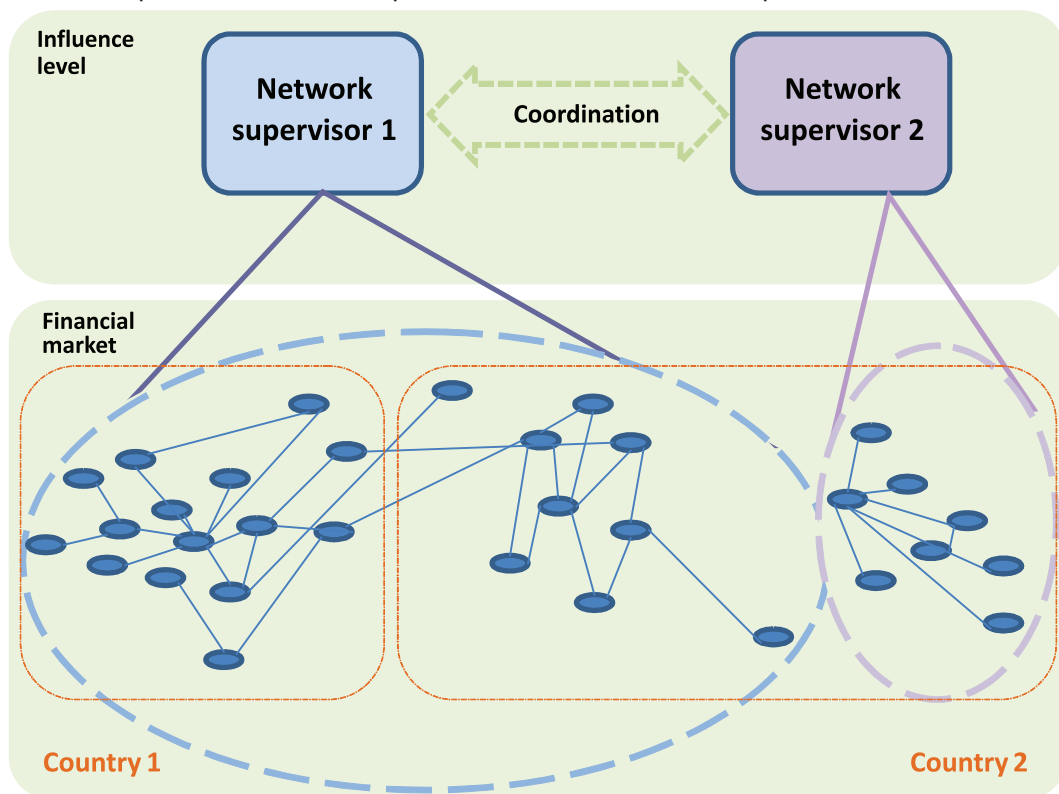


Fig. 1. Structure of a network supervision

the home and host supervisory authorities of the financial institution in case there is a cross-border financial group. This is possible because the network supervision will cover the essential relationships (links) along which a need for coordination in solving problems could emerge.

Even though there is no "universal" supervisory model for every situation and every market, the general formula for effective supervision invariably involves comprehensive and up-to-date information (Masciandaro & Quintyn, 2009). However, the application of this rule is not so easy. When markets were relatively static, the information about the status of the system at a point in time, collected at certain periods, was sufficient. In case the market is relatively segmented, the vertical supervisory model would logically be the most effective solution, which suggests the existence of separate supervisory authorities for the different type of financial institutions.

A fundamental principle is that the frequency of data collection should be in line with its dynamics. Nowadays, the dynamics of the financial market requires constant updating of information. Given the modern information technologies, the achievement of shared awareness based on "near real-time" information should not constitute a difficulty. The positive effects of this common awareness by far outweigh the costs of its achievement. This information will allow the real time regulation of the system in a manner similar to the classic critical infrastructures. A wide range of tools could possibly be used for the timely identification of potential risks, such as simulations, stress-tests, risk dashboards, etc. If this information is available to market participants, depending on the adopted market structure, the possible effects would be the system's self-synchronization and market participants' proactive responses in the event of systemic problems.

The suggested cutting of the "too-big-to-fail" banks would not yield satisfactory results,

because the individual institutions would remain interconnected in a network, which still poses a systemic risk. Similar ideas for dismantling big institutions are set out in the "Vickers report" (ICB, 2011), which provides a framework for reforming the financial markets in the UK, and in the "Liikanen report" (Liikanen, 2012), which provides a framework for stabilizing the European financial market (in parallel with the introduction of the European version of Basel III). The "Vickers report" suggests that financial institutions separate their retail functions from their riskier activities. Similarly, the "Liikanen report" suggests that financial institutions should spin off their risky trading activities. The two proposals are similar in nature, emphasizing on the separation of the activities which are relevant for the economy from the highly risky ones. In fact, the risk is not mitigated because even separated, the individual companies remain in one group and the channel for shock transmission (capital ties, mutual exposures, etc.) remain active, this is valid also for the reputation risk, which can easily lead to a bank run.

The interruptibility is an important concept in the analysis of systemic risks. If it is possible to interrupt network links that threaten its stability, it would be an effective means of stabilizing the economy. The above proposals aimed to prove this idea. The real question is how interruptible the links are. This crisis has shown for example that securitization schemes, which were considered to be an effective scheme to break the link between exposure and risk, in effect failed to perform this function and require the implicit support from their initiators in times of market turmoil.

In September 2012 the European Commission published a proposal for the creation of a supervisory mechanism as a step towards the creation of Bank Union. The recently adopted supervisory mechanism aims to facilitate the transition from the current model of distributed responsibilities



with coordination mechanisms to a model of centralized bank supervision, covering all banks in the euro zone and later those in the entire EU. It is envisaged that the ECB will take on the role of this single supervisory authority.

Differences between the network supervision model and the newly adopted role of the ECB at this stage are essential. It has been shown that the centralization of supervisory functions often fails to boost efficiency and increases administration. What is more, the vertical supervisory model remains active, where the ECB will have responsibilities only for the banking sector. For the other financial market sectors the new EU framework does not provide for the establishment of such structures. The inefficiency stems from the fact that the supervision mechanism draws on the current "Lamfalussy" model. The European Banking Authority (EBA), one of the "Lamfalussy" structures is a collective body and every major decision should be adopted by its Board of Supervisors, in which representatives of all EU banking supervisory authorities participate. Hence the way this body functions determines the relatively slow process of decision making. The involvement of the ECB in the supervision framework adds an additional layer of coordination and administration, as the ECB assumes the rights of national supervisors involved in EBA, and any decision by the ECB in this area is also subject to a final vote by the Governing Council of ECB, whose members are almost the same representatives of national supervisory authorities. Overlapping of administrative procedures, response times and coordination mechanisms determine the slow performance of the new structure.

#### **4. Opportunities for practical implementation of network-centric supervision**

In general, it is appropriate to establish integrated (internationally) joint financial supervisory structures with the following tasks:

- regulation and supervision of financial activities in specific emerging crisis;
- restructuring of financial structures;
- centralization and distribution of financial resources required for network supervision refinancing operations.

The possible joint integrated supervisory structures (JISS), assigned to a particular network or network segment, must be authorized by senior management of the Single Supervisory Mechanism (SSM) that determines the necessary financing.

On this basis, in the normal situation the different joint supervisory structures (banking, insurance, securities, etc.) should be trained through a cross-border/domestic financial crisis simulation exercises for the simulation of possible scenarios for crisis management and implementation of contingency plans.

The JISS will be reinforced when there is a need for real action on crisis management. A supervisory crisis center is created. These structures act essentially decentralized in that given network or network segment based on the powers and responsibilities delegated by the central European authority (the SSM for example). Thus emerges also possibilities for managing of cross-border financial crises when there is an interaction of financial institutions from countries with significant banking interrelationships.

After completion of the crisis management, in the supervisory crisis center will remain surveillance team and the other experts will return to their usual assignments.

On the basis of the implemented activities, an after action review, and lessons learned analysis and recommendations are elaborated for responding to such situations and for providing the necessary financial stability.

#### **5. Conclusion**

The idea of applying network-centric approach to the financial sector is an attempt

## Articles

to address the need to develop techniques for transformation of the financial (banking) system from a sector with a subsequent (delayed in time) management and regulation into an operational self-regulating system (system of systems) operating in near real-time. For the financial system such a process aims to transform the system in which supervisors take action to resolve certain problems after their identification and analysis, which requires considerable time. Such a transformation aims to ensure that supervisors and market participants immediately respond to a problem at the moment of its emergence, and, depending on the scale and nature of this problem, different cores are dynamically formed, which require swift response. This rapid response in the network would be possible in case timely and adequate information is available. This would facilitate the transformation, allowing for substantial increase of the stability and the efficiency of the entire system.

The development and effective implementation of joint integrated supervisory and regulatory structures could provide high efficiency in responding practically in real time to any crisis that may occur in the relevant networks or network segments.

The European Stability Mechanism is appropriate to plan adequate financial resources and establish technology for capital support and refinancing operations, conducted by the joint supervisory network structures. Such dynamic structures are widely used and are highly effective in the modern multi-national security systems.

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