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# РАДІОЕЛЕКТРОННІ І КОМП'ЮТЕРНІ СИСТЕМИ

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```
Imports Microsoft.VisualBasic
Imports System
Imports System.IO
Imports System.Xml
Imports System.Xml.Schema
Imports System.Xml.Linq

Namespace HowTo.Samples.XML
    Dim myStringWriter as StringWriter = new StringWriter()
    Public class XmlReadWriteSchemaSample
    Dim myXmlWriter as XmlTextWriter = new XmlTextWriter(myStringWriter)
    myXmlWriter.Formatting = Formatting.Indented
    myXmlWriter.Indentation = 2

    'Create a stringwriter for output
    Dim myStringWriter as StringWriter = new StringWriter()
    Dim myXmlWriter as XmlTextWriter = new XmlTextWriter(myStringWriter)
    myXmlWriter.Formatting = Formatting.Indented
    myXmlWriter.Indentation = 2

    'Read the Schema
    Console.WriteLine("Reading schema {0}...", args)
    Console.WriteLine()
    Dim mySchema as XmlSchema = XmlSchema.Read(new XmlTextReader(args), Nothing)

    'Write the Schema
    Console.WriteLine("Writing schema {0}...", args)
    Console.WriteLine()
    mySchema.Write(myXmlWriter)
    Console.WriteLine(myStringWriter.ToString())

    Console.WriteLine(myStringWriter.ToString())
end
```

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## A TAXONOMY OF ESSENTIAL SERVICES

*Communities, countries and alliances cannot be efficient in preparing to meet diverse threats to their security within traditional organizational stovepipes. The boundaries between 'internal' and 'external' threats are getting fuzzier, and the vulnerabilities of governments, businesses and communities feed on each other, while the comprehensive approach is gaining traction in ever more security fields. The implementation of the comprehensive approach poses a number of methodological challenges. While it clearly requires coordination of various capabilities of a multitude of actors, it is less apparent which is the suitable organising concept. This paper takes as a starting point the concept of 'essential services' and suggests a taxonomy, that would allow to treat threats, vulnerabilities and risk in a common comprehensive framework. The taxonomy has been developed with a specific purpose in mind, and thus refers to European Essential Services (EES). We nevertheless reason that it can be replicated to support decision making at other levels, e.g. in national security policy making and planning.*

**Keywords:** Security policy, planning, threats, vulnerabilities, comprehensive approach, critical infrastructure, risk management, uncertainty.

### Introduction

The landscape of international security has been changing rapidly since the end of the Cold war. Traditional monolith threats have been replaced by a multitude of threats of ethnic, religious, or ideological origin. Many of these threats come from non-state actors and hybrid armies. Acting across borders with asymmetric means and tactics, they attempt to utilise the vulnerabilities of modern societies.

Another influential factor is the rapid proliferation of information and communication technologies. While their massive incorporation serves to increase business and governmental efficiencies, they also introduce previously unknown vulnerabilities and mutual dependencies.

As a result, traditional delineation of threats into 'external' and 'internal' and their respective assignment to military and police forces as the two main pillars of the security sector—organised and operating largely independent of each other—does not provide for an effective and efficient security policy. Furthermore, having to deal with their own vulnerabilities, business organisations—in particular those owning and or operating critical infrastructures—also turn into security actors. The response options include variety of hard and soft instruments provided by governments, international and non-governmental organisations, business organisations and communities, often used in combination in the so called 'comprehensive approach' [1].

The concept of 'comprehensive approach' is evolving. In most of its interpretations it covers:

- the multitude of actors with their respective roles in what most broadly can be referred to as 'crisis management operations';
- the variety of operational instruments actor can or would be able to provide; and
- diverse crisis management strategies and/or respective operational phases, e.g. prevention, deterrence, protection, defence, consequence management, resilience [2].

The research question that was addressed with this work is how to provide for a rigorous and transparent decision making process given the evolving threats and vulnerabilities in their interdependence, as well as the evolving conceptual framework. For example, in what type of security capabilities to invest, which vulnerabilities need to be of highest priority, etc.

The research team decided that these questions need to be addressed in a comprehensive manner. It found, however, that there is no methodology allowing to treat the multitude of threats, actors, and vulnerabilities in a common framework which would afford rigorous comparison of investment options. It was decided to use the concept of *essential services* as a common ground for assessing investment options in the provision of European security.

This paper elaborates on the concept of essential services and suggests a taxonomy of European Essential Services (EES).

## 1. European Essential Services

As a starting point, it was assumed that *essential* are those services that would allow to preserve the functioning of government, economy and citizens under extreme conditions, e.g. natural disasters, industrial catastrophes, terrorist acts, military aggression, mass disorders, etc. These services would be provided various actors; the issue of who provides what services is secondary.

A number of official EU documents and recent conceptual developments were used in the elaboration of the taxonomy of essential services.

### *Critical infrastructures*

In 2005, the European Commission announced its *Green Paper on a European Program for Critical Infrastructure Protection* [3]. The document defined the term 'critical infrastructure' as "those physical resources, services, information technology facilities, networks and infrastructure assets, which, if disrupted or destroyed would have a serious impact on the health, safety, security, economic or social well-being" of, in this particular case, two or more EU member states (MS). It further states that the term 'essential service' is often applied to utilities (water, gas, electricity, etc.) and "may also include standby power systems, environmental control systems or communication networks that if interrupted puts at risk public safety and confidence, threatens economic security, or impedes the continuity of a MS government and its services." The Green Paper identified eleven potential sectors of critical infrastructure, including energy, information and communication technologies, water, food, health, financial, public and legal order and safety, civil administration, transport, chemical and nuclear industry, space and research.

The 2008 Council Directive 2008/114/EC on the identification and designation of European critical infrastructures elaborated on procedures and measures for protection of two of these sectors – energy and transport [4].

### *Public services*

According to Hans-Joachim Reck, President of the European Centre of Employers and Enterprises providing Public services (CEEP) "more than 500,000 providers deliver essential services for the 500 million Europeans and contribute to more than 26 percent of the EU-27 GDP. So we are a key element of the European economy" [5].

The concept of EESs is now recognized in Europe, but the term requires clarification. The *Green Paper on services of general interest* presented by the Commission of the European Communities in May 2003 gives a

number of definitions [6]. *Services of general interest* cover both market and non-market services which the public authorities classify as being of general interest and which are subject to specific public-service obligations. The term *services of general economic interest* refers to services of an economic nature which EU countries or the Union have chosen to subject to specific public-service obligations by virtue of a general-interest criterion. The definition covers in particular certain services provided by the big network industries such as transport, postal services, energy and communications. The term *public service* sometimes refers to the fact that a service is provided to the general public or that a particular role has been assigned to it in the general interest. It may also refer to the ownership or status of the entity providing the service. The term *public-service obligations* generally refers to specific requirements that the public authorities impose on the service provider in order to ensure that certain public-interest objectives are met – for instance, in the areas of air, rail, road transport and energy.

Various research groups and associations (such as the association Public Services Network, the European Centre of Enterprises with Public Participation and the European Liaison Committee on Services of General Interest) have become involved in the work begun by the European Union of promoting a set of European general-interest services. They all express the same wish, namely to take the needs of consumers, users and citizens as the starting-point in trying to identify a set of requirements common to all European countries. Generally speaking in Europe, services considered essential are transport, public broadcasting, water, gas and electricity supply, prison administration, the justice system, national security services, medical care and emergency services [7].

The International Labour Organization (ILO) also contributes to this discourse. It considers the hospital sector, electricity services, water distribution services, telephone services and air traffic control to be essential services. ILO states, however, that the strict definition of an essential service depends largely on the specific conditions in each country. The concept cannot be an absolute one, in that a non-essential service may become essential in case of endangering the lives, safety or health among all or a part of the population. [8]

The current economic and financial situation has highlighted more than ever the fundamental role of services of general interest in the European Union. At the same time, the budget constraints that currently confront public administrations and the need for fiscal consolidation make it necessary to ensure that high-quality services are provided as efficiently and cost-effectively as possible. The President's Political Guidelines of 2009 refer to the modernization of the services sector as one way to

boost new sources of growth and social cohesion and reiterates the “need to give a boost to the overall development of the social and health’s services sector, for instance by establishing a quality framework for public and social services, thus recognizing their importance in the European model of society”. Europe 2020 reconfirmed the need to develop new services, delivered both physically and on-line, that generate growth and create jobs.

At the end of 2011, the EC promulgated a Communication named “A Quality Framework for Services of General Interest in Europe” with the objective to present the quality framework which consists of three complementary strands of action: (1) enhancing clarity and legal certainty on how EU rules apply to services of general economic interest, and revising the rules when necessary to ensure that specific needs are catered for, (2) ensuring access to essential services (the Commission will take forward its commitment to ensure access for all citizens to essential services in specific sectors building on recent actions in the field of basic banking, postal services and telecommunications), (3) promoting quality (the Commission will reinforce its commitment to promoting quality in the field of social services, and will use these achievements in this area as a model for other services of general interest). The debate on services of general interest suffers from a lack of terminological clarity. Different concepts are dynamic and evolve, and are used interchangeably. The following definitions are currently used [9]:

- *Service of general interest (SGI)*: services that public authorities of the Member States classify as being of general interest and, therefore, subject to specific public service obligations. The term covers both economic activities and non-economic services;

- *Service of general economic interest (SGEI)*: economic activities which deliver outcomes in the overall public good that would not be supplied (or would be supplied under different conditions in terms of quality, safety, affordability, equal treatment or universal access) by the market without public intervention. The public service obligation is imposed on the provider by way of an entrustment and on the basis of a general interest criterion which ensures that the service is provided under conditions allowing it to fulfil its mission;

- *Social services of general interest (SSGI)*: these include social security schemes covering the main risks of life and a range of other essential services provided directly to the person that play a preventive and socially cohesive/inclusive role. While some social services are not considered by the European Court as being economic activities, the jurisprudence of the Court makes clear that the social nature of a service is not sufficient in itself to classify it as non-economic. The term social service of general interest consequently covers both economic and non-economic activities.

- *Universal service obligation (USO)*: type of public service obligations which sets the requirements designed to ensure that certain services are made available to all consumers and users in a Member State, regardless of their geographical location, at a specified quality and, taking account of specific national circumstances, at an affordable price. The definition of specific USO are set at European level as an essential component of market liberalization of service sectors, such as electronic communications, post and transport.

#### *Protection services*

In view of the comprehensive approach to security, the taxonomy needs to provide for elaboration of the full spectrum of capabilities. These capabilities may be provided by public or non-governmental organisations, community organisations or volunteers, private actors or through public-private partnerships, by one state or organisation or through ‘pooling and sharing’ of resources of two or more Member States or security sector organisations [10]. They should also cover the spectrum of potential activities, starting from prevention and deterrence, through protection, defence and consequence management, to include novel concepts such as community and business resilience.

#### *Governance & Administration*

In the elaboration of the taxonomy the research team took into account an advanced view to the approach to capability development under deep uncertainty [11]. In this approach investment in measures for protection of current vulnerabilities and in capabilities to perform foreseen operations is balanced with investments in:

- awareness of the security environment, its evolution, and early warning for shifts in the context for security policy making; and

- organisational agility, that would allow for a timely adaptation to changes in the security environment.

## **2. Taxonomy of EESs**

In addition to the considerations listed in the previous section, the research team analysed a number of recent policy documents, such as the 2010 EU Internal Security Strategy [12], the first annual report of its implementation [13], the European Security Strategy [14] and the report of its implementation [15], the target capabilities list of the U.S. Department of Homeland Security [16] and the accompanying user guide [17].

This analysis served to create taxonomy of essential services and provide necessary clarification of their meaning. While the team tried to be exhaustive in defining the scope of essential services, it exercised restraint

in going into detail and low hierarchical levels. The intention was to preserve opportunities for examination of the full list of essential services and their interdependencies by decision makers, as well as reviews by outside experts and end users.

The proposed taxonomy includes 66 'European Essential Services' under 16 headings in three functional groups as follows:

A. Policy making, administration & management (including guidance, command and control of security organisations);

B. Essential functions and services for the population, the economy, and security organisations;

C. Protective services.

The full taxonomy is included in Annex 1 to this paper.

## Conclusion

The complete list of 'essential services' in Annex 1 provides a unifying framework to support decision making on the allocation of public and provide resource to enhance security. While developed to serve decision making on EU security, and in particular on investing in security research, it can be replicated for other purposes, including the planning processes in national security sectors.

### Annex 1

#### A. Policy making, administration & management

##### 1. Administration & management

- 1.1. Security policy making
- 1.2. Deliberate and contingency planning, review of plans, implementation decision making
- 1.3. Interaction with strategic partners
- 1.4. Maintaining diplomatic relations and protecting EU citizens abroad
- 1.5. Functioning of European, national and local administrative bodies and territorial units of central governing bodies and agencies
- 1.6. Sectoral and corporate governance/ management (e.g. management of the energy sector, air traffic management, maritime traffic management, etc.)
- 1.7. Information and communications support to the system for administration & management
- 1.8. Transfer and protection of classified information

##### 2. Creating and maintaining crisis management capabilities and resources

- 2.1. Planning, programming and budgeting of crisis management capabilities and resources
- 2.2. Contracting and contract management
- 2.3. Control and audit of the implementation of plans, programmes, and contracts for creating and maintaining crisis management capabilities and resources
- 2.4. Personnel management
- 2.5. Assessing crisis management capabilities, e.g. European and multiagency exercises

##### 3. Strategic intelligence

- 3.1. Collection and analysis of information
- 3.2. Information fusion, awareness and early warning
- 3.3. Sensor networks, including space-based sensors and sensor networks

##### 4. Agility

- 4.1. Exchange of intelligence and other analytical information
- 4.2. Foresight & anticipation
- 4.3. Timely decision making on changing readiness levels and/or capability development plans and programmes (e.g. in case of a shift to another context scenario)
- 4.4. Research & Development

#### B. Essential functions and services for the population, the economy, and security organisations

##### 5. Security industrial base

- 5.1. Delivery of weapons, ammunition, and special purpose systems and equipment
- 5.2. Repairs and upgrades of weapons, ammunition, and special purpose systems and equipment
- 5.3. Security of the supply chain

##### 6. Water

- 6.1. Provision of drinking water
- 6.2. Control of water quality
- 6.3. Stemming and control of water quantity

##### 7. Food

- 7.1. Provision of vital food products
- 7.2. Control of food safety and quality
- 7.3. Provision for the functioning of agriculture

##### 8. Energy

- 8.1. Import, delivery/transfer and storage of energy sources
- 8.2. Electricity generation (including generation from nuclear power stations)
- 8.3. Oil and gas production, refining, treatment and storage, including pipelines
- 8.4. Transmission of electricity, gas, oil, and lubricants
- 8.5. Distribution of electricity, gas, oil, and lubricants

##### 9. Transport<sup>1</sup>

- 9.1. Transporting people
- 9.2. Transporting dangerous loads (weapons, ammunition, radiation sources, contaminated materials, etc.)
- 9.3. Transportation of general purpose (non-dangerous) loads

##### 10. Health and Social Services

- 10.1. Emergency medical services
- 10.2. Hospital care
- 10.3. Provision of medicines, serums, vaccines and pharmaceuticals

<sup>1</sup> The EU 2005 CIP Green Paper uses an alternative structuring for transport infrastructure with five sub-sectors: (1) Road transport; (2) Rail transport; (3) Air traffic; (4) Inland waterways transport; (5) Ocean and short-sea shipping.

- 10.4. Bio-laboratories and bio-agents
- 10.5. Provision of social care (for invalids, people with chronic diseases, elders, etc.)
- 11. Financial services
  - 11.1. Payment services
  - 11.2. Government financial services /assignment/ & central banks' services (including monetary services)
  - 11.3. Insurance, re-insurance services and financial intermediaries
- 12. Civil information, communication and navigation services
  - 12.1. Information systems and network services, including Internet & GRID systems
  - 12.2. Instrumentation, automation and control (SCADA) systems
  - 12.3. Provision of fixed and mobile telecommunications services
  - 12.4. Radio communication and navigation services
  - 12.5. Satellite communication and navigation services
  - 12.6. Postal and courier services
  - 12.7. TV and radio broadcasting services
- 13. Chemical and nuclear industry
  - 13.1. Production and storage/processing of chemical and nuclear substances and radiation sources
  - 13.2. Pipelines of dangerous goods (chemical substances)

### C. Protective services

- 14. Provision of media and morale (psychological support)
  - 14.1. Information and psychological support to the population
  - 14.2. Counter disinformation and counter propaganda
  - 14.3. Protecting European & national identities, symbols and cultural heritage
  - 14.4. Guaranteeing religious services
- 15. Protection of the population, strategic sites and critical infrastructure
  - 15.1. Preventive measures and activities (monitoring threats, assessment of vulnerabilities of and interdependencies between critical infrastructures, defining and implementing standards and requirements for protection of critical services and infrastructure, creating redundancies, territorial distribution of critical assets, community preparedness & participation)
  - 15.2. Protection of strategic sites and critical infrastructure assets
  - 15.3. Reaction (evacuation, search and rescue services, etc.)
  - 15.4. Recovery of the functioning of strategic sites and critical infrastructures
- 16. Public order and justice
  - 16.1. Control of land borders, maritime and air space

- 16.2. Control and provision for mass flows of people (sheltering and provision for refugees, mass flows of migrants, during evacuation, etc.)
- 16.3. Confinement of people in lawful custody (jails)
- 16.4. Delivery of justice

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## ТАКСОНОМІЯ ОСНОВНИХ СЕРВІСІВ

*Т.Д. Тагарев, В.А. Георгієв, В.Р. Ратчев*

Традиційні підходи в нинішнє час не можуть ефективно забезпечувати запобігання різним погрозам безпечі. Межі між «внутрішніми» і «зовнішніми» угрозами стають все більш нечіткими, уразливості держав, фірм і союзів зближуються. Комплексний підхід все частіше застосовується в областях, пов'язаних з безпекою. Реалізація комплексного підходу вимагає обґрунтованого методологічного підходу, що враховує узгодження різних можливостей виконавців і вибір відповідного організаційного принципу. Дана стаття за нульову точку бере принцип «основних сервісів» і пропонує таксономію, запобігти появі загроз, уразливостей та ризиків у загальній комплексній системі. Таксономія була розроблена з урахуванням конкретної мети, і тому посилається на Європейські Основні Сервіси. Проте вона також може бути використана для прийняття рішень на інших рівнях, наприклад здійснюючи або плануючи політику національної безпеки.

**Ключові слова:** політика безпеки, планування, загрози, уразливості, комплексний підхід, критична інфраструктура, управління ризиками, невизначеність.

## ТАКСОНОМІЯ ОСНОВНИХ СЕРВІСІВ

*Т.Д. Тагарев, В.А. Георгієв, В.Р. Ратчев*

Традиційні підходи на сьогодні не можуть ефективно забезпечувати запобігання різним погрозам безпечі. Межі між «внутрішніми» і «зовнішніми» угрозами стають все більш нечіткими, уразливості держав, фірм і союзів зближуються. Комплексний підхід все частіше застосовується в областях, пов'язаних з безпекою. Реалізація комплексного підходу вимагає обґрунтованого методологічного підходу, що враховує узгодження різних можливостей виконавців і вибір відповідного організаційного принципу. Дана стаття за нульову точку бере принцип «основних сервісів» і пропонує таксономію, запобігти появі загроз, уразливостей та ризиків у загальній комплексній системі. Таксономія була розроблена з урахуванням конкретної мети, і тому посилається на Європейські Основні Сервіси. Проте вона також може бути використана для прийняття рішень на інших рівнях, наприклад здійснюючи або плануючи політику національної безпеки.

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