



Review

of the Air Force Academy

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Energy Management Process:

- High Level Commitment
- Annual Reviews
- Report & Review Results Regularly
- Implement Projects
- Prepare Action Plan
- Conduct Energy Audit
- Implement staff Awareness & Training Program
- Set up an Energy Monitoring & Reporting System
- Prepare Energy Policy
- Appoint Energy Manager / Team

Communication Levels:

- peer-reviewed literature (publishing new knowledge)
- semi-formal communication (reporting research-in-progress)
- informal communication (developing a thesis)
- popular literature (socializing knowledge)
- summary literature (formalizing knowledge)
- professional literature (putting knowledge to use)

Motor Control Diagram:

- DC Motor
- Hall Effect Sensor
- Speed Controller
- Worm Gear

Electronic Circuit Diagram:

- Controlled PWM Voltage
- H-Bridge
- DC Motor
- Incremental Encoder
- Op-Amp
- Resistor R8
- Output Vo

Power System Schematic:

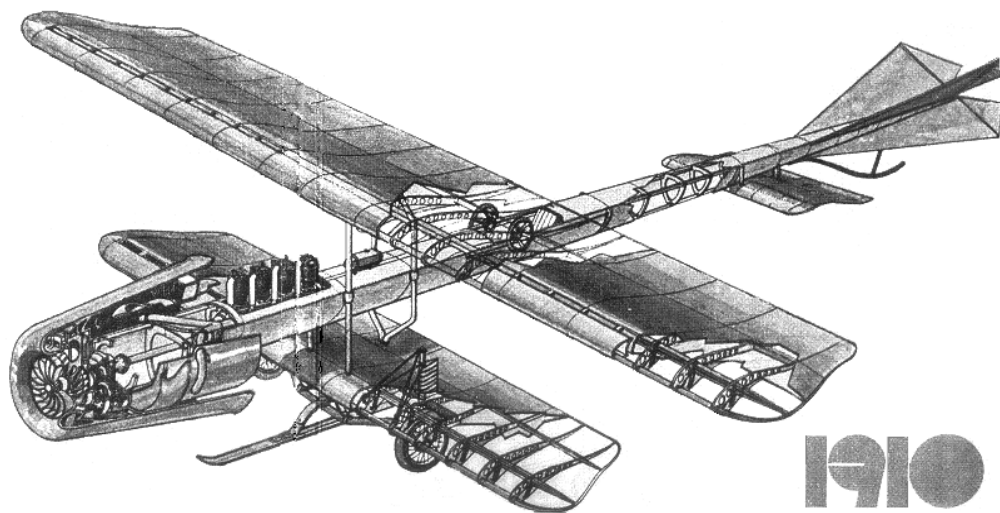
- from mains
- live
- neutral
- light
- switch wire
- common wire 1
- common wire 2

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of the Air Force Academy

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ROMANIA
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Phone: +40268423421, Fax: +40268422004
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C O N T E N T S

TECHNICAL SCIENCES AND APPLIED MATHEMATICS

Pavel NEČAS, Ionică CÎRCIU, Constantin ROTARU, Mircea BOȘCOIANU An Analysis of the Stability and Performances of Rotary Wing Micro Aerial Vehicles	05
Haibin WANG, Florentin SMARANDACHE, Yanqing ZHANG, Rajshekhhar SUNDERRAMAN Single Valued Neutrosophic Sets	10
Alex STEFAN Mobile Health Care System. e-Learning Security System Design	15
Ioan Gheorghe RATIU, Ioan Daniel RATIU, Mihail Gabriel RATIU Considerations About Fighting Against Cybercrime	20
Beazit ALI, Gheorghe SAMOILESCU About Aerodynamic Calculus Of Impellers Using The Numerical Methods	29
Gheorghe ANTON, Gheorghe RADU Oscillatory Solutions for the Systems Of Difference Equations with Variable Coefficients	33
Horia TARZIU, Anamaria COMES The Study of Theoretical Problems Related to the Military Equipment and Technologies with the Help of Computer Assisted Graphics	39
Ognyan STOYKOV The Use of Pilot Transmission Function for Airplane Control During the Process of Aiming	43
Cezar VASILESCU Applying Decision Theory Techniques to Information Security Related Decisions	47
Emilia SCHEIBNER Dimensioning Of Heating Networks Pipes	51
MANAGEMENT AND SOCIO-HUMANITIES	
Aurel Ion CLINCIU, Ruxandra Maria CLINCIU Percent Errors in Standard Muller-Lyer and Right-Angled Illusions	56
Lubomír BELAN, Lenka KURHAJCOVÁ System Of Project Manage In Phase Of Realization	62
Oana-Andreea PÎRNUȚĂ, Alina-Adriana ARSENI Common Law and Civil Law: The Major Traditions of the Western Legal Culture	68

Cătălin CIOACĂ The Economical Security Concept in the Context of the Global Economic Crisis	74
Daniela BELU Good Resistance to Manipulation and the Competence of Applying Ethics in Management	80
Elena-Simona INDREICA, Camelia TRUȚA Membership in Organizations and Self-Esteem in the Context of Biological Involution in Adult Female	86
Răzvan-Lucian ANDRONIC, Anca ANDRONIC Romanian Non-Governmental Organizations' Evolution	90
Kinga KOLUMBÁN Female Authorship Revisited in Margaret Atwood's <i>The Blind Assassin</i>	94
Aura CODREANU Organisational Communication Patterns Underlying the Concept of Organisational Behaviour	98
MILITARY SCIENCES	
Pavel BUČKA, Pavel NEČAS Basic Operation Capabilities of the Slovak Air Force	104
Adrian LESENCIUC The Professional Profile Of The Romanian Military	109
Daniela NAGY Miscommunication: Failing to Understand Those Gi's ?	114
Livia Ecaterina TĂȚAR The Role of Marketing-Based Approaches in Increasing the Military Education's Performance	118
Carmen POSTELNICU The External Information Flow of the Strategic and National Security Information	122
Cornel ARAMĂ, Ioan BĂĪLOS, Ovidiu MOȘOIU Eco-Drive – The Safe, Fluent and Environment Friendly Driving Style	126
Notes for Authors	132

AN ANALYSIS OF THE STABILITY AND PERFORMANCES OF ROTARY WING MICRO AERIAL VEHICLES

Pavel NEČAS*, Ionică CÎRCIU**, Constantin ROTARU***, Mircea BOȘCOIANU**

*Armed Forces Academy of General Milan Rastislav Štefánik Liptovský Mikuláš, Slovakia

“Henri Coanda” Air Force Academy, Brasov, Romania, *Military Technical Academy, Romania

Abstract: *Micro aerial vehicles are small objects dedicated to a new set of D3 missions (dull, dirty, dangerous missions) not capable for the classic UAV solutions. First we present the benefits of rotating wing micro aerial vehicles (RW-MAVs) and a classification of the mission scenarios. According to the new missions we define the basic requirements that RW-MAV that should be satisfied in order to successfully complete urban and indoor missions. We define the new 4RW-MAV architecture and we propose a comparative analysis with the characteristics and performances of different classic configurations. Based on a better maneuverability, portability and agility, the 4RW-MAV architecture is promising but depending on the geometry there are some differences regarding the performances, stability and the payload capacity. In urban or indoor missions the maneuverability is crucial and thus the new architecture should provide better movement capabilities. The 4RW-MAV configuration is effective in indoor narrow space with a capability to maneuver in a very fast and effective way, impossible for other configurations. The net effect relevant for control during autorotation landing is analyzed by adding a vertical offset relative to the vertical position predicted in the absence of ground effect. This vertical offset is estimated from flight data and taken into account accordingly.*

Keywords: *micro aerial vehicle (MAV), rotary wing MAV (RW-MAV), flight dynamics.*

1. INTRODUCTION

Autonomous RW-MAV flight represents a challenging control problem with high dimensional, asymmetric, nonlinear dynamics. RW-MAVs are widely regarded to be significantly harder to control than fixed-wing micro air vehicles. At the same time, RW-MAVs provide unique capabilities, such as in place hover and low-speed flight, important for many applications. Recently, there has been considerable progress in autonomous RW-MAV flight. Examples range from basic upright hovering and forward flight to inverted hovering, and even to extreme aerobatic maneuvers. All of this prior work pertains to helicopters operating with normal engine power.

The starting point for this kind of research is based on a new definition, a new classification of scenarios and missions proposed for the smallest category of UAVs.

Based on the new technologies and the downsizing of the payload and sensors, the effective envelope of civil applications for UAV systems (UAS) is extended and the research is focus on the ways to find new architectures, new solutions for reducing the costs of missions. According to their special capability to hover, there are different types of missions for RW-UAVs: urban law enforcement, special operations and information gathering; coastal patrol, on-shore border patrol and maritime surveillance; civil security (search & rescue and avalanche survivor search); fire brigade; civil security and police (contamination measurement and natural disaster monitoring); environmental (crop monitoring and local science mission); flight services (training, terrain mapping, photography and monument inspection). The aim of the analysis of scenarios and the capability to respond to different possible profiles of the mission is to obtain new

solutions, more robust and more effective. The main obstacles in the development of small size rotary wing vehicles are related to the following aspects: it is very difficult to develop control laws in an environment in which the flow induced by rotors in the vicinity of walls generates strong nonlinear aerodynamic ground effects; the problem of obstacle avoidance is difficult for small size objects; the autonomous navigation in a GPS-denied environment is not very accurate for small systems; the design of an airframe that can protect the vehicle against collision is possible only for dedicated configurations (ISAE concept). There are made of course new steps in video compression and real time monitoring, in navigation and control of micro vehicles. It is also necessary to reduce the weight, size and power consumption of payload (analyzing sensors technology, optics, housing and cabling and connectors), to adopt innovative sense and avoid systems, to test some new platform configurations that allow an extended envelope of operation for such miniaturized systems.

The basic performance parameters are presented in the following list:

- **Maximum Take Off Weight:** it represents the overall value of the vehicle mass. It is calculated considering the whole RW-MAV with every kind of device or instrument installed on it at the moment of the start of the mission (take off).

- **Payload:** for this parameter different definitions can be found. In our case, considering the modular conception of the platforms that will be designed, the payload can be seen as the maximum weight of the module applied to the vehicle. The difference between maximum take off weight and payload represents just the weight of the vehicle with the only devices strictly needed to make it fly.

- **Maximum speed:** this is the highest value of speed that the RW-MAV can reach during the fly.

- **Endurance:** it represents the time that the air vehicle can spend flying before a new landing is required (for changing batteries, refueling, recharging, downloading collected data).

- **Range:** it represents the maximum distance from the starting point that the vehicle can reach considering that it must come back and land. This parameter could change depending on the mission. In fact if it is not required the RW-UAV to come back, the maximum range could be theoretically double.

- **Ceiling:** due to the changing of the air characteristics with the altitude with respect to the sea level, the RW-UAV can reach a maximum height depending on its characteristics (power, efficiency, etc.).

2. INNOVATIVE RW-MAV PLATFORMS, DIFFERENT FROM THE CONVENTIONAL ONES

The basic requirements to satisfy in order to successfully complete an urban mission are:

- **Safety:** is for sure the most relevant topic when any kind of vehicle, especially if it is a flying vehicle, has to operate near to human beings. In case of accident, due to an external factor (system failure, too strong wind, etc.) or a mistake during the mission (wrong manual maneuver, bad mission definition to the autopilot, etc.), the contact between any rotating part of the vehicle and people in the surrounding has to be prevented and avoided.

- **Agility:** in urban environments it is common to find buildings very close one to each other, with different height, trees, electric cables, poles and a huge number of other fix or moving obstacles. For this reason, once took for granted that any “urban-UAV” must have its own collision avoidance system, the vehicle needs a great agility in terms of rapidity in changing speed, direction or altitude. The controllability must be improved as the speed of the platform increases as at high speed there is less time for decision and command of escape maneuvers. This characteristic would be probably more relevant than other, like the maximum speed value, because in narrow spaces it can become strictly necessary. From this point of view the best platform would be the smallest and lightest one (for instance a small 4 rotors) or in general the one with the higher power/mass ratio.

▪ **Autonomy:** in order to satisfy this particular requirement, the general platform layout or shape is not so relevant. More relevance has to be given to all the vision sensors (cameras, IR, thermal or sonar sensors, etc) and the flight control software (autopilot, collision avoidance, etc.). So during the design phase of an UAV for urban applications, all these devices must be taken into account and must be developed very carefully.

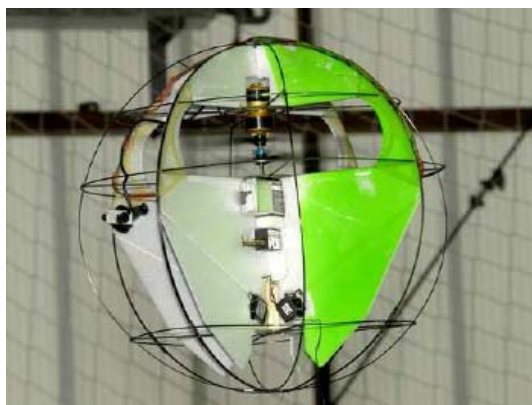


Fig. 1 Concept from ISAE

a) Vision concept from ISAE (Fig. 1) is a new tilt body bi-rotor concept based on two propellers facing each other and surrounded by a series of circular carbon rods. Each propeller is driven by a simple out runner brushless motor which has the advantage to avoid the complexity of a hollow shaft system. Speed control of both motors is carried out through a pair of speed controllers electrically connected through the carbon rods. The ultimate goal of the Vision is to be used as a hand-launch projectile which could be thrown through a window, roll on the floor and take-off to complete its indoor spying mission.

b) AirRobot (Fig. 2) is a micro UAV with autonomous flight and navigation capabilities and modular payloads for use in reconnaissance, surveillance, search and rescue, documentation, inspection and also other scenario.



Fig. 2 AirRobot

AirRobot AR family is a concept based on quadro-rotor solution and has a compact size of only 700 mm in diameter and utilizes a new (patented) propulsion system.

Fancopter (Fig. 3) is a close range aerial reconnaissance micro- system. The compact dimensions and collision avoidance system enable this RW- MAV to be used even inside buildings.



Fig. 3 Fancopter

The Small Quad-rotor **4RW-MAV** (Fig. 4a) is suited for very small payloads and can eventually fly inside buildings. Due to the small size of the platform part of the structure or internal components can be shared with model aircraft industry, this allows the widespread utilization of COTS for the design and development of such systems. Quad-rotors can be up scaled to higher maximum take off weight mass and payload mass to fulfill payload requirements for other missions, such as those coupled with the small shrouded rotor platform (Fig. 4b).

SIERRA Cargo Plus allows the utilization of bigger sensors for missions inside buildings. It results a capability to perform some missions that involve surveillance thanks to the availability of professional camera and video camera in the new payload range.



Fig. 4a - SIERRA Concept , b - Classic and 4RW Cargo Plus

3. AN ANALYSIS OF THE DYNAMICS OF A CONVENTIONAL 4RW-MAV

4RW-MAVs are well-known to have complex dynamics. For instance, to completely capture the state of the “4RW-MAV system” one would have to include the state of the air around the 4RW-MAV into the dynamics model. However, various prior work done on a conventional RW-MAV has shown it is possible to build a sufficiently accurate model for control by treating the 4RW-MAV as a rigid-body, possibly including the blade-flapping dynamics and the main rotor speed.

Let $\{e_N, e_E, e_D\}$ the inertial axes and $\{x_B, y_B, z_B\}$ the body axes. Euler angles of the body axes are $\{\phi, \theta, \psi\}$ with respect to the e_N, e_E and e_D axes (roll, pitch, yaw). Let r the position vector from the inertial origin to the vehicle center of gravity and ω_B the angular velocity. The current velocity direction is referred to as e_v in inertial coordinates.

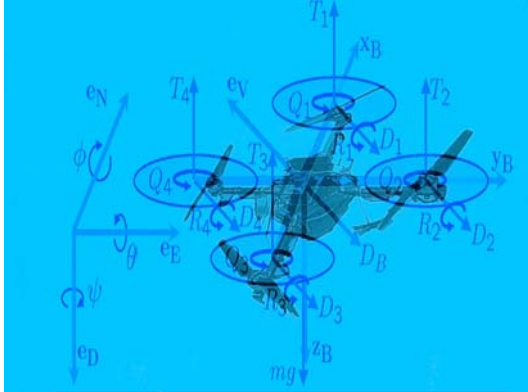


Fig. 5 Diagram of a quad-rotor aircraft

The rotors, numbered 1–4, are mounted outboard on the $x_B, y_B, -x_B$ and $-y_B$ axes, respectively, with position vectors r_i with respect to the CG. Each rotor produces an aerodynamic torque, Q_i , and thrust, T_i , both parallel to the rotor’s axis of rotation, and both used for vehicle control. Here,

$$T_i \approx u_i \frac{k_t}{1 + 0.1s} \quad (1)$$

where u_i is the voltage applied to the motors, as determined from a load cell test. In flight, T_i can vary greatly from this approximation. The torques, Q_i , are proportional to the rotor thrust, and are given by $Q_i = k_r T_i$. Rotors 1 and 3 rotate in the opposite direction as rotors 2 and 4,

so that counteracting aerodynamic torques can be used independently for yaw control. Horizontal velocity results in a moment on the rotors, R_i , about $-e_v$, and a drag force, D_i , in the direction, $-e_v$. The body drag force is defined as D_B , vehicle mass is m , acceleration due to gravity is g , and the inertia matrix is $I \in \mathbb{R}^{3 \times 3}$. A free body diagram is depicted in Fig. 2. The total force, F , and moment, M , can be summed as,

$$F = -D_B e_v + mg e_D + \sum_{i=1}^4 (-T_i z_B - D_i e_v) \quad (2)$$

$$M = \sum_{i=1}^4 (Q_i z_B - R_i e_v - D_i (r_i \times e_v) + T_i (r_i \times z_B))$$

The full nonlinear dynamics can be described as,

$$m \cdot \ddot{r} = F \quad (3)$$

$$I \dot{\omega}_B + \omega_B \times I \omega_B = M$$

where the total angular momentum of the rotors is assumed to be near zero, because they are counter-rotating. Near hover conditions, the contributions by rolling moment and drag can be neglected in Equations (1) and (2).

Define the total thrust as $T = \sum_{i=1}^4 T_i$. The translational motion is defined by,

$$m \ddot{r} = F = -R_\psi \cdot R_\theta \cdot R_\phi T z_B + mg e_D \quad (4)$$

where R_ϕ, R_θ , and R_ψ are the rotation matrices for roll, pitch, and yaw, respectively. Applying the small angle approximation to the rotation matrices,

$$m \begin{bmatrix} \ddot{r}_x \\ \ddot{r}_y \\ \ddot{r}_z \end{bmatrix} = \begin{bmatrix} 1 & \psi & \theta \\ \psi & 1 & \phi \\ \theta & -\phi & 1 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ -T \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ mg \end{bmatrix} \quad (5)$$

Finally, assuming total thrust approximately counteracts gravity, $T \cong \bar{T} = mg$, except in the e_D axis,

$$m \begin{bmatrix} \ddot{r}_x \\ \ddot{r}_y \\ \ddot{r}_z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ mg \end{bmatrix} \begin{bmatrix} 0 & -\bar{T} & 0 \\ \bar{T} & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} + \begin{bmatrix} \phi \\ \theta \\ T \end{bmatrix} \quad (6)$$

For small angular velocities, the Euler angle accelerations are determined from Equation (3) by dropping the second order term, $\omega \times I \omega$, and expanding the thrust into its four constituents. The angular equations become,

$$\begin{bmatrix} I_x \ddot{\phi} \\ I_y \ddot{\theta} \\ I_z \ddot{\psi} \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & -1 \\ 1 & 0 & -1 & 0 \\ K_r & -K_r & K_r & -K_r \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \end{bmatrix} \quad (7)$$

The 4RW-MAV control is based on a 4-dimensional action space: the cyclic pitch controls i_{lon} , i_{lat} , which cause the 4RW-MAV to pitch forward/backward or sideways; the tail rotor (rudder) control i_{rud} , which affects tail rotor thrust, and can be used to yaw (turn) the 4RW-MAV; the main rotors collective pitch control i_{col} , which changes the main rotors thrust by changing the pitch of the rotor blades. The interest is to use a dynamics model with a relatively small number of parameters to be estimated from flight data. In this case we first subtracted the effects of inertia and gravity, and then learn a model from data to predict accelerations in a coordinate frame attached to the 4RW-MAV. We integrate the accelerations over time to obtain position, velocity, orientation, angular rate and main rotor speed. The simplified dynamics uses the following parameterization:

$$\dot{u} = v \cdot r - w \cdot q - g_u + C'_u \cdot [u] \quad (8)$$

$$\dot{v} = w \cdot p - u \cdot r - g_v + C'_v \cdot [v] \quad (9)$$

$$\dot{w} = u \cdot q - v \cdot p - g_w + C'_w \cdot [1; w; i_{col} \cdot \Omega; \sqrt{u^2 + v^2}] \quad (10)$$

$$\dot{\Omega} = C'_\Omega \cdot [1; \Omega; i_{col}; w; \sqrt{u^2 + v^2}; (i_{lat}^2 + i_{lon}^2)] \quad (11)$$

The velocities (u , v , w) and angular rates (p , q , r) are expressed in the 4RW-MAV's reference frame. Here g_u , g_v , g_w refer to the components of gravity in the 4RW-MAV's reference frame; Ω is the main-rotor speed.

4. CONCLUSIONS AND FUTURE WORK

The 4RW-MAV architecture has similar characteristics to the traditional shrouded configuration. The main differences are in the payload entity, the maneuverability and the portability. The payload, instead of being from 3 to 20 kilograms, is less than one kilogram. In this way it is the best choice for scenarios whose payload is an optical camera or a simple IR camera. In this case the maneuverability is crucial and thus the configuration must provide a very high level

of movement. The 4RW-MAV architecture is able to maneuver in a very fast and effective way, moving in a way not possible for the other configurations. The portability can fulfill the needs of a typical mission, in which the rotorcraft should be carried on by a single person and should become operational in a very short time. The weaknesses of the 4RW-MAV configuration are the low speed, low endurance and short range. We found that the net effect relevant for control during a quad rotor autorotation landing was sufficiently well captured by adding a vertical offset relative to the vertical position predicted in the absence of ground effect. This vertical offset was easily estimated from flight data and taken into account accordingly.

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SINGLE VALUED NEUTROSOPHIC SETS

Haibin WANG*, **Florentin SMARANDACHE****, **Yanqing ZHANG***,
Rajshekhar SUNDERRAMAN*

*Computer Science Department, Georgia State University, Atlanta, GA

** Mathematical Department, University of New Mexico, Gallup, NM

Abstract: *Neutrosophic set is a part of neutrosophy which studies the origin, nature, and scope of neutralities, as well as their interactions with different ideational spectra. Neutrosophic set is a powerful general formal framework that has been recently proposed. However, neutrosophic set needs to be specified from a technical point of view. To this effect, we define the set-theoretic operators on an instance of neutrosophic set, we call it single valued neutrosophic set (SVNS). We provide various properties of SVNS, which are connected to the operations and relations over SVNS.*

Keywords: *neutrosophic set, single valued neutrosophic set, set-theoretic operator.*

1. INTRODUCTION

The concept of fuzzy sets was introduced by Zadeh in 1965 [1]. Since then fuzzy sets and fuzzy logic have been applied in many real applications to handle uncertainty. The traditional fuzzy set uses one real value $\mu_A(x) \in [0,1]$ to represent the grade of membership of fuzzy set A defined on universe X . Sometimes $\mu_A(x)$ itself is uncertain and hard to be defined by a crisp value. So the concept of interval valued fuzzy sets was proposed [2] to capture the uncertainty of grade of membership. Interval valued fuzzy set uses an interval value $[\mu_A^L(x), \mu_A^U(x)]$ with $0 \leq \mu_A^L(x) \leq \mu_A^U(x) \leq 1$ to represent the grade of membership of fuzzy set A . In some applications such as expert system, belief system and information fusion, we should consider not only the truth-membership supported by the evident but also the falsity-membership against by the evident. That is beyond the scope of fuzzy sets and interval valued fuzzy sets. In 1986, Atanassov introduced the intuitionistic fuzzy sets [3] which is a generalization of fuzzy sets and provably equivalent to interval valued fuzzy sets. The intuitionistic fuzzy sets consider both truth-membership $t_A(x)$ and falsity-

membership $f_A(x)$, with $t_A(x), f_A(x) \in [0,1]$ and $0 \leq t_A(x) + f_A(x) \leq 1$. Intuitionistic fuzzy sets can only handle incomplete information not the indeterminate information and inconsistent information which exists commonly in belief system. In intuitionistic fuzzy sets, indeterminacy is $1 - t_A(x) - f_A(x)$ by default. For example, when we ask the opinion of an expert about certain statement, he or she may that the possibility that the statement is true is 0.5 and the statement is false is 0.6 and the degree that he or she is not sure is 0.2.

In neutrosophic set, indeterminacy is quantified explicitly and truth-membership, indeterminacy-membership and falsity-membership are independent. This assumption is very important in a lot of situations such as information fusion when we try to combine the data from different sensors. Neutrosophy was introduced by Smarandache in 1995. "It is a branch of philosophy which studies the origin, nature and scope of neutralities, as well as their interactions with different ideational spectra" [4]. Neutrosophic set is a power general formal framework which generalizes the concept of the classic set, fuzzy set [1], interval valued fuzzy set [2], intuitionistic fuzzy set [3] etc. A neutrosophic set A defined on universe U . $x = x(T, I, F) \in A$ with T, I and

F being the real standard or non-standard subsets of $]0^-, 1^+[$. T is the degree of truth-membership function in the set A, I is the indeterminacy-membership function in the set A and F is the falsity-membership function in the set A.

The neutrosophic set generalizes the above mentioned sets from philosophical point of view. From scientific or engineering point of view, the neutrosophic set and set-theoretic operators need to be specified. Otherwise, it will be difficult to apply in the real applications. In this paper, we define the set-theoretic operators on an instance of neutrosophic set called single valued neutrosophic set (svns).

2. NEUTROSOPHIC SET

This section gives a brief overview of concepts of neutrosophic set defined in [2]. Here, we use different notations to express the same meaning. Let S_1 and S_2 be two real standard or non-standard subsets, then $S_1 + S_2 = \{x|x = s_1 + s_2, s_1 \in S_1 \text{ and } s_2 \in S_2\}$, $\{1^+\} + S_2 = \{x|x = 1^+ + s_2, s_2 \in S_2\}$. $S_1 - S_2 = \{x|x = s_1 - s_2, s_1 \in S_1 \text{ and } s_2 \in S_2\}$, $\{1^+\} - S_2 = \{x|x = 1^+ - s_2, s_2 \in S_2\}$. $S_1 \times S_2 = \{x|x = s_1 \times s_2, s_1 \in S_1 \text{ and } s_2 \in S_2\}$.

Definition 1 (Neutrosophic Set). Let X be a space of points (objects), with a generic element in X denoted by x. A neutrosophic set A in X is characterized by a truth-membership function T_A , an indeterminacy-membership function I_A and a falsity-membership function F_A . $T_A(x)$, $I_A(x)$ and $F_A(x)$ are real standard or non-standard subsets of $]0^-, 1^+[$. That is

$$T_A : X \rightarrow]0^-, 1^+[\quad (1)$$

$$I_A : X \rightarrow]0^-, 1^+[\quad (2)$$

$$F_A : X \rightarrow]0^-, 1^+[\quad (3)$$

There is no restriction on the sum of $T_A(x)$, $I_A(x)$ and $F_A(x)$, so $0^- \leq \sup T_A(x) + \sup I_A(x) + \sup F_A(x) \leq 3^+$.

Definition 2. The complement of a neutrosophic set A is denoted by $c(A)$ and is defined by

$$T_{c(A)}(x) = \{1^+\} - T_A(x) \quad (4)$$

$$I_{c(A)}(x) = \{1^+\} - I_A(x) \quad (5)$$

$$F_{c(A)}(x) = \{1^+\} - F_A(x) \quad (6)$$

for all x in X.

Definition 3 (Containment). A neutrosophic set A is contained in the other neutrosophic set B, $A \subseteq B$, if and only if

$$\inf T_A(x) \leq \inf T_B(x), \sup T_A(x) \leq \sup T_B(x) \quad (7)$$

$$\inf F_A(x) \geq \inf F_B(x), \sup F_A(x) \geq \sup F_B(x) \quad (8)$$

Definition 4 (Union). The union of two neutrosophic sets A and B is a neutrosophic set C, written as $C = A \cup B$, whose truth-membership, indeterminacy-membership and falsity-membership functions are related to those of A and B by

$$T_C(x) = T_A(x) + T_B(x) - T_A(x) \times T_B(x) \quad (9)$$

$$I_C(x) = I_A(x) + I_B(x) - I_A(x) \times I_B(x) \quad (10)$$

$$F_C(x) = F_A(x) + F_B(x) - F_A(x) \times F_B(x) \quad (11)$$

for all x in X.

Definition 5 (Intersection). The intersection of two neutrosophic sets A and B is a neutrosophic set C, written as $C = A \cap B$, whose truth-membership, indeterminacy-membership and falsity-membership functions are related to those of A and B by

$$T_C(x) = T_A(x) \times T_B(x) \quad (12)$$

$$I_C(x) = I_A(x) \times I_B(x) \quad (13)$$

$$F_C(x) = F_A(x) \times F_B(x) \quad (14)$$

for all x in X.

3. SINGLE VALUED NEUTROSOPHIC SET

In this section, we present the notion of single valued neutrosophic set (SVNS). SVNS is an instance of neutrosophic set which can be used in real scientific and engineering applications.

Definition 6 (Single Valued Neutrosophic Set). Let X be a space of points (objects), with a generic element in X denoted by x. A single valued neutrosophic set (SVNS) A in X is characterized by truth-membership function T_A , indeterminacy-membership function I_A and falsity-membership function F_A . For each point x in X, $T_A(x)$, $I_A(x)$, $F_A(x) \in [0, 1]$.

When X is continuous, a SVNS A can be written as

$$A = \int_X \langle T(x), I(x), F(x) \rangle / x, x \in X \quad (15)$$

When X is discrete, a SVNS A can be written as

$$A = \sum_{i=1}^n \langle T(x_i), I(x_i), F(x_i) \rangle / x_i, x_i \in X \quad (16)$$

Consider parameters such as capability, trustworthiness and price of semantic Web services. These parameters are commonly used to define quality of service of semantic Web services. In this section, we will use the evaluation of quality of service of semantic Web services [8] as running example to illustrate every set-theoretic operation on single valued neutrosophic sets.

Example 1. Assume that $X = [x_1, x_2, x_3]$. x_1 is capability, x_2 is trustworthiness and x_3 is price. The values of x_1, x_2 and x_3 are in $[0,1]$. They are obtained from the questionnaire of some domain experts, their option could be a degree of “good service”, a degree of indeterminacy and a degree of “poor service”. A is a single valued neutrosophic set of X defined by

$$A = \langle 0.3, 0.4, 0.5 \rangle / x_1 + \langle 0.5, 0.2, 0.3 \rangle / x_2 + \langle 0.7, 0.2, 0.2 \rangle / x_3$$

B is a single valued neutrosophic set of X defined by

$$B = \langle 0.6, 0.1, 0.2 \rangle / x_1 + \langle 0.3, 0.2, 0.6 \rangle / x_2 + \langle 0.4, 0.1, 0.5 \rangle / x_3$$

Definition 7 (Complement). The complement of a single valued neutrosophic set A is denoted by $c(A)$ and is defined by

$$T_{c(A)}(x) = F_A(x) \quad (17)$$

$$I_{c(A)}(x) = 1 - I_A(x) \quad (18)$$

$$F_A(x) = T_A(x) \quad (19)$$

for all x in X .

Example 2. Let A be the single valued neutrosophic set defined in Example 1. Then,

$$c(A) = \langle 0.5, 0.6, 0.3 \rangle / x_1 + \langle 0.3, 0.8, 0.5 \rangle / x_2 + \langle 0.2, 0.8, 0.7 \rangle / x_3$$

Definition 8 (Containment). A single valued neutrosophic set A is contained in

the other single valued neutrosophic set B , $A \subseteq B$, if and only if

$$T_A(x) \leq T_B(x) \quad (20)$$

$$I_A(x) \leq I_B(x) \quad (21)$$

$$F_A(x) \geq F_B(x) \quad (22)$$

for all x in X .

Note that by the definition of containment, X is partial order not linear order. For example, let A and B be the single valued neutrosophic sets defined in Example 1. Then, A is not contained in B and B is not contained in A .

Definition 9. Two single valued neutrosophic sets A and B are equal, written as $A = B$, if and only if $A \subseteq B$ and $B \subseteq A$.

Theorem 3. $A \subseteq B \Leftrightarrow c(B) \subseteq c(A)$

Proof: $A \subseteq B \Leftrightarrow T_A \leq T_B, I_A \leq I_B, F_B \leq F_A$
 $1 - I_B \leq 1 - I_A, T_B \geq T_A \Leftrightarrow c(B) \subseteq c(A)$

Definition 10 (Union). The union of two single valued neutrosophic sets A and B is a single valued neutrosophic set C , written as $C = A \cup B$, whose truthmembership, indeterminacy-membership and falsity-membership functions are related to those of A and B by

$$T_C(x) = \max(T_A(x), T_B(x)) \quad (23)$$

$$I_C(x) = \max(I_A(x), I_B(x)) \quad (24)$$

$$F_C(x) = \max(F_A(x), F_B(x)) \quad (25)$$

for all x in X .

Example 3. Let A and B be the single valued neutrosophic sets defined in Example 1. Then,

$$A \cup B = \langle 0.6, 0.4, 0.2 \rangle / x_1 + \langle 0.5, 0.2, 0.3 \rangle / x_2 + \langle 0.7, 0.2, 0.2 \rangle / x_3$$

Theorem 2. $A \cup B$ is the smallest single valued neutrosophic set containing both A and B .

Proof: It is straightforward from the definition of the union operator.

Definition 11 (Intersection). The intersection of two single valued neutrosophic sets A and B is a single valued neutrosophic set C , written as $C = A \cap B$, whose truthmembership, indeterminacy-membership and

falsity-membership functions are related to those of A and B by

$$T_C(x) = \min(T_A(x), T_B(x)) \quad (26)$$

$$I_C(x) = \min(I_A(x), I_B(x)) \quad (27)$$

$$F_C(x) = \min(F_A(x), F_B(x)) \quad (28)$$

for all x in X.

Example 4. Let A and B be the single valued neutrosophic sets defined in Example 1. Then,

$$A \cap B = \langle 0.3, 0.4, 0.5 \rangle / x_1 + \langle 0.3, 0.2, 0.6 \rangle / x_2 + \langle 0.4, 0.1, 0.5 \rangle / x_3$$

Theorem 3. $A \cap B$ is the largest single valued neutrosophic set contained in both A and B.

Proof: It is direct from the definition of intersection operator.

Definition 12 (Difference). The difference of two single valued neutrosophic set C, written as $C = A \setminus B$, whose truth-membership, indeterminacy-membership and falsity-membership functions are related to those of A and B by

$$T_C(x) = \min(T_A(x), F_B(x)) \quad (29)$$

$$I_C(x) = \min(I_A(x), 1 - I_B(x)) \quad (30)$$

$$F_C(x) = \min(F_A(x), T_B(x)) \quad (31)$$

for all x in X.

Example 5. Let A and B be the single valued neutrosophic sets defined in Example 1. Then,

$$A/B = \langle 0.2, 0.4, 0.6 \rangle / x_1 + \langle 0.5, 0.2, 0.3 \rangle / x_2 + \langle 0.5, 0.2, 0.4 \rangle / x_3$$

Now we will define two operators: truth-favorite (Δ) and falsity-favorite (∇) to remove the indeterminacy in the single valued neutrosophic sets and transform it into intuitionistic fuzzy sets or paraconsistent sets. These two operators are unique on single valued neutrosophic sets.

Definition 13 (Truth-favorite). The truth-favorite of a single valued neutrosophic set A is a single valued neutrosophic set B, written as $B = \Delta A$, whose truthmembership and falsity-membership functions are related to those of A by

$$T_B(x) = \min(T_A(x) + I_A(x), 1) \quad (32)$$

$$I_B(x) = 0 \quad (33)$$

$$F_B(x) = F_A(x) \quad (34)$$

for all x in X.

Example 6. Let A be the single valued neutrosophic set defined in Example 1. Then,

$$\Delta A = \langle 0.7, 0, 0.5 \rangle / x_1 + \langle 0.7, 0, 0.3 \rangle / x_2 + \langle 0.9, 0, 0.2 \rangle / x_3$$

Definition 14 (Falsity-favorite). The falsity-favorite of a single valued neutrosophic set B, written as $B = \nabla A$, whose truth-membership and falsity-membership functions are related to those of A by

$$T_B(x) = T_A(x) \quad (35)$$

$$I_B(x) = 0 \quad (36)$$

$$F_B(x) = \min(F_A(x) + I_A(x), 1) \quad (37)$$

for all x in X.

Example 8. Let A be the single valued neutrosophic set defined in Example 1. Then

$$\nabla A = \langle 0.3, 0, 0.9 \rangle / x_1 + \langle 0.5, 0, 0.5 \rangle / x_2 + \langle 0.7, 0, 0.4 \rangle / x_3$$

4. PROPERTIES OF SET- THEORETIC OPERATORS

In this section, we will give some properties of set-theoretic operators defined on single valued neutrosophic sets as in Section 3.

Property 1 (Commutativity). $A \cup B = B \cup A$, $A \cap B = B \cap A$, $A \times B = B \times A$.

Property 2 (Associativity). $A \cup (B \cup C) = (A \cup B) \cup C$, $A \cap (B \cap C) = (A \cap B) \cap C$, $A \times (B \times C) = (A \times B) \times C$.

Property 3 (Distributivity). $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$, $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

Property 4 (Idempotency). $A \cup A = A$, $A \cap A = A$, $\Delta \Delta A = \Delta A$, $\nabla \nabla A = \nabla A$.

Property 5. $A \cap \phi = \phi$, $A \cup X = X$, where $T\phi = I\phi = 0$, $F\phi = 1$ and $T_X = I_X = 1$, $F_X = 0$.

Property 6. $A \cup \phi = A$, $A \cap X = A$, where $T\phi = I\phi = 0$, $F\phi = 1$ and $T_X = I_X = 1$, $F_X = 0$.

Property 7 (Absorption). $A \cup (A \cap B) = A$, $A \cap (A \cup B) = A$.

Property 8 (De Morgan's Laws). $c(A \cap B) = c(A) \cap c(B)$, $c(A \cup B) = c(A) \cup c(B)$.

Property 9 (Involution). $c(c(A)) = A$.

Here, we notice that by the definition of complement, union and intersection of single valued neutrosophic sets, single valued neutrosophic sets satisfy the most properties of classic set, fuzzy set and intuitionistic fuzzy set. Same as fuzzy set and intuitionistic fuzzy set, it does not satisfy the principle of middle exclude.

5. CONCLUSIONS

In this paper, we have presented an instance of neutrosophic set called single valued neutrosophic set (SVNS). The single valued neutrosophic set is a generalization of classic set, fuzzy set, interval valued fuzzy set, intuitionistic fuzzy set and paraconsistent set. The notion of inclusion, complement, union, intersection, have been defined on single valued neutrosophic sets. Various properties of set-theoretic operators have been provided. In the future, we will create the logic inference system based on single valued neutrosophic

sets and apply the theory to solve practical applications in areas such as expert system, information fusion system, question-answering system, bioinformatics and medical informatics, etc.

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MOBILE HEALTH CARE SYSTEM E-LEARNING SECURITY SYSTEM DESIGN

Alex STEFAN

Bloomfield College, Bloomfield, New Jersey, USA

Abstract: *The Mobile Health Care (MCHC) System has an e-learning component, to train IT managers in understanding the IT security policies and strategies, applied on real organizations, like for-profit provider of primary, acute and emergency care to a rural population in a 50 mile radius. The MCHC e-learning system can be also assumed as a remote control system, used for testing security algorithms in the designing system process.*

Keywords: *e-learning, security systems, security algorithms.*

1. INTRODUCTION

Our task is to move our patient care system into the 21st century so that we continue to provide outstanding care, while maximizing revenue, to the following customers:

- Clinic, acute and emergency patients at our central location
- Satellite clinics in the surrounding community
- Outpatients and chronic care patients being treated at home
- Emergency patients in transit by ambulance

This requires secure information transfer between multiple user groups, accessing multiple applications via both wired and mobile devices, connected within the MCHC complex and remotely over the Internet.

The Mobile Health Care was design fist like an e-learning system to provide a better idea for the next step, implementation with the cooperation of the IT and security managers.

Concept of Operation

The patient data systems consist of the following:

- Patient identification
- MCHC Patient Healthcare departmental data will be assumed also as RCHC data (remote control health care)
 - Treatment history

- Scheduling
- Procedures, tests and results
- Test and implant device communications
 - Health Care Provider treatment plans and payment for treatments.
 - Insurance providers
- Payment authorization (billing is not directly handled by this system)
- Treatment plan and outcome database.

Users will access the system through the following methods:

- Patients
 - Remote locations
 - Personal computers
 - Future generation m smart phones, capable of operating via wifi and VOIP.
 - Within the MCHC complex
 - Terminals in patient rooms connected client-server over the LAN.
- CHC personnel
 - Client-server over the LAN
 - Client-server over the Internet for outsourced billing coding.
- Satellite Healthcare providers
 - Within the MCHC complex
 - workstations in the treatment and testing areas
 - Future generation smart phones, capable of operating over WIFI and VOIP
 - Remotely

- Personal computers
- Smart phones
- Insurance providers
 - Remotely over the Internet
- Surgically implanted appliances and portable medical test devices
 - Remotely over the Internet
 - Client-server over the LAN within MCHC complex.

2. e-LEARNING SYSTEM SECURITY & SENSITIVITY RISK PROPOSAL

The e-Learning Security & Sensitivity Policy is intended to help MCHC employees to determine what information can be disclosed to non-employees, as well as the relative sensitivity of information that should not be disclosed outside of MCHC without proper authorization.

The information covered in these guidelines includes, but is not limited to, information that is either stored or shared via any means. This includes: electronic information, information on paper, and information shared orally or visually (such as telephone and video conferencing).

All employees should familiarize themselves with the information labeling and handling guidelines that follow this introduction.

It should be noted that the sensitivity level definitions were created as guidelines and to emphasize common sense steps that you can take to protect MCHC Confidential information.

All MCHC information is categorized into two main classifications:

- MCHC Public
- MCHC Confidential

Table 1 MCHC Descriptive Security Policies Design for e-Learning System (extract)

Threat agents	IT ASSET AT RISK	Security Requirements	SECURITY POLICY
MCHC Employee	Patients Info	SR1: protect patients database from being seen by outsiders/unauthorized insiders SR2: protect the encrypted backup database from being seen by outsiders/unauthorized insiders	- Information Sensitivity Policy - Employee Internet Use Monitoring and Filtering Policy - Network Support Policy - Remote Access Policy - Acceptable Use Policy - Password Policy - Acceptable Encryptions / Mobile Device Encryptions Policy - Email Use (retention, forwarded, instant messenger) Policy - Database Password Policy
WIRELESS Employee	Wireless Internal Access	SR1: protect patients database from being seen by outsiders/unauthorized insiders /wireless WPA/no broadcast SR2: protect the encrypted backup database from being seen by outsiders/unauthorized insiders	• Information Sensitivity Policy • Wireless Device Policy • Employee Internet Use Monitoring and Filtering Policy • Network Support Policy • Remote Access Policy • Acceptable Use Policy • Password Policy • Acceptable Encryptions / Mobile Device Encryptions Policy • Email Use (retention, forwarded, instant messenger) Policy • Database Password Policy

HACKER	Wireless Sensitive Data	SR1: protect patients database from being seen by outsiders/unauthorized insiders /wireless WPA/no broadcast SR2: protect the encrypted backup database from being seen by outsiders/ unauthorized insiders SR2d: wireless monitoring	Information Sensitivity Policy Wireless Device Policy Employee Internet Use Monitoring and Filtering Policy Network Support Policy Remote Access Policy Acceptable Use Policy Password Policy Acceptable Encryptions / Mobile Device Encryptions Policy
MCHC MEDICAL ERRORS	MCHC Medical Practice	(covered SR15, SR16) (covered by SR19, SR17)	Personal Communication Devices and Voicemail Policy Acceptable Use Policy
System Admin	Power Server Loss	(covered SR15, SR16) (covered by SR19, SR17)	Acceptable Use Policy

Table 2 MCHC – e-Learning System Risk Management & Security Policies (extract)

Threat agents	IT ASSET AT RISK	RISK MANAGEMENT	SECURITY POLICY
MCHC EMPLOYEE	Patients Info	- Encryption stored MCHC P, HCPT - Daily backup MCHC P, HCPT, PTS, HCPT - OS patch - Firewall installed and maintain - Antispyware installed and maintain	Information Sensitivity Policy Employee Internet Use Monitoring and Filtering Policy Network Support Policy Remote Access Policy Acceptable Use Policy Password Policy Acceptable Encryptions / Mobile Device Encryptions Policy Email Use (retention, forwarded, instant messenger) Policy Database Password Policy
HACKER	Health care provider info	Antispyware update Employee contract of confidentiality Background check for System Administrator	Virtual Private Network Policy Ethics Policy Personal Communication Devices and Voicemail Policy Acceptable Use Policy
MCHC MEDICAL ERRORS	MCHC Medical Practice	Employee contract of confidentiality Logging updates and monitoring Logging layers with monitoring access Backup and encrypt sensitive data	Personal Communication Devices and Voicemail Policy Acceptable Use Policy
System Admin	Power Server Loss	Antispyware update Employee contract of confidentiality Background check for System Administrator Logging update and monitoring access	Acceptable Use Policy

3. e-LEARNING SYSTEM SECURITY RISK PROPOSAL ALGORITHM (EXTRACT)

The risk analyses was made by using a risk score calculation (proposal algorithm) over the MCHC Security Policy, an audit algorithm after the Security Policies were implemented.

The following steps have to be followed for risk score calculations:

- Decide the risk level of each item. The risk level of the item indicates its relative importance.
- Numerical value assign for the risk level:
 - Very High: 4;
 - High: 3;
 - Medium: 2;
 - Low: 1.
- If the response to the item is “Yes”, give the “Yes Details. This could take up any of the given three values: “Planned/Just started”, “partially completed” and “Fully implemented”.
- The final risk score for an item is calculated as follows:

▪ If the response is “NO” then the risk score is determined by the Risk level as follows:

- If risk is “Very High” then the score is 4;
 - If risk is ”High” then the score is 3;
 - If the risk is “Medium” then the score is 2;
 - If the risk is “Low” then the risk is 1.
- If the response is “Yes” then the risk score is determined by both the risk level and the “Yes Details” as follows:

- If risk is “Very High” then the score is 4* (“Yes Details” weight);
- If risk is ”High” then the score is 3* (“Yes Details” weight);
- If the risk is “Medium” then the score is 2* (“Yes Details” weight);
- If the risk is “Low” then the risk is 1* (“Yes Details” weight);

Where “Yes Details” weights are the followings:

“Planned/Just started”: weight 0.5

“Partially completed”: weight 0.25

“Fully implemented”: weight 0.

“Risk Upper Limit” is the maximum risk posed by an item, is used to calculate the “Percentage Risk Abated (%RA)”.

ORGANIZATION: MCHC	RESPONSE	“YES” DETAILS	RISK	RISK SCORE	
SECURITY POLICY	YES NO N/A	- Planned/Just started - Partially completed - Fully implemented	VERY HIGH HIGH MEDIUM LOW	Results	RISK UPPER LIMIT
Have the Information Security Policies been issued to all employees, including third party personnel and contractors?	Yes	Planned/Just started	VERY HIGH	2	4
Have all employees formally acknowledge adherence to the Information Security policies?	Yes	Partially completed	VERY HIGH	1	4
Are all users required to sign an Internet usage and responsibility agreement that acknowledge compliance with Internet policy	NO		VERY HIGH	4	4
TOTAL				19	77

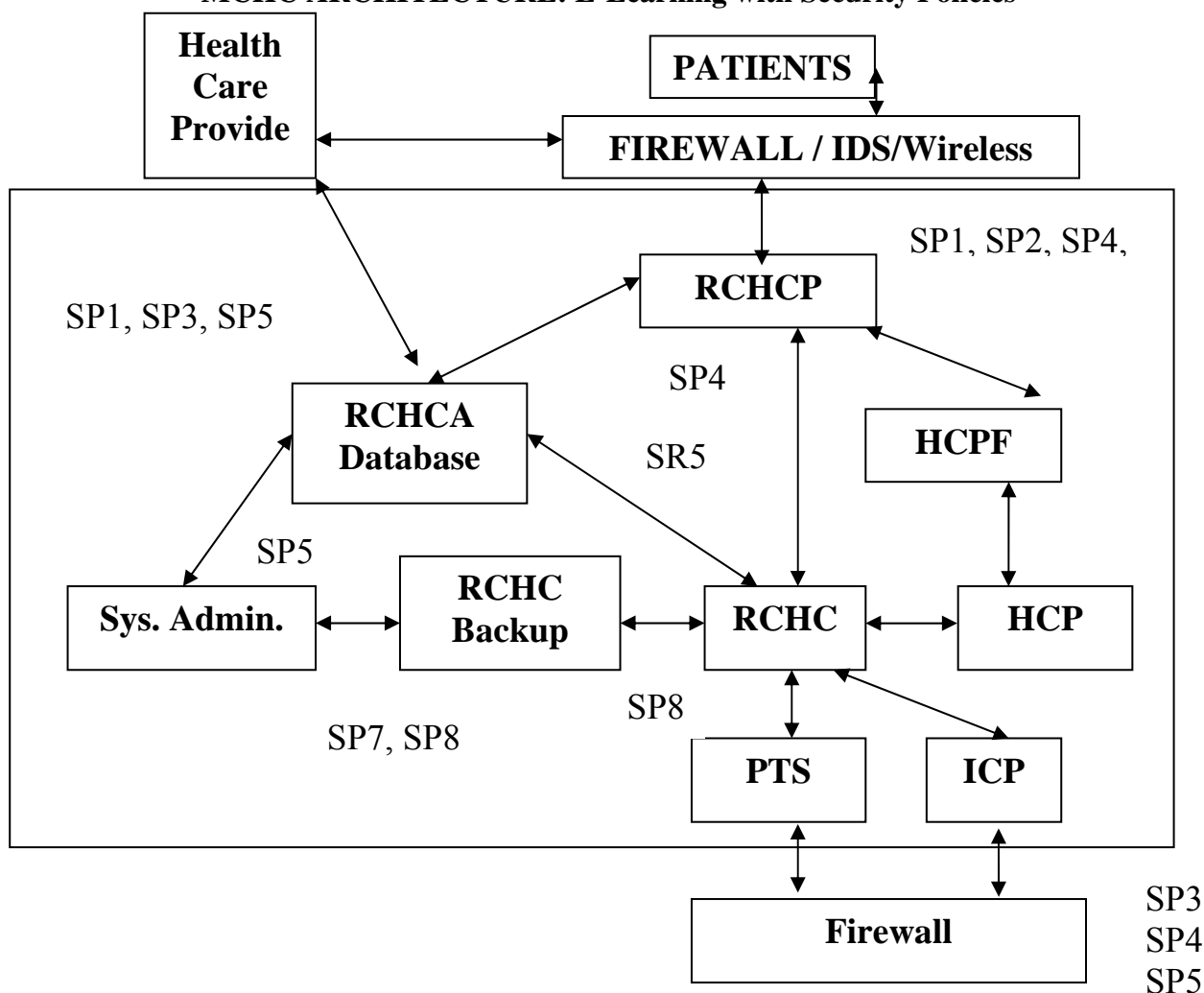
$$\%RA = 1 - \frac{\sum (\text{Risk Score})}{\sum (\text{Risk Upper Limit})} = 0.23$$

4. CONCLUSIONS

After MCHC/RCHC Security analyses were low risk, the security architecture was ready for implementation.

The e-Learning system will implement the low risk architecture in order to train mobile system employee. The security analysis generates the password policies (SP5) and audit vulnerability scan Policy (SP8), also.

MCHC ARCHITECTURE: E-Learning with Security Policies



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CONSIDERATIONS ABOUT FIGHTING AGAINST CYBERCRIME

Ioan Gheorghe RATIU*, Ioan Daniel RATIU**, Mihail Gabriel RATIU***

*"George Baritiu" University, Brasov, Romania, **ORIX Corporation, Tokyo, Japan

***Blom Bank France-Romania

Abstract: This paper presents some fundamental considerations to fight against cybercrime and highlights several legal aspects that contribute to building a trusted information society. It also introduces basic principles in computer forensic and deals with the notions of crime scene and digital traces. It presents a methodology to conduce effective investigation in a digital environment.

Keywords: computer, cybercrime, cyber-attack, cybercriminal, fight, forensic, law.

1. INTRODUCTION

The evolution of the society generates changes in the way to commit crimes (technologies as a tool to perform criminal activities) and also modifies the target of crime (information, computers and telecommunication infrastructures become the object of illegal actions). It is our responsibility to support such changes by defining effective law and regulation procedures, by organizing juridical and law enforcement systems in a way to satisfy needs of the information society and by realizing adequate private-public partnerships. To prevent, deter and fight cybercrime, cyber threats and cyber attacks should be well understood. To pursue cybercriminals, knowing cybercriminal motivation and their modus operandi is not sufficient if the society is not able to supervise and recognize illicit activities and discover criminals. For that, trained persons, tools and procedures for cybercrime pattern recognition, tacking charge of digital evidence and performing computer investigations should be operational and effective.

The number of security incidents reported to CERT [1], has been growing steadily since the start of the current century, as has the number of attacks reported to the legal authorities, contributing to a better understanding and accountability of computer

crime. Large-scale police operations conducted in several countries show that the authorities are reacting and adapting to the new criminal context. The arrest and conviction of several virus authors and spammers testify to the determination to deal with these new types of nuisance. However, the number of convictions remains very low given the sheer volume of spam and viruses circulating on a daily basis. The rate of unreported cybercrime is difficult to estimate. It is possible that the legal authorities, the police and the general public are aware of no more than 12% of cybercrime [2].

2. THE IMPORTANCE OF SECURITY ENFORCEMENT FOR FIGHTING AGAINST CYBERCRIME

In a global protection strategy, fighting cybercrime effectively involves:

- increasing the level of effort the criminal has to make to perpetrate a crime;
- increasing the level of perceived risks;
- decreasing expected profits.

In order to reach these strategic protection goals, information and communication security solutions have to be put in place. For example, with regard to the level of effort needed to carry out an attack, potential targeted resources can be less vulnerable if there is access control, integrity control, authentication control or monitoring

mechanisms. Enforcing network security architecture through the use of firewalls is also a technical measure that makes an attack more difficult to effect. In a complementary approach, legislative and regulatory measures help to raise the level of risk perceived by a criminal. Today, there are different phases of a cyber attack. The object of the first phase is to gather information and explore potential vulnerabilities in the target system, in order to gain a maximum of information for future exploitation. This involves studying the mechanisms and levels of security used for identification, authentication, access control, encryption and surveillance, and identifying technical, organizational and human weaknesses in the environment. The attacker often attempts to coax naive or credulous users into revealing information that can be used to design an attack (*this is called social engineering*). Social engineering is related to techniques, procedures, and measures used by malicious people, who usually take advantage of the users' credulity to, *inter alia*, obtain their passwords and connection parameters and usurp their digital identity, in order to trick and breach the system by pretending to be authorized visitors. Hackers can also look for and exploit known – but not yet repaired (patched) – security vulnerabilities, using the available means (attack libraries, attack toolkits) to infiltrate the system. The retreat phase is intended to cover up the traces of the attack, or to ensure that the traces that are left do not allow the hacker to be identified. Hackers increase their anonymity by using aliases, usurping legitimate users' identities, or covering their tracks by means of multiple intermediate (relay) systems. If the attacker does not know the target well (*phase 1 of the attack is insufficient*), the risk of being tracked down increases.

An attack can target a security system (*firewall, authentication server, etc.*), a security-related system to (*router, DNS, etc.*) or a system which has no link to security measures, services or functions, such as workstations or web servers, Fig. 1. According to the type of system targeted, the attack will be more or less difficult to carry out, more or less rapidly detected and have a varying

degree of negative impact. In any case, the computer hacker exploits the weaknesses of the target system. Even security systems are both vulnerable and fallible. Some systems are easy to attack; others are much less so. In order to correctly react to an attack, it is important to identify the visible objective of the attack and the means used for it. The more an incident is documented, the better the security policy will be able to adapt to the new “post-crisis” context. In the same vein, it is also necessary to monitor the company's information system daily, particularly the network, to identify attacks as soon as possible so that they can be countered efficiently. This is dependent on an attack prevention strategy.

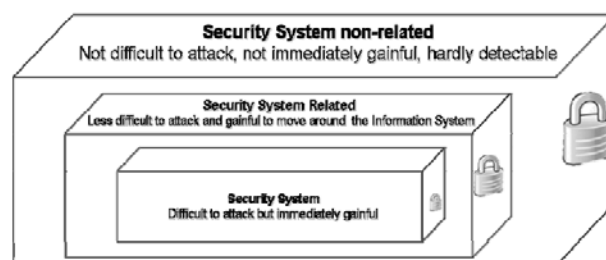


Fig. 1 Target systems and levels of cyber attack

Several attack recognition software programs (Intrusion Detection Systems - IDS) are available to address this last issue. They function in a very similar way to anti-virus software. They identify attacks according to a certain signature (attack pattern). The development of new types of attacks implies that it is vital to constantly upgrade intrusion detection systems.

Some of them follow attack recognition methods based on predictable user behavior (derivation of normal procedure). Their efficacy depends especially on their capacity to correctly discriminate the normal activities from those which lead to intrusions. Intrusion detection systems can be located in points of control such as networks, routers, or firewalls. Once a suspicious event is detected, systems should be capable of recording the event, generating a report, alarming the users (e.g. sending electronic messages or alerts by pager to operators), to activate security mechanisms or to end connections in progress.

Human resources management adapted to security needs, in particular at the time of

departure of computer specialists or users, is also important to prevent internal risks. At the same time, the security administrator should have an idea of the level of attraction that the system he has to protect represents for a potential criminal.

The identification of an attack must allow for a fast reaction in order to limit the harmful extent and consequences of it. Mastering a cyber attack should in addition help to identify the perpetrator for the purposes of potential prosecution. A reaction strategy involves five types of action: Identification of the attack; Evaluation of the goal of the attack (vandalism, diversion, etc.); Alert, report and notification (legal service, etc.); Blocking of the attack; Recovery and return to the normal situation as fast as possible.

To prevent threats, in-depth knowledge of the environment to be protected as well as in-depth knowledge of the values to be preserved is mandatory. An elementary rule consisting in avoiding the attribution of excessive privileges to users is to be respected when systems are configured, even if it means increasing their rights gradually according to need and this, for a limited duration.

3. PURSUING CYBERCRIMINALS

Fighting against cybercrime means that security technical barriers must be effective to increase the level of difficulty to attack a system. The perpetration of a malevolent act becomes more complex and the chances of performing it are reduced. But it is not enough if the criminal always feels that he or she could act with impunity. So really to increase the level of risk taken by the criminal, he must understand that he is carrying out a malicious act. Laws must, therefore, exist to criminalize illicit behavior and members of the justice system and police forces should have the means to identify criminals and bring them to justice in order to receive an appropriate sentence.

A nation's ability to deter, detect, investigate and prosecute cybercriminals' activities is one of the most important components for affording secure information infrastructures. Because of the international

nature of the Internet, vulnerabilities and weaknesses could compromise the security of others all around the globe. The absence of applicable and enforceable laws in a country leads to the creation of **digital paradises** used to develop harmful activities. The consequences of a digital paradise are prejudicial for all concerned. Each country has to set appropriate technical measurements and adopt an enforceable legal framework. That means that criminal laws must exist and police have the capacity to investigate and pursue computer-related crime.

To prevent, deter and fight cybercrime, cyber threats and cyber attacks should be well understood. To pursue cybercriminals, knowing cybercriminal motivation and their modus operandi is not sufficient if the society is not able to supervise and recognize illicit activities and discover criminals. For that, trained persons, tools and procedures for cybercrime pattern recognition, tacking charge of digital evidence and performing computer investigations should be operational and effective. Understanding a cybercriminal's motivation and level of technical skills can help to assess how serious an attack is, and assist in devising a counter-strategy. It could also be useful when trying to identify him during a police investigation.

Understanding cybercriminal profiles and motivation could be a great help to protect information technologies and pursue cybercriminals. At the present time there are two main groups of cybercriminals: the professionals who make money from their work, and the amateurs, who tend to be persons with a pronounced need for recognition.

Computer-related crime is sophisticated, and is usually committed across national borders, frequently with a time delay. The traces it leaves in the systems are intangible and difficult to gather and save.

They take the form of digital information stored on all sorts of media: working memory, storage peripherals, hard discs, external discs and USB sticks, electronic components, etc. The problem is how to capture the wide variety of evidence turned up in a digital search.

Digital evidence is even more difficult to obtain when it is scattered across systems located in different countries. In such cases, success depends entirely on the effectiveness of international cooperation between legal authorities and the speed with which action is taken. Effective use of such evidence to identify individuals depends on the speed with which requests are treated: if treatment is slow, identification is next to impossible.

In most countries there is a significant mismatch between the skills of the criminals who commit high-technology crimes and the resources available to the law-enforcement and justice authorities to prosecute them. The use of computer technologies by those authorities, whether at the national or international level, remains weak and varies greatly from one country to another.

In a global protection strategy, fighting cybercrime effectively involves:

- Increasing the level of effort the criminal has to make to perpetrate a crime;
- Increasing the level of perceived risks;
- Decreasing expected profits.

In order to reach these strategic protection goals information and communication security solutions have to be put in place. Enforcing network security architecture through the use of firewalls is also a technical measure that makes an attack more difficult to take effect.

4. COMPUTER FORENSIC AND CYBERCRIME LEGAL ISSUES

Any criminal investigation follows procedures developed in a specific appropriate framework. Some variations could exist from country to another but the following steps could be largely found: research of indicators and clue, criminal identification and localization, court evidence presentation.

When law enforcement agents are notified that a computer-related crime has been committed, police should gather evidence of the illicit action. As with any other criminal case, a search warrant may be executed; investigations, interviews or interrogations may be conducted in order to identify suspects and, if necessary, bring them before the courts. The purpose of any investigation is to discover

and present facts that contribute to establishing the truth.

Any computer systems' information and communication device (electronic components, memory devices, hard discs, USB sticks, etc.) or information it contains is potential targets or instruments of crime. Any devices are sources of digital evidence. Each software or data execution or transaction leaves digital traces in various components. Criminals take advantage of the territorial nature of the Internet and the lack, in some countries, of legislation outlawing computer-related crime, as well as the multitude of jurisdictions covering the Internet. In a similar manner to monetary tax havens, digital safe havens allow criminals to host servers, distribute illegal content or perform illegal actions without fear of being brought to justice. Installing such servers on the territory of weak countries creates a haven for cross-border operations. The lack of international regulations and control, and the ineffective nature of international cooperation in legal investigations and prosecutions allow cybercriminals to be very effective.

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Effective use of such evidence to identify individuals depends on the speed with which requests are treated: if treatment is slow, identification is next to impossible. One of the most important features is the duration during which Internet Service Providers keep information concerning user subscriptions and activities (IP addresses, connection data, etc.). The retention period, during which data is available in order to retrieve someone's identity from his IP address, varies from one country to another, and can be decided by national law. Legal systems must give law enforcement agencies the appropriate authority to access traffic data.

The legal constraint of recording connection data for a certain amount of time (six months is a minimum, given the speed of

international legal assistance procedures) obliges ISPs to provide adequate facilities to store and retrieve information when ordered. For Instant messaging services and Peer-to-peer or Internet relay chat facilities, logs and historical content of communication are kept for only a few days, when indeed they are kept. In fact, there is no guarantee that logs or user records exist or are conserved. Traces are volatile and rapidly removed from servers, and anyone can run an Internet relay chat server, for example.

Once the IP address of a system involved in a criminal activity has been identified, the next step is to answer the question “Who was using the computer?” It is always very difficult to establish the identity of a person on the basis of an IP address, email or web addresses or a digital trace. An IP address identifies a computer, not a person and criminals use false or stolen identities.

Investigators with a solid understanding of information technologies and the Internet, who use cybercrime investigation methodology in conjunction with effective international cooperation, should be able to uncover the criminal’s identity. In most cases at present, the police and legal authorities rely on conventional investigation methods used for ordinary crime in order to identify, arrest and prosecute cybercriminals. A trace is a mark, object or sign not always visible to the naked eye, or a vestige of a presence or an action at the place of the latter [3].

Within the context of cybercrime, digital traces may be seen as outwardly immaterial; nevertheless digital traces reside on a material reality – a particular state of memory (CD-ROM, etc.). Therefore, a digital trace is very similar to a traditional material one. Any trace is fragile and susceptible to deterioration; some may even be invisible or inaccessible.

Some IT computer forensic tools and procedures exist. They should be used by trained and competent experts.

On the other hand, criminals could be tracked by active communication monitoring and live surveillance. Telephone, e-Mail or instant messaging eavesdropping is possible to collect information related to communication content or non-content such as e-Mail headers

or IP addresses. In fact, criminals can also be identified through undercover investigation when investigators join instant messaging (IM) services, peer-to-peer networks (P2P), Internet relay chat (IRC), newsgroups, etc. to lure criminals.

In the same way criminals have developed attack methodologies and patterns that can help them to be efficient, investigators should learn to optimize computer crime investigation by transferring practical knowledge into rigorous search strategy methodology and standard operating procedures.

Whereas the IT security manager tries to recover its systems in the shortest time, to ensure the continuity of the production, the investigator is subjected to the formal constraints of the penal procedure which requires on him to obtain as much traces as possible, and to preserve them in accordance with very precise legal standards.

The problem of identification of the author is for him secondary towards the preservation of the activity of the organization. The recovery of the system represents so for him the end of the incident while it is often situated at the beginning of the investigator’s intervention (temporal gap). The procedures of reboot of Information System are often contradictory with the conservation of traces which would allow proving the reality of the attack, to select a group of suspects, and to obtain possible legally valid evidences.

However, when an incident has occurred, it can be useful to have additional information which could accelerate the work of the investigator. First of all, it is about the complete inventory of the human, software and hardware resources which make up the information system of the organization. In particular, the configuration and location of the computer systems and the networks should be available, as well as a logical map of the information system. Secondly, it is convenient to operate specific tools of collection, memorization, and analysis of electronic traces, which respect the constraints in which is subdued the procedure of investigation. It concerns the operational management tools of the network, the analysis means of the traffic, the audit methods, the intrusion detection

systems, the firewalls, and the log files. The common use of rigorous procedures of authentication of the data produced by all these means, in particular through the integrity control and the time stamping of the corresponding files, should strengthen the value of the electronic traces which they can supply. Eventually, an additional guarantee is brought by the regular conservation of the most important data (logs of logins and errors) on supports such as CD-ROM and DVD-ROM. It is necessary to underline that these various means will see their "judicial" value increasing by the yardstick of the regularity with which they are operated.

One cannot keep any more, today, to a security policy based essentially on prevention and detection. Such a point of view would mean that criminals, in this domain, are not as good as their homologues of the "real" world.

It is mandatory to include, as soon as the conception phase of a security strategy, the elements needed by an effective collaboration between IT security managers, and investigators in charge of tracking possible traces after the commission of an offence. It is first of all necessary to create the conditions of a real dialogue between representatives of two professional worlds who misunderstand each other. It is then unavoidable to alter the methods of conception of Information Systems, in order to allow, as soon as they are used in production processes, the protection of the information generated by the management of the system, in order to use it during the judicial proceedings of possible delinquents.

Since a growing number of business activities are computer assisted, and more and more computers are interconnected through Internet technologies, computer-related crime becomes often "cybercrime" which could be defined as a computer related crime committed in the cyberspace [4].

An attacked computer, (mainframe, personal computer, or even a personal digital assistant-PDA, etc.) is scrutinized in order to collect traces of an offence. In the same time, a cybercrime scene should be seen as any other scene of crime, with one further dimension, rather than a fully different space of investigation. The very problem is the nature

of the trace to be collected in a distributed systems environment as the Internet. The trace can be a "traditional" one, like a fingerprint, but it can also consist in information characterizing for example, some action that the targeted system is not supposed to perform. And when a network is used, traces are distributed all over interconnected systems. This introduces a new level of complexity in the daily work of an investigator who had to determine quickly which traces have to be privileged and where to collect them. A first question is to know what to look for.

The nature of the trace depends also on new criteria generated by the use of computer systems. In information technologies environment, a trace is not necessarily the information by itself, but rather its digitalized representation. Depending on how it is collected, a computer related trace will be considered as physical or not. For instance, if a log file is mirrored from the suspect's hard drive, it is a pure "non-physical" trace. And if the hard-drive is seized in order to use the log file as evidence, it is partly physical, since the support has to be treated as part of the trace.

Then, there is often a risk to base the choice of which traces to look for in emergency and crisis situation, on the first elements reported by the Information System Manager, who is usually the priority interlocutor of the investigator. She/he has a constraint of business continuity that is not really compatible with the needs of an investigation. In fact, she/he can also possibly be part of the malevolent act and have modified some traces to lead the investigator on a wrong trail.

The "human" dimension must absolutely be taken into account, since it could jam the communication between both parties. An investigator could be influenced by the traditional forensic way of exploring the scene of crime. At the same time, a computer scientist or an information systems manager have a totally different approach of the computer system and its environment.

The relative value of the existing traces must also be evaluated according to the life cycle of digital data. Finally, one must evaluate the interest of discovered traces

through their possible value in a court, compared with the technical difficulty generated by their collection and conservation.

When dealing with cybercrime, the investigator has to locate the place and time of creation of the traces that could become potential evidences. This is particularly difficult since many actors can be involved, at different moment of the criminal process, and geographically dispersed.

Time location depends on various system management policies. Each policy has to be understood by the investigator when he wants to find if a trace could still be collected somewhere in the system.

For the space location of relevant traces, the position of the author is not sufficient to limit the area of investigation. An information system connected through the Internet can be distributed between many locations. For instance, when server's management is outsourced, the data are often stored on a server situated in a remote facility. To reach this location, even from inside the enterprise, a criminal should certainly use the infrastructure of an Internet Access Provider. The physical support of the access could be different and each one of them will have its own policy for connections logs creation and conservation.

Several space locations to look for digital traces could exist when dealing with:

- A usual computer investigation: traces are localized in a system;
- A local area network (LAN) investigation: some network management tools can have stored information about the transactions or actions that occurred during the incident as for example;
- Internet environment investigation particularities: some of the "global carriers" (like backbone operators) log a lot of management information (in order to better manage their quality of service). This also can provide clues about the real attacker, or his/her true motivation;
- Internet Access Provider (IAP): Network management tools of the victim's IAP can be invaluable to find the origin of the attack (the "attacking system") and the possible destination of some of the stolen assets (specific data or financial transactions);

- In other hand, the IAP of the attacking system gives information about o the time of internet access (when done through ISDN or dial-up).

In the cyberspace, evidence can be very "volatile". Depending on the physical support, and on the nature of the processes that created them, digital traces can be more or less resilient. Four factors are determinant:

- The easiness of creation: this factor qualifies the technical difficulty encountered to create the trace during the normal operations of the system;
- The durability of the trace on the support: this criterion helps to define on which kind of support the first investigations have to be led;
- The speed of deletion by the existing tools of the system: usually, the deletion of a file is easily performed by the operating system;
- The ability to be fully erased: some physical supports are very difficult to clean.

The apparition of new and complex financial tools, at the same time of the markets globalization, led to a growth of sophisticated financial crime. A considerable effort was conducted to teach judges and police officers how to investigate such affairs. Once seen as very "exotic", financial crime is now fully integrated in judicial mechanisms, and even if its investigations needs expertise, time, and means, it is not seen as exceptional.

To accelerate this evolution, methods should be develop to better qualify the incidents, and to help the investigator to engage enough resources when needed. Investigating a cybercrime can be time consuming, and focusing on the right source of traces can become the only way to lead a case to its achievement. Another enhancement could reside in the collaboration between the investigator and the people in charge of IT infrastructures and security concerned by the offence. This can be improved notably by a perception of the investigator as "computer literate" or technically competent, by in place system administrators. Two ways lead to such a professional recognition: formation and formalization. Formation is a question of human resources management. Formalization is the consequence of applied research. By comparing best practices, existing guidelines,

with what is really needed in the field by the officer, researchers should be able to develop a common method of cyber scene of crime investigation that could improve investigator's efficiency, and the acceptance by the professionals.

A relevant international reference on cybercrime legal issues could be finding in the Convention on Cybercrime of the Council of Europe. The convention identifies cybercrimes that should be prosecuted and gives direction to investigate such crimes. The problem of international cooperation is also addressed. The Council of Europe, on November 8, 2001 adopted the Convention on cybercrime (ETS nr. 185) [6] and its Explanatory Report [7], which were proposed for signature on November 21 in Budapest on the issue of the International Conference on Cybercrime. Today this convention constitutes a worldwide recognized reference document.

The criminalization of xenophobic acts committed through computer systems is treated by the additional protocol to the convention on cybercrime (EST 189).

Additional offences related to attempting to commit or aiding and abetting offences, as defined in the Convention, is also punishable and the question of indirect liability is raised.

The section "jurisdiction" mentions that each party is required to punish the commission of crimes established in the convention, committed in its territory.

Existing police cooperation and mutual assistance modalities need a point of contact available in each country 24 hours per day, 7 days per week in order to ensure immediate assistance in investigation.

For indication, a non exhaustive list of law domains is proposed [8, 9, 10]: Penal; Civil; Commercial; Telecommunication; Privacy and data protection; Copyright; Unfair competition; Banking and professional secrecy; Right of disclosure/access; Statutory obligations for storage/disclosure; Accounting.

5. VULNERABILITY OF THE INTERNET ACTIVITIES

Many vulnerabilities and threats exist putting in danger any activities realized over

the Internet. From natural disasters, to malevolence acts, passing by errors or lack of control and management, a wide range of incidents can occur that has a negative impact on Internet activities. Fig. 2 summarizes some weakness points of an Internet infrastructure and Fig. 3 identifies some problems due to technology misuse or lack of sufficient security measures.

Most of communication protocols of the Internet can be misused to serve cyber attacks purposes and potentially any systems connected through the Internet can be the target of attacks [5].

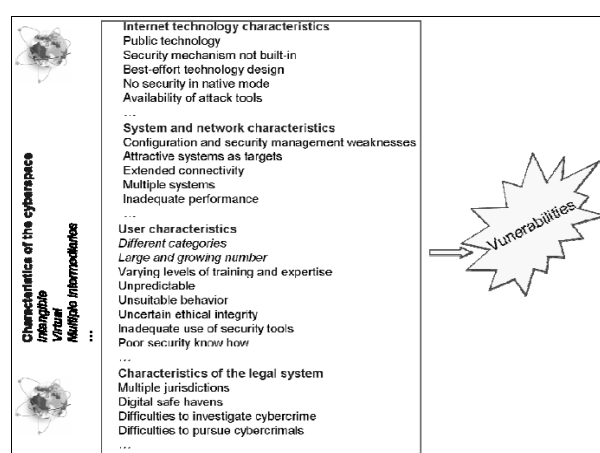


Fig. 2 Some weak points of an Internet infrastructure

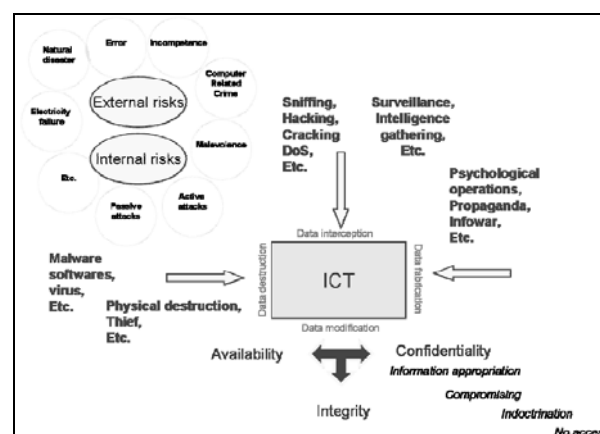


Fig. 3 Security breaches and impacts

A comprehensive, multilateral, international response is required, as mentioned by the Cybercrime Convention of the Council of Europe. Several different points of view, needs, and actors should be taken into consideration to strike an acceptable compromise between "freedom" and

“security”. The global information society and knowledge economy are constrained by the development and overall acceptance of an international cyber security framework. The validity of such a framework or model requires a challenging multidimensional and multi stakeholder’s approach for everyone – from individuals to organizations and states.

Cybercrime is not restricted to geographical or national boundaries. A criminal can be located in a country different from the one in which the crime produces its effects. Domestic laws are confined to a specific territory but electronic exchanges or data flows do not know any geographical boundaries.

6. CONCLUSION

Increasing awareness among all information society actors and stakeholders is fundamental but not sufficient to fight against cybercrime. Usual security policy prevention measures consist on raising the overall level of risk taken by criminals and by decreasing profitable expectations. That implies capacities to detect criminals’ activities over the Internet, to localize, to identify and pursue criminals. To achieve it, complementary legal, organizational and technical measures and resources should exist and be efficient at local and international levels. As criminals exploits Internet vulnerabilities, less weaknesses should contribute to decrease criminal opportunities. That means that is necessary to improve and enforce information technologies robustness and information security technical, procedural and organizational measures. Doing that, the level of difficulty of an attacks is augmented and the related cost in terms of efforts, means and know how needed to perpetrate an illicit action is increased. All in all, a global, comprehensive and integrative information security approach will contribute to reduce information society threats and risks.

Today, a relative deficiency still exists of:

- A global and well understanding culture of cyber security for all the actors of the information society;
- Adequate legal, organizational, technical measures;

- International cooperation to fight against cybercrime and enforce ICT infrastructures security.

It points out urgent requirements present at international, regional and national levels, to resolve the capacity building problem in order to obtain confidence and security in the use of ICTs, as identified by the World Summit on the Information Society [11] (Geneva 2003, Tunis 2005) and by the Global Cyber security Agenda ITU’s initiative launched on World Telecommunication and Information Society day 2007 by Dr Hamadoun Touré Secretary-General of ITU [12].

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ABOUT AERODYNAMIC CALCULUS OF IMPELLERS USING THE NUMERICAL METHODS

Beazit ALI*, Gheorghe SAMOILESCU*

*"Mircea cel Bătrân" Naval Academy, Constanța, Romania

Abstract: An algorithm for aerodynamic calculus of impeller using numerical methods (Computational Fluid Dynamics) is presented. The geometry of the impeller was analytically determined and the main objective is to compare the analytical solutions of lift with the numerical solutions.

Keywords: impeller, numerical solution, analytical solution, propeller.

1. INTRODUCTION

A Hovercraft is also sometime called an Air Cushion Vehicle or ACV. This is a vehicle that can drive on land like a car but will traverse ditches and small gullies like it is flat terrain. The Hovercraft is a unique method of transportation.

Modern Hovercraft are used for many applications where people or equipment need to travel at speed over water but be able to load and unload on land.

The hovercraft engine provides the power to drive fans that blow air under the craft. The air is retained by a rubber 'skirt' that enables the craft to travel over a wide range of terrain. The skirt simply gives way when an obstacle is encountered.

The engine also supplies power to a thrust propeller that pushes the craft forward on its 'bubble' of air. Rudders, like on an airplane, steer the direction of the craft. The propeller used to impeller for to drive the hovercraft along is usually an aircraft type with fixed or variable pitch blades.

For the analytical solution of thrust many hypotheses are made. Aerodynamic calculus of impeller's propeller using numerical methods (Computational Fluid Dynamics - CFD) can give us more accurate solutions for thrust. Also the distribution for the parameters of aerodynamic field is determined.

2. PROBLEM DESCRIPTION

The problem consists in the flow through a hovercraft fan with 6 blades. Due to cyclic periodicity only one blade will be modeled.

For geometric model was used GAMBIT software. For each aerodynamic profile were introduced 33 points (10 sections). The geometry of the impeller's propeller is the one determined in the analytical calculus. Figure 1 present the geometry of the fan and the boundary conditions.

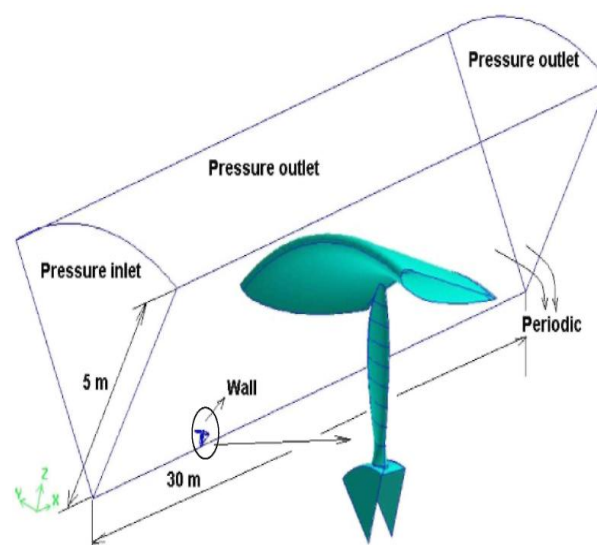


Fig. 1 Geometry and boundary conditions

As shown in figure 1, domain's extremities were chosen far enough from the fan.

For the lateral faces of the domain cyclic periodicity condition was applied.

The domain is rotating at the corresponding speed (fan speed – different values for each case considered) and because of this the ring wall has only the no-slip condition (implicit for turbulent flows) and the speed of the blade wall was set to 0 m/s.

For operating conditions the pressure was set to 101325 Pa.

In consequence, the boundary conditions are:

- “wall” for blade – Stationary Wall;
- “wall” for ring – Moving Wall – Relative to adjacent cell zone – Speed 0 rot/sec – Rotational – Direction (1,0,0) (x axis);
- “fluid” – Moving reference frame - Speed n rot/sec – Rotational – Direction (1,0,0) (x axis)
- “pressure outlet” – Gauge pressure 0 Pa – Backflow turbulence intensity 0,05% - Backflow turbulence viscosity ratio 1;
- “pressure inlet” – Gauge pressure 0 Pa – Turbulence intensity 0,05% - Turbulence viscosity ratio 1;
- “periodic” – rotational.

3. NUMERICAL SOLUTION

The discretisation of the domain was made considering a finer mesh around the blade and the ring, where the gradients are bigger and a coarse mesh at extremities. The final mesh with 524 000 tetrahedral cells is presented in figure 2.

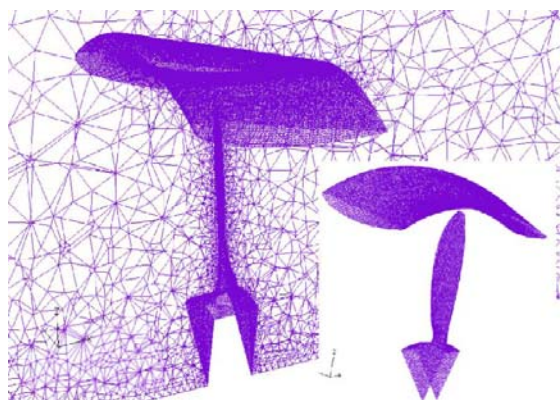


Fig. 2 Unstructured grid – 524 000 tetrahedral cells

The lateral faces of the domain were link-meshed for mesh correspondence in cyclic periodicity.

The working fluid is air with standard proprieties.

The solutions were determined using the segregated solver, implicit formulation. The implicit formulation has a faster convergence but needs more computational resources. The segregated method solves Navier-Stokes equations separated using the algorithm presented in figure 3.

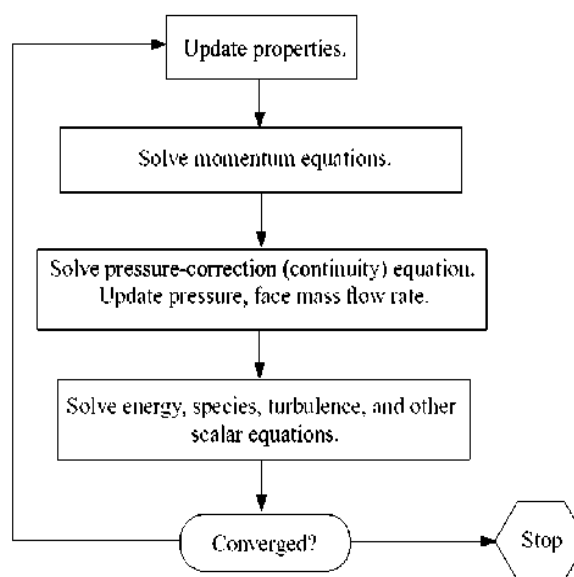


Fig. 3 Segregated method

The turbulence model is k-ε standard model and for each solution (rotational speed of the fan) were made 1000 - 1500 iterations until convergence.

The numerical solution was calculated for:
 Z = 6 – number of rotor blades;
 D = 1,15 m – diameter of rotor;
 P = 20 kW; 30 kW; 40 kW; 50 kW; 60 kW – engine power;
 n = 2000 rot/min; 2500 rot/min; 3000 rot/min; 3500 rot/min; 4000 rot/min – rotational speed of rotor.

In figure 4 is presented the distribution of static pressure for P = 60 kW, n = 3500 rot/min.

As was mentioned before, the reference pressure is 101 325 Pa.

In figure 5 is presented the distribution of velocity for P = 60 kW, n = 3500 rot/min.

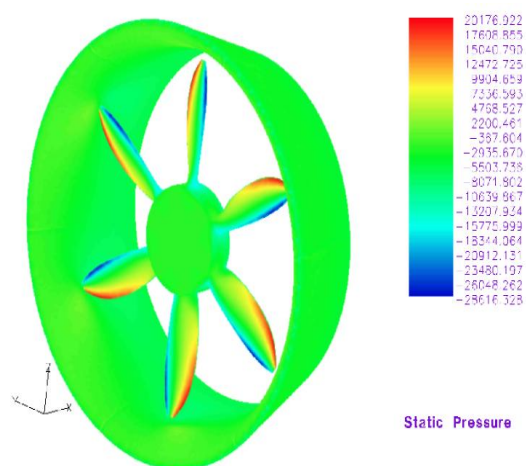


Fig. 4 Distribution of static pressure

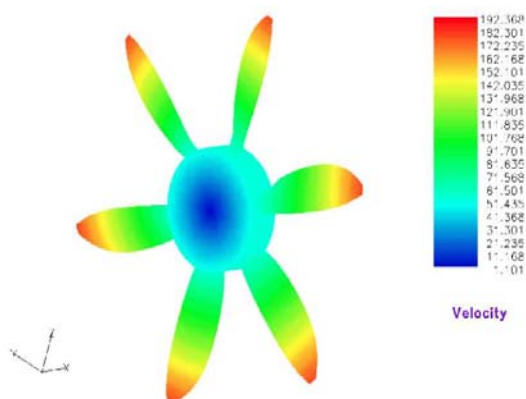


Fig. 5 Distribution of velocity

4. RESULTS AND DISCUSSIONS

The blade geometrical parameters listed in table 1 and 2 were determined in the analytical calculus.

In tables 3 and 4 are listed the analytical and numerical values calculated for thrust. There are also calculated the relative errors between analytical and numerical solutions.

Relative error = (numerical value – analytical value)/analytical value.

Table 1 Distribution of chord length (c) and airfoil width (b) along R

Type	I	
	b	c
r b/c		
30%	46,1	87,41
40%	18,99	109,1
50%	14,84	121,55
60%	13,02	128,58
70%	11,82	128,49
80%	10,22	117,55
90%	7,39	87,91
100%	3,73	45,16

 Table 2 Reference angle at $r = 0,75 (D/2) [^\circ]$

n(rot/min) P(W)	2000	2500	3000	3500	4000
20000	16.06	10.17	6.62	4.20	2.41
30000	20.86	13.49	9.17	6.29	4.22
40000	25.09	16.31	11.29	8.01	5.68
50000	29.00	18.84	13.16	9.50	6.93
60000	32.74	21.18	14.86	10.85	8.04

Table 3 Relative errors between analytical and numerical solutions. Thrust [N]

P/n	2000 rpm			2500 rpm			3000 rpm		
	Analytic	Numeric	Relative error	Analytic	Numeric	Relative error	Analytic	Numeric	Relative error
20000	837.3	874.26	+ 4.4 %	803.2	851.3	+ 5.9 %	721.4	789.2	+ 9.4 %
30000	1096.2	1250.2	+ 14 %	1088.5	1245.6	+ 14.4 %	1034.5	1215.2	+ 17.5 %
40000	1316.5	1489.1	+ 13.1 %	1329.5	1426.1	+ 7.2 %	1295.3	1425.6	+ 10 %
50000	1510.6	1725.3	+ 14.2 %	1543.5	1759.5	+ 13.9 %	1526	1746.1	+ 14.4 %
60000	1686.7	1856.8	+ 10 %	1739.4	1902.7	+ 9.3 %	1735.5	1923.1	+ 10.8 %

Table 4 Relative errors between analytical and numerical solutions. Thrust [N]

P\n	3500 rpm			4000 rpm		
	Analytic	Numeric	Relative error	Analytic	Numeric	Relative error
20000	578	642.8	+ 11 %	358.7	425.6	+ 18.7 %
30000	925.5	1098.4	+18.7 %	758.4	889.4	+ 17.2 %
40000	1213.3	1459.3	+ 20.2 %	1078.2	1215.3	+ 12.7 %
50000	1462.2	1614.1	+ 10.3 %	1350.2	1498.7	+ 10.9 %
60000	1690.1	1923.2	+ 13.8 %	1591	1775.2	+ 11.5 %

5. CONCLUSIONS

The model was generated using the coordinates determined from analytical solution and respects exactly the aerodynamic surface. The accuracy of aerodynamic surfaces is mandatory for CFD analyses.

Parametrical definition of geometry allows us to change very easy the problem.

The numerical values are bigger than the analytical values because in calculus of the numerical solution the flow is turbulent and the propeller is placed inside the ring.

The thrust of tubed propellers can't be calculated exactly with analytical algorithms.

There are experimentally determined coefficients witch multiplies the thrust of free propeller. In some references the increasing in thrust is maximum 30%, depending of the shape of the rings.

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OSCILLATORY SOLUTIONS FOR THE SYSTEMS OF DIFFERENCE EQUATIONS WITH VARIABLE COEFFICIENTS

Gheorghe ANTON*, Gheorghe RADU**

*Trades and Services High School, Buzău, **“Henri Coanda” Air Force Academy, Braşov, Romania

Abstract: In this paper we give some sufficient conditions for the oscillation of all solutions of the following system of neutral difference equations with variable coefficients

$$\Delta(u_i(n) + cu_i(n-a\lambda)) + \sum_{j=1}^r \alpha_{ij}(n) u_j(n-k) = 0 ; i = 1, 2, \dots, r$$

where $\alpha_{ij}(n)$ are real sequences with $i, j = 1, 2, \dots, r$; $\lambda, k \in \mathbb{Z}^+$, $a = \pm 1$ and $c \in [-1, \infty)$.

Mathematics Subject Classifications: 39A10

Keywords: systems of difference equations, oscillatory solutions, variable coefficients.

1. INTRODUCTION AND PRELIMINARIES

In this paper, we shall look at the oscillatory properties of all the solutions of the system of neutral difference equations with variable coefficients

$$\Delta(u_i(n) + cu_i(n-a\lambda)) + \sum_{j=1}^r \alpha_{ij}(n) u_j(n-k) = 0$$

$$i = 1, 2, \dots, r \tag{1}$$

where $\alpha_{ij}(n)$ are real sequences with $i, j = 1, 2, \dots, r$ and $a = \pm 1$, λ, k are positive integers, $c \in [-1, \infty)$ and Δ is the first order forward difference operator, i.e,

$$\Delta u(n) = u(n+1) - u(n).$$

Definition 1. We say that a solution $u(n) = [u_1(n), u_2(n), \dots, u_r(n)]^t$ of equation (1) is oscillating if for some $i \in \{1, 2, \dots, r\}$ and for every integer $n_0 > 0$, there exists $n > n_0$ such that $u_i(n)u_i(n+1) < 0$.

Definition 2. We say that a solution $u(n) = [u_1(n), \dots, u_r(n)]^t$ is nonoscillatory if it is not eventually the trivial solution and if each component $u_i(n)$ has eventually constant

signum.

Although the problem oscillation solutions for the difference equations has attracted many researchers, in recent years there has been much research activity concerning the oscillation of solutions of delay difference equations. For these oscillatory results, we refer to the [1,2,3,4,5,6] and the references therein.

In [2] Agarwal and Grace established oscillation criteria for the higher order systems of difference equations with constant coefficients. Further, in [3] Chuanxi, Kuruklis and Ladas studied oscillatory behaviour of systems of difference equations with variable coefficients.

In this paper, we obtain sufficient conditions for the oscillations of all the solutions of (1). To establish the main results we need a result on the oscillation of solutions of an Eq. with regressive differences [5].

Lemma 1. Let k be a positive integer and let $\{\alpha_n\}$ be a sequence of non-negative real numbers such that

$$\sum_{j=0}^k \alpha_{n+j} > 0 \tag{2}$$

for all large n .

Assume that $\{v_n\}$ is a solution of the following difference inequalities

$$v_{n+1} - v_n + \alpha_n v_{n-k} \leq 0, n = 0, 1, 2, \dots \quad (3)$$

such that

$$v_n > 0 \text{ for } n \geq -k,$$

Then the difference equation

$$u_{n+1} - u_n + \alpha_n u_{n-k} = 0, n = 0, 1, 2, \dots \quad (4)$$

has a solution $\{u_n\}$ such that $0 < u_n \leq v_n$ for $n \geq -k$ and

$$\lim_{n \rightarrow \infty} u_n = 0 \quad (5)$$

Lemma 2. Suppose that $\{\alpha_n\}$ is a positive sequence of real numbers and let k be a positive integer. For every solution of equation (4) to be oscillatory is sufficient to have the relationship

$$\liminf_{n \rightarrow \infty} \left[\frac{1}{k} \sum_{i=n-k}^{n-1} \alpha_i \right] > \frac{k^k}{(k+1)^{k+1}} \quad (6)$$

Proof. Assume, for the sake of contradiction, that equation (4) has a nonoscillatory solution $\{u_n\}$. As the opposite of a solution of Eq. (4) is also a solution, we may (and do) assume that $\{u_n\}$ is eventually positive. Then eventually

$$u_{n+1} - u_n = -\alpha_n u_{n-k} \leq 0$$

and so $\{u_n\}$ is an eventually decreasing sequence of positive numbers. It follows from equation (4) that eventually

$$u_{n+1} - u_n + \alpha_n u_{n-k} \leq 0$$

or

$$\alpha_n \leq 1 - \frac{u_{n+1}}{u_n}$$

and so eventually,

$$\frac{1}{k} \sum_{i=n-k}^{n-1} \alpha_i \leq \frac{1}{k} \sum_{i=n-k}^{n-1} \left(1 - \frac{u_{i+1}}{u_i} \right) \quad (7)$$

Set

$$\alpha = \frac{k^k}{(k+1)^{k+1}} \quad (8)$$

then, from (6), it is clear that we can choose a constant β such that, for n sufficiently large,

$$\alpha < \beta \leq \frac{1}{k} \sum_{i=n-k}^{n-1} \alpha_i \quad (9)$$

Thus, in view of (7),

$$\beta \leq \frac{1}{k} \sum_{i=n-k}^{n-1} \left(1 - \frac{u_{i+1}}{u_i} \right) \quad (10)$$

for all large n .

By using (10) and the well-known inequality between the arithmetic and geometric means we find that for n sufficiently large,

$$\begin{aligned} \beta &\leq \frac{1}{k} \sum_{i=n-k}^{n-1} \left(1 - \frac{u_{i+1}}{u_i} \right) = 1 - \frac{1}{k} \sum_{i=n-k}^{n-1} \frac{u_{i+1}}{u_i} \leq \\ &\leq 1 - \left(\prod_{i=n-k}^{n-1} \frac{u_{i+1}}{u_i} \right)^{1/k} = 1 - \left(\frac{u_n}{u_{n-k}} \right)^{1/k} \end{aligned}$$

that is,

$$\left(\frac{u_n}{u_{n-k}} \right)^{1/k} \leq 1 - \beta \quad (11)$$

for all large n .

In particular, this implies that $0 < \beta < 1$. Now observe that

$$\max_{0 \leq \lambda \leq 1} \left[(1-\lambda)\lambda^{1/k} \right] = \frac{k}{(k+1)^{1/k}} = \alpha^{1/k}$$

where α is the positive constant defined by (8).

Therefore

$$1 - \lambda \leq \alpha^{1/k} \lambda^{-1/k} \text{ for } 0 < \lambda \leq 1$$

and (11) yields

$$\frac{\beta}{\alpha} u_n \leq u_{n-k} \quad (12)$$

for all large n .

By using (12) in Eq. (4) and then by repeating the above arguments we find that

$$\left(\frac{\beta}{\alpha} \right)^2 u_n \leq u_{n-k} \text{ for all large } n$$

and, by induction, for every $m = 1, 2, \dots$ there exists an integer N_m such that for $n \geq N_m$

$$\left(\frac{\beta}{\alpha}\right)^m u_n \leq u_{n-k} \tag{13}$$

Next observe that because of (9), for n sufficiently large,

$$\sum_{i=n-k}^n \alpha_i \geq \sum_{i=n-k}^{n-1} \alpha_i \geq k\beta$$

Hence, for n sufficiently large,

$$\sum_{i=n-k}^n \alpha_i \geq \beta \tag{14}$$

Where $B = k\beta$. Choose m such that

$$\left(\frac{\beta}{\alpha}\right)^m > \left(\frac{2}{B}\right)^2 \tag{15}$$

This is possible because from (9), $\beta > \alpha$. Then for n sufficiently large, say for $n \geq n_0$, (13) is satisfied for the specific m which was chosen in (15), also (9) and (14) hold, and $\{u_n\}$ is decreasing for $n > n_0$. Now in view of (14) and for $n \geq n_0 + k$, there exists an integer \tilde{n} with $n - k \leq \tilde{n} \leq n$ such that

$$\sum_{i=n-k}^{\tilde{n}} \alpha_i \geq \frac{\beta}{2} \text{ and } \sum_{i=\tilde{n}}^n \alpha_i \leq \frac{\beta}{2}$$

From equation (4) and the decreasing nature of $\{u_n\}$, we have

$$\begin{aligned} u_{\tilde{n}-1} - u_{n-k} &= \sum_{i=n-k}^{\tilde{n}} (u_{i+1} - u_i) = - \sum_{i=n-k}^{\tilde{n}} \alpha_i u_{i-k} \\ &\leq - \left(\sum_{i=n-k}^{\tilde{n}} \alpha_i \right) u_{\tilde{n}-k} \leq - \frac{\beta}{2} u_{\tilde{n}-k} \end{aligned}$$

hence,

$$\frac{\beta}{2} u_{\tilde{n}-k} \leq u_{n-k} \tag{16}$$

Similarly,

$$\begin{aligned} u_{n+1} - u_n &= \sum_{i=\tilde{n}}^n (u_{i+1} - u_i) = - \sum_{i=\tilde{n}}^n \alpha_i u_{i-k} \\ &\leq - \left(\sum_{i=\tilde{n}}^n \alpha_i \right) u_{n-k} \leq - \frac{\beta}{2} u_{n-k} \end{aligned}$$

and so

$$\frac{\beta}{2} u_{n-k} \leq u_{\tilde{n}} \tag{17}$$

From (16) and (17) we find

$$\left(\frac{\beta}{2}\right)^2 u_{\tilde{n}-k} \leq u_{\tilde{n}}$$

which in view of (13) yields

$$\left(\frac{\beta}{\alpha}\right)^m \leq \frac{u_{\tilde{n}-k}}{u_{\tilde{n}}} \leq \left(\frac{2}{M}\right)^2$$

This contradicts (14) and so the proof of the theorem is complete.

2. MAIN RESULTS

In this section, we shall establish a few sufficient conditions for the oscillations of all the solutions of equations (1).

i. First, we analyze the behavior of the solutions oscillating system with variable coefficients (1) for a while $c = 0$.

$$u_i(n+1) - u_i(n) + \sum_{j=1}^r \alpha_{ij}(n) u_j(n-k) = 0 \tag{18}$$

where $\{\alpha_{ij}(n)\}$ are real sequences with $i, j = 1, 2, \dots, r$ and $k \in \mathbb{Z}^+$. In this sense we can state the following Theorem.

Theorem 1. Suppose that $c = 0$. Let $\{\alpha_{ij}(n)\}$ be real sequences with $i, j = 1, 2, \dots, r$ and let K be a positive integer. If every solution of the equation

$$v(n+1) - v(n) + \alpha(n)v(n-k) = 0 \tag{19}$$

oscillates, where

$$\alpha(n) = \min_{1 \leq i \leq r} \left\{ \alpha_{ii}(n) - \sum_{j=1, j \neq i}^r |\alpha_{ji}(n)| \right\} > 0 \tag{20}$$

then every solution of (18) oscillates.

Proof. Assume that equation (18) has a nonoscillatory and eventually positive solution $u(n) = [u_1(n), u_2(n), \dots, u_r(n)]^t$. Then, there exists an integer $n_0 > 0$ such that $u_i(n) > 0$ for $n \geq n_0$, $i = 1, 2, \dots, r$. If we let

$$w(n) = \sum_{j=1}^r u_j(n)$$

then

$$w(n+1) - w(n) = - \sum_{i=1}^r \alpha_{ii}(n) u_i(n-k) -$$

$$-\sum_{i=1}^r \sum_{j=1, j \neq i}^r \alpha_{ij}(n)u_j(n-k) \leq -\sum_{i=1}^r \alpha_{ii}(n)u_i(n-k) + \sum_{i=1}^r \sum_{j=1, j \neq i}^r |\alpha_{ij}(n)|u_j(n-k)$$

Therefore, from the above inequality we find the following

$$w(n+1) - w(n) + \sum_{i=1}^r \left[\alpha_{ii}(n) - \sum_{j=1, j \neq i}^r |\alpha_{ji}(n)| \right] u_i(n-k) \leq 0$$

or

$$w(n+1) - w(n) + \alpha(n)w(n-k) \leq 0 \quad (21)$$

$$n \geq n_1 \geq n_0$$

By the eventual positivity of $u_1(n), u_2(n), \dots, u_r(n)$ we conclude that $w(n)$ is eventually positive. Then by Lemma 1, we see that

$$v(n+1) - v(n) + \alpha(n)v(n-k) = 0$$

has a positive solution $\{v(n)\}$ for $n \geq n_1$, which contradicts our hypothesis and completes the proof. Thus, we have the following corollary that is immediate.

Corollary 1. Let $\alpha(n)$ be as in (20) and k be a positive integer. If

$$\liminf_{n \rightarrow \infty} \left[\frac{1}{k} \sum_{i=n-k}^{n-1} \alpha(i) \right] > \frac{k^k}{(k+1)^{k+1}}$$

holds, then all the solutions of the equation (1) oscillate.

Proof. It follows immediately if one takes into account the Lemma 2 and Theorem 1.

Suppose now that $c \in [-1, 0) \cup (0, \infty)$, we can state the following Theorem.

Theorem 2. Let $\{\alpha_{ij}(n)\}$ be real sequences with $i, j = 1, 2, \dots, r$; λ, k ($k > \lambda$) are positive integers and $\alpha(n)$ is defined in (20).

a. If $0 < c < 1$, $a = -1$ and every solution of the equation

$$v(n+1) - v(n) + (1-c)\alpha(n)v(n-k) = 0 \quad (22)$$

is oscillatory, then every solution of equation (1) is oscillating.

b. If $c > 1$, $a = 1$ and every solution of the equation

$$v(n+1) - v(n) +$$

$$+ \frac{1-c}{c^2} \alpha(n)v(n-(k-\lambda)) = 0 \quad (23)$$

is oscillatory, then every solution of equation (1) is oscillating.

c. If $c = 1$, $a = -1$ and every solution of the equation

$$v(n+1) - v(n) + \frac{1}{2} \alpha(n)v(n-k) = 0 \quad (24)$$

is oscillatory, then every solution of equation (1) is oscillating.

d. If $-1 \leq c < 0$, $a = -1$ and every solution of the equation

$$v(n+1) - v(n) + \alpha(n)v(n-k) = 0 \quad (25)$$

is oscillatory, then every solution of equation (1) is oscillating.

Proof. Suppose that $u(n) = [u_1(n), \dots, u_r(n)]^t$ is a nonoscillatory and eventually positive solution of (1), $a = \pm 1$. Then, there exists an integer $n_0 \geq 0$ such that $u_i(n) > 0$ for $n \geq n_0$, $i = 1, 2, \dots, r$.

We let

$$v(n) = \sum_{i=1}^r u_i(n) + c \sum_{i=1}^r u_i(n-a\lambda) \quad (26)$$

then, we have

$$v(n+1) - v(n) = \sum_{i=1}^r \Delta(u_i(n) + cu_i(n-a\lambda)) = -\sum_{i=1}^r \sum_{j=1}^r \alpha_{ij}(n)u_j(n-k)$$

or

$$v(n+1) - v(n) + \sum_{i=1}^r \sum_{j=1}^r \alpha_{ij}(n)u_j(n-k)$$

So, as in Theorem 1, we have for $n \geq n_1 \geq n_0$

$$v(n+1) - v(n) + \alpha(n)w(n-k) \leq 0 \quad (27)$$

where

$$w(n) = \sum_{i=1}^r u_i(n)$$

It is clear that $\{v(n)\}$ and $\{w(n)\}$ are positive sequences. We see from (26) that if $a = -1$ and $0 < c < 1$, then eventually

$$v(n) = w(n) + cw(n+\lambda),$$

and we get eventually,

$$\begin{aligned} w(n) &= v(n) - cw(n + \lambda) \geq \\ &\geq v(n) - cv(n + \lambda) \geq (1 - c)v(n) \end{aligned}$$

therefore, we get eventually,

$$w(n - k) \geq (1 - c)v(n - k) \quad (28)$$

If $c > 1$ and $a = 1$, then,

$$\begin{aligned} w(n) &= \frac{1}{c}(v(n + \lambda) - w(n + \lambda)) = \\ &= \frac{1}{c}v(n + \lambda) - \frac{1}{c^2}(v(n + 2\lambda) - w(n + 2\lambda)) \geq \\ &\geq \frac{1}{c}v(n + \lambda) - \frac{1}{c^2}v(n + \lambda) = \\ &= \frac{c - 1}{c^2}v(n + \lambda) \end{aligned}$$

therefore, by using above inequality, we get eventually,

$$w(n - k) \geq \frac{c - 1}{c^2}v(n - (k - \lambda)) \quad (29)$$

Now, we take the $c = 1$ and $a = -1$. Then, by (26) eventually,

$$v(n) = w(n) + w(n + \lambda)$$

so eventually,

$$w(n) = v(n) - w(n + \lambda) \geq v(n) - w(n)$$

and we have eventually,

$$w(n) \geq \frac{1}{2}v(n) \quad (30)$$

Now, we take the $-1 \leq c < 0$ and $a = -1$. Then, by (26) eventually,

$$v(n) = w(n) + cw(n + \lambda)$$

and we have eventually,

$$w(n) = v(n) - cw(n + \lambda)$$

and so eventually,

$$w(n) \geq v(n)$$

and we have eventually,

$$w(n - k) \geq v(n - k) \quad (31)$$

Next, from the above we have the following:

a. If $0 < c < 1$, and $a = -1$, by (31) and (28), we obtain eventually,

$$v(n + 1) - v(n) + (1 - c)\alpha(n)v(n - k) \leq 0$$

b. If $c > 1$, and $a = 1$, then, by (27) and (29), we obtain eventually,

$$v(n + 1) - v(n) + \frac{1 - c}{c^2}\alpha(n)v(n - (k - \lambda)) \leq 0$$

c. If $c = 1$, and $a = -1$, then, by (27) and (30), we obtain eventually,

$$v(n + 1) - v(n) + \frac{1}{2}\alpha(n)v(n - k) \leq 0$$

d. If $-1 \leq c < 0$ and $a = -1$, then, by (27) and (31), we obtain eventually,

$$v(n + 1) - v(n) + \alpha(n)v(n - k) \leq 0$$

Using the same reasoning as in Theorem 1 we arrive at a contradiction in each of the above situations and the theorem is completely proven.

The following corollaries are immediate, if one takes into account Lemma 2 and Theorem 2.

Corollary 2. Let $\{\alpha_{i,j}(n)\}$ be real sequences with $i, j = 1, 2, \dots, r$; λ, k ($k > \lambda$) be positive integers and $\alpha(n)$ is defined in (20).

a. Suppose that $0 < c < 1$, $a = -1$, if

$$\liminf_{n \rightarrow \infty} \left[\frac{1}{\lambda} \sum_{i=n-\lambda}^{n-1} \alpha(i) \right] > \frac{1}{1 - c} \frac{\lambda^\lambda}{(\lambda + 1)^{\lambda+1}}$$

then every solution of (1) is oscillating.

b. Suppose that $c > 1$, $a = 1$, if

$$\liminf_{n \rightarrow \infty} \left[\frac{1}{\lambda} \sum_{i=n-\lambda}^{n-1} \alpha(i) \right] > \frac{c^2}{c - 1} \frac{(k - \lambda)^\lambda}{(k - \lambda + 1)^{k - \lambda + 1}}$$

then every solution of (1) is oscillating.

c. Suppose that $c = 1$, $a = -1$, if

$$\liminf_{n \rightarrow \infty} \left[\frac{1}{\lambda} \sum_{i=n-\lambda}^{n-1} \alpha(i) \right] > 2 \frac{\lambda^\lambda}{(\lambda + 1)^{\lambda+1}}$$

then every solution of (1) is oscillating.

d. Suppose that $-1 \leq c < 0$, $a = -1$, if

$$\liminf_{n \rightarrow \infty} \left[\frac{1}{\lambda} \sum_{i=n-\lambda}^{n-1} \alpha(i) \right] > \frac{\lambda^\lambda}{(\lambda + 1)^{\lambda+1}}$$

then every solution of (1) is oscillating.

4. CONCLUSIONS

The results of this work may constitute the starting point for other generalizations. In reference [6], under some appropriate conditions over the real sequences $\{\alpha_n\}$, and $\{\beta_n\}$, the behavior of all the solutions of the oscillating difference equation with variable coefficients is studied.

$$u_{n+1} - u_n + \sum_{i=1}^r \alpha_{in} u_{n-k_i} + \beta_n u_{n-m} = 0$$

Where

$m \in \{\dots, -2, -1, 0\}$, $k_i \in \mathbb{N}$ and $k_i \in \{\dots, -3, -2\}$, $i = 1, 2, \dots, r$, respectively.

It is therefore, interesting to analyze the oscillating behavior of the system of the difference equations with variable coefficients corresponding to

$$u_i(n+1) - u_i(n) + \sum_{j=1}^r \alpha_{ij}(n) u_j(n-k_j) + \beta_i(n) u_i(n-m) = 0, \quad i = 1, 2, \dots, r$$

under certain conditions imposed on coefficients $\alpha_{ij}(n)$ and $\beta_i(n)$, eg

$$\liminf_{n \rightarrow \infty} \alpha_{ij}(n) = \alpha_{ij}$$

and

$$\liminf_{n \rightarrow \infty} \beta_i(n) = \beta_i > 0.$$

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THE STUDY OF THEORETICAL PROBLEMS RELATED TO THE MILITARY EQUIPEMENT AND TECHNOLOGIES WITH THE HELP OF COMPUTER ASSISTED GRAPHICS

Horia TARZIU*, Anamaria COMES*

*The Air Force Academy “Henri Coandă”, Brasov, Romania

Abstract: The article exemplifies some of the applications of the CAD concept in the study of the fundamental technical subjects, which precedes the study of the specialty subjects in military aviation equipment and technologies: double orthogonal projection and solid modeling, revolution bodies, mass properties, animated representation techniques, graphical methods for the cinematic study of the link rod mechanisms.

Keywords: orthogonal projection, animated representation, flanges, bushes, sleeves, shafts, lids.

1. THE PRINCIPLE OF THE FIRST AND THIRD ANGLE ORTHOGRAPHIC PROJECTION

The normal positioning of projections can be easily and evocatively acquired by using the solid modeling of polyhedrons. Fig. 1 illustrates a realistic image of a prism with a series of chamfers, channels and orifices.

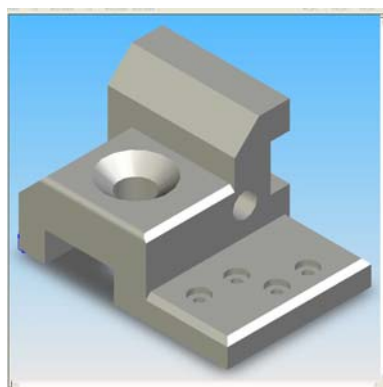


Fig. 1 The analyzed theoretic model

The terms specific to solid modeling technique were imposed by the emergence of the specialized programs for this purpose. Therefore, they do not always have an analogous term in Romanian. For instance, the widely used term *feature* is translated as *characteristic* even though it also denotes a

certain operation and a particular element. For example, an extrusion, by comparison with the technological process that bears the same name, could be the very process through which a sketch is transformed into a solid. Also, the same extrusion can be the basic characteristic of a complex solid. Finally, extrusion can be considered a tool as well, i.e. a solidification tool.

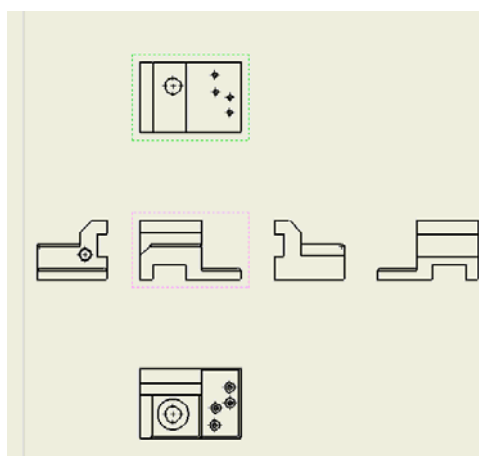


Fig. 2 Principle of angle orthographic

In other words, according to the English terminology of solid modeling, the instrument, the process and the modeled element are sometimes referred to by using the same term.

The terms first and third angle correspond to the notation used in mathematics for the

quadrants of a circle. In Fig. 2, the body represented in Fig. 1 is considered as placed inside an imaginary cube, projected onto the cube's interior faces, after which the latter are displayed in one of the two possible modes. Thus, the two possible modes of the projections' normal positioning are obtained, also known as method A and method E.

Perhaps the most significant common denominator of all the solid modeling programs is the "active plane" or work plane (WP). Any sketch necessary to its subsequent solidification by means of a particular process, is a plane sketch, i.e. it belongs to a plane. It is composed of a series of elementary geometrical elements, interconnected in a specific sequence (to a line, point, arc or to another plane, curve, polygon, etc.), which can only be performed in a plane. And this plane is called an active plane, which is specifically selected at the beginning of the sketching, unless the program itself prompts for the plane to be defined. An active plane can be any of the three rectangular planes (two by two in a perpendicular position) of the universal Cartesian system, called horizontal, vertical, and lateral, or any other plane defined in relation to other characteristic elements of the model. It can be defined by means of three points, a line (possibly an edge of the model) and a point, by moving with an appropriate distance one of the three planes of the trihedral, by slanting an existent plane; practically, there are numerous ways of conveniently defining a current WP. The easiness and rapidness of building the model depend on appropriately choosing this plane. As far as the modeling is concerned, this is somewhat similar, for instance, to choosing the UCS coordinate system from AutoCAD. Once this active plane is selected, in some programs, either a window is opened, "materializing" this active plane in which it is carried out the sketching precisely in the plane in which the drawer works, i.e. the plane of the screen; or the representation plane becomes an active plane in a direct manner. Once the active plane established, all the instruments and means of plane representation become accessible, including the intelligent methods of notation, geometrical restrictions (parallelism,

perpendicularity, etc.), or objectsnap (smartdimension, intelisketch, objectsnap, etc.).

2. ANIMATED REPRESENTATION TECHNIQUES

The landing gear mechanisms that are studied as part of the specialty discipline are built in a large variety of types, motions, cinematic couples, etc. that will not be covered in the present article. We will only refer to their way of representation, and the analysis and animation of the representation.

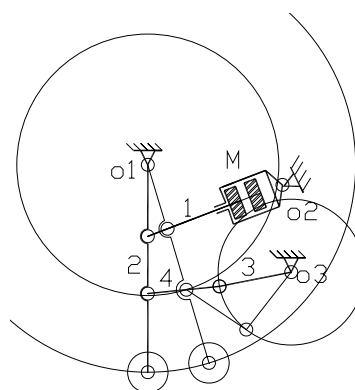


Fig. 3 Cinematic scheme of the landing gear mechanism

One way to create the animated representation of the mechanism's functioning is to obtain individually one position at a time by choosing a motion parameter, for example the distance of the hydraulic cylinder piston of the leading element, followed by the introduction of the successive positions in a suitable graphic environment, such as Macromedia Flash. In order to correctly obtain the successive positions (and to accurately keep the distances and angles), the AutoLISP application was built, here called "aatren" and presented below.

```
(DEFUN C:aatren ( )
(SETQ d (GETREAL "Valoarea cursei d:")
o1 (list 300 500)
o2 (list 1000 500)
o3 (list 1000 250)
r 200
r1 300
r2 300
d1 (distance o1 o2)
a (/ (- (+ (expt d1 2) (expt d 2)) (expt r 2))) (* 2 d1
d))
```

```

b (sqrt (- 1 (expt a 2)))
c (/ b a)
u (atan c)
p1 (polar o2 (+ pi u) d)
  u1 (angle o1 p1)
  p2 (polar o1 u1 400)
  p3 (polar o1 u1 600)
  p4 (polar p1 u 1000)
  c1 (polar p4 (+ (* (/ pi 180) 30) u)
40);pistonulc1c2c3c4
c2 (polar p4 (+ (* (/ pi 180) 150) u) 40)
c3 (polar p4 (+ (* (/ pi 180) 210) u) 40)
c4 (polar p4 (+ (* (/ pi 180) 330) u) 40)
i1 (polar o2 (+ (/ pi 2) u) 40);cilindruli1i2i3i4
i2 (polar o2 (- u (/ pi 2)) 40)
i3 (polar i1 u 500)
i4 (polar i2 u 500)
d11 (distance p2 o3)
a11 (/ (- (+ (expt d11 2) (expt r2 2)) (expt r1 2)) (*
2 d11 r2 ));elem3si4
b11 (sqrt (- 1 (expt a11 2)))
c11 (/ b11 a11)
u11 (atan c11)
u12 (angle p2 o3)
u13 (+ u11 u12)
p11 (polar o3 (+ pi u13) r2)
    )
    
```

In this example, for the constructive elements of the cinematic chain, the following values were selected: a 200-unit ray r (from O_1 to the first articulation of the chain), the rays r_1 and r_2 of the rod systems each of 300 units, a 1000-unit long hydraulic engine piston's rod ($p4$ (polar $p1$ u 1000)), and a 600-unit distance from O_1 to the second articulation ($p3$ (polar $o1$ $u1$ 600)). All these can be easily modified, depending on a particular situation.

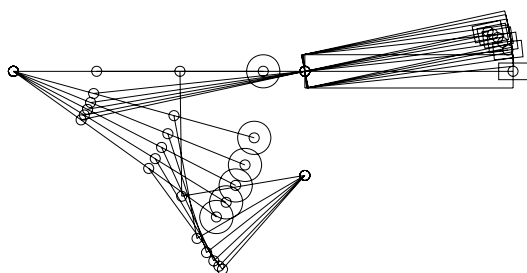


Fig. 4 The succession of the mechanism elements' positions, with a 10-unit distance of the piston's movement, from $d = 500$ to $d = 550$, as obtained with the use of the "aatren" application

The above illustrated application does not include the AutoCAD commands for drawing

as well, only the instruments for assigning the variable's values that are of interest in the animated representation of the cinematic sketch.

3. GRAPHICAL METHODS WITH CAD INSTRUMENTS

Let there be the cinematic sketch of the known mechanism in figure 1. The vectors corresponding to the speeds of the points $p1$ and $p3$, marked as such to better observe the presence of the coordinates of these points within the application that will be further presented, have been attached to the current position.

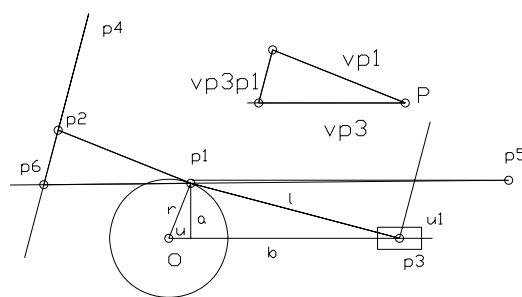


Fig 5 Cinematic sketch of the mechanism and the attached plane of the speeds

In figure 5, the plane of the speeds was represented for the current position first with the pole to the plane in point $p2$ of the mechanism, and then, for clarity reasons, with the pole in point P . For any position of the elements, the speeds' polygon follows the vector relation:

$$V_{p3} = V_{p1} + V_{p3p1} \quad (1)$$

The next application, called "biela", illustrates the automatic representation of the edges of the speeds' polygon and returns the value of the distance between $p1$ and $p6$, which is precisely the instantaneous speed of the driven element. It requires to manually insert (using the keyboard) the current angle u , the ray r , the revolution n , and the length of the rod l .

```

(DEFUN C:biela ( )
(SETQ u (GETANGLE "Valoarea unghiului u:")
r (GETDIST "Valoarea razei r:")
n (GETREAL "Valoarea turatiei:")
p1 (polar o u r)
    )
    
```

```

l (GETDIST "Lungimea bielei l:")
p2 (polar p1 (+(/ pi 2) u) (/(* pi 2 r n) 1000))
a (* (sin(/ (* u pi) 180)) r)
b (sqrt (- (expt l 2) (expt a 2)))
p3 (polar o 0 (+ b (* r (cos (/ (* u pi) 180))))))
u1 (- (angle p1 p3) (/ pi 2))
p4 (polar p2 u1 100)
p5 (polar p1 0 200)
p6 (inters p1 p5 p2 p4 nil)
(Command "Point" p1)
(Command "Point" p2)
(Command "Point" p6)
(Command "Pline" p1 p6 "c")
!(distance p1 p6)
)
    
```

For instance, for an angle of 60 degrees, a ray of 200, a revolution of 800 rotations / minute, and a length of 300, the program returns:

```

Command: biela
Valoarea unghiului u:60
Valoarea razei r:200
Valoarea turatiei:800
Lungimea bielei l:300
1088.31.
    
```

Similarly, a cinematic study can be carried out, as well as and an animation of its functioning for the mechanism with sway bar link, another well known mechanism. The previously mentioned method, for the rod mechanism, can be generalized for any other type of mechanism with joint bars, plane-parallel moving parts, or even such specific mechanisms as the landing gear.

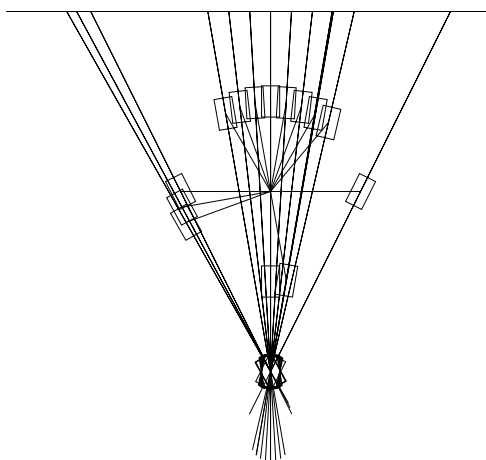


Fig. 6 Successive positions of the sway bar link mechanism's elements

Figure 6 illustrates a few successive positions of the elements of a sway bar link mechanism as obtained with AutoCAD, and with the help of the AutoLISP application, which preserves the construction values of the mechanism's elements and requires the repetitive insertion of the current value of the leading element's angle u , selected as a movement parameter. Next, this application (called "aaculisa") is presented.

```

(DEFUN C:aaculisa ( )
(SETQ o1 (list 1000 600)
o2 (list 1000 200)
o3 (list 200 1000)
o4 (list 800 1000)
r 200)
u (GETANGLE "Valoarea unghiului u:")
(SETQ p1 (polar o1 u r)
p2 (inters o2 p1 o3 o4 nil)
l1 (polar p2 0 800)
l2 (polar p2 pi 800)
u1 (angle o2 p1))
(SETQ p3 (polar p1 (+ (*(/ pi 180) 30) u1) 40)
p4 (polar p1 (+ (*(/ pi 180) 150) u1) 40)
p5 (polar p1 (+ (*(/ pi 180) 210) u1) 40)
p6 (polar p1 (+ (*(/ pi 180) 330) u1) 40)
p7 (polar o2 (+ (*(/ pi 180) 30) u1) 40)
p8 (polar o2 (+ (*(/ pi 180) 150) u1) 40)
p9 (polar o2 (+ (*(/ pi 180) 210) u1) 40)
p10 (polar o2 (+ (*(/ pi 180) 330) u1) 40)
p11 (polar p2 (+ pi u1) 1000)
    
```

To conclude, these possibilities to perform the above presented animated representations are but a few of the more elaborated multiple techniques.

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THE USE OF PILOT TRANSMISSION FUNCTION FOR AIRPLANE CONTROL DURING THE PROCESS OF AIMING

Ognyan STOYKOV

Aviation Faculty of National Military University “Vassil Levski”, Dolna Mitropolia, Bulgaria

Abstract: This paper articulates the utilization of pilot transmission function for airplane control during the process of aiming. It identifies the amplification coefficients of transmission function using criteria of minimum time for discordance signals elimination.

Keywords: aiming, airplane control, transmission function, discordance.

1. INTRODUCTION

The aiming head-up display receives a signal, which forms the required angular coordinates of target β_1 and ε_1 . The required coordinates of the target are compared with the observed coordinates of the target β_{1T} and ε_{1T} .

The pilot registers the difference $\beta_1 - \beta_{1T}$, $\varepsilon_1 - \varepsilon_{1T}$ and tries to eliminate it, using the control surfaces of the aircraft. The aircraft, responding to the deflection of the control surfaces changes the parameters of its attitude in relation to the target. When the discordance absolute value becomes lower than the accepted permissive deviation, the pilot maintains the deviation differences within the admissible limits.

In order to get a model of the above - described process, the response of the pilot to the discordance has to be modelled, i.e. to get the calculated values of the aircraft control surfaces deflection depending on the angles of discordance.

$$\begin{aligned} \delta_{BH} &= \delta_{BH}(\varepsilon_1 - \varepsilon_{1T}) \\ \delta_{eH} &= \delta_{eH}(\beta_1 - \beta_{1T}) \end{aligned} \quad (1)$$

Where δ_{BH} , δ_{eH} are the calculated values of the rudder and aileron deflection ($\delta_H = 0$).

The task of the pilot as a managing component of the closed pilot-aircraft system consists of the following stages:

- to receive and interpret the information, provided by the instruments and the environment;
- to process the information and decide on the corresponding managing action to control the aircraft;
- to apply the managing action to the control surfaces of the aircraft.

The mechanism of the aircraft control with the participation of the pilot functions on the principles of “tracking with pursuit” or “tracking with compensation” [1].

In the pilot-aircraft system based on the principle of “tracking with pursuit”, the pilot observes the value of the input and output signals of the system and his task are to minimize the discordance between the target position and the blip following it. In order to get an adequate description of the pilot’s work, his transmitting function or other mathematical description should reflect the main characteristics as a component of the control system. The most important of these are:

- temporary delay of the pilot’s response to the input signal;
- ability to adjust to the dynamic characteristics of the controlled object and the nature of the input influence;
- ability to respond to the parameter deflection of the assigned value, its derivative and the parameter deflection integral;

- ability to increase the value of the control impact;
- non-linear characteristics of the pilot;
- acting as a multi-channel device in the control system (the information which he receives can be processed separately or integrally);
- dependence of the quality of the pilot's control on his psychodynamic characteristics and potential.

2. LINEAR AND NON-LINEAR PILOT OPERATOR MODELS

There are different models (linear and non-linear) which are used to describe the pilot's performance and they include the abovementioned characteristics. Linear models, considered to be the most convenient from engineering point of view, have been extensively developed and are widely used. However, they have some disadvantages:

- they don't take into account the ability of the pilot to anticipate the process;
- they cannot interpret experimental data, so the pilot operator tends to behave discretely.

Some non-linear pilot-operator models are known to be based on the psycho-physiological analysis of the pilot's reactions. In a linear pilot-operator model based on "tracking with pursuit", pilot is represented as a section of the tracking system and it is possible to be described with transmitting function. It is suggested that the transmitting function of all pilots has the same structure and their individual features are read from the transmitting function coefficients values. The pilot model describes the real pilot's characteristics with approximation.

To receive the estimated values of the airplane control surfaces in dependence with the discordance angles:

$$\delta_{\text{BH}} = \delta_{\text{BH}}(\varepsilon_1 - \varepsilon_{1T}), \quad \delta_{\text{CH}} = \delta_{\text{CH}}(\beta_1 - \beta_{1T})$$

The following pilot's transmitting function is used [2]:

$$W_{\text{п}}(p) = \frac{K_0 e^{-\tau p} (T_1 p + 1) K_1}{(T_2 p + 1)(T_3 p + 1)} \quad (2)$$

where

- τ is the time characterizing the delay of the input signal;
- K_0 – coefficient of pilot increase;
- T_1 – constant coefficient characterizing the ability of the pilot to differentiate and react to the speed of input signal change;
- T_2 – constant coefficient of inertia section of the pilot;
- T_3 – constant coefficient identifying the nerve-shoulder response;
- K_1 – coefficient of increasing the nerve-shoulder unit.

The structural scheme of the pilot transmitting function is on Fig. 1:

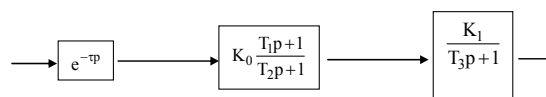


Fig. 1 Structural scheme of the pilot transmitting function

The first section of the chart is the amplifying section with delay. Here the calculated information from the indicators is received. And the signals in proportions based on dynamic characteristics are added. The second section is a calculating element processing amplification and differentiation of the received signals. That element has the feature to amplify the signal. The third section is inertial and it uses its dynamic features. It reflects the neuro-muscular effect on the managed object.

The experiments [3] show that the operator changes his transmission characteristics in dependence with the managed object features and the disturbance function. The experience, training and fatigue are factors with an influence on the type of the transmitting characteristics, therefore the operator does not possess one defined transmitting function and he is able to tune his work up in relation with what the function is.

The experiment results show the pilot changes his transmitting characteristics in dependence with managed object features and the type of disturbance. That means that the pilot is able to tune himself up according to the concrete task.

For identified task circle and concrete airplane the increasing coefficients values K_0

and K_1 and constant coefficients T_1, T_2, T_3 and τ change in particular narrow limits.

The pilot transmission function is used to receive the estimating angles of ventral surfaces deflection, when the discordance signals proceed to the input (Fig.2).

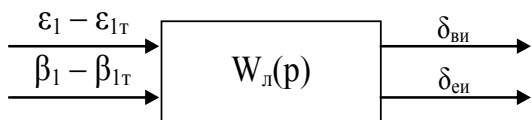


Fig. 2 The pilot transmission function

If use the Taylor decomposition limited with first two terms

$$e^{-\tau p} = 1 - \tau p \quad (3)$$

and introducing the symbols:

$$\varepsilon_1 - \varepsilon_{1\tau} = \varepsilon_{11} \quad (4)$$

$$\beta_1 - \beta_{1\tau} = \beta_{11}$$

We receive:

$$\frac{\delta_{вн}}{\varepsilon_{11}} = -\frac{K_{c.B}(T_1 p + 1)(1 - \tau p)}{(T_2 p + 1)(T_3 p + 1)} \quad (5)$$

$$\frac{\delta_{ен}}{\beta_{11}} = \frac{K_{c.e}(T_1 p + 1)(1 - \tau p)}{(T_2 p + 1)(T_3 p + 1)} \quad (6)$$

where $K_c = K_0 K_1$ is general coefficient of amplification

As the value of T_1 is greater the process of airplane control from pilot's point of view becomes more difficult. Additionally, the requested amplification of T_1 requires greater accuracy in terms of identification of rate of change of input signal.

If the pilot possesses sufficient professional skills the transition process ends faster if the following values of τ, T_1, T_2, T_3 [4] have been accepted:

$$\tau = 0,1s; T_1 = 0,1s; T_2 = 0,1s; T_3 = 0,1s \quad (7)$$

The formulas (5), (6) and (7) lead to the following differential equations determining the longitudinal and lateral control channels:

$$\ddot{\delta}_{вн} + 20\dot{\delta}_{вн} + 100\delta_{вн} = -\ddot{\varepsilon}_{11}K_{c.B} + 100\varepsilon_{11}K_{c.B} \quad (8)$$

$$\ddot{\delta}_{ен} + 20\dot{\delta}_{ен} + 100\delta_{ен} = \ddot{\beta}_{11}K_{c.e} - 100\beta_{11}K_{c.e} \quad (9)$$

After introducing the symbol:

$$z_1 = \dot{\delta}_{вн} + 20\delta_{вн} + K_{c.B}\dot{\varepsilon}_{11} \quad (10)$$

After differentiation the result is:

$$\dot{z}_1 = \ddot{\delta}_{вн} + 20\dot{\delta}_{вн} + K_{c.B}\ddot{\varepsilon}_{11} \quad (11)$$

Then from equation (8):

$$\dot{z}_1 = 100K_{c.B}\dot{\varepsilon}_{11} - 100\delta_{вн} \quad (12)$$

And introducing the symbol:

$$z_2 = \dot{\delta}_{вн} + K_{c.B}\dot{\varepsilon}_{11} \quad (13)$$

From equation (10) the result is:

$$\dot{z}_2 = z_1 - 20\delta_{вн} \quad (14)$$

From formula (13) we receive:

$$\dot{\delta}_{вн} = \dot{z}_2 - K_{c.B}\dot{\varepsilon}_{11} \quad (15)$$

After integration using nil initial conditions:

$$\delta_{вн} = z_2 - K_{c.B}\varepsilon_{11} \quad (16)$$

At the end from equation (8) the system is received:

$$\delta_{вн} = z_2 - K_{c.B}\varepsilon_{11} \quad (17)$$

$$\dot{z}_2 = z_1 - 20\delta_{вн}$$

From (9) by analogy:

$$\delta_{ен} = z_4 + K_{c.e}\beta_{11} \quad (18)$$

$$\dot{z}_4 = z_3 - 20\delta_{ен}$$

$$\dot{z}_3 = -100K_{c.e}\beta_{11} - 100\delta_{ен}$$

Using equations (17) and (18) the angles of altitude controlling surface and ailerons deflection can be determined in dependence with discordance angles $\beta_{11}, \varepsilon_{11}$ in the lateral and longitudinal channels. To comply with that target it is necessary to determine general coefficients of amplification in the abovementioned equations systems for both channels using criteria of minimum time for discordance signals elimination.

In result from the integration of those equations angles needed for airplane control are determined:

$$\delta_B = \delta_{вн} + \delta_{B.б.ал}; \delta_e = \delta_{ен} \quad (19)$$

where $\delta_{вн}, \delta_{ен}$ are values of altitude control surface angle estimated using the pilot transmission function, $\delta_{B.б.ал}$ – balanced value of altitude control surface angle.

For the purpose of discordance signals that tend to zero $\varepsilon_1 - \varepsilon_{1T}$, $\beta - \beta_{1T}$, there is a need to determine amplification coefficients K_{CB} , K_{ce} . The studies are accomplished separately for longitudinal and literal channels and for both channels simultaneously.

The process modeling is accomplished with initial air speeds $V_{1,0} = 160, 240, 320\text{m/s}$; initial altitudes $H_0 = 600, 1100, 1600, 2100\text{m}$ and initial angles of descent:

$$\lambda_0 = -10^0, -30^0, -50^0.$$

3. CONCLUSIONS

From research done in mathematical modelling of airplane track and vertical profile in the stage of descent when the transmitting function is used the following conclusions can be made:

1. The amplification coefficient K_{CB} of the pilot model for longitudinal channel depends on the airplane speed;

2. The airplane trajectory is influenced by aiming error that depends on amplification coefficient K_{CB} ;

3. The amplification coefficients K_{CB} , K_{ce} and time constants T_1 , T_2 , T_3 and τ are determined experimentally when the pilot model is used with the model of concrete airplane. The determined transmission function characterizes pilot actions only for concrete airplane and when the required conditions are met [2].

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APPLYING DECISION THEORY TECHNIQUES TO INFORMATION SECURITY RELATED DECISIONS

Cezar VASILESCU

Regional Department of Defense Resources Management Studies, Brasov, Romania

Abstract: *Software designers and security specialists can improve their selections if they choose to apply decision theory techniques to reduce the uncertainty involved. In case of security technology selection decisions, decision theory is attractive because it provides a methodology to cope with the uncertainty and multi-objective nature of these decisions. This paper defines the information security technologies selection problem and tries to present different alternatives to be employed when quantifying the benefits of security countermeasures in correlation with the consequences of successful computer-based attacks. Moreover, it presents the sources of uncertainty underlying the process of taking decisions related to what security technology to use.*

Keywords: *decision theory, information security, countermeasures, information system.*

1. INTRODUCTION

Information Technology software projects and their implementation during the lifecycle contain a certain percentage of uncertainty in the objectives and in the selection of the appropriate ways to fulfill them. Software designers and security specialists can improve their selections if they choose to apply the power of decision theory to reduce the uncertainty of their success. This involves relying on somebody else's specialized expertise that leads to a very important question: how to apply decision theory techniques to information security related issues and deal with the challenges that could appear. There are several selection methods and methodologies recommended to be used to solve the security technology selection problem [1]. Using decision theory in choosing software security technologies is very challenging and usually the specialist may have to address two decisions:

- If the final goal is to replicate another's security manager security selections or to improve them;
- The appropriate level and detail of information necessary to make reasonable selections.

Both issues impact the structure of the selection method and the source of information used to make security technology decisions. To better understand how to respond to these challenges, we first need to examine the nature of decision theory and its standard methods of application.

Using decision theory we could provide answers to four main questions [2]:

1. *What is a decision?* We can define a decision as "a conclusion or resolution reached after consideration" [3]. Another definition that is close to our goals states that "a decision is a choice made by some entity of an action from some set of alternative actions" [2].

2. *What makes a decision good?* A decision is good when it identifies an alternative that the decision maker believes will be as effective as other alternative actions.

3. *How should one formalize evaluation of decisions?* Good decisions are formally characterized as actions that maximize expected utility. Decision theory formalizes this notion in stages:

- It first presumes an association of a set of outcomes with each action. A stands for the set of all outcomes identified with the actions or alternatives.

A = action → outcome.

- Then, it presumes a measure U of outcome value that assigns a utility $U(\omega)$ to each outcome $\omega \in \Omega$. Ω stands for the set of all outcomes identified with any actions (the union of those associated with each action). The outcomes must be identified so as to have some determined value or utility of the decision under consideration. This is to ensure that a single outcome cannot come about in ways that differ in value.

- Then it presumes a measure of the probability of outcomes conditional on actions, where $P_r(\omega|a)$ - probability that outcome ω comes about after taking action $a \in A$ in the situation under consideration.

- Using these elements, the expected utility $EU(a)$ of an action a as the average utility of the outcomes associated with the alternative, weighting the utility of each outcome by the probability that the outcome results from the alternative,

$$EU(a) = \int_{\Omega} U(\omega)P_r(\omega|a)d\omega \quad (1)$$

4. *How should one formulate the decision problem confronting a decision maker?* Alternatives, outcomes, probabilities and utilities are identified through an iterative process of hypothesizing, testing and refining sequences of formulations. By using knowledge of the situation and through direct queries, alternatives and outcomes can be identified.

In the case of security technology selection decisions, decision theory is attractive because it provides a methodology to cope with the uncertainty and multi-objective nature of these decisions. If the consequence of actions/decisions (the result) is uncertain, decision theory calls them risky decisions.

Risky decisions can also have multiple objectives, each having an attribute that is the degree to which a given decision objective has been attained.

The value of each alternative is computed and ranked based on the objective attributes. Probability distributions can be associated with each attribute to reflect the expectations of decision makers. The power of decision theory is that it provides a systematic way to

consider tradeoffs among attributes, which can be used to make decisions.

2. INFORMATION SECURITY RELATED DECISIONS

We can define Information Security technologies selection problem as “*the task of selecting the best set of security countermeasures for an information system*”.

The biggest challenge in this respect is to quantify the benefits of security countermeasures and the consequences of successful computer-based attacks. The degree to which a security countermeasure stops an attack (or deals with the consequences of it) determines its usefulness.

Making decisions during the development or updating the information system security architecture is one of the most challenging tasks for a security analyst.

Specifically, it is a flexible, systematic and repeatable process that prioritizes threats and helps select countermeasures to clarify the best investments for the organization’s objectives.

The process of taking decisions regarding which security technology to use has a certain degree of uncertainty, given by three key elements:

- the attack itself, because most security designers have little data concerning the frequency of attacks and which attacks are more likely to occur (that determines the appropriate selection of countermeasures);
- the outcome of a successful attack, because once the computer system is breached there are many potential action paths an attacker could follow;
- the benefit from countermeasures, because the effectiveness of a countermeasure in protecting or detecting an attack can only be estimated.

Another source of uncertainty came from the fact the security designer/administrator must also balance multiple objectives when selecting security technologies. Consequences of successful attacks must be balanced with:

- performance constraints;
- budget limitations;
- other design considerations.

This will add complexity to the application of decision theory techniques on information security related decisions. The selection process of the appropriate security technology could take advantage of the power of decision theory techniques, because possible outcomes from successful attacks (i.e. productivity loss) can be viewed as objectives. After the levels of outcomes are determined, reasonable alternatives can be generated from probability distributions.

3. IMPROVING DECISIONS BY USING DECISION THEORY TECHNIQUES

The application of decision theory techniques in the software design decision process improvement may result in an improved decision, but with a degree of uncertainty. If it does not rely on sufficient information (expertise), it could easily lead to a poor decision. For example, the information security technology selection process relies on countermeasure expertise to improve the selection of countermeasures. This expertise (the risk analysis consisting of the likelihood of attacks and their potential outcomes) is used to realistically represent the impact of a countermeasure to a specific computer-based attack. After the risk analysis is done, an outcome distribution for each relevant attack results. When a countermeasure is used, the outcome distribution graphs might be different. For example, when anti-virus software is used, the frequency of successful virus attacks is reduced or the amount of revenue lost is reduced. The outcome distribution graphs might shift when an anti-virus technology is used (Fig. 1, 2).

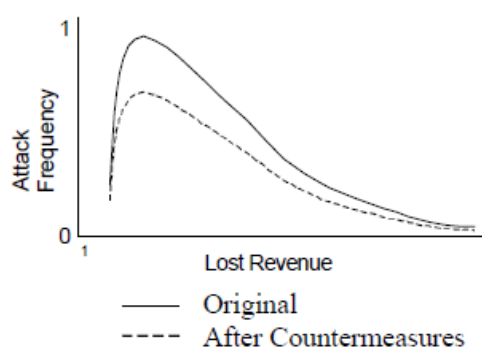


Fig. 1 Virus attacks - frequency mitigation

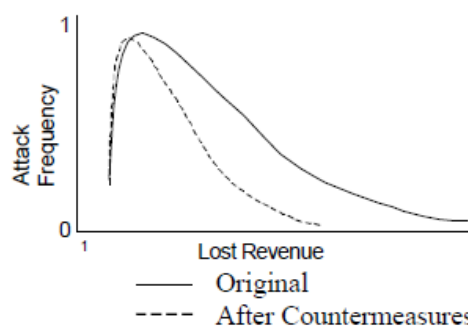


Fig. 2 Virus attacks - outcome mitigation

Generally speaking, if expertise is available, then decision theory techniques can be used to improve security design decisions. In order to use statistically analyzed attack frequencies information, threat data must be available.

In our days, one of the greatest challenges is to acquire reliable countermeasure expertise. Because this could affect their prestige, very few organizations report security incidents, and there is little reliable statistical data about attack frequencies. For example, even if 49% of the companies that took part in a survey said that their primary security concern was data leakage (such as employee or customer information), and 29% of them were in fact confronted with the problem in 2007, only 11% actually reported the incidents [4].

Another important consideration in the application of decision theory to design problems is the level and detail of the information used in the decision process. If the information is too detailed, it will result in a large amount of data that are extremely difficult to be reassembled into meaningful recommendations. There are more than 18 different types of computer-based attacks (from Denial-of-service (DoS) Attacks to TCP SYN or TCP ACK Flood Attack) [5], over 40 security countermeasures [6], and at least half a dozen possible outcomes [7].

Each class of outcomes may be associated with different attributes. A distribution curve may be also established for each outcome. For example, for each outcome of a computer-based attack three values could be provided: low, high, and expected.

In order to take information security related decision by using decision theory, an

important step is to determine a way to reduce the possible combinations of attacks, outcomes and countermeasures. The most efficient way to reduce the possible combinations is to focus on the most important. This technique eliminates aspects of the decision process that do not contribute significantly to the final selection. In this respect, we must focus on information about the top 3-4 outcomes and also on the countermeasures that provide a moderate level of protection.

In conclusion, the essence of the problem is to combine the information regarding the attack with mitigation information, so that countermeasures can be selected. There will be lots of different outcome distributions, each distribution adjusted to several countermeasures that are also weighted based on their overall contribution to outcomes mitigation.

4. CONCLUSION

So far I have described a few issues that must be taken into consideration when trying to apply decision theory techniques to information security decision problems.

Decision theory can be a significant tool in information security practice. However, it typically involves issues like *uncertainty,*

complexity, high-risk consequences, multiple alternatives (each with its own set of uncertainties and consequences).

With these difficulties in mind, the best way to make a complex decision is to use an effective process. Clear processes usually lead to consistent, high-quality results, and they can improve the quality of our information security related decisions.

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DIMENSIONING OF HEATING NETWORKS PIPES

Emilia SCHEIBNER

Department of Descriptive Geometry and Computer Graphics, „Transilvania” University of Brasov

Abstract: *The main objective of the project is to create a presentation about the main sized of supporting and clamping elements of industrial installations. These depend on diameters of pipes of industrial equipment. Therefore, prior choosing or determining construction elements of clamping and support items, there is necessary to thoroughly study all installation designs, whether electric, water, gas, rain water, compressed air, ventilation etc. according to which pipe networks have been dimensioned. Clamping and support devices with the highest constructive diversity are met at heating equipment. The specific of this type of installation is given by pipes expansion when heat transfer fluid flows. This paper develops information especially for the mechanical calculation of heating networks, i.e. calculation of pipe walls thickness and calculation between mobile and fixed supports.*

Keywords: *heating equipment, mobile and fixed supports.*

1. INTRODUCTION

The heating network is a system of branched pipes which provide heat distribution. The size of this network may vary according to the area served, from the ground surface of a city, i.e. a district or building.

The mechanical calculation of heating network with steel pipes considers tension condition of the pipe material, generated by charges (loadings) with action [1]:

- permanent, generally derived from the weight of pipes and fittings;
- temporary (quasi - permanent): determined by wind, friction on mobile supports and axial compensators, of internal pressure, pretensioning etc.;
- temporary (variable): generated by rapid uneven heating of pipes, shrinkage of mobile supports etc;
- accidental – in event of earthquakes or sudden valve closing.

2. CLASSIFICATION OF HEATING SYSTEMS

Hot water at maximum temperature of 95°C will be used. The heat transfer fluid

increases heating potential inside the boiler, taking over a part of heating energy transferred from the burnt fuel, and through a closed pipe network, transfers accumulated heat energy to the area to be heated, using heating surfaces.

Hot water heating systems are classified according to composition or functioning particularities [1], as follows:

- a) According to temperature of heat transfer fluid at boiler outlet: hot water equipment: average temperature; rated temperature of up to 95°C; low temperature warm water installations; rated temperature up to 65°C.
- b) According to how warm water circulates in the distribution network of heat transfer fluid: natural circulation equipment, known as “thermosiphon” or gravity circulation; forced circulation equipment.
- c) According to the number of heat transfer agent distribution pipes: double pipe installations (bitube installations); single pipe installations (monotube installations).
- d) According to clamping diagram or connection with atmosphere: open installations, provided with open expansion tank systems; closed installations, provided with closed expansion tank systems.

- e) According to location of distribution pipes: lower distribution; upper distribution.
- f) According to the solution of forming the distribution network: arborescent networks; radial networks; ring networks.
- g) According to response level to conditions of heat and hydraulic stability: local thermo-hydraulic adjustment installations; central thermo-hydraulic adjustment installation; global energy management equipment.
- h) According to the components of heat transfer to heated area: with convective surfaces (static or dynamic); convection-radiation surfaces; with radiation surfaces.

The main features of hot water heating systems are the following [1]:

- provides comfort conditions because of low temperature of surface of heating items;
- allow central or local adjustment of heat transfer fluid flows delivered to heat spaces;
- provides operation and maintenance safety;
- average life duration, because of low corrosion coating;
- presents high thermal inertia, compared to other heating systems;
- presents freezing danger, in case of absence of a protection system with attached conductors or freezing inhibitors;
- have high investment costs compared to other systems.

3. CALCULATION OF PIPE WALL THICKNESS

According to official design instructions (Instructions RT-1 M.E.E.-I.S.P.E.), thermal

pipe resistance calculation is based on the method of admissible mechanic tension [1].

The thickness of pipes' wall, expressed in cm, is determined with the formula

$$s = \frac{p_i D_i}{2 \cdot \phi \cdot \sigma_a} + c \quad (1)$$

Where: p_i is the maximum interior operating pressure (rated pressure) [daN/cm²]; D_i – inner pipe diameter (that can be assimilated to the nominal diameter [cm]; ϕ – welding quality coefficient depending on the welding technology used in making the pipe (values ranged from 0.8 to 1); σ_a – admissible resistance of material related to the loading determined by the interior pressure on tangential direction [daN/cm²], depending on the material quality.

$$\sigma_a = \sigma_r / C_s \text{ [daN/cm}^2\text{]} \quad (2)$$

Where: σ_r is the material's breaking resistance [daN/cm²]; C_s – safety coefficient, equal to 3.75, for seamless pipe and 3, for welded tubes; c – addition of corrosion and wear equal to 0.05 cm for nominal diameters of $D_n \leq 250$ and of 0.1 cm for pipes of $D_n > 250$.

After calculation, the standard dimensions of tubes in the current production are selected; the tubes wall thickness being selected according to the standard value immediately higher resulted from calculation with the formula (1). Calculation for checking the tension generated by interior pressure is done by choosing the thickness of tube walls (table 1) of the current manufactured series, with the formula:

$$\sigma = \frac{p_i D_i}{2 \cdot \phi \cdot (s - c)} \leq \sigma_a \quad (3)$$

Table 1 Sizes and weights for pipes STAS 6898 (extras)

Outer diameter [mm]	Wall thickness, [mm]						
	7,1	7,9	8,7	9,5	10,3	11,1	11,9
	Linear mass, [kg/m]						
406,4	69,91	77,73	85,32	92,98	100,61	108,20	115,77
508	87,70	97,43	107,12	116,78	126,41	136,01	145,58
610	105,56	117,30	129,00	140,18	153,32	163,93	175,54
711	123,24	136,97	150,67	164,34	177,98	191,58	205,15
813	141,10	156,84	172,56	188,24	203,88	219,50	235,09
914	158,79	176,52	194,22	211,90	229,54	247,85	264,72
1016	-	196,30	216,11	235,79	255,45	275,07	294,06
1118	-	-	237,99	259,69	281,35	302,99	324,59
1219	-	-	259,66	285,35	307,01	330,63	354,23

1321	-	-	282,00	307,25	332,92	358,55	384,16
1422	-	-	303,70	330,91	358,57	386,20	413,80
1524	-	-	325,62	355,69	384,89	415,00	444,15
1626	-	-	347,54	378,70	410,38	442,04	473,66

4. CALCULATION OF THE DISTANCE BETWEEN MOBILE AND FIXED SUPPORTS

Regardless the type of mobile supports employed (with each sliding or rolling friction) the distance between these supports is determined with the load evenly distributed continuous beam bending formula of calculation [1]:

$$l = \sqrt{\frac{10 \cdot W \cdot \sigma_{ai}}{g_t}} \text{ [cm]} \quad (4)$$

Where: σ_{ai} is the admissible bending resistance thanks to the sole weight [daN/cm²] with values ranged between 200 and 250 daN/cm² for laying down pipes in canals unable to inspect and elbows area, regardless the location, and in the other cases (airborne location and inspected canals) with values of 500... 600daN/cm²; W – pipe section resistance module [cm³]; g_t – total tube, water and insulation weight [daN/cm].

Values for W and g_t are give in table 2, for other pipe dimensions must be calculated according to formulas applied in strength of materials.

Table 2 Technical data for calculation of central heating pipes

Ref. no.	Diameter		Pipe wall thickness	Transversal section area [cm ²]		Pipe outer surface [m ² /m]	Inertia moment I [cm ⁴]	Pipe strength module W [cm ³]
	Nominal Dn (mm)	Outer De (mm)		Pipe wall A _p	Outer free A _i			
1	40	48	3,5	4,89	13,20	0,150	12,164	5,06
2	40	48	4,0	5,25	12,57	0,150	13,467	5,61
3	50	57	3,5	5,88	19,63	0,179	21,099	7,40
4	50	57	4,0	6,66	18,85	0,179	23,476	8,32
5	65	70	3,5	7,31	31,17	0,219	40,459	11,55
6	65	70	4,0	8,36	30,12	0,219	45,244	12,92
7	80	89	3,5	9,40	52,81	0,279	85,897	19,30
8	80	89	4,0	10,68	51,53	0,279	96,508	21,68
9	100	108	4,0	13,07	78,53	0,339	176,639	32,70
10	100	108	4,5	14,63	76,97	0,339	195,947	36,65
11	125	133	4,0	16,21	122,71	0,417	336,924	50,66
12	125	133	4,5	18,16	120,76	0,417	374,748	56,35
13	150	162	5,5	25,31	156,14	0,477	678,849	89,32
14	200	219	7,0	46,62	330,06	0,688	2617,36	239,02
15	200	219	8,0	53,03	326,65	0,688	2950,17	269,42
16	250	273	8,0	66,60	518,64	0,857	5841,29	427,93
17	250	273	9,0	74,64	510,70	0,857	6498,97	476,11
18	300	325	8,0	79,67	749,90	1,021	9996,09	615,14
19	300	325	9,0	89,34	740,23	1,021	11141,40	685,62
20	350	377	9,0	104,05	1012,23	1,184	11759,26	933,29
21	350	377	10,0	115,30	1000,98	1,184	19391,30	1028,71
22	400	419	7,0	90,60	1288,25	1,316	19195,60	916,23
23	400	419	8,0	103,29	1275,56	1,316	21780,40	1039,63
24	500	521	7,0	113,03	2018,86	1,636	37269,50	1430,7
25	500	521	8,0	128,93	2002,90	1,636	42348,00	1625,6
26	600	620	8,0	153,81	2865,20	1,947	71895,90	2319,2
27	700	720	8,0	178,94	3892,50	2,261	113206,30	3146,1
28	800	820	8,0	204,08	5076,90	2,576	167913,70	4095,3
29	900	920	8,0	229,21	6418,40	2,890	237899,70	5171,7
30	1000	1020	8,0	254,34	7916,90	3,202	325045,90	6373,4
31	1100	1120	10,0	348,71	9503,30	3,516	536154,80	9574,2
32	1200	1230	11,0	421,26	11461,03	3,862	781133,40	12960,5
33	1300	1330	12,0	496,88	13396,03	4,176	1077083,9	16196,7
34	1400	1430	13,0	578,72	15481,90	4,490	1450025,1	20280,1
35	1500	1530	14,0	666,38	17709,60	4,804	2044832,7	26729,8

Depending on constructive solution of mobile supports, at tubes with diameter of $D_n \geq 700$ there is the possibility to increase the distance between mobile supports, by additional calculation of tube consolidation. This can be done by the increase of the inertia moment (resistance module W) of pipe section in the are of maximum bending moments; for this will be welded, in the vertical plane of the tube section, either a metal sheet rib with thickness of 10...30 mm and adequate width (Fig.1,b), or a metallic profile (Fig. 1, a).

Improvement of the resistance module is achieved by welding, at the upper side of the tube, of two metal sheet ribs, creating an angle of 15...20° with the vertical plane (Fig. 1, b). Insertion of intermediary rod supports is another solution to increase distances between supports (Fig. 2).

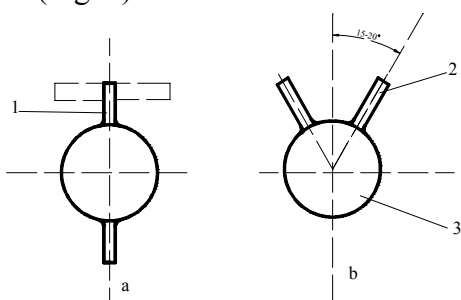


Fig. 1 Solutions to increase tubes' self - support:
a - metallic profile welding; b - welding two sheet metal ribs (1 - metallic profile; 2 - rib; 3 - tube)

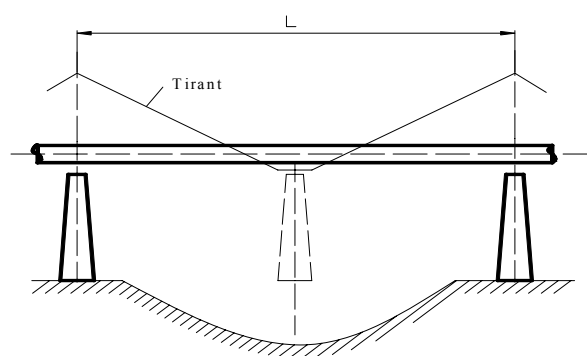


Fig. 2 Rod support of tubes

For the calculation of distance between fixed supports it is necessary to take into account the value of reaction forces generated by the expansion compensator existing between the two fixed supports. The critical buckling force (P_{cr}) is calculated considering the tube embedded in the fixed support and articulated in the compensator [1], with the formula:

$$P_{cr} = \frac{\pi^2 \cdot E \cdot I}{(0,7 \cdot L)^2} = 20,2 \cdot \frac{E \cdot I}{L^2} \text{ [daN]} \quad (5)$$

Where: E is the elasticity module of material [daN/cm^2]; I – inertia moment of pipe section [cm^4] (table 2); L – distance between fixed support and compensator [cm].

Table 3 Distances between mobile and fixed supports of heating tubes

Ref. no.	Nominal diameter [mm]	S Thickness [mm]	Distances between mobile supports, [m]					Distances between fixed supports, [m]					Remarks
			Compensators []			Stuffing box compensators		Compensators []			Stuffing box compensators		
			Canal unable to inspect	Canal to inspect	Overhead laying	Canal to inspect	Overhead laying	Canal unable to inspect	Canal to inspect	Overhead laying	Canal to inspect	Overhead laying	
1	40	3,5	3,0	4,5	4,0	-	-	45	50	50	-	-	Seamless pipes STAS 404
2	50	3,5	3,5	5,0	4,5	-	-	50	55	55	-	-	
3	65	3,5	4,5	5,5	5,0	-	-	55	60	60	-	-	
4	80	3,5	5,0	5,5	6,0	-	-	65	70	70	-	-	
5	100	4,0	5,5	7,5	7,0	-	-	70	75	75	-	-	
6	125	4,0	6,0	8,5	8,0	7,0	6,5	75	80	80	65	65	
7	150	5,5	7,0	9,5	9,0	8,0	7,5	85	90	90	70	70	
8	200	7,0	7,5	11,5	10,5	9,5	9,0	100	100	100	75	75	
9	250	8,0	8,5	13,0	12,0	11,0	10,5	100	105	105	85	85	
10	300	8,0	9,5	14,0	13,5	13,0	12,0	115	115	115	95	95	
11	350	9,0	11,0	15,0	14,5	14,0	13,5	115	135	135	105	105	
12	400	7,0	10,5	14,5	14,0	13,5	13,0	120	150	150	115	115	Helicoidally welded pipes STAS 6898
13	500	7,0	10,5	15,5	15,0	13,5	13,0	125	160	160	130	130	
14	600	8,0	11,5	16,5	16,0	13,5	13,0	125	170	170	140	140	
15	700	8,0	12,0	17,0	16,5	13,5	13,0	130	170	170	140	140	
16	800	8,0	12,5	18,0	17,5	14,5	14,0	130	180	180	150	150	
17	900	8,0	13,0	19,0	18,5	15,0	14,5	135	180	180	150	150	
18	1000	8,0	13,5	20,0	18,5	16,0	15,0	135	200	200	160	160	

19	1100	10,0	14,0	21,0	20,0	16,5	15,5	140	205	205	160	160	Longitudinally welded pipes STAS 7656, 7657
20	1200	11,0	15,0	22,5	21,5	16,5	16,0	140	210	210	160	160	
21	1300	12,0	15,5	24,0	23,0	17,0	16,5	150	215	215	160	160	
22	1400	13,0	16,0	25,0	24,0	17,0	16,5	150	220	220	160	160	
23	1500	14,0	17,0	27,0	25,5	17,5	17,0	160	225	225	160	160	

Under the condition for the critical buckling force to be higher than the compensator reaction force will be determined the limit distance between fixed support and compensator. These limit distances are given (table 3) for curved compensators of U shape and axial expansion joint ones.

The variety of tubes and multiple versions of design of installations, lead to the need to dimension support elements of networks examined herein.

The specific of these networks consists of temperature variations or pressure variations to which tubes are subject.

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PERCENT ERRORS IN STANDARD MULLER-LYER AND RIGHT-ANGLED ILLUSIONS

Aurel Ion CLINCIU*, Ruxandra Maria CLINCIU**

*"Transilvania" University of Brasov, Romania

**University of Essex, Department of Psychology, Colchester, UK

Abstract: *This within-subjects experiment focuses on the possible causes and origins of the Müller-Lyer illusion by introducing two theories (the confusion theory and the perceptive theory) that investigate the effect of the placement of wings on judging the mid-point of the shaft. The assumption that was made was that when judging the mid-point of a line, one estimates the end points and then bisects the distance. The Independent variable consisted of a shaft with either two wings or with a right angle figure. The Independent variable had six conditions, depending on the two types of figures: the standard Müller-Lyer illusion or the right-angled illusion. The Standard Müller-Lyer illusion had greater effects of distortion than the one with the right-angled extensions, where the effect of perspective could not be invoked.*

Keywords: *Müller-Lyer illusion, size scaling effect, acute/obtuse or right-angled wings.*

1. INTRODUCTION

Although it is one of the oldest and most well known geometrical illusions, the Müller-Lyer illusion [1] is still very far from a unitary psychological explanation. Though the studies regarding this illusion are numerous, the mechanisms of producing the perceptive distortion have not been discovered yet.

Among the explicative theories that are often cited, Gregory's perspective theory [2] is one of the most relevant. However, as appealing as it is, it still does not explain the illusion in a satisfactory manner, thus confirming the point of view expressed by Eysenck and Keane: "In all probability, more than one factor contribute to the Müller-Lyer illusion" [3]. According to this perspective theory, the knowledge, which derived from a previous perceptual activity of the three-dimensional objects, is inappropriately transferred to an actual perception of a two-dimensional object. It is taken into account, therefore, the apparent distance in order to conserve the constancy of the shape and though measures concerning the depth are taken, they are of a two-dimensional figure. Although it is sustained by multiple evidence,

there are still a couple of important counter arguments: firstly, the illusion works perfectly even in the absence of the shaft and the wings alone can create the impression of expansion or compression of the space between them [2]. Secondly, the illusion can also be obtained when "the fins of the two figures are replaced by other attachment such as circles and squares" [3]. Thirdly, the illusion "can appear in the three-dimensional space as well" [4].

On the other hand, the confusion theory draws attention upon the fact that the decisive elements in the judgment of the shaft length are the wings that are placed at its extremities. Thus, the obtuse wings (pointing outwards) tend to move perceptually the end of the shaft in the same way, towards the exterior, whereas the acute wings (pointing inwards) produce the opposite effect. In other words, while the obtuse wings produce an effect of expansion, the acute wings produce an effect of compression on the shaft length. This theory also states that these effects of expansion and compression of the length are localized towards the extremity with the respective wings. Thus, the name of the local distortion: the distortion in length arises close to the wings, not all along the length of the shaft.

There are a lot of theories of vision, offered as explanations for the classic Müller-Lyer illusion, like direct size scaling [5], perceptual assimilation of the length of the shaft toward the length of the contextual elements [6] (or visual scene interpretation) [7], framing effects [8].

In order to verify this effect, [9] eliminated the wings from one of the ends in an experiment based on the task of subjective appreciation of the centre of the shaft. They reported a stronger effect of expansion for the obtuse wings than for the acute wings. Furthermore, the effect of perceptual compression seems to be localised more towards the end with the acute wings rather than towards the end with the obtuse wings. As a replicate, Predebon's study [8] reported similar effects regarding the intensity and the location for both types of wings, namely "acute and obtuse-angle forms yielded similar pattern of bisection errors" [8]. These discoveries seem consistent with the local distortion theory because the mid-point errors are in the underlying region of the shaft, therefore being negligent in the spare space of the shaft.

Specifically, Gregory's perspective theory has generated the challenge to verify the effect of the Müller-Lyer illusion through other types of approaches, different from the acute/obtuse wings, for example through the extensions with circles and squares. The local distortion theory has produced diverse models of research that could verify the different types of distortions by the category of the extension (inwards or outwards), as well as the uniformity of its distribution on the length of the shaft. This process is called bisection and scaling of the effect because it implies the judging of the centre of the shaft by reducing the conventional figures to the one-wing version.

The present investigation approaches matters that have resulted from both of the theories and tries to answer the question whether the effects are as strong and as clear for the conventional extensions as for the right angles. This could contradict Gregory's theory of perspective. In the same time, the present study investigates the judging of the distortion

depending on the different type of extension.

The *hypothesis* that have been outlined are the following:

1. The study aims to verify the validity of the local distortion theory by using one wing shaft with acute and obtuse wings (standard Müller-Lyer illusion) or inward/outward extensions in a right angle. It is expectable that the errors occurred in the judging of the mid-point of the shaft to be negative or positive only in the segment with the wings, regardless of the type of extension, classic or in a right angle.

2. In the judging of the mid-point of the shaft we estimate where the ends points are, and then bisect the distance. In the standard Müller-Lyer illusion, the error of estimation appears as a consequence of the subjective movement either inwards or outwards of the ends of the shaft. In this experiment, the extensions in right angle fall perpendicularly on one of the shaft's end. By having the ends of the shaft, it is expectable for the error of estimation to be substantially lower than in the standard illusion. Also, it is expectable for the local distortion, generated by the type of extension used, to persist, regarding its inwards or outwards orientation. In other words, the effects of the illusion in modified conditions (right angle) will be similar to those with standard extensions (acute wings or obtuse wings).

3. Another new element in this study is the fact that the extensions that are attached to the shaft do not have opposite directions. They are combined so that different extensions are in the same direction. It is anticipated that in this experimental condition, the effects of local distortion will be the biggest.

4. Last/finally similar effects are anticipated for the same type of extension (outwards or inwards), regardless the category of which the wings are in (standard Müller-Lyer or right angled).

If hypothesis one is true, the local distortion theory could find a strong experimental support. Similar, if hypothesis two is confirmed, it will be in agreement with Eysenck and Keane's point of view, according to which the Müller-Lyer illusion can be explained through more types of mechanisms.

In the end, the last hypothesis will confirm whether or not our data are consistent with the results Predebon or Warren & Bashford arrived at.

2. METHOD

Participants: 105 undergraduate students from the University of Essex participated in the experiment as a compulsory module requirement.

Apparatus: Each participant used a Macintosh computer to determine the mid-point of the shafts that were presented.

Materials: The original Müller-Lyer illusion consists of two figures (see appendix). They have in common a horizontal line of the same length, called “shaft” or “axis”, and a pair of symmetrical oblique lines, called “wings” or “fins”, attached at *the* both ends of the axis. In one figure the wings form an obtuse angle with the axis by extending outwards from the shaft and in the other figure the wings form an acute angle with the shafts, by pointing inwards to the centre of the figure.

In this experiment the participants had to examine two types of figures: one was based on the standard Müller-Lyer illusion and it involved both acute and obtuse angles, whereas the other type of figure was made up of right angles only. For both types of figure a computerised programme was used to display the stimuli. In each figure the shaft measured 16 cm in length and 1mm in thickness and the wings measured 4 cm in length and 1mm in thickness each. However, for the standard illusions, the obtuse angle measured 90 degrees and the acute angle 45 degrees. In the right-angled figures, the wings resembled a square with one missing side.

Design: This study was a within-subjects experiment. The order in which all the participants had to judge the figures was randomised but in the end all of them were presented the same figures.

In this experiment, the Independent variable consisted of a shaft with either two wings or with a right angle figure. The Independent variable had six conditions, depending on the two types of figures: for the Standard Müller-Lyer, condition 1 was obtuse

wing on one end; condition 2 was acute wing on one end; condition 3 was obtuse wing on one end, acute on the other (like an arrow). For the second type of figures, the right-angled ones, condition 4 was wing extends outwards; condition 5 was wing extends inwards; condition 6 consisted of wings at both ends. All the participants were presented 4 figures of each type and for the asymmetrical figures, on half the trials the figures were left-right reversed.

The Dependent variable was the percent error. In other words, the score obtained on each trial by all the participants was the mid-point error divided by the length of the shaft.

Procedure: The procedure was the same on each trial. Firstly, a box appeared either on the left or on the right hand side and it had the function to prevent the effect of perceptual setting. The participants had to click the mouse in that box and the cursor and box would disappear. Following a short delay, the figure which had to be judged was shown and the participants were instructed to look closely at the figure and try to determine the mid-point of the shaft by eye. In order to record the mid-point they had to simply click the mouse where they believed to be the mid-point of the axis. After two seconds, another box would appear and the same process would restart. The participants were instructed to look closely at the figure and decide where the mid-point was without placing the cursor on the line because they would violate the estimation by judging the figure and the cursor as one composite.

The participants were also asked to be silent during the presentation as they might disrupt other participants in the experiment.

3. RESULTS

For each of the six experimental conditions previously presented, the computer generated the percent error (normalized deviation score), noted by each of the 105 participants, as no data were discarded. The data that were obtained were processed for each experimental condition. The mean and standard deviation, as well as the types of illusions are represented in the table below.

Table 1 Descriptive statistics for the Standard Müller-Lyer extensions (obtuse, acute, combined and total) and for the extensions in right angle (outward, inward, combined and total)

Category	Müller-Lyer standard (acute, obtuse)				Right-angled			
	1	2	3	1_2_3	4	5	6	4_5_6
N	105	105	105	105	105	105	105	105
Mean	2.11	-2.05	-4.57	-4.51	0.88	0.68	-1.33	-0.23
SD	1.85	1.40	1.56	4.16	1.49	1.25	1.35	2.93

The first four columns from Table 1 above represent a veritable confirmation of the fact that the orientation of the arrows towards the exterior or the interior dilates or comprises the underlying segment from the shaft. The sign of the distortion is in agreement with the specific hypothesis.

Also, the third column shows that the distortion produced by combining the two types of extensions is greater than the simple addition of the average percent error of the first two experimental conditions, thus providing a reliable explanation for the effect of synergy of the effects of distortion.

The last four columns of Table 1 are similar to the ones analyzed previously with two mentions. Firstly, the absolute size of these average percent errors is much smaller. Secondly, the results from condition 5 are opposite to those in condition 2, contradicting one of our expectations. Or, if the allegation of Eysenck and Keane or Goldstein is true (Müller-Lyer illusion occurs with other types of extensions than conventional ones), the fact that was previously pointed out should not occur. Therefore it would have to be considered a critical incident and an indirect confirmation of Gregory’s theory of perspective.

A one-sample t-test was conducted in order to investigate whether the means for each of the six conditions are significantly different from the test value of 0. The results confirm the fact that all the values are statistically significant ($p < 0.001$). The t-values are greater for the Standard Müller-Lyer.

The critical incident regarding the positive score for the fifth condition $t(104) = 5.60$, $p < 0.001$ is opposite to the one in the second condition and it clearly indicates that the mechanism of the illusion is not the same, regardless the different types of extension

used. Eysenck and Keane’s supposition with concern to the multiple mechanisms (possibly different) of producing this illusion seems to be well supported by these results. Similarly, if the local distortion theory had been correct, then the second, third, fifth and sixth conditions would have had to give negative values.

In order to test the second specific hypothesis, a t-test was conducted and the significance of the difference between the percent errors from columns 4 and 8 in Table 1 was determined. The result was the following: $t(104) = 12.35$, $p < 0.001$, which means that the difference of 4.28 produces a t-value extremely significant. This means that the illusion has greater distortion effects in the Standard illusion rather than in the right-angled one.

The type of extension outwards-inwards does not produce more outlined effects for expansion, as Warren and Bashford claimed.

The t-test supports this argument: $t(104) = 0.33$, $p < 0.05$ for the Standard illusions and $t(104) = 1.50$, $p < 0.05$ for the right-angled illusions.

In conclusion, the local effects are fully comparable in size for the inward-outward orientation, which is in disagreement with Warren and Bashford’s findings.

4. DISCUSSION

The present study produced results that were consistent with the initial assumptions. Thus, for five out of six experimental conditions, the local distortion theory was correct (hypothesis one). However, there was one critical incident, because in the fifth experimental condition the value was positive, rather than negative, as it was expected.

The main hypothesis of this experiment (that the types of extension used would generate similar distortion effects) can be confirmed only partially, because the inwards extension in right angle produced opposite effects to the one in acute angle. Nevertheless, the assumption that the magnitude of these effects of distortion (error percent) of the centre was greater in conventional illusion was fully confirmed, because the bisection was facilitated when the ends of the shaft were indicated by perpendicular lines, as in the case of the right angles. The fact that there were no differences of distortion effects between the extensions outwards and inwards, indicated that the mechanism of generating distortions was similar.

There was a great agreement between the results of this study and Predebon's, because the effect of the illusion had the same intensity, regardless the type of angle. In addition, the local distortion theory was correct in five out of six experimental conditions.

The fifth condition can be considered a critical incident that requires the taking into account of other explanatory mechanisms, such as the Gestaltist model, which states that we perceive the whole before perceiving the parts and that the synthesis precedes the analysis.

Gregory's perspective theory was partially confirmed because the Standard Müller-Lyer illusion had greater effects of distortion than the one with the right-angled extensions, where the effect of perspective could not be invoked.

There are also some intriguing aspects, resulting from our experiment. Unlike the finding of Christie [10] (1992) or Predebon [8] of greater length illusion magnitudes for the obtuse-angle Müller-Lyer figures, in our research the magnitudes of the percent bisection errors for acute angle wings were similar or greater those corresponding to obtuse-angle conditions.

There are a couple of questions that remain unanswered, for example the incompatibility of the fifth condition which suggests that Eysenck and Keane might be right when affirming that in the Müller-Lyer illusion there

may be more than just one explicative mechanism.

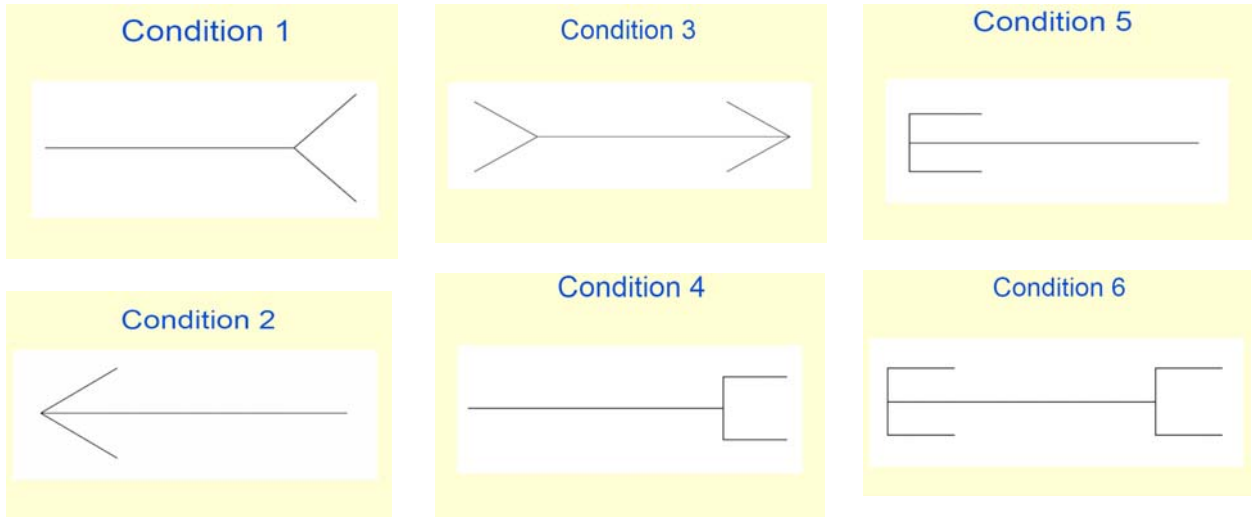
The present study clearly demonstrated the effect of synergy but leaves unsolved the problem of possible experiments with other types of extensions (circle, oval, square, complete, incomplete, angular may closed or open, etc.) or the approach in three-dimensional space, as suggested by Goldstein [4].

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APPENDIX

The six experimental conditions and The start point screen for experiment Müller-Lyer conventional and with right angles.



SYSTEM OF PROJECT MANAGE IN PHASE OF REALIZATION

Lubomír BELAN*, Lenka KURHAJCOVÁ*

*Armed Forces Academy of General Milan Rastislav Štefánik Liptovský Mikuláš, Slovakia

Abstract: In the article we point on problem of project manage in phase of project realization and his possible steps. We mention on possibilities like manage this whole hard process. There is no simple way like to manage process of project realization. It depends on specialist skills, social and personal competencies and it depend on praxis of project managers, too. But not least it depends on project team, too.

Keywords: project management, project manage, realization of project, time plan, risk analysis.

1. INTRODUCTION

Project manage feel like simple way, but praxis shows that this problematic isn't simple. Complexities of project manage result from many activities which are needed.

The first place is project planning, which isn't simple. The second place, when we have successfully planed project, his own realization isn't simple way. In the phase of realization is needed to keep plans, which are affecting by many factors (human resources, budget, material, conflicts, meteorological influence and so on.)

In the article we point on problem of project manage in phase of project realization and his possible steps. We mention on possibilities like manage this whole hard process. There is no simple way like to manage process of project realization. It depends on specialist skills, social and personal competencies and it depend on praxis of project managers, too. But not least it depends on project team, too.

Sanjay Golub told: „Negligently done project take thrice time more, like was planed. Carefully done project take only twice more”.

2. REALIZATION OF PROJECT

View of solving ipso facto of project realization may be different. It depends on many factors, which have mainly influence

of project realization. During project realization is very important fact of project type (category of project). It depends of project depth, his complexity, human resources and costs.

Appropriate manner like to make manage system of project realization work according to Nemeč [1] have six part (subsystems), which help to project manager manage project realization. Content of subsystems is:

- **Monitoring** solvency of project realization considers identification, measurement and collects data about pass of project realization (project monitoring).
- **Control** representative fulfill task and terms, exploitation of sources, cost drawdown and make high quality of project work. Scope of control is identifying divergence.
- **Decision making** representative choice of effective variant of project work realization by obtained information's and by using optimal criteria's for appreciate (task of project manager).
- **Regulation** is establishment of harmony between planed and real realization (task of project manager). Scope of establishment is remove divergence from real realization and planed variance.
- **Motivation** is create motivational environment for all stakeholders (task of project manager).

- **Administration and technical support** include lists, documentation work of management, software support, administrative support (task of top management).

For monitoring and control showing project realization is needed point on basic plan document, which is described by triple – imperative (Fig.1) by following:

- What and how we have to do.
- Time - plan – term monitoring,
- Budget monitoring (planned cost on every activity).

Triple - imperative (Fig. 1), which representative: time manage, cost manage, quality manage.

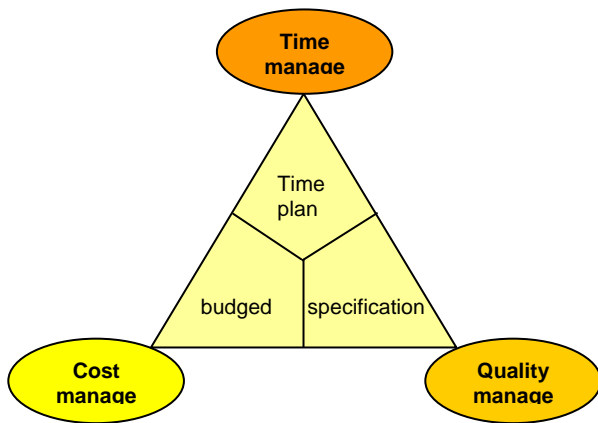


Figure 1 Triple - imperative

Whole three part is re –bound to each other. Change in one parameter is reacting to left over two.

Project manage expressive so – called feedback loop. It matter regularly and systematic evaluate proportion in praxis:

$$\frac{\text{Plan}}{\text{Reality}} = \frac{\text{value planning}}{\text{real (measured value)}} \quad (1)$$

For control to plan fulfill is made interval of its monitoring. It is needed to monitor of project work progress from time to time, it is good for easier detection of problems and following correct realization will be easier.

Project manager may from subordinates demand:

- a) to inform project manager every week by the status of project (workshop of project team),
- b) Every month realize control day of project.

Earned Value Analysis. Scope of earned value analysis is effective support of project manage.

This method makes possible to project manager (or to superior) compare basic plan with realization work according to planed budget. Analysis of earned value uses these basic parameters:

BCWS - Budgeted Cost for Work Scheduled, BCWP - Budgeted Cost for Work Performed, ACWP - Actual Cost of Work Performed.

From above parameters start these indicators of project progress:

1. CV (Cost Variance)
 $CV = BCWP - ACWP$; $CV\% = CV/BCWP$
2. SV (Schedule Variance)
 $SV = BCWP - BCWS$; $SV\% = SV/BCWS$
3. Divergence in ending
 $VAC = BAC - EAC$
4. Cost index
 $CPI = BCWP/ACWP$
5. Planed index
 $SPI = BCWP/BCWS$

Where: BAC - planned budget (complex), EAC - calculation of estimated ending budget at origination divergence.

Using this method is effective, when is integrated to software for project planning. For example Microsoft Project support count and graphic display (Fig. 2) result of earned value analysis.

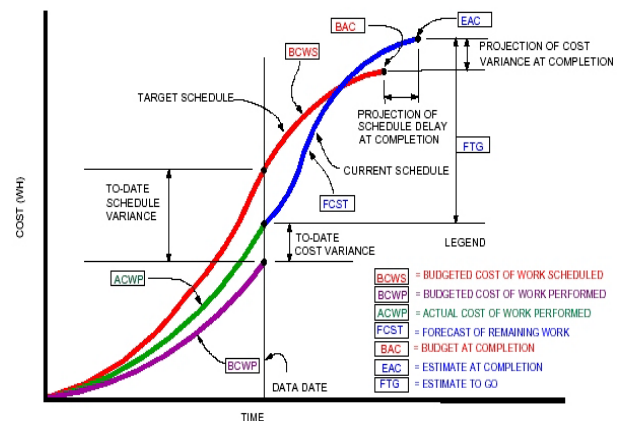


Fig. 2 Graphic display result of earned value analysis

Project would like to manage by following steps:

1. Make effective system of reporting (reporting system).

2. Monitoring of project output in specific dead – lines. (Milestones).
3. Analyze scope, plan and actual divergence.
4. Variants planning and make simulations (What if Analysis).
5. Develop and applied control interference.
6. Modification of project scopes. (Plan Revision).
7. Documented existent phase [3, 4].

In the phase of project realization is needed to monitor situation of project time – plan. We analyze next steps for identification trends and possibilities of uncertainty in remaining part of project work.

For valuation of process we need to use ordinary time – plans. From this plans we can identify and analyze divergences. If divergences are eminent, we have to adequate reacted on it (Example 1).

It is important identify key reason of divergences from time – plan, whether fortunate or unfavorable. The reasons of unfavorable and fortunate divergences we can use for permanent improvement.

Project manager mention **quality manage** to praxis by quality plan, quality control, quality realization and quality improvement in quality manage system.

For **costs manage** is needed to observe these steps:

- Feedback from interested,
- Result from monitoring, budget drawdown of project; quantification of non –planned costs (risk, radical change of specification, failure of contractor, and so on.),
- Interpretation of divergences from budget drawdown which was accredited, identification of causality breach budget drawdown time table, design and manage correction,
- Actualization of time table of budget drawdown and documented of changes.

Causalities of divergences of project costs are:

- Decreasing of costs without time plan change or quality,
- Purchaser compress costs by misuseage competitors (competition of liars),
- Optimistic guess by sources planning and mistake in cost calculation [2, 4].

It is important to prevent from cost divergences (what isn't easy proposition), how to prevent divergence of cost?

- Prevention,
- Good and in detail made financial analysis and budget, avoid changes in project.

During whole phases of project is very important to monitor and manage **risks** by process of risk identification, appraisal risk and attendance with risk.

Project has to be managing by sense, that everything has risk. Plans of risk have to be in stand – by treatment. Reports from risk monitor has to be part of valuation his duration.

In the phase of realization **changes** may have positive influence (opportunities), but negative influence on project. We have to analyze key reasons of negative influence and use result for preventive measure and start – up with improvement [2].

Measuring time divergences, cost divergences, but quality divergences too from plan we can detail analyzed by **5W1H** questions:

- **WHAT** happened?
- **WHEN** did it happen?
- **WHERE** did it happen?
- **WHY** did it happen?
- **WHO** was involved?
- **HOW** did it happen?

Example 1 „Time planning“

Project has 8 activities. The project has to be finished till 16 months. Day limit of workers is maximum **14** workers.

When we control time plan we find out that project duration is 19 months. Project manager have to fulfill time table (16 months) and it is needed to change time plan.

In time plan modification we have more variants, which activities we can move or shorten. It exist one rule, when we change time plan, we can not forget to change sources too.

If it is duration of critical way all right, you can finish solving. If it is duration of critical way bad, try to devise modification (Step 6):

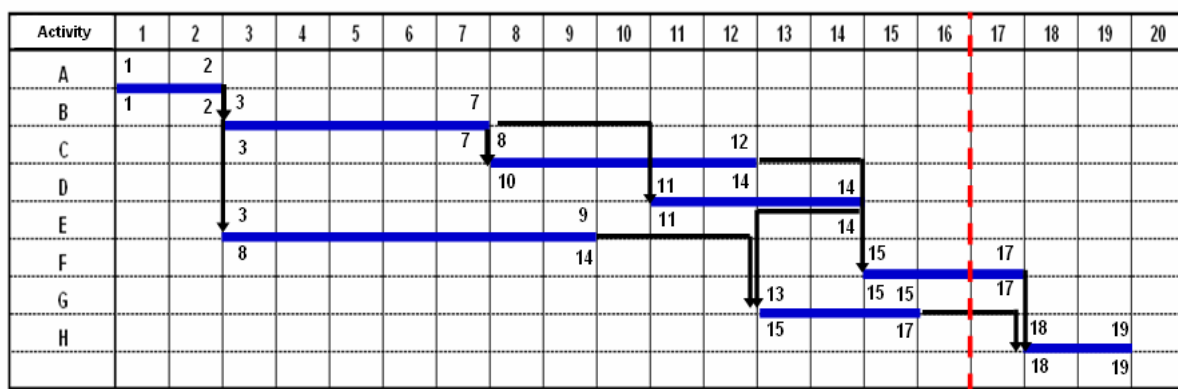
- point what and why you are changing on chosen activity.

System of Project Manage in Phase of Realization

Step 1

Activity	Previous activity (links)	Quantity on activity (costs in thousand €)	Productivity of labour on 1 worker in thousand €/per month	Count of workers on activity	Months
A	-	120	20	3	2
B	A	170	17	2	5
C	B	270	9	6	5
D	B fs +3	320	20	4	4
E	A	560	20	4	7
F	C, D	540	30	6	3
G	D fs -2, E	620	41	5	3
H	F, G	400	25	8	2

Step 2 Gantt graph

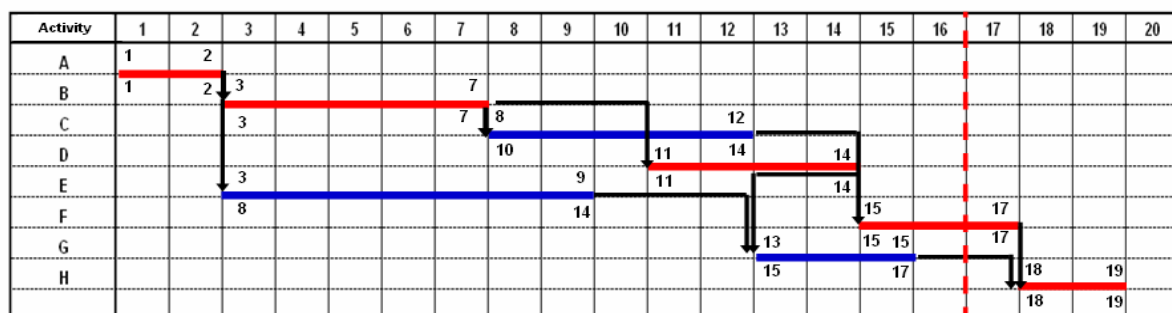


Step 3 Table of activities duration

Activity	Duration in months	Time of beginning activity		Time of ending activity	
		At first possible	At the furthest allowed	At first possible	At the furthest allowed
A	2	1	1	2	2
B	5	3	3	7	7
C	5	8	10	12	14
D	4	11	11	14	14
E	7	3	8	9	14
F	3	15	15	17	17
G	3	13	15	15	17
H	2	18	18	19	19

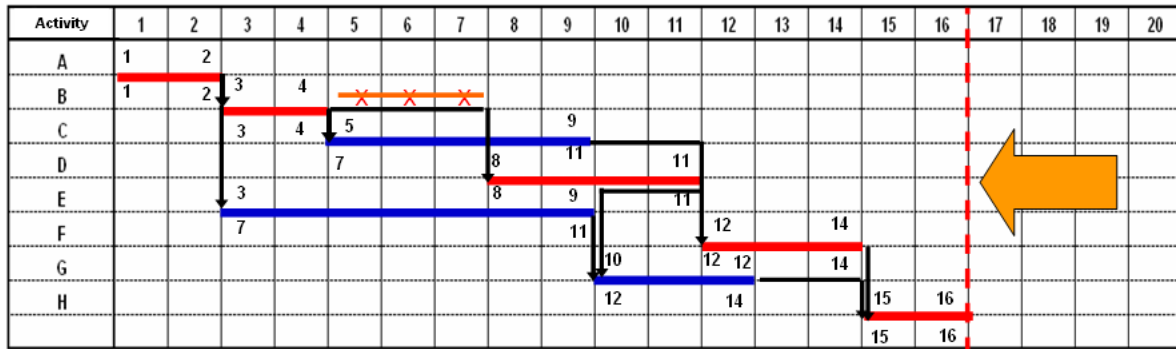
Step 4 Gantt graph

Critical way A-B-D-F-H has duration 19 months.



Step 5 Gantt graph

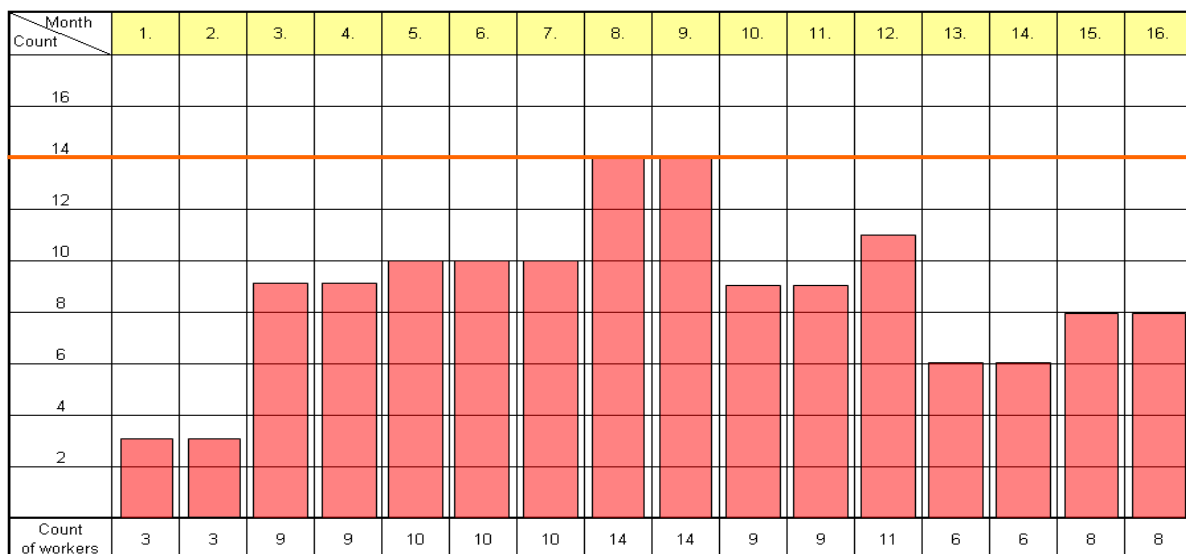
Activity B (lies on critical way) will shorten about 3 months.



Step 6 Table of activities duration

Activity	Previous activity (links)	Quantity on activity (costs in thousand €)	Productivity of labour on 1 worker in thousand €/per month	Count of workers on activity	Months
A	-	120	20	6/ 3	2
B	A	170	17	10/ 5	2
C	B	270	9	30/ 6	5
D	B fs +3	320	20	16/ 4	4
E	A	560	20	28/ 4	7
F	C, D	540	30	18/ 6	3
G	D fs -2, E	620	41	15/ 5	3
H	F, G	400	25	16/ 8	2

Step 7 Table of human resources planning



We fulfill day limit of workers max. 14 workers /per day

3. CONCLUSIONS

Manage and decision making in project realization is very hard process which is made by many professionals.

It is very important that this work is made by skilled persons, because process during project realization have to be monitor and with right interpretation. If the project manager observe this progress it will be ensure continuity of whole process within project manage and success of achievement scopes.

Invest labour to manage every project is in its success realization and in addition for area in which is project made.

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COMMON LAW AND CIVIL LAW: THE MAJOR TRADITIONS OF THE WESTERN LEGAL CULTURE

Oana-Andreea PÎRNUȚĂ*, Alina-Adriana ARSENI*

*“Transilvania” University of Brasov, Romania

Abstract: *The purpose of the present paper is to examine the defining traits of the two highly influential traditions of Western law, namely Common Law and Civil Law. They are an integral part of the Western legal culture, as the various systems of law which are part of it are generally described as belonging either to one or the other. At the same time, this identification implies an adherence to a certain view on law, which reveals a specific set of rules, principles, and institutions. But most importantly, the theoretical and practical aspects concerning the Western legal traditions place the discussion in a cultural context: in order to thoroughly understand the contemporary legal configurations of different states, one must bear in mind the distinctive historical and cultural evolution of the Western world, which has shaped the development of these two great traditions over the centuries.*

Keywords: *common law, civil law, legal traditions, legal culture, systems of law, comparative law.*

1. INTRODUCTION

The *common law* (or *Anglo-American law*) and the *civil law* (also known as the *Romano-Germanic* or *continental law*) represent the two major legal traditions of the Western world.

They are part of the legal *culture* as both law and legal systems are, broadly speaking, ‘cultural products’ [3], ultimately reflecting a well-established set of values, which can be perceived in all social manifestations, starting from the organization of the judiciary and ending with the individuals’ everyday lives. Moreover, it has been stated that ‘one cannot understand the role of law in society without understanding something of legal cultures’ [7].

Throughout the past centuries, the language and law of different European states represented the primary cultural products to be exported. These came into contact with the languages and laws of the farthest places and they would either coexist with the local languages and laws or make them disappear. Due to the recent revolution in the fields of transport and information, this longstanding process has intensified, taking the form of globalization [11].

As Merryman and Pérez-Perdomo [12] rightly argue, the concepts of *legal tradition* and *legal system* have quite different meanings. Thus, a legal system is ‘an operating set of legal institutions, procedures and rules’; according to this definition, all states have a distinct legal system. On the other hand, it is a well-known fact that, for instance, England, New Zealand and the United States of America belong to the ‘common law’ tradition, just as France, Germany, Italy, Switzerland, Argentina, Brazil or Romania are members of the ‘civil law’ family, but this does not imply that they have identical legal institutions, procedures or rules. The distinction can be taken even further, both on the national level, as in the case of the United States, where there is one federal and fifty state legal systems, and on the international level, organizations such as the United Nations or the European Union having created their own systems of law.

The role of the legal tradition is highly relevant as it ‘relates the legal system to the culture of which it is a partial expression. It puts the legal system into cultural perspective’ [12]. Thus, the macrocosm of a legal culture can be highlighted.

2. CLASSIFICATIONS OF THE NATIONAL SYSTEMS OF LAW

The scholarship studying the different systems of law is called comparative law. The comparatist approaches in this field of knowledge have attempted to group the national systems of law, according to different criteria, into larger categories called families of law, major systems of law or types of law. Here is a synopsis of these classifications [5].

According to the community of principles, sources and legal language, René David identifies the following families of law: the Romano-Germanic law, the common law, the socialist law, as well as the traditional and religious systems of law. This classification is widely accepted.

Some authors, such as F.S. Canizares, propose a tripartite taxonomy, reducing the aforementioned families of law to three types: Western, socialist and religious.

In accordance with the Marxist theory, which lays emphasis on the class factor, there are four types of law: slave-owning, feudal, bourgeois and socialist law.

Following the historic evolution of law, there is the incipient law, the antique law, the medieval law, the modern law and, finally, the contemporary law.

From among the various criteria suggested in the literature, Peter de Cruz [6] adopts the one proposed by Zweigert and Kötz in *An Introduction to Comparative Law* (1977, 1998). The quoted writers consider that the 'juristic style' is the determining test according to which the legal systems can be classified, this being established according to the following factors: the historical background and development of the system, the characteristic mode of thought, the distinguishing institutions, the types of acknowledged legal sources and the way it relates to them, as well as its ideology.

3. THE COMMON LAW TRADITION

The common law tradition relies on three pillars: Common Law, Equity and Statute [2].

An important inference from the previous statement is that the phrase '*common law*' can

be used in two senses: on the one hand, it refers to the major legal tradition governing England and the majority of its former colonies and, on the other hand, it refers to the jurisprudence of the courts and to the law formed by the court decisions (in the latter meaning, it is a synonym for '*case law*').

Historically speaking, before 1000 A.D., a conglomerate of norms of different origins coexisted on the British territory, namely Germanic norms, as well as Roman and canonic law, introduced in 664 A.D. As a result of the Norman Conquest (1066), the law of the conquerors was imposed on these heterogeneous practices. The unification of law in Great Britain was the direct result of the political unification accomplished by William the Conqueror. Therefore, this unified law was called '*common law*' as opposed to the laws that had been in force before [11].

The *judicial precedent* is a key element in common law systems, binding the courts to consider previously decided cases. If such a precedent does not exist, the judge will rule according to the general principles of law and so, the precedent is created for future decisions. Thus, the common law tradition lays great emphasis on the so-called '*judge-made law*' (using a phrase coined by Bentham) [10, 14], the guiding principle being that 'it is unfair to treat similar facts differently on different occasions' [2].

The type of reasoning used by judges of the common law tradition is inductive, '(...) deriving general principles or rules of law from precedent or a series of specific decisions and extracting an applicable rule, which is then applied to a particular case' [1], as opposed to the deductive method employed in the civil law legal systems, where the judge has to analyze the rules and general principles of law inscribed in codes or other laws in order to reach a specific decision.

Consequently, the decisions pronounced by the courts are mandatory not only for the parties, but also for the other courts. This is expressed by the principle of *stare decisis*, i.e. 'to stand by what has been decided'. Concerning this aspect, the following distinction must be made: a judgement consists of two parts, namely the principle of law on

which the decision is based (*ratio decidendi*) and other incidental observations added by the judge in order to clarify the decision (*obiter dictum*, literally meaning ‘something said by the way, in passing’). It is only the former part of the judgement that is binding, the other having a merely persuasive purpose. Moreover, the *ratio decidendi* does not represent the decision itself (which must be obeyed by the parties), but only that part of it which is binding in later cases [14].

There is also a hierarchy of precedents: the lower courts must follow the decisions of the higher courts (in a descending order, the hierarchy of courts in England is the following: the House of Lords, the Court of Appeal and the High Court of Justice) [10, 14].

Equity is equally important for the common law tradition, having a supplementary status, since, as the name suggests, it aims at achieving justice and fairness by avoiding a rigid application of common law. Both equity and common law have been applied by the same courts since 1875, and if the two happen to contradict each other, equity shall prevail [2]. The rules developed by the courts to govern the application of equity are named ‘maxims’ of equity. Here are a few examples: ‘*Equity will not suffer a wrong to be without a remedy*’ (that is, equity intervenes only in the absence of a common law remedy), ‘*Equity follows the law*’ (the equitable remedy must not be contrary to the law, i.e. equity does not take the place of the common law), ‘*He who comes to equity must come with clean hands*’ (any party who acts unfairly shall not be granted an equitable remedy), ‘*Equitable remedies are discretionary*’ (only the court has the power to decide, after analyzing the circumstances of the case, whether to grant the remedy or not), and so on [14].

Statute law is the law enacted by the Parliament. The Parliament exerts the legislative power, passing the laws, and it is the role of the judiciary to apply them to individual cases, but not before undertaking a process of *statutory interpretation* through which the meaning intended by the legislator is sought [14, 2].

The common law tradition can be traced in almost all the countries of the Commonwealth,

with several exceptions, as there can be observed from the following enumeration [2]: most of the United Kingdom (excluding Scotland), Ireland, the United States of America (federal law and the law of forty-nine states, except Louisiana), Canada (except Quebec, which belongs to the civil law system, its legal system being inspired by the French law), Australia, New Zealand, India (except Goa, whose law is inspired from the Portuguese civil law system), Pakistan, Hong Kong, and so on.

There are also mixed systems, such as that of South Africa, which is based both on the Roman-Dutch law and on the English common law, or of Nigeria, incorporating, besides English common law, Islamic and traditional law [for a comprehensive list of the legal systems of the world, see *The CIA World Factbook*, Field Listing – Legal System, <https://www.cia.gov>].

4. THE CIVIL LAW TRADITION

The civil law tradition consists of the following national legal systems: the French legal system, together with those related to it, namely the Italian, Spanish, Portuguese, Belgian, Romanian, the legal systems of Latin America, some of Asia and Africa, as well as the German legal system. Both the French and the German law have common roots in the Roman law. Moreover, this great tradition is also based on the Germanic customary law, which has influenced, in its turn, the French legal practices standing at the basis of the Napoleonic codifications. Hence, the label ‘Romano-Germanic’ law [5].

Still regarding terminology, the phrase ‘civil law’ stems from the tripartite division of private law in ancient Rome, introduced by Gaius, more exactly from the term *jus civile* (or *jus quiritum*), a highly formalist system, whose norms applied solely to Roman citizens; the other two systems of law were *jus gentium*, applying to the contacts between Romans and foreigners, and *jus naturae*, a system of law deemed valid for all peoples and in all times [6, 13].

One of the chief features which distinguish the civil law tradition from that of the common

law is *codification*, deriving from Emperor Justinian's *Corpus Juris Civilis*. In the continental law tradition, written law is prevalent, as opposed to the law created by judicial decisions, as in the common law tradition. This characteristic provides a greater degree of systematization of the legal branches, but, at the same time, the legal provisions are less flexible as opposed to the common law systems. Although codes are also seen in common law systems, such as the United States, '(...) the underlying ideology – the conception of what a code is and of the functions it should perform in the legal process – is not the same' [12]. The quoted authors exemplify this statement by analyzing the underlying motivations behind the French Civil Code of Napoleon (1804) and the German Civil Code (1896), both of them aiming at a solid separation of powers between the legislative and the judicial and, at the same time, seeking to create a complete, unitary piece of legislation in order to support the unity of the state. In contrast, the codes of the common law systems – as, for instance, the California Civil Code or the Uniform Commercial Code adopted in the American jurisdiction – stem not only from a different ideology, but also from a different cultural reality: on the one hand, they are not based on the idea of completeness and, on the other hand, they do not reject the previous laws, but rather try to improve them. 'Thus the conservative tendencies of the common law tradition stand in marked contrast to the ideology of revolution from which the spirit of civil law codification emerged' [12].

The long-standing dichotomy *private law* – *public law* represents another trait of the civil law systems (although this theory has a tradition dating back to Roman law – here it is worth to mention Ulpian's famous remark: '*publicum jus est quod ad statum rei Romanae spectat, privatum quod ad singularum utilitatem*', i.e. public law deals with the organisation of the Roman state, while private law applies only to the relations among individuals [13] – it has been criticized by authors like H. Kelsen, a leading exponent of legal positivism, or L. Duguit). The former category comprises branches such as civil law

or commercial law, while the latter includes, among others, constitutional, criminal, financial, or administrative law. In Romania, for instance, both criminal and civil procedures are considered part of the public law, although in some countries civil procedure is regarded as belonging to the private law. There are also mixed legal branches (as labor law, for example) [1, 5].

Even though this division might seem clear-cut, the different branches of law belonging to the public or to the private law are interconnected in many ways [5]. In other words, the rapports between individuals, which are specific to private law, depend on those established between the sovereign power and the individuals, the latter being part of public law [11].

Different criteria have been suggested in the legal literature to stand at the basis of this distinction between public law and private law [5]: the nature of the protected interest (a general one, in the case of public law and an individual one, in the case of private law); the legal form or the way in which the protection of rights is assured (*ex officio* or at the request of the involved parties, respectively); or the organic criterion, according to which public law refers to those who govern, while private law is targeted at the governed.

Although the common law systems also acknowledge that private law governs the relations between private citizens and corporations, whereas in public law relations the State is one of the parties at all times, the distinction has far less practical significance than in the civil law systems, where there are generally specialized courts dealing with the two types of law [6].

5. OTHER DIFFERENTIATING ASPECTS BETWEEN THE TRADITIONS OF COMMON LAW AND CIVIL LAW

Apart from the aspects which have already been mentioned, and which, by delineating the profiles of the two traditions, set them apart at the same time, there are several others issues to be discussed.

The fact that case law is a valuable source of law in the Anglo-American legal tradition

determines a different role for the common law judge, as compared to the judge belonging to the civil law tradition: while the former contributes to the creation of law, the latter only applies the law [1]. Nevertheless, when reaching a decision for a particular case, the civil law judge would consult relevant jurisprudence and doctrine on the matter.

The independence of the judiciary is a key principle in both traditions due to the fact that they are considered ‘the upholders of the rule of law’ [14]. A judge must be independent from the executive power and from the parties.

Also, a judge’s career follows different stages in each of the two traditions. In England, for instance, judgeship is considered a highly prestigious status and this perception is supported by the fact that, as a rule, only the most brilliant jurists become members of this profession [10].

Another noteworthy area is the legal process. Both the civil and the criminal procedures are conducted in accordance with specific provisions.

One of the main differences between the two traditions is the existence of a jury in the case of common law jurisdictions (this tradition remains strong especially in the United States, as there is a constitutional right to a jury even in civil cases [12]), whereas in civil law systems, this is uncommon. However, it has been observed that the role of the jury in the English legal system has started to decline in recent years [14].

The judge belonging to the civil law tradition manifests an active role throughout all stages of the process until he/ she is ready to give the solution, as opposed to its common law counterpart; in common law proceedings, the lawyers generally dominate the courtroom.

Concerning civil procedure, as it has accurately been asserted, ‘just as civil law is the heart of the substantive law in the civil law tradition, so civil procedure is the heart of procedural law’ [12]. Compared with the civil trial specific to common law countries, which takes place as a unique event, civil procedure in the continental law unfolds as a series of court sessions, during which many actions are taken: at the beginning, preliminary issues are discussed; then follow hearings, written

communications, testimonies, the proposing and presenting of other evidence, and so on [1]. Comparatists speak about the ‘concentration’ of the trial in common law systems, a feature which the civil law countries are trying more and more to implement nowadays [12].

Pertaining to criminal procedure, the notions of *adversarial or accusatorial* and *inquisitorial* justice correspond to the two legal traditions under consideration. Thus, the criminal trial in common law systems is preponderantly accusatorial, while, in civil law countries, criminal proceedings are mainly inquisitorial. However, there is an ongoing trend for the inquisitorial systems to borrow accusatorial elements and the other way round. Thus, no legal system relies completely on one of these approaches. The Netherlands is considered probably the most inquisitorial of the West European countries, while the English/ Welsh system is deemed to be the most accusatorial [9].

Since the complexity of this subject exceeds the aim of the present paper, a sketch of the conventional images of both models will suffice. The classical inquisitorial model takes place as follows: the criminal investigation is conducted by a supposedly neutral judicial officer and the competence for determining the guilt or innocence of the defendant belongs to a judge or a panel of judges, having full access to the investigation file (or dossier). The proceedings at trial are overseen by a presiding judge, without a jury. The rights of the defendant are not as clearly emphasized as in the accusatorial trial, in the latter case the presumption of innocence, the right to an attorney, or the right to silence playing an essential part. The inquisitorial trial may not be continuous and can last for an excessive period of time. In the accusatorial model, the police investigation is non-neutral and aims at collecting evidence. The trial is held before an independent and impartial judge or jury with no previous information about the case or dossier. The proceedings are continuous and are conducted according to the principle of morality; there is a ‘trial by combat’, where the attorneys attempt at deconstructing the arguments of the opposing party [4].

Both models include both strengths and shortcomings [4]. In the inquisitorial trial, the magistrate relies on the resources of the state to uncover the truth, but there is a rather rigid approach to the case.

The accusatorial model has the benefit of safeguarding the rights of the parties, but its main disadvantage results from the virtual inequality between the prosecuting and the defending parties, the former generally being more resourceful.

6. CONCLUSIONS

Even though the common law and the civil law traditions have developed distinctive rules, principles, and institutions, there are more and more interactions between the two, each of them being inspired by the other.

The scholars agree upon the following issue: in the context of globalization and, regionally speaking, facing the new challenges generated by the European Union and the European Court of Human Rights, the processes of adaptation and unification are likely to evolve. This is why, at the present time, a thorough study of law is bound to include the comparative method.

Moreover, in order to keep the positive law into perspective, lawmakers also ought to take into account the features of different systems of law when drafting normative acts.

Finally, by investigating these two great legal traditions, which stand at the core of the Western legal culture, one attains a deeper understanding of the configuration of the diverse national legal systems. Thus, the affiliation of a certain system of law to either common law or civil law is not at random, but rather results from a specific complex of cultural factors.

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THE ECONOMICAL SECURITY CONCEPT IN THE CONTEXT OF THE GLOBAL ECONOMIC CRISIS

Cătălin CIOACĂ

“Henri Coanda” Air Force Academy, Brasov, Romania

Abstract: *The analysis focuses on the dark realities of present, when the global economic body slipped down of the generalized imbalance. If the original was more a liquidity crisis and of the stock exchange, the effect of the current economic downturn has been felt in all areas and worldwide. The author is investigating the impact of crisis to the national economic security and particularly the case of Romania. For purposes of this paper, I considered relevant the analysis of economic security under the current crisis in terms of national economic competitiveness. The fall of the national economy has many serious effects, from the economic security of the individual and his family up to reducing the state economic security, from the vulnerabilities amplification political, economic, social and military rule, up to shock the architecture of security and regional and global stability.*

Keywords: *economic security, global economic crisis, competitiveness economic environment.*

1. THEORETICAL APPROACHES

To understand the economic security concept is required a prior analysis to the term of security. This, despite numerous discussions, remains nebulous, often used as a pretext, an excuse or justification for other political measures or strategic ones, more or less justified [1]. However, what we can say with certainty is that security is the common denominator of the major concerns that include for understanding and application, the state and social stability, political, economic, cultural and other indispensable both to the existence and development of state actors or union of any of them, and preservation of their fundamental values and positive promotion of their interests [2].

Blackwell dictionary of political science indicates that security is a concept used in discussions about foreign policy, but suitable also for statements regarding individuals or states. If during the Cold War there were limits to define the term security, charging it with particular military connotations, after the fall of the Iron Curtain and especially after 9/11, security is extended to the political, economic, societal and environmental.

The economic security is a complex and dynamic concept derived from many economic phenomena, that occur both nationally and globally. For purposes of this paper I believe that the definition of relevant economic security aims to ensure the conditions for the full exercise of its law to dispose freely of external nature, in harmony with its own interests and aspirations [3], resource, finance and markets necessary to ensure an acceptable level of wealth and power of the state (Barry Buzan). To define the economic security of Romania requires to identify all the necessary conditions to be provided for the country's economic development and catching of development with the Western EU countries.

In the context of these approaches, it must operate at the conceptual distinction between *the economic security* and *the economic dimension of security*. If the first concept concerns the functioning of an economy and is equated with „safety tomorrow” in terms of prosperity, welfare, standard of living decent/adequate, economic independence, the second captures the operation of the social and political systems, the state, public institutions, and national organizations as part of international alliances and coalitions [4]. On

the other hand, if economic security is a direct consequence of the economic power of the state, the economic dimension of security is relevant to the fact that without a strong modern economy, the safety and stability of the state or the international community can not really exist.

In terms of economic and financial crisis, the economic security is a key component of national security at least in terms of resources and ensuring a dynamic balance for other components of this system [5].

What in February 2007 seemed to be just a U.S. financial problem, a year later turned into a global economic crisis. Before the financial downturn, the international economy was already severely affected by rapidly increasing oil prices and increased market prices of consumer goods [6]. Even if the economic security is a concept with multiple meanings, the threats which it is subjected to through the changes in the external economic environment are a certainty, especially in conditions of globalization, when economies overlap and become vulnerable to a global crisis.

Economic security is directly affected by *the competitive economy*, by the way it adapts to changes in the global economy. The competitiveness is defined as all institutions, policies and factors that determine the productivity of a country [7]. This level of productivity, in its turn, determines their sustainable growth that can be achieved by an economy. In other words, the competitive economies lead to improved living standards of population and also determines the rates of return obtained by investing in an economy.

Therefore, the concept of competitiveness has both a static and one dynamic side: it determines the ability of the state to support its level of income, but investment returns in the economy, being one of the factors explaining the growth potential in the future.

2. THE WORLD CRISIS AND THE ECONOMIC SECURITY

In the context of confrontation with the largest global recession in the last decades, policy makers were confronted with new economic management challenges and adopted

an active position. Thus, to avoid entry into financial system collapse, banks have been rescued or nationalized on an unprecedented scale. It is in contradiction with the modern capitalism principles and it has strengthened the private sector in expense of the state.

The current financial shock has led to slowing the global economic growth in an alarming rate: 6.3% reduction in the last quarter of 2008, compared with growth of 4% a year ago [8]. Financial bankruptcy expanded rapidly over the world, based next near tricks with irregular loans, on the following cases: a flow of cheap money coming from emerging markets (especially China), financial regulation inconsistencies, distortions in government policies and an inappropriate oversight on these markets.

As a result, according to IMF estimates, the aggregate amount of losses to banks and other financial institutions, only in 2009, has exceeded 4 trillion, while only 1,1 trillion was designed to resolve the crisis. An analysis of the effects only to the U.S. [9] show that GDP for 2009 is lower compared to 2008 by 7%, cumulative for three years, the buildings fell by 33%, 22% of the amount of funds lost retirement, to which adds 1,2 trillion in deposits and investment losses. All these losses amount to colossal figure of 8,3 trillion USD.

Before analyzing the effects of the current crisis on economic security, I think it is good to know that this can be quantified. There are several concerns in this area, of which I mention: the International Labor Organization, which launched the methodology of calculating an index of economic security to the individual level or Sightline Institute in the U.S. that calculates an index based on their economic security unemployment, children poverty and the average income.

The economic security is directly influenced by economic competitiveness so, my analysis is designed starting from the Global Competitiveness Index (GCI), index that the World Economic Forum based its reports since 2005. This index captures the microeconomic and macroeconomic foundations of national competitiveness and has 12 pillars: institutions, infrastructure,

macroeconomic stability, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market sophistication, technological readiness, market size, business sophistication and innovation.

The importance of a solid *institutional environment* has become even more apparent during the current crisis, given the increasingly direct role played by the state in the economy of many countries. The degree of control by the state to private groups is greater, the public goods tend to be directed primarily to representatives of dominant groups and the state becomes increasingly weak. If anti-crisis strategy does not pose serious challenges for knowledge, serious problems may occur in practical application where there is lack of institutional capacity, mechanisms confusing or inexplicable bureaucratic delays.

Also, private institutions are an important element in creating prosperity. The assurance of transparency in the private sector is essential for business, as indeed, the recent global economic crisis has highlighted the relevance of accounting and reporting standards for the prevention of fraud and mismanagement.

Infrastructure is the key to ensuring the effective functioning of the economy. In the crisis context it became more evident that lack of infrastructure is a brake in economic development. Infrastructure is, for any country, the backbone of the economy. It is an area in which the crisis can still be a positive factor on the long term, given the central role of infrastructure development in most national stimulus packages.

Macroeconomic stability is important for business, but equally important is the fact that by itself it can increase the productivity of a nation. Maintaining macroeconomic stability is essential to prevent adverse effects associated with sudden fluctuations. Economic indicators fluctuations, a high interest rate monetary policy, an unstable exchange rate can be for investors as many signs of declining marginal productivity of capital [10]. The impact of the crisis on macroeconomic indicators is clear: they have changed over the past years and have generated or have reacted to economic

contraction. For Romania, a country considered to be affected average by the crisis (Table 1), these indicators show the following:

Unemployment returned on an upward trend since the second half of 2008. Unemployment reached 6.3% in July 2009, a level that has not been confirmed from 2006. Most of those who remained unemployed in 2009 come from the private sector, more sensitive to shocks in the economy. The government planned to reduce the vast bureaucracy of the year 2010, the number of unemployed will probably exceed the threshold of 1 million.

Table 1 Romanian macroeconomic indicators

GDP (1 st half 2009/1 st half 2008)	-8.7%
Households consumption (1 st half 2009/1 st half 2008)	-15%
Gross fixed capital formation (1 st half 2009/1 st half 2008)	-25%
Industrial production (July 2009/July 2008)	-6.9%
Current account deficit (July 2009/July 2008)	-73.8%
Unemployment (August 2009)	6.6%
Budget deficit (8 months 2009)	-4.4%

Inflation has changed its upward trend at the same time with major reductions in spending population. Thus, the annualized inflation down by nearly 4 percent from the maximum recorded in summer 2008, reaching 4.7% at the end of 2009. Some banking analysts argue that this level is still slightly higher because of the monopolistic markets where consumers can not exercise sufficient pressure to determine the reduction rate of price increase.

Industrial production went into negative territory since the fall of 2008. The decline deepened in 2009 when there were significant monthly declines, in the context of the low demand which caused the companies to reduce the volume of manufactured goods. In the II quarter, Romania's industrial output dropped by over 8%, while in some European countries dropped by over 20%. Amid the decline of exports and domestic demand weak, some factories even produce at half of their capacity.

External debt of Romania's medium and long term exploded in 2009, reaching 57.2 billion EUR. Analysts argue that because the most debt is represented by the long term, the major risks in the economy are minor.

GDP, after in 2008 reached a record 126.4 billion EURO, up by 7% compared to 2007, declined by 7.1% in 2009. This is the first annual decline after 2000 (Fig. 1), during which nominal GDP of Romania increased by more than tripled.

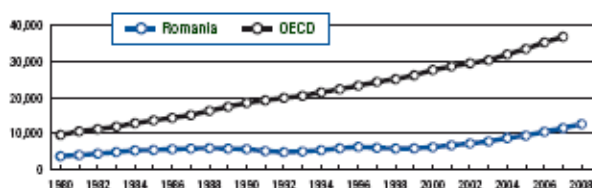


Fig. 1 GDP (PPP int'l \$) per capita, 1980-2008

Decreased the exports, the industrial production and the foreign investment have put huge pressure on emerging countries in Eastern Europe, including Romania, which have seen no source that fueled the economies in the past.

Public debt reached in the middle of 2009 the value of 29.3 billion EURO, almost one quarter of GDP. With falling revenue from the state budget, the Government had to borrow from both local banks and from international lending institutions.

Net average wage has continued to grow and in early 2009 but at rates much lower than previous years. Thus, in June 2009 it was 1379 lei, by 8.3% above the same month in 2008. The wage growth has stopped speaking of a „freezing” of the wage income of the entire 2010 budget. The high pressures to reduce costs recorded also in the private sector.

Foreign direct investment in the Romanian market in 2009 saw a decline of almost 37% compared to 2008, year of the post-revolutionary maximum (over 9 billion EURO). Now, the investors are more alert regarding the risks of operations in emerging markets, especially in a time when funding is more difficult obtained than previously.

The exchange rate leu-euro has stabilized in the recent months around the threshold of 4.2 RON, after a galloping growth recorded in

the late of 2008 and early months of 2009, when it exceeded the threshold of 4 lei/euro. The result of plummeting current account deficit has led most specialists estimate for 2010 has an oscillation rate between 4.0 and 4.5 RON/ EURO.

The exports of the Romanian companies have declined in the late of 2008, amid contractions developed economies of Western Europe. During January-June 2009 exports registered an average decline of almost 19% over the same period in 2008, while imports recorded an average contraction almost double.

Thus, the Romanian commercial deficit in the first 6 months of 2009 was 4.3 million EURO, 6.8 million EURO less than the same period of 2008.

Following of the output recession signals in the Western European economies, it is expected to demand a return of Romanian products since 2010 (Fig.2). A healthy population means a vigorous nation and a productive workforce, which is a prerequisite for sustainable economic development of a country.

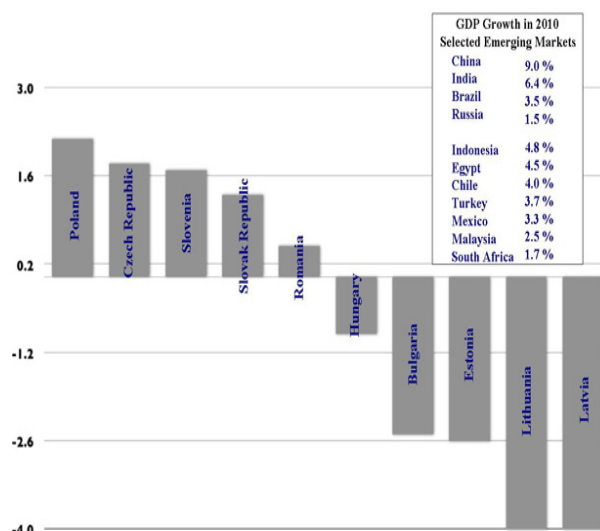


Fig. 2 GDP growth in 2010

The financial crisis is felt in *the health system*, which in most cases requires additional funds, otherwise the risk of inability to grant health care essentials is imminent. The only way to avoid such devolution is to maintain system health on the agenda of

government priorities, investing and using health resources efficiently.

Basic education, the quality of higher education and training are crucial for economies that want to move the value chain beyond simple production process. The global financial crisis threatens to deprive millions of children in the poorest countries of education, with a secondary effect on future economic growth. Governments are forced to reduce expenditure on education, which might lead some parents to withdraw children from school. Thus, we witness the „creation of a lost generation with huge costs to society” [11].

In terms of *efficiency of the goods market*, because of the sharp fall in prices on commodity exchanges, the strategy followed by major exporters was to extend massive stocks, while reforming the industry.

The economic crisis brought on the *labor market* new supply and demand reformulations. If qualified staff felt the effects of the crisis by lowering offers and reduced wages, those with common jobs are faced with the need to retrain in order to keep their jobs or to find some work, in conditions that the unemployment is rising. Thus, in an International Labor Organization report shows that in 2009, global unemployment has reached 6.6%, meaning 212 million people unemployed.

Despite measures taken by governments, the number of unemployed will remain high in 2010. The young people under 35 were most affected. Between 2007 and 2009, 10.2 million people were forced to live from unemployment benefits. In Romania, the crisis has created a paradoxical situation: in terms of unemployment rates that exceeded 8% in January 2010, there are a number of sectors in which jobs are available for anyone but nobody applies to occupy them. The necessary staff training and workplace training for adoption workers' skills to the changing needs were the last priorities in the current economic context.

Those who regulate and supervise the *financial markets* should never underestimate systemic risks and have to be always on alert when it comes to financial stability. The accumulated losses of the global financial

system following the credit crisis could amount to 2800 billion USD (after the Bank of England's estimate of 28.10.2008). The most severe financial crisis of the past 80 years has caused the global collapse of the stock exchanges, the bankruptcies of more banks emblematic of the modern market economy and adopt more extreme measures by countries to stabilize their economies or avoid collapse.

The current economic climate has led to a change in thinking about *technology* and its impact. In the context of „new normality” [13], innovation based on technology are the main leverage in order to create competitive advantage. The feature taxes for technology are becoming more limited, but what the state can do is to provide a fair competitive market.

The same phenomenon is found in *scientific research*. Drastic decrease in the budgets in this area affects not only the opportunity to conduct research projects by national or international competitions, but the long term, the loss of human resources in research. Basically, under-funding of research is a loss of national competitiveness of the economy that will persist for decades.

The markets were not immune to current financial shock and many were severely affected. For example, the situation on the main market in early October 2008 was presented in this way: The U.S. Dow indicator decreased by 25% in three months, the indicator of China's Shanghai Exchange fell by 30% at Brazil's BOVESPA, with 41% and Russia, RTSI, with 61%.

Not even the emerging markets have been avoided; they were badly affected due to reduction of export and flow of private capital. This effect was magnified by the phenomenon of „flight to quality” when investors withdrew their capital from risky markets. The countries are required more than ever to manage economic sovereignty from national competitiveness, increase of national wealth fund involvement in international economic relations and national economic security.

3. CONCLUSIONS

The main lesson that we gave the current recession is mainly related to reconsider the

state's role in rescuing the financial system, in ensuring the sustainability of the system, integrity and transparency it.

Also, the risks during the crisis are changed and interventionist measures by governments are not always welcome, particularly because of the long-term effects. That can be gold-plating of the financial sector or lack of resources that have to be allocated to prevent other risks, such as those related to infrastructure.

However, this crisis could provide an opportunity for governments "transition countries" (as Romania) to regain credibility of their citizens by adopting measures such as the creation of macro and micro economic safe conditions for capital investment stranger, to continue the structural reforms that will be the basis for sustainable growth, focusing on fiscal and monetary policies, the imposition of rule of law, institutions of law and property rights protection.

Without doubt, any state is concerned about economic security. In crisis, economic security becomes more than a component of national security.

It is a direct consequence of the economic power of the state, both seriously affected by changes in external economic conditions and by a number of internal factors: the political system, lack of the economic competitiveness and the failures of the social protection system.

Paradoxically, should Romania is able to effectively manage EU funds under the anti-crisis plan, alongside with a program and a properly tailored crisis budget, flexible enough, it could get out of this crisis stronger, with a substantial increase in economic security.

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GOOD RESISTANCE TO MANIPULATION AND THE COMPETENCE OF APPLYING ETHICS IN MANAGEMENT

Daniela BELU

“Henri Coanda” Air Force Academy, Brasov, Romania

Abstract: *This paper has the purpose of transmitting information and ideas about the things that stand at the foundation of performance assessment destined to bring success in private life and also in the organisation development.*

Keywords: *management, emotional intelligence, resistance to manipulation.*

1. OVERVIEW

The purpose of the survey was to check the following hypotheses:

- I. Not all subjects with Machiavellian attitudes are as well victims of manipulation (that is with a weak resistance to manipulation) or not.
- II. Can the subjects with good resistance to manipulation be found to a greater extent only in sample 2 and are missing from the samples 1 and 3 or not.
- III. Are there subjects with weak resistance to manipulation only in the samples 1 and 3 or not.

In the light of the above mentioned aspects, we find it opportune to emphasize the competence of the young military students (future officers for the Infantry and Air Force) and civilians (future doctors) regarding the competence of applying ethics into management (reflecting emotional intelligence in dominating the own negative emotions and to transmit positive emotions to the others). We used as a measuring system the second indicator: the capacity of not surrendering to manipulators.

The second instrument is an adapted version [1] of the questionnaire in Table 1, which comprises 30 questions about different usual life situations, some of them really critical, even irritating. You can answer YES, NO or MORE OR LESS, when you are undecided. There is no time limit for completing the test, but it would be better to try to answer quickly, without philosophizing too much on each question, without splitting hairs. Answer with absolute sincerity, because only this way you have the opportunity to know your real conditions in the face of the environment and whether you are a victim of manipulation or not.

The achieved score is calculated as follows: at first, award 2 points for each YES answer to the questions 2, 3, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 27, 29 and for each NO to the questions 1, 4, 7, 12, 23, 26, 28, 30. Furthermore award 1 point for each MORE OR LESS answer. Summing up the points, you shall get the personal score which can be interpreted according to the value categories in Table 3, in order to find out the grade for susceptibility or in other words your resistance to manipulation.

Table 1 *Are you being manipulated?*

Current no.	Questions
1	Do you know how to stand to your interests?
2	Are your thoughts and emotions easy to read?

3	Are you a hot- tempered person?
4	Do you answer a determined NO to an inconvenient demand?
5	Were you involved in absurd actions only to please someone?
6	Do you have a soft spot for certain persons?
7	Are you being called a stubborn person?
8	Do you agree with the saying: no great loss without some small gain?
9	Do you consider the first decision taken to be also the best?
10	Do you easily fall into traps?
11	Do you enjoy gambling?
12	Do you cease an activity in the middle of it when you find out that the result being pursued is uncertain, although you have invested a great deal of money, time and energy?
13	Do your acquaintances consider you a naïve and credulous person?
14	Do you subscribe to the Latin aphorism “Errare humanum est, perseverare diabolicum est”?
15	Do you hold yourself responsible only if you have promised something to someone even formally?
16	Do you fulfil your promise, even if it was forced upon you?
17	Do you get easily angry?
18	Have you sometimes realised that you have certain opinions, but you cannot justify their origin?
19	Is the saying “Capul plecat sabia nu-l taie” correct? [Romanian proverb meaning “Obedient people don’t get into trouble”]
20	Do you deliver a service to someone even if you consider he/ she does not deserve it?
21	Are you usually a polite person?
22	Are you inflexible in your decisions?
23	Is your sleep restful?
24	Do you give in to the requests of a charming person?
25	Do you listen to the statements of an interlocutor even if he/ she is uttering gross ineptitudes?
26	Do you consider that everything you do is the consequence of your decisions?
27	If you started an activity and have not achieved the desired results, do you have the tendency to invest new expenditures considering that you hereby approach the pursued goal?
28	When you make an important decision, do you also take into account other persons' opinions?
29	Do you stick to a point of view only because you do not want to be regarded as a weak, hesitating person?
30	Do you set yourself a limit (of time, money, effort) in solving a problem, beyond which you give up your activity?

Table 2 *Score interpretation*

Achieved score	Grade of resistance to manipulation
60-43	Weak
42-23	Average
22-10	Good
9-0	Very good

We established three samples of 12 subjects each:

- SAMPLE 1 made up of infantry students,
- SAMPLE 2 made up of military students-navigating aviators from the Air Force,
- SAMPLE 3 made up of civilian students from the Faculty of Medicine.

The three samples of military and civilian students, as well as the results of applying the

two tests, which have already been presented in terms of content and interpretation, are depicted in the Tables no. 3, 4, 5.

Regarding the resistance to manipulation, it has been determined that, in sample no. 1, out of six subjects who do not use manipulation techniques, three subjects have an average resistance to manipulation, and the other three have a good resistance, whereas out of the 6 students who apply manipulation techniques 4 have an average resistance to the attack of other manipulative persons, one has a poor resistance and only one displays a good resistance (Table no. 3).

In sample 2, one subject of the 2 who do not use manipulation techniques has an average resistance to manipulation and the

other one has a good resistance, whereas out of the 10 subjects who apply manipulation techniques, 4 have an average resistance to the attack of other manipulative persons and the rest of 6 subjects show a good resistance (Table no. 4).

In sample 3 all 9 subjects who do not use manipulation techniques have an average resistance to manipulation, and out of the 3 subjects who use manipulation techniques, 2 have an average resistance to the attack of other manipulative persons and one has a poor resistance (Table no. 5).

What differentiates respondents with low resistance to manipulation (respondent 11 from sample 1 and respondent 11 from sample 3), from the rest of the respondents, no matter

what sample they are from is the fact that they **use the manipulation techniques** listed below **in groups**:

- “I make a merit of not being honest by labelling my attitude as diplomacy”;
- “I use force in order to make people around me to act as I want them to”;
- “I feel no remorse when I am lying to someone in order to gain certain benefits”;
- “My goal is not to act morally.”

At least two of the 4 manipulation techniques highlighted above have been applied in sample 2 by each of respondents 6, 11, 12, who show, all three of them, an average resistance to manipulation, like 50% of the upright respondents from samples 1, 2, 3.

Table 3 SAMPLE No. 1

$x_i \rightarrow$ $\bar{x}_1 = (\sum x_i)/12 =$ 1,08(3)	Standard deviation $\sigma_1 = x_i - \bar{x}_1$	Variation σ_1^2	Standard sample deviation
27	-1.08(3)	1.1728	$\sum(x_i - \bar{x}_1)^2 = 554.915$
21	-7.08(3)	50.1688	
28	-0.08(3)	0.0068	
27	-1.08(3)	1.1728	
27	-1.08(3)	1.1728	
22	-6.08(3)	37.0028	
26	-2.08	4.3388	$[\sum(x_i - \bar{x}_1)^2]/12 = 46.2429$
36	+7.917	62.6788	
26	-2.08(3)	4.3388	
33	+4.917	24.1768	
45	+16.917	286.1848	
19	-9.08(3)	82.5008	

Table 4 SAMPLE No. 2

$x_i \rightarrow$ $\bar{x}_2 = (\sum x_i)/12 = 22,91$	Standard deviation $\sigma_2 = x_i - \bar{x}_2$	Variation σ_2^2	Standard sample deviation
28	+5.09	25.9081	$\sum(x_i - \bar{x}_2)^2 = 384.6$
18	-4.91	24.1081	
30	+7.09	50.2681	
13	-9.91	98.2081	
18	-4.91	24.1081	
27	+4.91	16.7281	
22	-0.91	0.8281	$[\sum(x_i - \bar{x}_2)^2]/12 = 26.4097$
19	-3.91	15.2881	
22	-0.91	0.8281	
22	-0.91	0.8281	
26	+3.09	9.5481	

30	+7.09	50.2681	
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Table 5 SAMPLE No. 3

$x_i \rightarrow$ $\bar{x}_3 = (\sum x_i)/12 = 4,083$	Standard deviation $\sigma_3 = x_i - \bar{x}_3$	Variation σ^2	Standard sample deviation
27	-2	4	$\sum(x_i - \bar{x}_3)^2 = 280$
27	-2	4	
30	+1	1	
23	-6	36	
38	-1	1	
30	+1	1	
26	-3	9	$[\sum(x_i - \bar{x}_3)^2]/12 = 23,33$
26	-3	9	
28	-1	1	
35	+6	36	
42	+13	169	
26	-3	9	

2. VALIDATION OF THE SCORE OF RESISTANCE TO MANIPULATION

By studying the information referring to the resistance to manipulation we find that the share of those who have a good resistance and respectively a weak resistance to manipulation in the 3 sample is as follows:

Sample no. 1

3...12

$x \dots 100 \rightarrow x = 3 \cdot 100 / 12 = 25\%$

have good resistance to manipulation

1...12

$x \dots 100 \rightarrow x = 100 / 12 = 8.33\%$

have a weak resistance to manipulation.

The other 66.67% have an average resistance to manipulation.

Sample no. 2

7...12

$x \dots 100 \rightarrow x = 7 \cdot 100 / 12 = 58.33 \%$

have a good resistance to manipulation.

The other 41.67% have an average resistance to manipulation.

Sample no. 3

0...12

$x \dots 100 \rightarrow x = 0 \cdot 100 / 12 = 0\%$

have a good resistance to manipulation

1...12

$x \dots 100 \rightarrow x = 100 / 12 = 8.33\%$

have a weak resistance to manipulation.

The other 91.67% have an average resistance to manipulation.

We compare the average from sample 1 to the average from sample 2 and apply the “t” test, i.e. we use formula (1):

$$t = \frac{x_1 - x_2}{\sqrt{\frac{(\sum \sigma_1)^2 \cdot 11 + (\sum \sigma_2)^2 \cdot 11}{22} \cdot \sqrt{\frac{1}{12} + \frac{1}{12}}}} \quad (1)$$

Common standard deviation is calculated using formula (2)

$$\sqrt{[(\sum \sigma_1)^2 \cdot 11 + (\sum \sigma_2)^2 \cdot 11] / 22} \quad (2)$$

$$t = \frac{28.08(3) - 22.91}{\sqrt{\frac{554.9156 \cdot 11 + 316.9172 \cdot 11}{22}} \cdot \sqrt{\frac{2}{12}}} = \frac{5.173}{26.948649} = 0.1919$$

$t_{\text{calculated}} = +0.1919$

Looking into the table of “t” values on the row indicated by the liberty threshold ($n_1 + n_2 - 2$) and in the column indicated by the probability threshold, 0.20, (i.e. at the intersection of column 0.20 with line 22) we find the value of t_{critical} :

$t_{\text{critical}} = +1.32$

$t_{\text{calculated}} < t_{\text{critical}}$

$+0.1919 < +1.32 \rightarrow$

Null hypotheses 6 is accepted

With an error risk of 20%, ($0.20 \cdot 100 = 20$), we conclude that the two averages of samples 1 and 2 not differ significantly. By observing

the two environments we notice that the subjects of sample 1 are less resistant to manipulation than the subjects of sample 2 ($28.08(3) > 22.91$).

We compare the average of sample 1 to the average of sample 3 and apply “t” test, i.e. we use formula (3):

$$t = \frac{\bar{x}_1 - \bar{x}_3}{\sqrt{\frac{(\sum \sigma_1)^2 \cdot 11 + (\sum \sigma_3)^2 \cdot 11}{22} \cdot \sqrt{\frac{1}{12} + \frac{1}{12}}}} \quad (3)$$

Common standard deviation is calculated using formula (4)

$$t = \frac{28.08(3) - 29}{\sqrt{\frac{554.9156 \cdot 11 + 280 \cdot 11}{22} \cdot \sqrt{\frac{2}{12}}}} = \frac{0.917}{26.371916} = -0.03477$$

$$t_{\text{calculated}} = -0.0377$$

Looking into the table of “t” values on the row indicated by the liberty threshold and in ($n_1 + n_2 - 2$) the column indicated by the probability threshold, 0.20, (i.e. at the intersection of column 0.20 with line 22) we find the value of t_{critical} :

$$t_{\text{critical}} = +1.37; t_{\text{calculated}} < t_{\text{critical}};$$

$$-0.0377 < +1.37 \rightarrow$$

Null Hypothesis 5 is rejected.

We therefore conclude that a risk of error of 20%, ($0.20 \cdot 0.001 = 20$), that the two averages belonging to sample 1 and sample 3 not differ significantly. By observing the averages we find that the subjects of sample 1 are somewhat more resistant to manipulation than the subjects of sample 3 ($28.08(3) < 29$).

By way of transitivity it results that the subjects of sample 2 resist a lot better to manipulation than the subjects of sample 3 ($22.91 < 29$).

By comparing, in sample 1, the average to the norm of resistance to manipulation, we apply the “t” test, this time using formula (5):

$$t = \frac{\text{a var age of sample 1 + nom}}{\frac{\text{s tandard deviation in sample 1 + nom}}{\sqrt{\text{number of subjects in sample 1}}}} \quad (5)$$

Standard deviation from sample 1 is calculated using formula (6):

$$\sqrt{\frac{\sum \text{value}^2 - \frac{\sum \text{value}^2}{\text{number of values}}}{\text{number of values} - 1}} \quad (6)$$

$$\sum (\text{values})^2 = (27)^2 \cdot 3 + (21)^2 + (28)^2 + (22)^2 + (-36)^2 \cdot 2 + (33)^2 + 45^2 + (19)^2 = 10019$$

$$\text{Standard deviation from sample 1} = \sqrt{(10019 - 10019/12)/11} = 28.894925$$

$$t = -6.08(3)/(28.894925/\sqrt{12}) = 0.7292$$

Looking into the table of “t” values on the row indicated by the liberty threshold and ($n_1 - 1$) in the column indicated by the probability threshold, 0.20, (i.e. at the intersection of column 0.20 with line 11) we find the value of t_{critical} :

$$t_{\text{critical}} = +1.37; t_{\text{calculated}} < t_{\text{critical}};$$

$$+0.7292 < +1.37 \rightarrow$$

Null Hypothesis 1 is accepted.

With an error risk of 20%, ($0.20 \cdot 100 = 20$), we conclude that:

- 66.67% of the subjects in sample no.1 have and average resistance to manipulation, (i.e. they have a slight tendency to let themselves manipulated by other people, recovering quickly from a rational and logical point of view), and 33.33% of these use manipulation techniques themselves;
- 8.33% of the subjects, i.e. one subject only, (who also applies Machiavellian techniques), has a weak resistance to manipulation, (i.e. he/she manifests the tendency to accept other people’s ideas and easily gets under external influences which might pertain to mundane lifestyles, the acceptance of novelty in all the domains, a great receptivity to advertisements and commercials);
- 25% of the subjects have a good resistance to manipulation, (i.e. they manifest the tendency to imitate certain attitudes, sometimes unconsciously).

By observing the norm and the average in sample 1, ($22 < 28.08(3)$), we find that the subjects generally have an average resistance to manipulation, (i.e. they have a slight tendency to let themselves manipulated by other people, but recovering rapidly from a rational, logical point of view).

By comparing, in sample 2, the average with the norm of not using manipulation techniques, meaning being an upright person, we apply the “t” test, again using formula (5).

Standard deviation from sample 2 is calculated using formula (6):

$$\sum(\text{values})^2 = (28)^2 + (18)^2 \cdot 2 + (30)^2 \cdot 2 + (13)^2 + (27)^2 + (22)^2 \cdot 3 + (19)^2 + (26)^2 = 6619$$

$$\text{Standard deviation from sample 2} = \sqrt{6619 - 6619/12} / 11 = 23.455811$$

$$t = 0.91 / (23.455811 / \sqrt{12}) = 0.1342$$

Looking into the table of “t” values on the row indicated by the liberty threshold (n1 - 1) and in the column indicated by the probability threshold, 0.20, (i.e. at the intersection of column 0.20 with line 11) we find the value of t_{critical} :

$$t_{\text{critical}} = +1.37; t_{\text{calculated}} < t_{\text{critical}}; +0.1342 < +1.37 \rightarrow$$

Null Hypothesis 1 is accepted.

With an error risk of 20%, (0.20 · 100 = 20), we conclude that:

- 58.33% of the subjects from sample no.2 have a better resistance to manipulation (i.e. they manifest the tendency to sometimes imitate attitudes unconsciously), and 50% of them actually use manipulation techniques;
- 41.67% of the subjects have an average resistance to manipulation, (i.e. they have a slight tendency to let themselves be manipulated by other people, rapidly recovering from an emotional, logical point of view), and 50% of these actually use manipulation techniques.

By the norm and the average in sample 2, (22 < 22.91), we find that the subjects generally have good resistance to manipulation, (i.e. they manifest the tendency to sometimes imitate certain attitudes unconsciously).

By comparing, in sample 3, the average to the norm of resisting well to manipulation, we apply the “t” test, again using formula (5).

Standard deviation from sample 3 is calculated using formula (6):

$$\sum(\text{values})^2 = (27)^2 \cdot 2 + (30)^2 \cdot 2 + (23)^2 + (28)^2 \cdot 2 + (26)^2 \cdot 3 + (35)^2 + (42)^2 = 10372$$

$$\begin{aligned} \text{Standard deviation from sample 3} &= \\ &= \sqrt{(10372 - 10372/12)/11} = 29.399546 \\ t &= 7 / (29.399546 / \sqrt{12}) = 0.8247 \end{aligned}$$

Looking into the table of “t” values on the row indicated by the liberty threshold and (n1 - 1) in the column indicated by the probability threshold, 0.20, (i.e. at the intersection of column 0.20 with line 11) we find the value of t_{critical} :

$$t_{\text{critical}} = +1.37; t_{\text{calculated}} < t_{\text{critical}}; +0.8247 < +1.37 \rightarrow$$

Null Hypothesis 1 is accepted.

With an error risk of 20%, (0.20 · 100 = 20), we conclude that:

- 91.67% of the subjects of sample no. 3 have an average resistance to manipulation, (i.e. they have a slight tendency to let themselves be manipulated by other people, but recover fast from a rational, logical point of view), and 16.6% of them use manipulation techniques themselves;
- 8.33% of the subjects, i.e. one subject (who also applies Machiavellian techniques), has weak resistance to manipulation, (i.e. he/she manifests the tendency to accept other people’s ideas, easily abiding by external influences that might pertain the mundane lifestyle, the acceptance of novelty in all the fields, a great receptivity to advertisements and commercials).

By observing the norm and the average in sample 3, (22 < 29), we find that the subjects generally have an average resistance to manipulation, (i.e. they have a slight tendency to let themselves be manipulated by other people, but recovering rapidly from a rational, logical point of view).

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MEMBERSHIP IN ORGANIZATIONS AND SELF-ESTEEM IN THE CONTEXT OF BIOLOGICAL INVOLUTION IN ADULT FEMALE

Elena-Simona INDREICA*, Camelia TRUȚA*

*"Transilvania" University of Braşov, Romania

Abstract: *Personal successes and failures and internalization of others opinions influence, among other factors, self - image. In adulthood a person remodels his or her self-image on the ground of perceived body-image and according with status and successes. Our investigation was designed as a comparative study between adult female members of an organization and adult female non-members of an organization regarding their self-image, in the context of biological involution characteristic to the 45 - 55 age sub-periods. All participants in our study were considered professional successful. Our hypothesis was confirmed at a highly significant level.*

Keywords: *motivational area, adult female, biological involution, self-image, organization.*

1. INTRODUCTION

Biological involution does not imply only a genetic program of individual ontogenesis, but also subjective experiences, emotional feelings, and mental states [1,3,10]. Attention is mostly driven by the physical changes, psychological ones being neglected.

Despite the controversies about age stages between different authors in developmental psychology, we consider in this article the 45 - 55 age interval as being part of adult life. Often characterized by professional and socio-cultural identities [1,12], this stage is marked by biological involution, tensioned events, depression, and changes in the usual life rhythm [10,11]. "Middle age crisis" is used by researchers to describe the moment in which middle age women realize the changes produced in their lives, such as getting old, occupational changes, children departure.

Personal successes or failures and others' interiorized opinions influence self - image. As an adult, a person rechanges his/her self-image according to the way in which he/her perceives the corporal self and her achievement. Women without a professional activity or those obsessed with the idea of

getting old are more vulnerable in developing depression or negative self-esteem. Can we talk about differences regarding self - esteem between adult women who belong to an organization and those who don't, while both categories have professional success?

2. BIOLOGICAL INVOLUTION AND PSYCHOLOGICAL AGING

Psychological aging is the result of age-induced changes in biostructures [10], which constitute the material support of mental life and that of actual performance of psychological functions [2]. These changes are determined by intern factors (such as heredity, usage of the nervous system) and external factors (ecological, social and cultural factors) [3].

Events in the social environment (the socio-professional environment, socio-cultural environment and relational environment), which particularly occur in the life of adults [11], have a strong echo on the psychological plan, being the ground of psychological aging. Retirement from professional activity, waiving of some activities, diminishes in biological potential, frequent somatic illnesses, possible

disabilities, decreases in the number of family members (death of life partner, children become adults), disappearance of old friends are some of these social events [2].

Regressions in the sensorial plan associated with diminished informational flux and relational sphere [1,12], determine psychological suffering changes such as helplessness, isolation, ideas of injuries. Another important factor of psychological changes and disorders is becoming aware of biological involution and associated uncertainties regarding the future perspectives. Psychology of senescence is characterized, in general, by unequal and non-linear involution of discrete psychological functions, associated with important individual differences determined by innate predispositions, previous level of psychological abilities development, level of achieved performance, experience, cultural level and educational level [13].

Psychology of senescence has three general aspects [2, p.45]:

- The differential character, which highlights significant differences between persons and between the systems or functions of the same person.

- Multiple determination of the psychological senescence, the aging process is the result of individual interactions with the particular physical, biological and social environment, which determine the degree of aging to depend less on the age and more on genetic, somatic, moral and social characteristics of the individual.

- Relative character of disabilities, physiological senescence appears without obvious signs as a consequence of the fact that human body and mind can compensate and balance deterioration by using complex reserves. For example, although intelligence reaches maximum performance in fluidity between 16 and 25 years old, we cannot talk of deterioration of intelligence after this period of age, many times similar or even greater performance are obtained later.

According to PhD Constantin Bogdan (1997), normal functioning of an elder implies physical, psychological and social balance.

Psychological changes imply [2]:

1. Changes in attention or diminished ability to concentrate, diminished voluntary attention which lead to decreases in mnemonic ability, especially in the short-term memory; information in long-term memory appears to be much more organized and systematized.

2. Changes in thinking which are characterized by decreases in spontaneity, flexibility, quick adaptation disorders and stereotypes. Decreases in the number of neurons and of nervous connexions do not affect in the same way every cerebral structure or region. These differential characteristics appear in behaviour.

3. Several disharmonic pre-existent traits can be accentuated or even developed at the character dimension.

4. The affective dimension is dominated by depression, apathy, coldness, which lead to an unstable or irritable behaviour. Somatic sufferings, sleep and appetite disorders, feeling of culpability and uselessness, self-blaming are symptoms of involution depression.

Characteristics of the aging process are obvious at all personality dimensions [14]. Depending on the attitudes systems developed in relation with complex existential state of the adult, a person may be in one of the following frequent condition: existential situation is perceived as being overwhelming and disarming, constructive or refused [2].

Those approaching the first condition will develop aging models with high pathological risk; egocentric, introvert, depressive and anxious, and hypochondriac traits are in advantage. Those persons approaching the second condition will develop optimal aging models. We mention here adults or elder persons who have a balanced and structured personality and who can reorganize their potential and invest it in an activity in concordance with their new, post-retirement, personal, familial and social conditions.

Persons in the third condition will also develop aging models with high pathological risk but in a different manner. As a dominant characteristic of these people is the strain their excessive "hyper-ego" imposes. Not admitting specific deterioration of their age, these persons remain at activity levels that go beyond their possibilities and risk to suffer

somatic or psychological break-downs much difficult to overcome later.

We should also mention a disharmonic structure of personality on the ground of biological involution giving the elders a general negative state [13]. The analytical adult will become the pestiferous old man, the prudent adult will become the suspicious old man, the meticulous adult will be the stereotypical old man, the economic one becomes miser and so on.

3. RESEARCH METHODOLOGY

Purpose of the research: to conduct a comparative study on self - image in female adults who belong to an organization and self - image in female adults who don't belong to an organization, according to specific biological involution of the 45 -55 age stage.

Research objectives: to stress biological involution influence on female adults' self - esteem; to identify the biological factors that influence adult women's self - esteem; to point out the necessity of maintaining women's health through their involvement in family and society; to identify the professional factors that influence adult women's self - esteem.

General hypothesis: under the impact of biological involution, women's self - esteem records negative changes, especially in persons who don't belong to an organization.

Specific hypotheses:

1. There is a significant correlation between the degree of biological involution and self - esteem level in adult women (of 45 - 55 years old).
2. There is a relation of interdependence between corporal self perception and social self - esteem in adult women (of 45 - 55 years old).
3. There is a correlation between professional dissatisfaction level and self - esteem level in adult women (of 45 - 55 years old).
4. There is a correlation between health problems associated with the age and self - esteem level in adult women (of 45 - 55 years old).

The investigated sample: all the participants (80 persons) were adult women,

with ages between 45 and 55; 41 persons were working in different organization, while 39 women were free-lancers.

Instruments used: biological involution questionnaire; self - esteem questionnaire; social self - esteem inventory; corporal self perception questionnaire; observation guide.

4. RESULTS

Hypothesis 1: The correlated variables in hypothesis 1 are biological involution level and self - esteem level. Bravais - Pearson correlation coefficient was used in order to determine the relation between the two variables. We obtained: $r = -0.406$, $N = 80$, $p < 0.001$. The statistically significant negative correlation allows us to affirm that the hypothesis is confirmed: while biological involution accentuates, self - esteem level decreases.

Hypothesis 2: The correlated variables are corporal self perception and social self - esteem level. The result of the correlation was statistically significant: $r = 0.289$, $N = 80$, $p < 0.001$. Hypothesis was confirmed: as adult women are more satisfied with their physical appearance, the level of social self - esteem increases.

It was also noticed that participants' occupation influences their perception of physical appearance, and social self - esteem. The result of the correlation (Bravais - Pearson correlation coefficient) between participants' occupation and the way in which they perceive their physical appearance was: $r = 0.265$, $N = 80$, $p < 0.005$. The coefficient is statistically significant which means that corporal self perception improves as participants' occupation is higher.

Regarding the relation between participants' current occupation and their social self - esteem, the result of the correlation was: $r = 0.238$, $N = 80$, $p < 0.005$. The correlation is statistically significant: as participants' current occupation is higher, their social self - esteem is higher.

Hypothesis 3: The correlated variables are the level of professional dissatisfaction and self - esteem level. The result of the correlation (Bravais - Pearson correlation

coefficient) was: $r = -0.263$, $N = 80$, $p < 0.005$. The statistically significant negative correlation confirms the hypothesis. As participants' professional dissatisfaction increases, self - esteem decreases.

Hypothesis 4: The correlated variables are health problems associated with the age and self - esteem level. The result of the correlation (Bravais - Pearson correlation coefficient) was: $r = -0.245$, $N = 80$, $p < 0.005$. The statistically significant negative correlation confirms the hypothesis. As health problems associated with the age accentuate, self - esteem level decreases.

5. CONCLUSIONS

Most of the women (78% from the investigated sample) build their self - image during adolescence. The fundament of self - image construction was corporal self, psychological and social selves playing a secondary part. Therefore, biological involution in adult life determined negative changes in self - image, because the changes associated with the process of getting old are evident and irreversible (on a scale from 1 - unnoticed to 20 - extremely evident, the mean for the degree of getting old is 16, which means a high level of biological involution at the participants in the research).

For testing the main hypothesis, we used independent sample t test for difference of means between the self - image of adult women belonging to an organization and the self - image of adult women who don't belong to an organization. The difference is statistically significant ($t = 4,12$, higher than the 3,62 value corresponding to $p < 0,001$), confirming therefore the fact that the self - esteem suffer, under the impact of biological involution, negative changes in persons who don't belong to an organization. A possible explanation is that the persons involved in an organization perceive their corporal self in a more positive manner (the comparison with others is at a low level as a consequence of standard conduct or uniforms - on a scale from 1 to 5, the mean is 1.7; for persons whot don't belong to an organization, the mean is 4.1, the comparison being at a much higher level).

Women involved in an organization receive, also, much more compliments and encouragements when compared with freelancers. This helps them to accept more easily the process of getting old.

The objectives of the research were partially achieved, the necessity of maintaining women health through involvement in family and society and identification of specific differences in the perception of corporal, psychological, social selves of female adults regardless of their social status, their culture or nationality remaining as points of interest for future researches.

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ROMANIAN NON-GOVERNMENTAL ORGANIZATIONS' EVOLUTION

Răzvan-Lucian ANDRONIC*, Anca ANDRONIC*

*Faculty of Psychology and Educational Sciences, „Spiru Haret” University, Braşov, Romania

Abstract: *Although a “core” and non-profit sector, having an important role in the functioning of a democracy, Romanian NGOs are little known to the general public and only rarely addressed by specialists. This article presents a brief history of the Romanian NGOs (from their appearance to date), with the emphasis on specific elements.*

Keywords: *NGOs, association, democracy.*

1. NGOs: THE „CORE” OF THE NONPROFIT SECTOR

Non-governmental organizations (NGOs) have a unique position, being the most visible and most influential component of the civil society, the “core” of the “third sector”, and membership in such organizations is a non-political form of participation (Almondo and Verba, 1996, 267).

At present, the NGOs have globally an accelerated rhythm of numerical growth and diversification of their fields, developments that create major problems to the typology of these nonprofit entities. Referring to the adopted classification criteria, Vasile Stanescu (2001, 142-143) mentioned: the way the members are recruited (depending or not on membership or profession); membership or coverage area (local, national or international NGOs); types of beneficiaries (the general public, one or more target groups); sources of income; the organization's size. For the same author, “the most interesting classification of NGOs” is the “*International Classification of Nonprofit Organizations*” – derived from the UN's international standard of industrial classification – which divides NGOs into nine main categories, according to their main carried out activity (activity to which the most operational expenses are destined).

In Romania there has been a confusion regarding the correct name from which the

abbreviation “NGO” comes. It is used the correct form, “non-governmental organization” (composed of the prefix “non- element of composition, adding the meaning ‘not’ to nouns, adjectives and adverbs” (*Explanatory Dictionary of Romanian Language, DEX, 674*) followed by the adjective “governmental – belonging to government, regarding the government, coming from the government; which represents or supports the government” – *DEX, 439*), as well as the incorrect one, “ungovernmental organization” (composed of the prefix “un- element of composition that adds the meaning “not”, “lacking” before nouns and some adjectives” (*DEX, 698*) followed by “government”). The incorrect use is common, being present especially in the media, but also in public or nongovernmental sources of information.

The main obstacle to the full affirmation of the role of the Romanian NGOs as a central element of “the third sector” is the fact that it is not very well known, a “lack of basic information on the sector and how it works” (Salamon and Anheier, 1998, 6). This statement is fully true for Romania, where the sources of information on NGOs are few and scattered (Stoiciu, 2001, 15): various reports of *the National Institute of Statistics and Economic Studies*, reports published annually by the *Foundation for the Development of Civil Society* (FDSC) or other organizations,

such as *CENTRAS*. Other sources of information can be found in public administration (e.g. publication of the balance sheets by the *Ministry of Public Finance*).

2. BRIEF HISTORY OF ROMANIAN NGOS

Mihaela Vlăsceanu (1996, 13) wrote that the existence of “the third sector” has been known for at least four centuries, as the activities of the church, philanthropic and charitable institutions, mutual aid associations, etc. For Vasile Stanescu (2001, 135) “associations and foundations have a fruitful local tradition”, with a distant origin in the associations of the type of the Roman colleges (attested by inscriptions from the third century AD), then the handicraft professional associations (since the XIIth century) and then the guilds (the XIVth century). The *Calimach Code* (the first form of civil code of Moldova, in force between 1817 and 1865) expressly recognized the legal personality of the guilds, a provision which is found in the *Organic Regulations*.

Daniel Saulean and Carmen Epure (1998, 2-4) present the history of philanthropy and the nonprofit sector in Romania, which began to develop at the border between the XIXth and the XXth centuries. In relation to countries from the Western Europe, this development was delayed by a series of “general inhibitors”:

a) geopolitical factors: the fact that state institutions have emerged later, following the influence of our neighbouring empires; political instability and dependence on foreign leaders;

b) the role of the Orthodox Church: unlike Catholicism, the Orthodox theology “does not stress and promote charity as a means of salvation”. However “in the absence of good administration of the state, the Church was neither more nor less than required to meet several functions of social assistance. The Orthodox monasteries became involved in hosting and supporting the poor”. (Saulean and Epure, 1998, 3) With the secularization of the churches' assets (in 1863), the resources available to the Orthodox Church were

reduced drastically; that was why the monasteries were no longer involved in social activities;

c) the rural character and the community-based organization of the Romanian society: the population consisted largely of peasants in the state of poverty, which provided cheap labour for landowners. The middle class did not make its presence felt during the principalities, which led to the “persistence of the traditional rural mentality, leading to the isolation of rural communities. The society suffered from chronic atomization, manifested at all levels of the community life, maintaining a primitive way of life and thus remaining an impenetrable environment for the progressive ideas”. (Saulean and Epure, 1998, 4)

The NGOs' development was made possible by the occurrence of the Law 21/1924, “*Law for legal persons (associations and foundations)*”, which occurred one year after the Romanian Constitution of 1923, the first Romanian Constitution recognizing the right to free association. Law 12/1924 has an interesting history. It was initiated by the then Justice Minister, G G Marzescu, in order to use the “tools of association and foundation well and clearly regulated” in an effort to connect Romania to the evolution of the “civilized countries, where the expansion of private initiative is ongoing upward” (Stanescu, 2001, 136). The law was not changed for many years (75 years) and resisted the attempts to repeal it, repeals tried by the leadership of the *Romanian Communist Party*, due to the efforts of the *Legislative Council*, which “managed to keep the law under the category of active regulatory acts, using an ingenious solution, that is “by omission”, avoiding its inclusion in both the active track and in the “passive” one, the one of the repealed legislative acts” (Stanescu, 2001, 166).

During the interwar period, NGOs grew substantially, both numerically and by diversifying the scope of their concerns. However, the NGOs' expansion in number was not a spectacular one, given the fact that civic activism and philanthropic activity were generally the preserve of the upper strata of society.

In relation to the interwar Romania, the communist regime meant a “significant step backwards” (Saulean and Epure, 1998, 7) in terms of NGOs' activity. Officially, the party-state controlled any type of organization, including those based on free association, even if their work could hardly become a “subversive” one (for example, the Bee Breeders Association of Romania). Gradually, the communist regime began to “encourage” freedom of association, enabling some associations to set up (according to special laws and not to Law 21/1924, which was in force, but inactive during the communist period) especially those supporting the totalitarian regime particularly in sports, cultural and entertainment fields. This is about the so-called “benign” development of the non-governmental organizations in the ‘70-‘80s (Stoiciu, 2001, 10), a phenomenon common to the other countries of the former “socialist bloc” (Salamon and Anheier, 1998, 19). A case that illustrates the “benign” development of the civil society during the communist period is the *Flame Literary Circle* (Stoiciu, 10-11), who represented “the communist perspective on civil society”. Designed to “reduce social tensions and mobilize youth, the *Flame Literary Circle* encouraged artistic activities, becoming gradually (for its direct participants) an authentic associative movement, providing support for social and cultural changes”, while for the critics it was merely a means of manipulation, due to the Communist leaders’ control (Stoiciu, 2001, 10-11).

3. EVOLUTION AFTER DECEMBER 1989

More stages can be identified in the NGOs’ evolution after December 1989, starting from their approach in several works: Saulean and Epure (1998); Association for Community Relations and Allavida (2003); Burada and Berceanu (2005):

a) the period 1990-1993 is characterized by the predominance of the perception of the civil society as the “public enemy” of the Romanian power structures, opinion which was favoured by the expression of the NGOs with an

advocacy role of a speech highly critical of the new power, who was labelled as a relic of the communist government;

b) between 1993 and 1996 the attitude towards NGOs has improved slowly but surely. The first notable collaboration of the NGOs with public authorities appeared then. The lack of opportunities for obtaining public funding is still felt, and media reports mostly the negative aspects of the non-governmental organizations’ activities (tax fraud, dubious international adoptions, etc.). However, this period is a “good period” for the NGOs’ development; it has proved its ability to attract and produce resources, “among which the human resources have got a special place” (Saulean, 1999, 18);

c) during 1996-2000 Romania has been governed by a coalition that was strongly supported by the civil society’s representatives, and a number of prominent leaders of the NGO’s sector were involved in ruling. The rapid erosion of trust in government (embodied by the fact that after the 2000 elections the coalition that governed had no parliamentary representation) affected the credibility of the civil society’s leaders, who supported it;

d) The year 2000 marked a turning point: renewing the legislative framework related to the NGOs. The Government’s Ordinance 26/2000 (whose text is almost entirely proposed by the participants in the National NGO Forum in 1999) replaced Law 21/1924, providing a more appropriate framework for the NGOs’ activity. The main changes brought by the Ordinance 26 are: the simplification of the procedure for registering an NGO (the number of individuals required for establishing an association is reduced from 21 to 3 and there is no longer needed a ministry’s favourable opinion) allows diverse economic activities, including the foundations (something which was prohibited by Law 21 / 1924); an NGO can have the “public utility status”, which can be obtained by providing public services; this status provides access to grants and partnerships with local authorities; the National Register of NGOs was set up and any NGO must obtain a registration certificate from the court to which it belongs.

e) the period 2001-2006 brought about a decrease in funding opportunities for NGOs. With the consolidation of democracy and the European integration moment coming closer, a number of organizations, which in the past had significant financing programmes designed exclusively for NGOs (*Soros Foundation, USAID, and even the European Commission*), have significantly limited their activity, a trend that can be identified since 1997 (Stoiciu, 2001, 26). On the other hand, a series of government initiatives to fund NGOs appeared with the help of some ministries (*Ministry of Youth and Sport*) while the practice of subsidizing social services expanded (Burada, Berceanu and Petrescu, 2007);

g) after Romania's integration into the EU, the Romanian NGOs have achieved equal status with similar organizations in other Member States, having access to structural funds. However, the NGOs' are still not very well financed, in line with the low rate of absorption of the EU funds into Romania between 2007 and 2009.

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FEMALE AUTHORSHIP REVISITED IN MARGARET ATWOOD'S *THE BLIND ASSASSIN*

Kinga KOLUMBÁN

“Henri Coandă” Air Force Academy, Braşov, Romania

Abstract: *Anxiety of influence and anxiety of authorship are two common terms in literary history and theory. Both of them refer to the struggle of an artist to come to terms with the impositions of the literary canon. The first one, coined by Harold Bloom, has a general reference over the poet and his relationship to his literary ancestry while the latter, originating from the - by now ‘classical’ – The Madwoman in the Attic, addresses this phenomenon from the point of view of feminine authorship – restricted by the constraints of patriarchal culture which has traditionally rendered authorship masculine and attributed women unrealistic roles which they haven’t been able to identify with. Canadian writer, Margaret Atwood approaches the problem of women’s authorship – directly or indirectly - in several of her novels. The present paper sets out to analyze such aspects in The Blind Assassin (2000), by tracing in the novel the motif of ‘the double’ and identifying it as a metafictional comment on women’s literary tradition.*

Keywords: *anxiety of influence, poetic misprision, anxiety of authorship, the double, feminist metafiction.*

1. INTRODUCTION

The Blind Assassin is the somber story of two sisters, Iris and Laura Chase, tracing their lives from a happy childhood in a well-to-do middle class family until Iris’s old age. The novel offers a realistic and accurate social milieu to the Canada of the beginning of the century. From its debut, informing on Laura’s suicide more or less triggered by Iris admitting an affair with Alex, the man Laura had been in love with, we find out about Iris’s unhappy marriage to Richard Griffen, an industrial magnate, the loss of her daughter, the twists and turns that have lead to the tragic conclusion in both sisters lives. The story unfolds through Iris’s narrative who intends it to be some kind of a testimony or confession to her granddaughter Sabrina, whom she has never seen. Parallel to Iris’s story there runs another one about the secret rendezvous of two lovers, the man – a true male Seherazade – telling the gruesome story of the blind assassins and sacrificial virgins –victims turned into avengers - on the faraway planet of Zycron. We gradually connect the science fiction characters to the ‘real ones’ (that is,

those in Iris Chase’s story) and realize that the two narratives – interspersed with ‘the official version’ of newspaper cut-outs – are also instruments of revenge. Iris’s story will help Sabrina discover the truth about her origin and ‘reinvent herself at will’ [1]. When it is published, the parallel story – attributed to Laura and generating an actual cult around her image as a one-book rebel who died too young – brings down Richard Griffen, the person causing both sisters’ misery.

2. THE ANXIETY OF INFLUENCE

Harold Bloom, in his remarkable analysis on the mechanisms of poetic (and, implicitly, artistic) imagination employs the term ‘misprision’ in order to trace elements of impact in the creation of new artistic work [2]. The meaning of the term itself covers both the possibility of misunderstanding, as well as that of contempt of authority. As such, it becomes a pertinent word to denominate the position of an artist within the continuum of tradition. Bloom explains this process, which can be described as both appropriation and assimilation, in six episodes. The masterpieces

of predecessors induce anxiety but at the same time they represent an imperative for new creation through the prism of the old one. Misprision implies a deliberate misunderstanding, or, in the case of literature, misreading and miswriting of a preexisting text to the point in which it no longer belongs to the predecessor, much rather, it gives the impression that the work of the predecessor has been actually written by the successor. This last episode is given the name 'Apophrades: return of the dead' and it is an allusion to a belief in ancient Athens that on certain ill-fated days the dead returned to haunt the houses they had lived in. However, this 'literary haunting' is a necessary one, it being the prerequisite frame of new creation. As pointed out elsewhere: "there are no texts, but only relationships between texts" [3], so literature is a vast map of (artistic) misreading, a succession of texts conjured into being by the anxiety of influence.

Margaret Atwood describes this process as 'a negotiation with the dead' and imagines the artist – like Orpheus, Gilgamesh, Dante and so many others - as going down 'to where the story is' and bringing it to the surface. 'All writing of the narrative kind' – Atwood says – 'is motivated, deep down, by a fear and a fascination with mortality – by a desire to make the risky trip to the Underworld, and to bring something or someone back from the dead' [4]. Risky, because of the danger of not being able to return but important because it is a record of memories on past events, thus, saved for the future, securing one's immortality. The undertaking of Atwood's fictional writer, Iris Chase, who represents the 'key' to the story, is twofold. The narrative saves and recovers the sisters, and the 'truth' for Sabrina who represents both Iris's and Laura's future. At the same time Laura is brought back by an admitted, spiritual contribution to the writing of the narrative.

Yet, a probably more important reason for this memoir being put on paper is that of finally being revealed the truth. By his/her descent to the Underworld the artist fulfills an 'old arrangement': 'The dead get blood; [...] In return, the poet gets clairvoyance and the completion of her identity as a poet' [4], and

so does Iris. By writing the story she settles accounts with Laura, for having caused her suicide. It is an offering in exchange for being given the chance to arrange the pieces of the puzzle and put the fragments of memory into their right place. Throughout the story Iris is the one who 'is asleep' as Laura tells her (185). As opposed to her, 'Laura had such a direct gaze, such blankly open eyes' (190). Despite her 'not being like other people', or perhaps exactly because of that, Laura recognizes the futility of Iris's sacrifice in order to save her own family. By the time Iris can 'see' the truth (the choice of name also suggests the implication of vision) Laura is dead. 'I thought I could live like a mouse in the castle of the tigers, by creeping around out of sight inside the walls; by staying quiet, by keeping my head down. No: I give myself too much credit. I didn't see the danger. I didn't even know they were tigers. Worse: I didn't know I might become a tiger myself. I didn't know Laura might become one, given the proper circumstances. Anyone might, for that matter'(323).

3. THE ANXIETY OF AUTHORSHIP

One possibility of reading *The Blind Assassin*, offers itself right away, one typically feminist, of a 'feminine voice' negotiating a place of author (ity) exposing her own perspective by weaving – like Penelope – her complex tapestry of resistance. As such, this story can be considered as part of a tradition in women's writing brought into the discourse of literary theory by the second wave feminism of the 60s and 70s.

In an anthological piece of that period, called suggestively *The Madwoman in the Attic*, Sandra Gilbert and Susan Gubar produce the famous feminist re-reading of Charlotte Brontë's *Jane Eyre*.

In their view, Bertha Mason, Rochester's mad wife, who destroys her husband's residence and herself by setting a fire, represents Brontë's (and, as they argue - any woman writer's of that age) hidden desire to break loose from the shackling representations of femininity in 19th century Western culture.

"Before the woman writer can journey through the looking glass toward literary autonomy... she must come to terms with the images on the surface of the glass, with, that is, those mythic masks male artists have fastened over her human face both to lessen their dread of her "inconstancy" and by identifying her with the "eternal types" they have themselves invented to possess her more thoroughly." [5] Those masks are that of the angel and the monster, the two extreme images employed by 19th century western canon to represent women and the above quotation could well be a motto for second wave feminism's project to disclose patriarchal ideology behind these images of sweetness and monstrosity. Being feminine equaled being 'the angel of the house', sweet, obedient and selfless, a two-dimensional image of purity that has no story to tell. Yet, the emphasis on the 'mysterious' and 'duplicitous' nature of the feminine betrays both distrust and fear of it and literature has abounded in images of evil, demonic witches and fiends. As artistic creativity has been rendered male, women's coming to terms with literary authorship meant a somewhat schizophrenic state (hence the anxiety) while attempting to find themselves in these unrealistic depictions. According to Gilbert and Gubar the presence of the female monster, the 'writer's 'mad double' within 19th century fiction represents both their anxiety but also an unconscious strategy for 'revising the self – definitions patriarchal culture has imposed on them' [6].

Their book has attracted a lot of criticism for various reasons, especially because it regards the final, necessary death of the 'monster-woman' as liberation. Yet, it has undoubtedly contributed to the creation of the image of 'the self-destructive female artist', also reinforced by the lives of writers like Virginia Woolf or Sylvia Plath. Just how strongly such an image has affected Atwood's self-perception as an artist can be traced in her biography (anxiety confessed over being an aspiring woman writer in the 50s Canada) and also in her fiction, one of such examples being Laura Chase who represents a literary kinship to these fictional or real predecessors. The complexity of her position is given both by her

being Iris's double/*alter ego* within the text, her sister's shadow and constant companion, even after the suicide occurs, and, also, by her figure recalling the literary theme outside the text. Laura haunts the text even if at the end of her narrative Iris admits authorship of both parallel narratives (also the one attributed to Laura): "I can't say Laura didn't write a word. Technically that's accurate, but in another sense – what Laura would have called the spiritual sense – you could say she was my collaborator. The real author was neither one of us: a fist is more than the sum of its fingers"(490). Laura's death makes it possible for Iris to recognize the truth and set off her 'machinery of revenge' but the revelation comes too late and at too much a cost.

The Blind Assassin is woven through with references to 19th century images of femininity. During their childhood they study 19th century poems, the house they live in, their burial place is decorated with angelic figures, after her marriage, Iris goes to a society costume ball dressed as Coleridge's Abyssinian Maid. Also, the angel/monster divide, duplicity, and mystery related to the feminine is constantly present in the narrative. Laura grows up to be seen by the others as an 'odd child', and her 'being different' is several times suggested. Yet, her characteristic is purity, straightforwardness, Iris even calls her 'skinless'. Laura's clothes are 'less like something she'd chosen to put on than like something she'd been locked up in'(8), on the other hand clothes are a 'secret consolation' to Iris who is wrapped, hidden by them. Looking in the mirror she sees her own face 'so loose and transparent I could peel it off like a stocking' (43). Early in her childhood they are educated in the name of 'neatness, obedience, silence' (152) but Iris soon learns 'half concealed insolence and silent resistance', she learns 'not to get caught' (160).

Her greatest project is, of course, placing Laura as the author of her book, thus, turning her (or, rather letting her be turned) into a spectacular *double* for herself that hasn't got much to do with reality: "Laura was a "modernist," we are told on the inside flap. She was "influenced" by the likes of Djuna Barnes, Elizabeth Smart, Carson McCullers –

authors I know for a fact that Laura never read" (276). This is not merely a possible action of prudence or cowardice, as she ponders at a given moment (489); it is also the process of an artist being 'obscured by the image he himself has created' [4], the public persona replacing the one that writes the stories. Yet, as Atwood points out, the one cannot exist without the other. "They alternate. They are attached head to head" [4]. In the same way, Iris's narrative is "... a lefthanded book. That's why one of us is always out of sight, whichever way you look at it" (490). By creating her narrative, Iris refuses to die and succumb to the literary pattern; in addition, she reveals her 'real' face.

The complementarity of the two sisters is more than just a narrative technique; their relation to one another is also a reassessment of artistic creativity, beyond the caveat traditionally imposed on women. Thus, Atwood joins the line of feminist metafiction as explained by Gayle Green. She carries out a *re-vision* of an existing literary pattern and manages to exceed that within the traditional and hardly spectacular frame provided by the 19th century realist novel. Metafictional novels masquerading as realism determine "*critics to reenter old plots to reevaluate them and novelists reenter them to rewrite them or to 'write beyond' earlier endings*" [7]. Iris and

Laura Chase recall some of the female characters rendered to the angel/monster dichotomy of 19th century fiction but also contribute to the dissolution of this artificial divide, thus, representing Atwood's argument for a more complex way of exploring womanhood.

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ORGANISATIONAL COMMUNICATION PATTERNS UNDERLYING THE CONCEPT OF ORGANISATIONAL BEHAVIOUR

Aura CODREANU

Regional Department of Defense Resources Management Studies, Brasov, Romania

***Abstract:** In order to understand what patterns of communication underlie organisational behaviour and thus better grasp the latter concept a two-fold approach is necessary. First, a broad outline of what communication is from the perspective of communication theories is necessary since it may provide an insight into the basics of the concept of communication proper. Thus, once general terminological delineations are made and a model of communication theory identified as the incipit for a communication paradigm, a breakdown of the concept of communication into its main variables from the perspective of organisational theory is required in order to set out the basic paradigm of analysis for the concept of organisational behaviour.*

Hence, the aim of this article is to provide an overview of theoretical delineations of the concept of communication with a view to future research in the field of organisational behaviour. Moreover, starting from the theoretical outlook, a depiction of the independent variables underlying prospective research in the field will also be carried out.

***Keywords:** communication, organisational behaviour, research variables.*

1. INTRODUCTION

Work experience with various organisations contributes not only to increased expertise in the field of work. Beyond this surface there is a plethora of empirical observations about people's character, motivations, expectations, assumptions concerning the drivers behind individual and/or group behaviour towards formal groups or formal leaders, new comers, informal groups, top-down changes, or hypotheses about how organisational design (i.e. number of departments, span of control) or communication channels contribute to overall organisational efficiency.

Consequently, the problem that appears is if all these observations point out to a reality that can be perceived, experienced only from within an organisation or any objective researcher can frame it from the outside. Hence, the basic assumption underlying this article is that regardless of the background of an empirical observer with various

organisations, the latter's observations can only yield partial insights into organisational life which may be biased, inconclusive or narrowed to personal or group perceptions and likely to turn into mere clichés.

As a result, the task of objectively studying and building up an overall picture out of the insights into organisational life through employment of an overarching concept and of a paradigm through which the latter to be better accounted for starting from a an investigation into the already existing literature in the field of investigation lies with the researcher.

Thus, the focus of this article is to provide the theoretical tools necessary for the investigation of organisational life which is also known as organisational behaviour. The paradigm by which the latter is to be tackled is that of organisational communication patterns underlying the concept proper and the method considered as best for investigating both the paradigm and the concept is the comparison and contrast one.

2. COMMUNICATION FROM THE PERSPECTIVE OF COMMUNICATION THEORIES

According to Bounoux [1], *'the primary role of communication is to organize social relationships, to structure daily life and to maintain community cohesion'*. Thus, what communication is about in the end, as the above opinion upholds, is the way the human being connects with another human being and thus influences the latter through signs. Moreover, as part of this pragmatic viewpoint, failure of communication or, in other words, miscommunication needs to be also taken into account when approaching the topic of communication. Another issue that needs to be remembered when talking about the concept already defined is that quantifying or objectively describing communication results is a vain attempt since, as Bounoux highlights [1], no science or technique can encompass communication due to the latter's presence in so many fields that it becomes difficult to grasp all the dimensions of the concept under a unifying perspective.

However, such an attempt with inherent shades of grey is made by Muchielli [2] who claims that from the point of view of communication theories, the concept is viewed as 'all the "expressions" (and by this term the author refers to communication instances cut out of longer, more complex communication sequences) yielded by social actors and carrying an analysable intentionality' within a context defining for the actors involved.

In addition to the above aspects, both Bounoux and Muchielli [2], draw attention to the fact that communication is not only information since the latter represents only the last stage within the communication process. Moreover, communication has to be viewed beyond the words uttered or put down on paper, beyond the exchanges taking place at an interpersonal level and, inherently, as covering non-communication as well (namely what could have been said, done or written but was not simply because this, in its turn, was meant to convey a message).

Consequently, in order to understand the 'expressions' of communication, to use

Muchielli's term, their context or framework within which they take place needs to be analysed. In this respect, Watlawick and alii [3] view communication as a whole whose parts are the content of the communication and the relationship established between interlocutors. Thus, in order to understand a message or behaviour, the type of relationship to which they are subsumed needs to be understood.

As a result, such knowledge informs on the framework to which a specific instance of communication belongs and leads to the conclusion that within communication as a whole, it is the relationship that includes the content and becomes metacommunication.

In conclusion, communication also involves metacommunication as long as the interlocutor needs to know how a certain message is to be classified in terms of the addressee; the latter's status, the category the message falls in. Nonetheless, such metaframeworks, even though underlying communication, need not to be made explicit as long as the interlocutors agree on the issues they communicate about. Only when disagreement appears, metacommunication is resorted to in order to account for the framework to which the exchange belongs.

Thus, starting from Bateson's idea [1] according to which 'to communicate is to join the orchestra', Bounoux underlines the fact that the relationship developed while communicating needs to be aligned with the already existing means, channels, networks of communication. In this way, one of the basic constraints with a say in the communication process is the need to work within the available network, rather than create a new one.

In support of the above idea Auroux [1] claims that statements do not exist outside the context in which they were uttered. Hence, the latter informs on who made the statement, the place where it was made, and its witnesses and how it was made. Based on this, Muchielli distinguishes several contexts:

- The spatial context, namely the place where the statement was made and the inherent constraints of the place on uttering the statement

- The physical and sensorial context as expressed through sight, hearing, smell, touch, senses which convey meaning to a statement.
- The time context when what is said at a certain moment becomes meaningful in comparison with what was said before
- The social relationship context, namely how the quality of the relationship among the interlocutors give meaning to a statement
- The cultural or sub cultural context built on collectively shared norms and rules when statements acquire meaning in accordance with the norms acknowledged or established during communicative exchanges.
- The actors' identities context when statements acquire meaning in accordance with what is known or displayed about the intentions and stakes of those involved in communication.

Thus, starting from the contexts listed and briefly described above, the conclusion drawn by Muchielli is that meaning emerges only by contextualizing the communication process and is shared by all actors only through and during exchanges that often become metacommunication.

As a consequence, out of the models (e.g. the sender-receiver model, the two-level communication model, the transactional communication model, etc.) employed along the history of communication sciences, the contexts listed above point out as a model of communication analysis the situational one. Hence, from the perspective of this model, communication is a collective construct through contexts and, in this respect, the stakes of communication are how meaning is shared and to what extent communication is possible.

However, considering the topic of the current research, very few of the contexts previously mentioned can be analysed in order to assess how the situational model of communication informs on organisational behaviour. Consequently, the model is not very helpful in constructing the paradigm needed to carry out the analysis and interpretation of the data unveiled by prospective research in the field. However, it may be useful when drawing the final conclusions of such research.

3. TOWARDS A MODEL OF COMMUNICATION FROM THE PERSPECTIVE OF COMMUNICATION THEORIES

In order to set out the basic framework of analysis and interpretation for future studies in the field of organisational behaviour another model needs to be employed. As a result, by resorting to the list of models of communication presented by Muchielli, the best model that fits the purposes of this article is the interactionist and systemic one. According to the explanations provided by the aforementioned author, from the perspective of this model communication is defined as 'participation to a system of interactions' and is built upon a system of exchanges necessary to meet the requirements of all the actors involved in terms of cohesion, advantages, collective participation to name just a few.

Relating this model to the constituents of communication, namely content and relationship described by Bougnoux, Muchielli emphasizes the fact that there is a tight connection between the systems of relationships social actors (i.e. groups, collectivities, organisations, institutions) are part of and their identities, since the latter are based on these systems. Consequently, communication sciences are concerned not only with systems of communication, but also with the identities of the social actors generating or joining these systems since the claim they make is that one of the fundamental contexts for the analysis of communication is the context within which an individual acts [3].

4. COMMUNICATION FROM THE PERSPECTIVE OF ORGANISATIONAL THEORY

With a view to the above theoretical background and more specifically to the interactionist and systemic model through which we believe that the analysis and interpretation of the data of prospective in the field of organisational behaviour can be carried out, as well as taking into account the dimensions of the concept of organisational behaviour as accounted for in previous articles

[4], this sub-chapter aims at grounding the research into a feasible paradigm through which the findings to gain relevance for the reader. Consequently, in what follows, a presentation of how communication is defined and viewed from the perspective of organisational theory will be carried out. Communication in an organisational context is an evolutionary and cultural process which consists of sharing information and enhancing relationships in formal organisations.

Building up on this definition, Martin [5] emphasizes an idea already highlighted by Bougnoux and Muchielli. Thus, according to him, communication is not only the exchange of information between two persons. In this respect, it needs to be a two-way process involving not only transmission of data, but also proper interactions on those data. Consequently, without mentioning the name of the model proposed by this research as a possible paradigm of interpretation of the information to be made available by future research, the aforementioned author reinforces the usage of the interactionist paradigm as a means of investigation into the concept of communication as a landmark for organisational behaviour.

In terms of the interacting systems identified by Martin from the perspective of organisational framework, the latter are built around the key concept of the communicator. The main roles of this “system” are as follows: to give instructions, to organize, to clarify, direct and influence when getting into contact with the system of subordinates, to establish parameters, identify options and influence when in contact with the system of external peers, to report, to seek approval, to clarify and to influence when in touch with the system of superiors and last, but not least to persuade, integrate and influence when interacting with internal peers. In conclusion, starting from the interactionist and systemic model the author proposes, the investigation of organisations involves a complex process since, as he puts it ‘*Complexity in communication is an exponential function of the number of people involved*’.

Barnard [6], in his turn, emphasizes the fact that communication holds primacy when

approaching the topic of organisational theory, since communication techniques determine the structure and the scope of an organisation. Consequently, Steers, R. M and J. Stewart Black [7] point out the fact that in organisational settings there are several types of organisational communication that can be identified in accordance with the direction a message can flow. Thus, the dimensions of organisational communication they identify are as follows: upward, downward and horizontal.

As far as downward communication is concerned, this type of communication is employed by managers in order to direct and control the activities of those in the chain of command. The purposes identified by Daft, R. and R. Steers as underpinning it are as follows: provision of clear goals, strategies, objectives for the whole organisation, as well as for the departments within it in order to ensure employees have a sense of direction and purpose; job instructions and the rationale behind them; organisation design; policies and procedures through which people are informed on organisation design; performance assessment and correction of performance; indoctrination and socialization since employees are told what the organisation holds important and what not.

Concerning the other type of communication identified by Steers and Black, namely upward communication, the latter flows towards the top of the hierarchical ladder and it involves the following aspects: problems and exceptions that are presented to the manager; performance reports; grievances, disputes; accounting and financial reports.

However, noteworthy in this respect is that, as F. Luthans and J. Larsen observe [8], ‘*when upward communication does occur, it is likely to be influenced to a considerable degree by what the subordinate thinks his or her superior wants to hear*’. Consequently, when promotion is a personal goal, for example, then positive message get exaggerated, while negative ones are downplayed or omitted.

As for the third type of communication, namely horizontal communication, the latter refers to inter-departmental and intradepartmental activities carried out in order

to ensure completion of projects and tasks assigned to departments or work groups.

Besides these types of communication Zlate [9], drawing upon specialized literature in the field of organisational theory, identifies two major types of communication: formal and informal. The formal one subsumes the three dimensions of communication already identified and described in the paragraphs above. As for the informal one, the latter emerges from the complexity of networks established among people as a result of their psychological needs, the frequency of the interactions among them, age, gender similarities. In the case of this type of communication, information flows in all directions regardless of hierarchy. Among some of its characteristics, the following are worth mentioning: rapid information flow; focus on both organisational and personal life; partial accuracy of information; positive, as well as negative output due to informal socialization, increase of group cohesion.

As we may notice, the above dimensions of communication describe accurately the interactionist and systemic model outlined by Martin. However, one important interaction fails to be observed by Steers, Black and Zlate, namely the one with external environment. In this respect, it is organisation theories that make the omission.

Concerning the relationship between an organisation and its external environment, the issue is of great importance because any organisation needs to be viewed as an '*open system*' [7]. Consequently, not only does any organisation receive input from the external environment (e.g. employees, raw materials, investment), but it also gives back output to the environment (e.g. goods, services, etc.). Consequently, for an organisation to have good communication with its environment and thus ensure its growth and survival it is necessary to be able to respond to the opportunities, challenges, risks and limitations posed by the external environment [10]. As a result, factors such as the political, economic, socio-cultural, technological, legal ones must all the time be taken into consideration in the relationship of continuous exchange

established between an organisation and its external environment.

Thus, as Mullins points out '*Organisations make contributions to the quality of life and to the well-being of the community*' through the plethora of stakeholders who have an interest or are affected by the goals, activities and organisational behaviour.

Even though organisation theory does not state it explicitly, we believe that in the relationship organisations establish with external environment, the output they contribute to the latter consists not only of the materials or services they provide, but also of the way their image is communicated through all three dimensions of the concept of organisational behaviour, but especially through individual and organisational behaviour. Consequently, depending on how successful this communication with external environment is, the input these organisations get in terms of the resources they need to employ in their current activities is determined and plays a major role in their positioning within a competing environment.

5. CONCLUSIONS

Based on the theoretical investigation provided by this article, further research into organisational behaviour that resorts to patterns of communication as a paradigm of study and interpretation of data needs to view this framework as the one yielding the independent variables. Consequently, we suggest two broad interrelated categories, namely inter-organisational communication and organisational outward communication as umbrella terms for the independent variables. Thus, in our opinion, inter-organisational communication is defined through the traditionally acknowledged variables of formal communication (V1), informal communication (V2), vertical communication (V3), horizontal communication (V4).

In their turn, these variables can be measured through the variables and categories described by the concept of organisational behaviour.

Thus, any prospective questionnaires and data interpretation are bound to take into

account the following concept-defining variables:

V1: Formal communication described through the following independent variables: communication in terms of organisation processes; organisation design; job policies and procedures; career; leadership; work environment; conflict (measured through the categories of 'conflict sources' and 'conflict approach').

V2: Informal communication measured through communication at informal group level and power relationships

V3: Vertical communication (i.e. upward communication) described through the inward projection of organisational relationships in terms of linguistic means of showing respect to superiors

V4: Horizontal communication depicted through communication at formal group level; conflict (measured through the category of 'conflict sources'); power and politics

As for the category of organisational outward communication, the focus is a two-fold one. Thus, even if when tackling this issue specialized literature speaks only of organisational behaviour in relationship with environmental factors (see for example Steers and Black, 1994: 358-394), the current article upholds the assumption that if the concept of organisational behaviour is to be discussed from the perspective of the patterns of communication underlying it, then it is individual behaviour that needs to be held under scrutiny. As a result, individual attitudes towards the organisation in terms of job satisfaction, organisation commitment and organisation trust can inform both on the current and future status of the organisations under scrutiny. Thus, for a better understanding of the variables measuring the category of organisational outward communication, the former are listed below:

V5: Organisational outward communication viewed as organisation's behaviour within its environment; outward linguistic projection of organisational relationships and individual attitudes towards job satisfaction, organisation commitment, organisation trust.

In conclusion, we believe that based on the insights into the categories and variables of organisational communication patterns an accurate and through investigation into the concept of organisational behaviour can be further undertaken.

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BASIC OPERATION CAPABILITIES OF THE SLOVAK AIR FORCE

Pavel BUČKA*, Pavel NEČAS*

*Armed Forces Academy of General Milan Rastislav Štefánik Liptovský Mikuláš, Slovakia

***Abstract:** The paper describes basic operation capabilities of the Air Forces of the Slovak Republic. The capabilities have to be achieved within the specific requirements and capabilities and stem from the operational requirements, placed on the modern Air Forces conducting future operations and air campaigns. The Air Power, Air Defence tasks, and tactical Air Force assets are elaborated and characterized in this paper.*

***Keywords:** Air Force, operational capabilities, NATINADS, MiG-29, sophistic weaponry.*

1. INTRODUCTION

Doctrine documents of the Allies characterise the Air Force as the capability of combat force projection in the air or space by means of airborne platforms and guided missiles. Air force is best applied predominantly in joint and combined operations over the whole scope of the conflict. It is the most powerful element in manoeuvre capabilities of combat and combat support operations. From the point of view the compatibility of future Air Forces of the Slovak Republic capabilities with other segments of the Slovak Republic Armed Forces, the focus is on basic operation capabilities, which determine in decisive role the quality increase in capabilities of task achievement, primarily in the airborne air defence within the Air Defence of Slovak Republic Armed Forces. The capabilities have to be achieved with the specific requirements and capabilities and stem from the operational requirements placed on the Air Forces of the Slovak Republic in future operations and air campaigns.

2. AIR FORCE SPECIFICS

Air Force can be characterised by such fundamental and unique characteristics as the movement in three-dimensional space, focused on the wide range of height, velocity and range

use. The basic factors of effective deployment of airborne platforms are:

- rapid projection of capabilities, abilities and capacities,
- operation far away from protected objects,
- ability to operate deep in the operation space,
- rapid and flexible response to changes in the course of operation activity,
- wide range,
- clear situation overview of the operation space,
- flexibility and versatility,
- concentrated impact of power,
- sustainability depending on logistic support,
- limited endurance in operation space,
- vulnerability (on the ground and in the air).

These factors determine the advantage and special role of the Air Force in both military and non-military operations and missions, but, on the other hand, are limiting and narrowing ones in the planning and implementation of the deployment at different levels of conflicts.

The key advantages, crucial in the use of the Air Force, can be found in such capabilities as rapid and flexible projection of force in the area of interest without geographical limitation. Over the last several years, Air Force has been used in a great extent in the escalation of military force and threat, as a part of complex political and military strategies of deterring and persuasion.

Without favourable air situation over the operation space of Ground Force or the Navy, Air Force cannot conduct operations with necessary freedom and operation pace. It provides rapid reaction for the attack against point reinforced targets out of ground asset range.

It can supplement or replace artillery and armour fire power. It can operate simultaneously against tactical operation and strategic targets in joint operation space. It requires localised command, control and planning and decentralised operation focused on effects. Moreover, manned or unmanned airborne platforms, designed for surveillance, search, observation and intelligence, are irreplaceable in achieving information and intelligence advantage, and decision-making process advantage as well [2, 3, 4].

3. AIR FORCE TASKS

Following comprehensive analyses and real evaluation of possible contribution to joint defence of Alliance interests, responsibilities

have been adopted, which are decisive for further development of air defence and undermine the trends of development in the following decades. They focus primarily on the area of airborne operations and adequate personnel training. The training in peace time conditions necessitates further requirements on the implementation of a wide range of standards according to the regulation and harmonising of air space utilisation within International Civil Aviation Organization (ICAO). Furthermore, they involve the preparation of an air unit for NATINADS system to meet NATO standards and criteria. Modernisation of air and ground assets to make navigation, communication and identification systems and devices compatible for self-protection of aircraft in the whole electromagnetic spectrum also plays an important role.

A system of regular evaluation of task achievement in the form of so-called Key Tasks has been developed along with the Component Command Air HQ in Ramstein, Germany [1].



Fig. 1 Structure of the Slovak Republic Armed Forces

The tasks of Air Force of the Slovak Republic Armed Forces (Fig. 1) can be divided into the following basic categories:

- the defence of the territory of the Slovak Republic by all available assets and forces,

- the defence of facilities of special importance and other important facilities,
- providing the integrity of the Slovak Republic air space,
 - o the defence of the Slovak Republic air space sovereignty,
 - o the defence of the NATO – NATINADS integrated air space,
- providing support to aircraft in emergency over the area of the Slovak Republic,
- support of NATO and EU forces during flybys, in the area of deployment and during their deployment in the Slovak Republic- Host Nation Support,
- constant surveillance and monitoring of the Slovak Republic air space.

A section of the Air Force of the Slovak Republic Armed Forces has become a part of joint integrated system of air space defence NATINADS. The full participation in sharing the responsibilities, resulting from this fact, requires a different understanding in relation to previous approaches, mainly in the ways of operation preparation, personnel training and building specific capabilities.

The key role is taken by the functioning integrated structure of command and control (C2), which relies on a complex summary of information from the available sources and sensors, its processing and the distribution to all users.

Providing the defence of the sovereignty of the Slovak Republic air space in the context of possible threats is an important part of the activities of the national system of integrated air defence, in line with the Concept of capabilities of the future Armed forces of the Slovak Republic. The main assets of the airborne air defence comprise tactical aircraft of the Air Force, equipped with combat and training jet aircraft, stationed at Sliach Air Wing.

Tactical Air Force has undergone a lot of changes over the period of the sovereignty of the Slovak Republic. Apart from a significant decrease in the total number of aircraft, a major structure change has occurred as well. Over the last years, the Air Force has lost specialised airborne platforms for effective ground operation support, due to high cost and being not economical. The threat of the air

force not being capable of meeting the responsibilities and tasks in the necessary effect, both to national and alliance responsibilities has become imminent. To divert this threat, the modernisation projects of all types of current air assets have commenced in order to provide compatibility and interoperability in both joint and international operations.

Tactical aircraft assets currently represent 12+3 MiG-29 (10 Mig-29 AS, 2 MiG-29UBS, 2 Mig-29 A and 1 Mig-29UB), along with 10 L-39 aircraft in CM and ZAM modifications, which represent the training system for tactical air force. After the modernisation programme is completed by 2015, the tasks resulting from operation requirements can be successfully fulfilled [1, 2, 3].

The diversity of airborne facilities in the area of operations and responsibility of the air force is a challenge, and it also determines the criteria for an effective weapon complex with adequate ground based technical and logistic support and robust system of command, control and communication. The importance of such system is also emphasised by the fact, that the response to new threats of misuse of a civilian aircraft as a terrorist weapon, so called RENEGATE, requires a rapid decision-making process, which necessitates an adequate system of command, control and communication. The effective achievement of common air space protection and defence tasks is a prerequisite for member countries Cross border Operations.

Following the fore-mentioned requirements and tasks, the fundamental characteristics of the weapon complex developed in this way, can be summarised into the following key areas:

- supersonic combat aircraft,
- multi-purpose concept – multi-purpose use:
 - o medium range active and passive guided airborne target weapons,
 - o accurate, guided ground target ammunition,
- integrated attack and defence systems,
- data and information interconnectivity into a networked system of other combat platforms and sensors of the Armed Forces of the Slovak Republic and NATO,

- aerial refuelling
- the possibility of operation deployment from limited airport runways.

4. FIGHTER AIRCRAFT MiG-29

Fighter aircraft MiG-29 AS and MiG-29 UBS (FULCRUM) (Fig. 2) are supersonic jet fighter aircraft primarily designed to operate against airborne targets. They are closely associated with the defence of airspace sovereignty of the Slovak Republic. Since 2005 they have served as a part of an integrated NATO Air Defence system within the European Allies. They belong to the most

powerful fighter aircraft, thus being demanding for air personnel skills and experience. Only the pilots with the license for subsonic jet trainer aircraft can be integrated into the supersonic jet fighter training programme.

MiG-29 AS and MiG-29UBS have an extended technical lifecycle which is to expire in between the years 2029 and 2035. After their modernization the jet fighter aircraft are to meet the NATO norms and standards and EUROCONTROL recommendations, which specify the compatibility between jet fighter aircraft and communication, navigation and identification systems (CNS).



Fig. 2 Supersonic jet fighter aircraft MiG-29AS from Air Wing Sliač

General characteristics:

- Crew: One
- Length: 17.37 m (57 ft)
- Wingspan: 11.4 m (37 ft 3 in)
- Height: 4.73 m (15 ft 6 in)
- Wing area: 38 m² (409 ft²)
- Empty weight: 11,000 kg (24,250 lb)
- Loaded weight: 16,800 kg (37,000 lb)
- Max takeoff weight: 21,000 kg (46,300 lb)
- Powerplant: 2×Klimov RD-33 after burning turbofans, 8,300 kgf (81.4 kN, 18,300 lbf) each

Performance:

- Maximum speed: Mach 2.25 (2,400 km/h, 1,490 mph) At low altitude: 1,500 km/h, 930 mph

- Range: 700 km (430 mi)
- Ferry range: 2,100 km (1,800 mi) with 1 drop tank
- Service ceiling: 18,013 m (59,100 ft)
- Rate of climb: initial 330 m/s average 109 m/s 0-6000 m[101] (65,000 ft/min)
- Wing loading: 442 kg/m² (90.5 lb/ft²)
- Thrust/weight: 1.01

The reasons for modernization:

1. The modification of cockpit equipment of MiG-29 needs to be standardized according to the NATO requirements, which cover the interoperability of all systems.
2. It is vital to regain the baseline MiG-29 performance, which includes ability to identify airborne targets, according to NATO standards.

3. The use of an original Russian navigation system RSBN, which is the basic part of airborne navigation and airborne weapon system, has been terminated by the resolution of the Slovak Republic government. The accomplishment of flying missions would be impossible without an appropriate replacement of the original RSBN system. Replacement of the whole Russian RSBN system with a primary NATO navigation system – TACAN means into an aircraft avionic system

4. Changing the flight data indication from metric system into Anglo-Saxon system.

5. The improvement of flight security in the international flight corridors.

The manufacturer of MiG-29 is in charge of the modernization. It guarantees the utility of the system as a whole and the MiG-29 flight security as well. The manufacturer cooperates with BAE SYSTEMS, ROCKWELL COLLINS and Aircraft Repair Company Trenčín JSC. The modernization of networking and communication equipment is compatible with NATO equipment and meets the further requirements of interoperability in combat operations.

The modernization of radio navigation systems meets NATO standards. Navigation equipment is fully compatible with NATO systems and guarantees safe navigation in international flight corridors and landing on both military and civilian airports.

The modernization of identification equipment meets the latest NATO standards. Such an extensive installation has never been performed in any MiG-29 jet fighter in the world. The identification equipment will meet the standards and further NATO identification systems requirements. Also NATO jet fighters have to be newly equipped with the same identification equipment to support compatibility.

The modernization of cockpit is to bring better and easier equipment operating, data readability, testing of newly installed equipment and to lessen pilot stress during the flight, thus considerably improving the flight safety of MiG-29.

The system of flight data indication and radio communication will be fully compatible with NATO jet fighters.

The mutual integration of Russian and “western” systems guarantees the reliability and safety of MiG-29 systems as a whole. This modernization meets the NATO standards defined for this type of air assets. It provides the compatibility of jet fighter systems with NATO systems (5-10 year period), thus providing space for considering the further need for new jet fighter aircraft.

5. CONCLUSIONS

The Slovak Air Force performed an upgrade on their MiG-29/29UB in order to achieve full NATO compatibility. Work has been done by RAC MiG and Western firms, starting from 2005. The aircraft now has onboard navigation and communications systems from Rockwell Collins, an IFF system from BAE Systems, new glass cockpit features multi-function LCD displays and digital processors and also fitted to be integrating with Western equipment in the future. However, the armaments of the aircraft remain unchanged. Already 12 MiG-29 were upgraded and had been delivered as of late February, 2008.

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THE PROFESSIONAL PROFILE OF THE ROMANIAN MILITARY

Adrian LESENCIUC

“Henri Coanda” Air Force Academy, Brasov, Romania

Abstract: *The professional profile of the Romanian military is perceived as related to the image of the armed forces institution. The loss of percentage points from the perspective of civilians' trust in the Armed Forces has become more evident, so the professional profile has changed gradually. Because of this dynamic, Huntington's and Niculae's coordinates of military systems of values are not proper to the present military framework. For example, corporateness loses in importance. A study based on a sample of 1.020 military students proves that it is possible to build a professional profile based on a set of values, which contains: “way of life”, “surroundings”, and “supervisory relationships”. Values such as “management”, “associates”, and “variety” are not appreciated as they should. In a mercantile society, the Armed Forces are no longer chosen for this military spirit, but for the economic return. Moreover, the individualism promoted nowadays, gradually determines the diminishing of the role of corporateness.*

Keywords: *professional profile, military systems of value, Work Value Inventory.*

1. INTRODUCTION

The professional profile of the Romanian military merges in the collective outlook with the image of the phenomenon of armed forces. Furthermore, armed forces relate to rationalized myth of national identity [1], while the military profession builds on myths of:

- devotion, as a result of higher reasoning regarding the tasks, even with the price of life;
- professionalism, derived from the degree of complexity of preparation and
- political equidistance, imposed normatively.

Although, it is considered to be a reputable institution, which inspires confidence among the masses, the armed forces have begun to be seen more doubtfully. This aspect has led to a loss of confidence barometer by 28 percentage points over the past 19 years¹ [2], amounting in 2009 to 60% of options, while the trust of

the Orthodox Church institution totals 86% [3]. Basically, the armed forces, a “total institution” in Goffman's terms [4], is characterized nowadays by slow changes. The process of “remaining unchanged” in this institution, by maintaining in the leading positions a managerial class relying on former ideology, that has adopted a false attitude of supporting the transition process, has been made more visible by reference to a management policy specific to a dynamic and consumerist society.

Moreover, the cleavage between bureaucratic management practices and imaginary reform has increased considerably, contributing to further erosion of society's trust capital in the armed forces institution. With the erosion of the institution's image, the image of the military occupation has lost in importance too. In parallel with the adherence to West European standards of organization, armed forces institution has begun responding to the systematic restructuring based on framework plans and design of development, regarding the professionalization of the staff, strengthening civil expertise and resizing. The assessment of the professional profile at prospective level – regarding the future

¹ The descendent trend of the trust in the armed forces institution is indicated by the next percentages: 1990:88%, 1991:82%, 1992:81%, 1993:87%, 1994:79%, 1995:85%, 1996:86%, 1997:81%, 1998:72%, 1999:71%, 2000:70%, 2001:75%, 2002:75%, 2003:77%, 2004:65%, 2005:69%, 2006:62%, 2007:65%;

military personnel of the Romanian Armed Forces - is an opportunity for gaining awareness of the need to define new training coordinates.

2. MILITARY PROFESSIONAL PROFILE THEORETICALLY PROJECTED

The military profession has features resulting from circumscription of the armed forces in view of the war. The shaping of a professional profile should be done taking into account this phenomenon regarding the military pattern.

When trying to define identity dimensions of a certain profession, Huntington [5] notes that the military profession meets some criteria as defining features:

- expertise, based on knowledge and

specialized skills, which are the standards of competence,

- responsibility, seen as the main motivation of professionalism, involving commitment to the profession and,
- corporateness or group consciousness, powered by membership to a professional organization.

Moreover, the dimensions of professional expertise and responsibility as the defining features of the military institution are achieved through complex training and by the specificity of the military profession that aims the security of the society. Corporateness is the quality indicator.

Niculae [1] builds a professional value system, which contributes to maintaining a high level of trust among the civilian population, by targeting components of surface and depth.

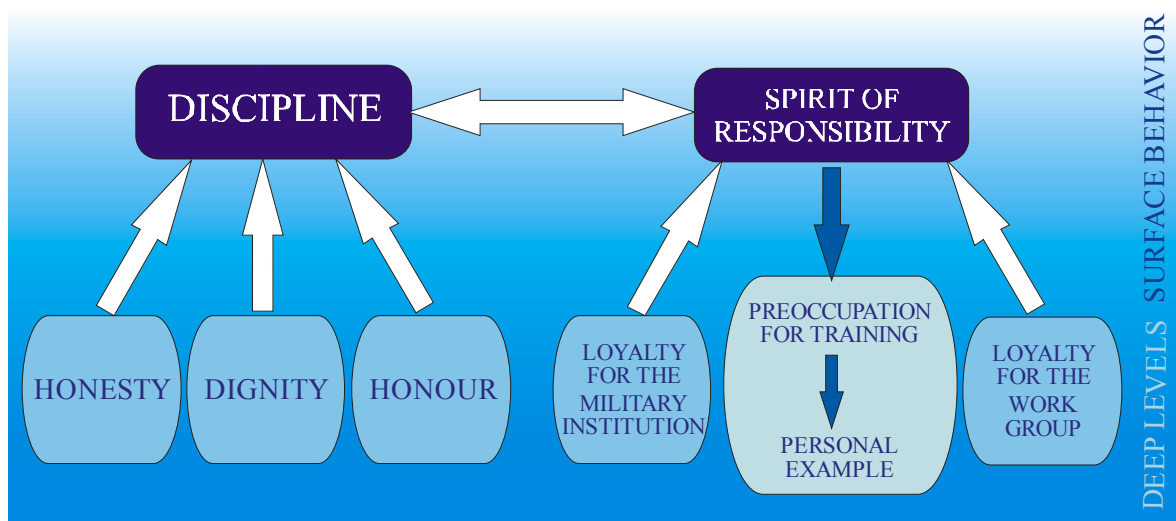


Fig. 1 Niculae's professional value system

Visibility is provided only for the surface level: discipline and spirit of responsibility. If the spirit of responsibility is one of the most significant characteristics of the Huntington model, discipline derives from a set of attitudes and values from levels of depth: honesty, dignity, honor. Unused by the inventory of professional values, honesty and dignity are found in the Rokeach table.

In a wide study realized in 2009-2010 (on 1.020 subjects), I investigated the ethno-psychological, professional, and communicational profile of military students (on a

sample of 1.020 subjects). In order to examine the ethno-psychological profile, we may choose a WAY tool (a test *Who are you?*). The results of the test were pre-encoded based on M. Rokeach's table of values [6]. The professional profile of military students, as well as the ethnic profile was outlined by investigating values, interests and attitudes. To emphasize that point I used the Work Value Inventory (WVI) tool (Donald E. Super), adapted for the Romanian population by Septimiu Chelcea [7]. In this case, we can use the results from the WAY test applied to build

the ethnic profile of military students in order to configure the “discipline” level.

Regarding “honesty”, where we indexed all the variables in open responses that refer to honesty, incorruptibility, integrity, loyalty, probity, respectability, we raise a sensitive issue, interpreted as relation to hetero-image regarding the ethnic profile of the Romanian military.

In the professional profile, “honesty”, located on top, is an indicator of the desire to achieve discipline in terms of the surface level of military value system, but it is not doubled by “dignity”. Dignity comprises moral behavior, including relationships with superiors, and the score regarding the ethnic profile set it on mid-range classification ratings, with rank 20 (of 40). Also, dignity comprises “prestige”, a value of rank VI (of 15) in Super inventory.

3. MILITARY STUDENTS’ PROJECTED PROFESSIONAL PROFILE

Responsibility, seen as “obligation to be responsible of own actions, facing certain situations, according to well defined procedures” [8], includes, besides procedural dimensions, the concepts of “competence” and “power”. From the perspective of the ethnic profile “responsibility” is a value of rank 3 as a mark of military environment, and “professional capacity”, interpreted in the same scale, is a value of rank 8. In Super inventory, “responsibility” is replaced by a combination of values.

The “spirit of responsibility”, a surface value in Niculae’s model, is “fueled” from the deep levels by loyalty for the military institution and for the work group, in interdeterminance with “honour” that “feeds” the “spirit of discipline”. However, the spirit of responsibility determines in depth a high level of preoccupation for training and personal example.

These values are in accordance with “achievement”, “prestige”, “management”, “supervisory relationships”, and “associates”, identified and included in Super’s Work Value Inventory (WVI). The students’ average scores on WVI are presented in the next table:

Table 1 The students’ average scores on Super’s WVI

Rank	Work values	Scores
I	Way of life	13.40
II	Surroundings	12.92
III	Supervisory relationships	12.87
IV	Achievement	12.21
V	Economic return	12.14
VI	Prestige	12.09
VII	Altruism	11.92
VIII	Security	11.72
IX	Creativity	11.71
X	Independence	11.55
XI	Intellectual stimulation	11.31
XII	Management	11.15
XIII	Associates	10.26
XIV	Variety	10.25
XV	Aesthetics	9.81

We can observe that the “supervisory relationships” value reaches rank III, “achievement” - rank IV, “prestige” – rank VI, while “management” is a value of rank XII and “associates” a value of rank XIII. Before trying to find trends in outlining the professional profile of the military, let’s review the results of a study conducted by the specialists of “Carol I” National Defense University [9], which aims at identifying the socio-occupational image of the Romanian officer among military pupils and students. The features of the officer’s model (projected image) were: sociability and the spirit of cooperation, which were designed by the framework of citizen and educator competences [9], while the officer’s image (current image) was characterized by attributes developed by a set of projected skills. Romanian officer is: disciplined (39%), intelligent (30%), courageous (28%), responsible (21%), patriotic (14%), perseverant (14%), sociable (10%) [9]. In other words, the current image of the officer is mainly characterized by features and mental skills (theoretical dimension) rather than by acquired capacity (practical dimension).

The officer’s projected image is similar for the military pupils and students, but the features are not arranged in the same order: for military pupils: intellectual capacity - 67%,

accountability - 44%, management capacity - 44%, discipline - 43% and professional competence - 41%, respectively for military students: intellectual capacity - 67%, professional competence - 65%, management capacity - 58%, accountability - 45% and discipline - 40%. We can conclude that a new formative design ought to be based on leader, specialist and fighter skills.

Therefore, we observe differences between the military projection of self-image, the professional profile of the military student, and the projected image of Romanian officers. We can observe that the present image of officers described in terms of Niculae's and Huntington's system of military values is not similar to the present image of future officers, detailed in terms of Super's Work Value Inventory. We can define in our study, for involving a proper interpretation, the present image of the officers (*hetero-image*) and the present image of the future officers (*self-image*).

The major difference is determined by the fact that in the professional profile of military students the values "way of life" (Ist rank), "surroundings" (IInd rank) and "economic return" (Vth rank) are situated on top. These values indicate the tendency towards individualism, erosion of the corporateness, alienation, competition. They correspond to the tendency of Chelcea's study [7], regarding over-valuing of the importance of extrinsic work factors, a "perverse effect" of the post-revolution period, but are dissonant with a small scale projected study at the "Dimitrie Cantemir" High School College" from Breaza, inconclusive from the point of view of sampling [10].

According to this study (on the sample of 83 subjects), the first places in the ranking values were "way of life" (medium value, $m = 4.64$), "associates" ($m = 4.61$) and "altruism" ($m = 4.41$), while the last places were "aesthetic" ($m = 3.36$), "management" ($m = 3.51$) and the "variety" ($m = 3.51$). The long period of time until the integration of military pupils on the labor market and the high degree of security regarding the professional range in the military framework have caused the placement on the second half

of the hierarchy of values of the indicators "economic return" and "security". There are other indicators of the "individualization" trend, such as the high position (Ist rank) of "way of life", but the IInd rank of "associates" value looks differently at the age of puberty, in spite of the rank XIII in our study .

Another difference between present (hetero-) image of the officers and present (self-) image of the future officer (military students) is linked to the "management"/"managerial capacity" indicator. If in the first case "managerial capacity" is a rank II value, in our study "management" is situated on the XIIth position from XIV possible positions. In other words, the officer projection is related to leadership, which is not sufficiently promoted.

4. CONCLUSIONS

The two professional profiles differ substantially. One of the indicators of this approach is the low valuation of the relational dimension. This indicator is based not only on the tendency towards individualization, alienation, and employment relationships in order to obtain major and immediate financial benefits, but it is also based on the lack of an appropriate design.

If from the ethnical perspective the Romanian military profile is coagulated around the relational/communicational dimension, in terms of the professional profile, the Romanian military avoids this dimension. The lack of communication competence of the graduate military model leads to an increased trend of individualization in a profession that requires corporateness. Moreover, despite the unstable balance, this profession gradually turning into an occupation in the competition between the institutional and the occupational model of armed forces [11].

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MISCOMMUNICATION: FAILING TO UNDERSTAND THOSE GI's ?

Daniela NAGY

“Henri Coanda” Air Force Academy, Brasov, Romania

Abstract: *The aim of this article is to draw attention to three types of miscommunication involved in the language used by the military. The social variables play an important part in failing to understand messages within the military environment. Among the common occurrences of miscommunication the use of acronyms, military jargon and euphemisms are mentioned.*

Keywords: *miscommunication, acronyms, jargon, euphemisms, communication breakdown.*

1. INTRODUCTION

Effective communication within the military environment is vital so long as the accomplishment of professional tasks is pursued. Nevertheless, instances of miscommunication, either among the military personnel or between military and non-military participants in the communicative act are frequent and of various types. Consideration will further be given to users of proficient English, both native and nonnative speakers, involved in social and professional encounters while utilizing the language of the military.

The dictionary definition of miscommunication [1] is “failure to communicate clearly”. One may find this definition insufficient, at least from the perspective of the word ‘clearly’, as it does not specify the amount of clarity necessary for successful communication, neither does it offer any hints with regard to the context in which such faulty communication occurs. In other words, there is still a large amount of confusion concerning whose fault it is in case of miscommunication: the sender’s, the receiver’s or both?

Susan M. Gass and Evangeline M. Varonis [2] have divided miscommunication into two subcategories: (1) misunderstanding and (2) incomplete understanding. They state that “a major differentiating factor between these two

types is whether or not the participants overtly recognize a problem and manifest a subsequent attempt at remediation.” In case of misunderstanding they do not, in the latter they do.

The military language, as a communicative instrument of individuals grouped under the same social category lends itself to misinterpretation, and subsequently, results into miscommunication, once it is inappropriately contextualized.

For illustration, reference will be further made to the use of military acronyms, jargon and doublespeak in verbal communication. In each of the above-mentioned semantic frameworks, the social variables as role relation, participants and context (of speech and situation) play important parts.

2. MILITARY ACROMYMS AND ABBREVIATIONS

Acronyms are extensively used in the military environment and often a source of major headache for receivers of oral messages containing them. Given the social context of the military instruction, the use of acronyms by drill instructors may lead to communication breakdowns provided that the semantic abilities of the participants in the training are ignored or overestimated.

“*Gents, our POI (Plan of Instruction) for today includes a GI (General Inspection) by*

the IIC (First in Command). It will be first thing in the morning, soon after your PT (Physical Training). Put on your BDUs (Battle Dress Uniforms) and make sure not to miss the roll call. Morning classes may be delayed, though (...)"[3].

Assuming that participants in this morning briefing had been previously accommodated to the meanings of these acronyms, no misunderstandings of the message should have occurred. On the other side, if such messages had been transmitted in the absence of previous linguistic warning, the result of the inevitable lack of understanding or even the incomplete understanding of the plan of instruction (POI) would have been a failure in accomplishing the orders. It is worth mentioning, though, that inference may sometimes help understanding the missing or unclear bits of conversation, on condition that, at least two thirds of the whole message is clear to receivers.

In more elaborate conversational situations, incomplete understanding or misunderstanding may occur due to the unawareness of the participants. Military personnel belonging to various branches may, at one point, be gathered in an international coalition environment. In the absence of pre-training concerning the type of language to be used during their cooperation, work expertise may not be of great help. Take, for instance, the case of identical acronyms, used by different branches to designate different realities. Such acronyms will be made up of letters and/or numbers: A, stands for 'army' or 'air(force)', whereas in combination with numbers it may be an indicator of the chain of command: A3 (Operations Directorate). Furthermore, double or triple letters, in acronyms often refer to different matters: AA (aircraft assault/anti-aircraft), AAA (antiaircraft artillery/ arrival and assembly area/ assign alternate area) [4]. The misuse of acronyms of this type would result in confusion of the participants in the specific activity and ultimately, in a failure of understanding messages appropriately.

Roles of participants is a clear indicator of whether communication breakdowns have any chance of repair. Take, for example the case of orders issued by superiors to their

subordinates. In most circumstances, there is no chance for remediation, since a further request for explanation may be taken for disobeying a direct order: "*MEDEVAC (Medical Evacuation) operations in the DMZ (Demilitarized Zone) will only occur at order, at 5:00 ZT (Zulu Time). The ETA (Estimated Time of Arrival) for crews is confidential for the moment.*"

Another instance of abbreviated language, although it is not considered acronymic is the use of clipped words. In verbal communication, it indicates the relationships between participants in the social activity: chief – subordinate, situation in which, conversation is often one-way (from the superior to the subordinate, without any chance of asking for clarification), or between equal ranks, which may indicate social solidarity and in which remediation of the conversation occurs frequently: "*Shun!(Attention) (At)Ease! P'rade! P'rade 'shun! (for parade at attention) Ajuwaya! (as you were)*" [5], "*Bro(brother), are you hap'(happy) in this place?*" "*Shu, shu, mo' than ha'.*"(sure, sure, more than happy) [3].

3. MILITARY JARGON

The phrase *military jargon* is more often used than military 'language'. For better or worse, the language of the military and of warfare in particular has greatly impacted the English language. In recent years, numerous dictionaries have been compiled in the attempt to ascertain and record the **often-ephemeral** vocabulary associated with specific wars – not only weapons terminology and technical jargon, but also the colorful slang that inevitably characterizes every war. The social variables are, again, worth mentioning, when trying to give justification for the 'coinage' of several categories of jargons. Like their fellow soldiers in Germany, Vietnam or Korea, those deployed in Afghanistan and Iraq have created a language all of their own, filled with black humor, cultural references and even with occasional crudity. Failing to understand these jargons will be only due to the absence of initial stimuli that have lead to their coinage and the authentic context that generated them.

Among the most used military jargons are those involving profession-related associations: air-force pilots use the term *aluminum cloud* for the F-14 Tomcat; *black Cadillacs* are often mentioned by army guys to ironically describe their footwear as a mode of transport; navy officers employed aboard submarines proudly call themselves *ducks*, and the *Dual Cool* is a phrase for a Marine, usually Recon or Force Recon, who has earned both the Scuba Bubble and Gold Jump Wings. Jargon involving gender differences or even sexual connotations may explain the social context in which such terms were coined: participants in the speech acts may have felt like showing superiority in relation with the opposite sex or making excuse for personal frustrations caused by the harsh war conditions. Accordingly, a *stealth woman* stands for a woman covered in black, as a veiled Iraqi woman, whereas *leg-spreaders* is derogatively used for a fighter pilot's insignia. Jargon using vocabulary that masks violence appears to play a dual role in the social context: on the one side, it is intended to sweeten the horrors of the front, on the other side, it may be used in order to hide the truth from receivers involved in the conversational act. Take, for example the funny reference to the Gulf War (Operation Desert Storm) as *Operation baby storm* or *Operation desert stork* due to anticipated high number of births, nine months after the return of troops from the Gulf, while '*laying down a carpet*' has nothing in common with domestic activities, its meaning being 'saturation bombing'.

4. MILITARY EUPHEMISMS

At the other extreme, the *doublespeak* or the use of *euphemisms*, although considered a jargon category, its conversational intention is no longer to address members of the same social status but to deceive receivers of the messages sent by social participants often found in an official position: members of parliaments, chiefs of military offices etc. By doing so, they deny their social roles and hope to diminish or even hide the tough impact their messages may have upon their targeted audiences. Statistics relative to the military

environment have shown that military terminology that hides violence and danger under humorous or benign language indeed effectively alters perception. For instance, the euphemism '*collateral damage*' designating 'civilian casualties' is defined as damage that is incidental to the intended outcome. The term originated in the United States military, but it has since expanded into broader use. Initially the coined phrase was meant as an official excuse for damage caused in the urban areas, including loss of lives as a direct result of air bombing.

From the military environment, the term has been borrowed by other fields, to stand for unpredicted damage besides the targeted one. Nevertheless, if other fields than the military may not display hidden intentions of language control, the military intentionally fail to present the truth in order to diminish the social revolt, as civilians dislike being lied to with regard to the front realities. Otherwise, irony and even humor may be involved in the making-up of euphemisms related to the military while the hidden intention of distorting reality is still preserved. In such phrases as "*an uncontrolled contact with the ground*", in relation to an air crash, "*runaway denial device*", meaning a bomb that scatters clusters of cratering bombs over a wide area to destroy air base runaways, "*coercive potential*" referring to the military power, the social implication consists of the fact that even if meaning is purposely distorted, the impact of the message upon the hearers is lessened.

From the sociolinguistic perspective, the use of euphemisms, together with the other two linguistic devices – acronyms and jargon may justify the individuals' need to convey social meanings in the specific context of the military life. The social functions of the language deriving from military realities provide a wealth of information about the way the language works, as well as about the social relationships within the military community.

5. CONCLUSIONS

In conclusion, the major challenge for addressing the impact of warfare and military

terminology on the English language is one of scope.

Military terminology is incredibly flexible. Not only are different military groups and, indeed, different wars characterized by particular vocabularies, military terminology also infiltrates the language of civilians and, conversely, is impacted by a number of specialized civilian vocabularies. Failures in understanding correctly the meaning of the message may have a variety of reasons, out of which, the social nature of the language plays an extremely important part.

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Note: *GI stands for Government Issue. This reverts to military law, which says that, all military personnel, and also the bunks they sleep in, the clothes they wear, and the guns they carry, are the property of the Government. What started as a common joke among soldiers that they were, in fact, Government issued military property, became the standard ready reference. They were, quite simply, issued by the government and, therefore, became Government Issues.

THE ROLE OF MARKETING-BASED APPROACHES IN INCREASING THE MILITARY EDUCATION'S PERFORMANCE

Livia Ecaterina TĂȚAR

The Regional Department of Defense Resources Management Studies, Romania

Abstract: *In a constantly changing environment that may be described by an acronym such as VUCA (volatile, uncertain, complex, and ambiguous), military organisations should limit their traditional approach to doings things by means of complicated chains of command, and adopt instead different techniques in which flexibility and creativity play the pivotal role. This article briefly examines some models of marketing, and attempts to apply them to a hypothetical military educational organisation in order to conclude upon the usefulness and appropriateness of marketing tools in improving organisational performance in the military educational system.*

Keywords: *marketing, military system, military education, organisational objective, organisational performance.*

1. INTRODUCTION

A constantly changing reality inherently calls for developing and re-developing models and approaches, especially when the term “reality” defines the present global environment. The tremendous political, economic and social transformations occurred during the last decades, such as the collapse of the communist regimes in Eastern Europe, the military conflicts in the Far East and former Yugoslavia, as well as the more recent events such as the economic crisis or the nuclear experiments of Iran have resulted in the necessity of re-shaping both business and security objectives, strategies and attitudes.

The purpose of this paper is to analyse the extent to which marketing approaches specific to the business environment may be applied to military organisations, given the fact that the former have been developed in relation with private or corporate organisations – more prone to change and, therefore, to adaptation and flexibility, whereas the latter are hierarchical, bureaucratic, and rigid *par excellence*.

There is no right or wrong model of marketing planning, as each serves different businesses with different purposes, structures,

and values. Nevertheless, pointing out the common aspects of some of the models, as well as the differences between them could offer a more comprehensive perception of marketing planning processes. This is the purpose of the first part of this paper.

Its next stage attempts to apply the theoretical models to a specific organisational context, whereas the final part aims at deciding upon at the usefulness of the models to the organisation in question.

2. THEORETICAL CONSIDERATIONS

After analysing the data resulted from a survey carried out among UK consumers and industrial companies more than twenty years ago, Griffin [1] concludes that ‘marketing’ is but one of the many terms “used to describe one of the main functions of business” as the survey subjects reported the use of other terms, such as ‘strategic’, ‘business’, ‘operational’, to name only three.

However, the content of what the study presented as “a marketing plan” was described in “very similar” ways, as two-thirds of the respondents indicated. Regardless of its name, the document contained the following elements:

- SWOT analysis of the business;

- business objectives (to be achieved during or by the end of the year);
- business strategies on how to achieve the objectives;
- tactics regarding each element of strategy;
- forecast;
- estimate of income, expense, and profit;
- assessment methods to evaluate the overall effectiveness of the plan and each element of the strategy.

On the other hand, one may consider different theoretical models, such as the marketing planning processes respectively developed by McDonald in 1984, Majaro in 1993, and Westwood in 1997. The most conspicuous aspect in this case is the high degree of resemblance among the models on the one hand, and between the models and the study findings on the other hand.

All the models mentioned above contain common elements: corporate objectives, SWOT analysis, assumptions, and strategies.

As far as McDonald's and Westwood's models are concerned, the resemblance can be further expanded to the sequence of the first stages: setting corporate objectives, carrying out internal and external marketing research, SWOT analysis, marketing objectives.

Nonetheless, the order of the last stages of the two models is not identical: whereas McDonald [2] suggests that programme implementation should be followed by measurement and review, Westwood [3] considers that these two stages should be separated by a control system phase, whose role is to ensure that all the necessary conditions for the plan implementation are met.

Another difference between McDonald's and Westwood's models is the emphasis on feedback: McDonald advances the idea that the feedback loops should connect all the marketing planning stages, from assumptions to measurement and review, while Westwood's opinion is that the feedback role should be restricted to the intermediate phases, from marketing objectives and expected results to budget setting.

On the other hand, Majaro's marketing planning process [4] may be regarded as a hybrid of the previous two models, in the

sense that it contains the same elements, but positions the marketing audit phase on the first place, unlike McDonald and Westwood, who begin their planning processes with setting the corporate objectives.

Another characteristic of Majaro's model is placing great emphasis on information gathering and feedback at every level.

Each model lends itself to different organisational profiles, according to its strengths and weaknesses. Thus, one can argue that Majaro's model is clear, logical, and offers good knowledge of the market environment, but at the same time the audit procedures may be expensive. Consequently, it would be appropriate for small organisations that are new on the market.

On the other hand, McDonald's model is both simple and comprehensive, in the sense that it focuses on the organisation, as well as on the market. Also, it provides information on competitors, estimates results, and gives alternative plans. However, it has significant shortcomings such as the lack of specific information on customers and budgetary constraints.

Finally, Westwood's model encompasses strengths such as focus on employees, which increases their motivation and participation, opportunity to review the plans, and emphasis on external preferences. On the other hand, its implementation may be expensive and time-consuming, which makes it unsuitable for large or multi-facet organisations.

However, mention should be made that the practical application of such models requires adaptability and flexibility of interpretation, both regarding the terminology used and the contents of the plans, as "the number of components of the plans structure and the amount of wording that goes with each are, in the end, a matter of management style"[1].

The idea of combining the marketing and managerial aspects originates from the fact that the two activities represent different perspectives of the same unitary issue: the effective and efficient running of the business. This viewpoint is supported by Simkin's opinion [5]: "To be credible, marketing planning must include an understanding of managers' behaviour and the broader

organisational context in which it takes place”.

3. THE ORGANISATIONAL PROFILE

Due to the nature of the hypothetical organisation taken into consideration hereby, the term “commandant” will substitute the term “manager” in the context of this paper.

The organisation’s objectives should derive from its mission and may consist of the following:

1. To develop understanding of concepts, principles, methods and techniques related to military subject matters.
2. To implement modern operational methods and techniques in the field of defence and security.
3. To carry out scientific research for supporting the fundamentals and application of military sciences.

Romania’s national security is determined by the regional, European, and global security. The collapse of the communist regime in December 1989 has imposed a new approach to defence issues, while the NATO integration process has resulted in the necessity of reforming the Armed Forces. The educational dimension is an essential part of the deep reform process of the Romanian military system, and it must reflect the latest tendencies and approaches in the field.

Consequently, when setting the corporate objectives, the commandant must give serious consideration to the elements of market orientation, which is “the aspect of business culture that motivates employees throughout the organisation to place the highest priority on the profitable creation and maintenance of superior customers’ value” [7]. The model techniques are external and internal marketing research, which leads to the aspect of using various methods of internal and external marketing research data collection.

These include the already traditional ways based on suggestion boxes, interviews – whether they are of a personal, mailing, or telephone nature – or the more modern email contacts or Internet approaches. Regardless of the method in which it is provided, the feedback is essential. However, Malhotra and

Peterson [7] advance the idea that more and more marketing research problems will be addressed based on secondary data alone due to the extensive nature of secondary data available over the Internet, from business, government, and syndicated sources. Mention should be made that the organisational objectives must be clear and communicated properly to the staff. It is important that the objectives meet the so called SMART criteria, i.e., specific, measurable, achievable, realistic, and timed.

The next step is the classical SWOT analysis, which “consists of two parts: one dealing with the external environment (opportunities and threats), and the other with the internal set of organisational resources (strengths and weaknesses)” [6]. One can argue that the SWOT analysis is subjective and consequently its results are debatable. However, “the SWOT analysis is ultimately about making informed judgements which may themselves be informed in some way by the results of a market analysis” [6].

Then, the model refers to the action plans, namely addressing the segment, target, and positioning issues, as well as generating promotion plans, so an interesting question arises: “Who is the real customer? Is it the student, the student’s current employer, or society at large?” [8].

Last but not least, the promotion strategy options refer to the organisation’s competitive advantage of uniqueness and monopoly.

After all these stages have been clearly established, the plan is explained to the staff as “effective service delivery requires motivated and customer-conscious employees” (Grönroos) [9]. During this phase the role of internal marketing is vital. As Ahmed and Rafiq [9] argue, the employees’ behaviour or attitudes are essential “for the effective implementation of a particular corporate or functional strategy”.

As Nicholls *et al.* [8] notice, in today’s changing educational environment, “a new balance must be found between commercialism and professionalism”, but “academics do not necessarily enjoy promoting their services”. One way to overcome this difficulty is using an

opportunistic and reactive method, based on the fact that “discussions with colleagues in business schools elsewhere suggest this type of approach is not unusual” [8].

Also, the organisation can make extensive use of ways in which risk can be reduced for the student and to facilitate the student's decision-making processes, which would include prompt and accurate feedback to enquiries, as well as a “more proactive approach to promotion and perhaps, too, greater use of alumni associations” [8].

Finally, the controlling, reviewing and updating systems are applied. At this stage, the progress of the plan is assessed by monitoring the number of potential students who manifest their interest in the courses by telephoning or accessing the organisation's website.

Another element to be considered is the compliance with the set budgets, whereas according to the data collected, consequent measures are taken: accelerating the advertising campaign, reducing or increasing the budgetary allocation within the established limits.

4. CONCLUSIONS

This paper attempts to explain how a combined marketing approach to achieving the objectives of an imaginary military educational organisation (based on Westwood's marketing planning process) is not only useful, but also necessary, because it ultimately enforces the very issue of credibility of the unit as a service provider. This illustrates the idea that “unless schools succeed in improving their marketing, they will stand accused of not practising what they preach” [8]. Considering the profound challenges posed by the current economic, strategic,

political, cultural, and social events, the paramount importance of providing competitive military education cannot be overstated.

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THE EXTERNAL INFORMATION FLOW OF THE STRATEGIC AND NATIONAL SECURITY INFORMATION

Carmen POSTELNICU

“Mihai Viteazul” National Intelligence Academy, Romania

Abstract: Modern intelligence services have constantly improved their analytical function, which allows them to develop relationships with the main social partners. Due to the position these key partners have within the structures of power, they intervene in a decisively manner into the national security policy, extending to the international one.

Keywords: information, flow, expertise, security, beneficiaries, providers.

1. INTRODUCTION

In the democratic countries, the intelligence services are institutions of the state, that achieved an increasingly degree of relevance, having the role of a social partner for the power factors who are entitled to make decisions on the national security plan, extending to the international one. One of the finalities of the specific activities conducted by the intelligence services is to support a prevention process conducted by the body legally entitled to obtain information products. The institutional collaboration established between the providers/services and the beneficiary/decision makers are achieved through an external information flow that is generated by the services and captured by the beneficiary.

The generic name of beneficiaries include people occupying key positions within the institutions of the state, the highest level being held by the state president and the prime minister, according to the form of government, by the presidents of the Chambers of the Parliament, by the ministers or the representatives of local administration. Although all the states have precise regulations in this field, in reality there have always been dissensions between the intelligence services and the political factor. “The difficulties arise, according to the intelligence services, from the

trend of the decision makers to pay no attention to those information products that do not support the political strategies they want to adopt, or those ones they already adopted and to which they made a commitment [1]”.

Complex information products are disseminated to the beneficiaries, products that passed, within the services, through different phases of processing. The most important phase that information to be transmitted to its recipient is passing through is the analysis. “The analysis refers to the process of transforming the information collected in any manner into a product that can be used by decisional factors and military leaders” [1]. The analytical function increased its weight in all the types of intelligence organizations, considering that the information bombardment is excessive and the information is not properly filtered, and all these can cause adverse effects. In the upper class of the intelligence services more and more emphasis is put on the maximal use of the analytical function, both as a process and as an optimal distribution of the staff who has expertise in this area. Optimizing the analytical capacity is a priority of intelligence services, which are forced to adjust their capacity of response and intervention to the coordinates and the expressions of aggression factors or threats. The strength of analysis and anticipation will represent the success of the intelligence

activity in the next years, given that aggression difficult to predict must be anticipated and reported in terms and time allowing an effective removal capacity. While traditional threats have diluted their dangerousness potential, the asymmetric or unconventional ones, with cross-borders symptoms, won a repudiated kind of celebrity, because of their aggressive potential, their pulling-back ability and their element of surprise, which, together with the anonymity of the authors, represents a destructive gear with a large capacity of proliferation and propagation.

These categories of threats will be able to be anticipated and effectively removed throughout the efficient combination of gathering the information and analyzing the information.

Intelligence services will adapt and make

flexible their strategic and tactical activity and will develop the analytical capacity of the field workers, things that will lead to the increase of the anticipation potential on all levels of intervention.

2. EXTERNAL INFORMATION FLOW AND ITS MAIN FEATURES

The relationship between information providers and its recipients is based on external information flow, which is a continuous process.

In general, information flow is the amount of information exchanged between the transmitter and the beneficiary of the information and assigned the following characteristics: length, speed, reliability, cost and laden degree (Fig. 1).

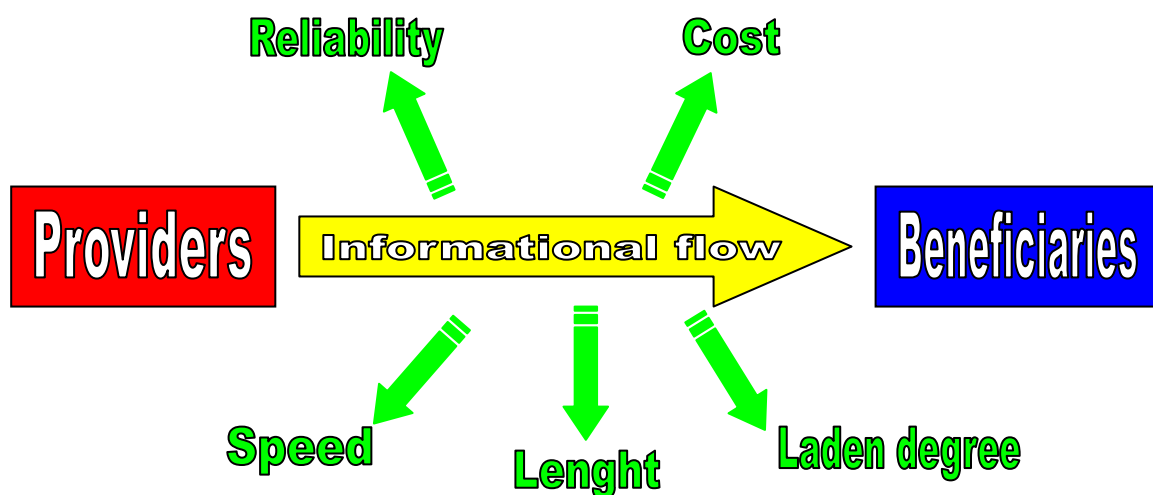


Fig. 1 Information flow

Applying this path to the relationship between the intelligence services in Romania and the legal beneficiaries leads to the assumption that information is a highly perishable product.

The length of information flow between the provider and the beneficiary must fit within the tolerance limits designed to ensure the transfer of information, without any jam along the circuit, to the intermediate structures. In the Romanian formula, there is only a single link between the providers and the beneficiaries, the NIC – National Intelligence Community, which operates a filtrate volume of information, that have already been subject

to some corroboration and analysis activities, conferring them accuracy and adhesion. Regarding the NIC, it operates with national security information that meet certain criteria, the final form being assigned by the issuing services. We can argue that the primary type information referred to the NIC is already a complete one, verified and therefore safe. As a consequence, NIC is favored because it accumulates only information with a high degree of relevance, which improves the analytical process. Analytical work is accessible, in terms of reducing the ballast elements, those which duplicate the contents and the redundant data.

In any collective type system there is also the risk of waste accumulation, bypassing the process, and information services are no exception. The appropriate management projects and programs, along with the internal procedures adapted to the modern business intelligence requirements, helps to increase the quality and to reduce the unnecessary treasuriness of unnecessary information.

The speed of information movement towards the beneficiaries is in a congruent relationship with the length of the information flow. If there are more intermediate links between the information provider and the beneficiaries, those links can hamper the development within the circuit and the shifting speed decreases. For these reasons, between the providers and the beneficiaries there must be the fewest possible superstructures, in order to disqualify the information and its subject to perishable character. Returning to the idea exposed above, in Romania, the information flow has a speed which is unconditioned by external elements, NIC being the only intermediary entity, but one that doesn't intervene across the path of all the information categories issued by the services the service. In case of threats, aggressions or imminent risks, the information can be sent both to NIC, in order to achieve the integration process, and to the beneficiary, in order to promptly achieve the act of prevention as it must be done.

The reliability of the information flow represents the measure of intelligence services professionalism within the institutional relationship they have with the beneficiaries. The request of maintaining viable the information flow and to exclude any malfunctions that may intervene at a particular moment, and under specified conditions, is placed on the provider, who must build his own internal mechanisms very well, in order to create the information finished product, which falls outside his own system. From this framework, the beneficiary's contribution, which helps maintaining the reliability of the process, should not be excluded. If the beneficiary does not intervene to ensure the preventive function, it means that the ultimate goal of the intelligence activity is not achieved. Reliability, in this context, is not

reduced to a kind of staff office correspondence but it is assimilated and integrated into the final purpose of intelligence activity, as an integrating process.

One of the problems of modern intelligence services is subject to costs, which are included in budgets, and subject to accounting purposes which does not exceed any field of activity. Information costs as much as each state wants to offer to obtain them. The real cost of information is not always reflected by the available budget of the service producing it. The intelligence services never receive the budgets they wish for, and this fact can lead to the occurrence of dysfunctions in the activities they undertake. In fact, the budget allocated to the intelligence services is one of the hottest topics that are debated by the political class and by the civil society representatives. Those who talk the least about their own budgets are the intelligence services themselves, which are in a defensive position to the other social partners and do not claim for any possible failures that might occur because of the poverty or the lack of financial availability. In the secret services zone is it a known fact that an added value of the information is obtained by the professionalism of the workers who successfully compensate for the lack of money.

In 2010 Romania allocated SRI – Romanian Intelligence Service a budget of 957,201,000 lei [3,5], compared to the 2009 preliminary implementation of 958,726,000 lei, which director George Cristian Maior considers as satisfactory for carrying on daily activities and assuming obligations to the international partners: "It's a crisis budget, reduced from 2009 and from previous years at around 98%. We can also find a decrease in value of the share of GDP budget from 0.3% to 0.23%. We hope we can maintain at a strategic and operational level, the continuity of our mission on anti-terrorism, counterespionage, or service's mission on the field of country cybernetic defense.(...) It is a satisfactory budget in these days of crisis, we have adapted ourselves to the rigors of the situation". SRI Director confirmed that, according to the evaluation of the service for

the coming years, some categories of security risks and threats are growing, “next year in particular, increasing risks related to organized crime at the strategic level”, but also “a growth related to the terrorist threat in Euro-Atlantic area, foreseen by us”. Maior noted that external partnerships of SRI are “very important” and said he was pleased that there are budgetary resources for further participation in operations alongside other “very strong services”.

For SIE – Extern Intelligence Service, the allocated amount is 214,300,000 lei [3,4], and the Chairman of the joint activity control commission decided to support the director’s request to supplement the initial amount, in order to sustain the technical segment. It can be said, when talking about the year 2010 budget of the intelligence services in Romania, to be an adapted to the specificities of the crisis one, but still being able to respond to the requirements for ensuring the national security.

As a characteristic of the information flow, the laden degree is a volumetric representation of the ability distribution that intelligence services have in their relation with the beneficiaries. The laden degree needs to be adherent to the needs of the beneficiaries, which can not be excessively demanded, because of the risk of not succeeding in establishing priorities. As in any type of communication, the laden degree of the message must have a good dispersion, in order to avoid altering the finality of the original purpose, the one of ensuring national security. An abundant, excessive flow can induce turbulence into the system, which loses also in

reliability and, not at last, generates additional costs.

3. CONCLUSIONS

If we place the strategic information in the context of the current marketing nowadays, we can assign its appropriate result with the degree of satisfaction of the beneficiary who is using it. The relationship between the services and the beneficiaries is an interesting and legally postulated one, with obligation directed towards the services that inform the decisional factors of the state, and they, at their turn, are presumed to occur through the enforcement of those measures that remove the threats to the security or achieve prevention by another way of expression, namely undertaking actions with positive impact on security: creating favorable alliances, assuming international commitments, cooperating with other international structures and organizations with prerogatives in the security field, etc.

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ECO-DRIVE – THE SAFE, FLUENT AND ENVIRONMENT FRIENDLY DRIVING STYLE

Cornel ARAMĂ*, Ioan BĂLOS*, Ovidiu MOȘOIU*

*“Henri Coandă” Air Force Academy, Brasov, Romania

Abstract: *What can the driver against the requirements of increasingly heavy road traffic management? What Can I do to drive as safe as quickly, with minimal costs, as smooth and respecting environment? The answer can be only one: adjusting the driving style to meet these demands. That is the eco-driving style.*

Keywords: *eco-driving, environment, safety, smooth, fuel consumption.*

1. INTRODUCTION

Sitting relaxed behind the steering wheel. More comfort for you and your passengers. A better overview over the traffic situation and more traffic safety. Cost saving through less fuel consumption. Contributing to environmental protection. That's what the economical, fuel saving driving stile can offer. Also you can profit from eco-driving.

Eco-Driving, the training of an economically and ecologically sound driving style, is a cheap method to save fuel and money whilst contributing to road safety. The average reduction of fuel consumption amounts to 10%. Pay back periods of the training lessons are reasonably short. Nevertheless, the development of the market for eco-driving is slow, at least on a European scale.

The project aims to accelerate the establishment of a European market for training lessons in an economic driving style as well as to integrate eco-driving in the driving license curricula in European countries.

In 2001, the initiative „eco-driving Europe” started aiming to accelerate the establishment of eco-driving in Europe. Until then, there had been rather isolated national initiatives in the Netherlands, in Germany, Finland and Switzerland. In the meantime eco-

driving has become a priority in most EU-countries as well as in the European commission when energy efficiency, climate protection as well as road safety programs are concerned. Eco-driving Europe has contributed to this favorable development by:

- building a European network

Resources have been shared to develop new solutions as well as to evaluate results. Experience and know-how have been exchanged in workshops, demonstrations, through newsletters or in personal contact. New solutions and knowledge are the result of working together. EU-countries have benefited from each others' experience and results and could thus accelerate eco-driving activities and programs.

- building a knowledge basis

Facts and figures concerning eco-driving have been collected throughout Europe and beyond and made accessible to stake-holders and starting countries. Moreover, know-how and expertise on how to implement, market and evaluate a program have been developed and disseminated.

- making eco-driving a policy issue

The convincing evidence of it's benefits has put eco-driving on both national and European policies' agendas and has resulted among others in an increased number of directives and calls from the European commission that include eco-driving issues.

2. BENEFITS OF “ECO-DRIVING”

Eco-driving improves road safety as well as the quality of the local and global environment and saves fuel and costs. All three benefits are important for furthering eco-driving. Different benefits facilitate bringing eco-driving to different stakeholders and policy fields and their activities. The differences between the normal drivers and the drivers who followed special courses can be seen into the figure 1 [3].

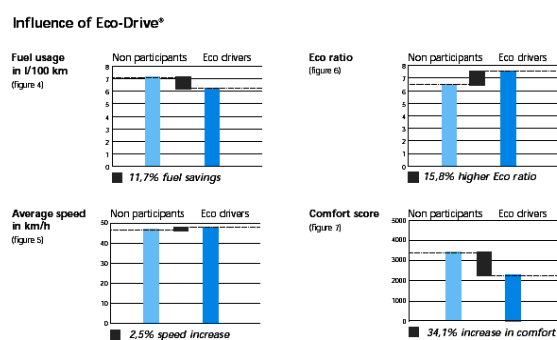


Fig. 1 The influence of Eco-Driving style

Fuel consumption and climate protection

Eco-driving trainings lead to a consumption reduction up to 20 % after trainings and about 5% in the long run. The European Climate Change Program calculated a reduction potential of eco-driving of at least 50 million tons of CO₂ -emissions in Europe by 2010, saving about 20 billion euros [1, 2].

Local environment and health



Fig. 2 Reducing the noise in urban traffic

Eco-driving reduces noise pollution as well as local air pollution. The engine noise of one car driving with 4000 rpm (revolutions per

minute) equals the engine noise of 32 cars at 2000 rpm (Fig. 2). Thus, eco-driving reduces one of the main problems of traffic in urban areas [1,2].

Costs and safety

Eco-driving reduces not only fuel costs, but also costs for maintenance and costs for repairing cars after accidents. The safer driving behavior results from:

- an anticipating driving style;
- maintaining a steady speed;
- less speeding;
- less overtaking;
- less stress/aggressiveness.

Some examples:

- CANON company in Switzerland trained the eco-driving style with 350 service car drivers in VSZ VELTHEIM. The drivers reduced fuel consumption by 6,1%, had 22% more km per accident and 35% less accidents in total;

- Eleven month after eco-driving trainings, the German company HAMBURGER WASSERWERKE effected fuel consumption reductions of more than 6 %, accidents and related costs could be diminished by more than 25 %;

- In the year 2000, eco-driving trainings in the Austrian bus company NIGGBus reduced fuel consumption by 5% in day-to-day driving. The effect increased up to 7% in the year 2001;

- Eco-driving programs prove to be very cost-effective. The Dutch eco-driving program results in a cost-effectiveness of about 5 euro per avoided ton of CO₂-emissions over a period of 10 years.

3. THE IMPLEMENTATION OF “ECO-DRIVING” STYLE IN EU-COUNTRIES

Safe and economic driving behaviors (often referred to as eco-driving) have the potential to considerably reduce the energy use and CO₂ emissions of transport. This has been stated in many national strategies and programmers concerning transport in Finland. However, in order for eco-driving to become a common behaviors model there is a need for systematic and long-term training and communication to many stakeholders. This

concerns especially those who already possess a driving license, since the training of safe and economic driving has already been obligatory for new drivers (in the 2nd training phase) in Finland for 6 years.

The awareness of stakeholders is raised concerning the economical, safety and environmental benefits of safe and economic driving. Pilot projects based on new models of getting drivers trained are launched among certain target groups.

The primary target groups are the following:

- consumers (car buyers, car owners);
- transportation companies, companies; purchasing transportation services;
- municipalities;
- decision-makers of company car acquisition.

The secondary target groups are:

- retailers of passenger cars;
- media;
- political decision-makers.

The key messages of marketing are based on the following viewpoints (the priority order and the communication for each target group is defined separately):

- safe and economic driving enhances traffic safety;
- safe and economic driving can bring about fuel cost savings of 5–10 % without lowering the average speed;
- safe and economic driving is the fastest and the most cost-effective measure to reduce the environmental effects of transport;
- safe and economic driving can reduce the vehicle repair costs considerably.

The project was implemented between 01.01.2005–31.12.2006. The costs of the project was 95000€. Responsible for the implementation of the project were:

- ECODRIVING CENTER Ltd (training network including 35 training units and 70 trainers in Finland);
- KH FIN LTD (KEY training network including 14 training units and 90 trainers in Finland).

The project involved also the following co-operating parties:

- The Ministry of Transport and Communications;
- The Ministry of Trade and Industry;

- Vehicle Administration;
- Car importers;
- The Finnish Central Organisation for Motor Trades and Repairs;
- OIL INDUSTRY SERVICE CENTER;
- TAPIOLA INSURANCE COMPANY.

The Netherlands ECO-DRIVING programmer ‘Het Nieuwe Rijden’ resulted from the Kyoto agreement and from national policy documents targeting CO₂ emission reductions in traffic and transport. The programmer concerned a long-term strategy for the period 1999 until 2006, involved about € 20 Million. There already was a long tradition of eco-driving projects and activities in the Netherlands since 1988. After the Kyoto agreement however, the programme grew to maturity.

The programme was implemented by NOVEM (Netherlands agency for energy and the environment) on behalf of the Dutch Ministry of Transport and in co-operation with the Ministry of Environment. It aims to motivate (professional) drivers and fleet owners to purchase and drive passenger cars, delivery vans and lorries more energy-efficiently. The programme created conditions and organizational and logistics structures to achieve CO₂ emission reductions. The programme co-operated with over 20 consumer and retail organisations, mainly in the transport and car business. These organizations had signed an agreement to implement eco-driving activities. Among these organisations are the Royal Dutch Touring Club (ANWB), the Dutch Consumer Association (CONSUMENTENBOND) and the Dutch Association of Car Importers (RAI-VERENIGING). These organisations are best fitted to address the target groups with the eco-driving mission.

The Netherlands eco-driving programme has been addressed the following issues:

1. Driving style of (professional) drivers;
2. Driving school curriculum;
3. Fuel-saving in-car devices;
4. Tyre pressure;
5. Purchasing behaviour (e.g. car labeling).

Some achievements and aims of the Netherlands eco-driving programme:

- More than 90% of the Dutch driving instructors and examiners (6,500) were trained in eco-driving.
- Eco-driving is already part of theory exams for driving instructors, examiners and learner drivers. Shortly eco-driving will also become part of practical exams.
- The eco-driving program aims at the standard equipment of all newly sold cars in the European Union with fuel-saving in-car devices such as on-board computers and cruise control.
- A large mass media campaign (TV, radio and print) starts in 2004, mainly focusing on private car drivers. Aim of the campaign is to stimulate car drivers to apply the main driving style recommendations.
- The program co-operates with a large network of consumer and retail organizations, mainly in the transport and car business. These organizations actively promote eco-driving to the target groups.
- A certification and education system has been set up for eco-driving trainers.
- The number of providers of eco-driving courses as well as the variety of courses has increased significantly since 2001.

In the time from 1995 to 1996, the German Road Safety Association, the Commercial Professional Co-operation and the Federal Union of Driving Instructors developed, tried and tested, a practical training programme using real traffic situations for the education of drivers on a more environmentally friendly driving style. The programme had the title „Safe, economical and environmentally friendly driving” and the target was to teach fleet drivers in the new driving style. In the time from 1996 and 1997, the DVR, Commercial Professional Co-operation and Federal Union of Driving Instructors have installed training network for the whole Federal Republic of Germany. The trainers educating the drivers have all received a certificate from DIN EN ISO 45013 and are subjected to an ongoing quality control.

On the basis of the former programme, the trademark „Fahr und Spar mit Sicherheit - Sicher wirtschaftlich und umweltschonend fahren” was developed in 1998 by the German Road Safety Association in co-operation with

the Commercial Professional Co-operation, the Federal Union of Driving Instructors, the FORD company, the German foundation on environmental help

On the basis of the brand „Fahr und Spar mit Sicherheit - Sicher wirtschaftlich und umweltschonend fahren” „ECO-DRIVING” has been developed, tried and tested, and evaluated by FORD COMPANY AG and the German Road Safety Association together with the Federal Union of Driving Instructors. „ECO-DRIVING” is a programme for private customers and companies and will be spread to the public through FORD dealer Federal wide offers.

In June 2000, eco-driving, managed by DVR, was presented to the public. The programme was supported by the Federal Ministry for Construction, Housing and Transport. The „DVR-Spritsparstunde” was introduced in 2002. Interested persons can join courses nearby and only in one hour. A professional trainer teaches the technical of the new driving style in the customer’s car and gives support when it is needed.

4. THE “GOLDEN RULES” OF “ECO-DRIVING”

In the last decades, engine technology and performance of passenger cars, Lorries and buses have improved rapidly; however, most drivers have not adapted their driving style. Eco-driving is adapted to modern engine technologies and means smooth and safe driving at lower engine revolutions. Eco-driving is easy to learn and it has been shown that written information itself has a substantial impact on driving behavior, on safety and on fuel consumption without increasing travel time.

There are four basic rules to follow (main recommendations):

1. Shift into a higher gear as soon as possible (Fig. 3);
2. Maintain a steady speed, using the highest gear possible. Your engine will work in the very efficient area;
3. Look ahead and anticipate traffic flow. This gives you enough space to react adequately and without stress;

4. Decelerate smoothly by releasing the accelerator in time, leaving the car in gear. In this case, modern engines do not need any fuel.

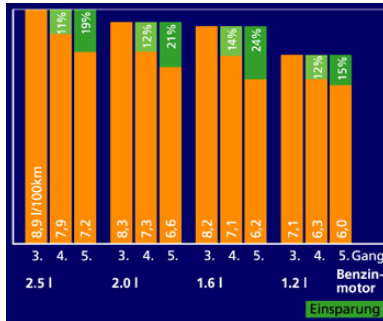


Fig. 3 The influence of Eco-Driving on fuel consumption

Additional recommendations:

- Switch off the engine at short stops (> 1 minute);
- Check the tire pressure once a month. High tire pressure saves fuel and endures the lifetime of the tire;
- Make use of fuel saving in-car devices such as board computers, econometers, cruise control etc;
- Change into a lower gear when you approach a curve;
- Take care of your vehicle aerodynamics;
- Do not accelerate without reason;
- Get rid of surplus weight and not used roof racks.

5. TESTING THE DRIVER, „ECO-DRIVING” CRITERIA

There must be a reference point for the assessment of a driver. In assessing a driver, the trainer has to consider following items [3]:

Defensive and social driving behavior

Defensive and social driving reflects the overall style of driving. The consultant should take this into account in the overall picture of a driver:

- adapted and determined (safe) driving;
- taking into account road and weather conditions;
- taking into account other traffic;
- taking into account the interests of other road users (particularly the more vulnerable);
- anticipation.

Controlling the vehicle

- proper use of safety belts, rear-view mirrors, head rest, seat;
- proper use of lights and other equipment;
- proper use of clutch, gearbox, accelerator, braking systems (including third braking system), steering wheel;
- controlling the vehicle under different circumstances, at different speed;
- steadiness on the road;
- taking into account the measures, weight and characteristics of the vehicle;
- taking into account the weight and kind of the load;
- taking into account the comfort of the passengers (no fast acceleration, smoothly driving and no hard braking).

Observation

- all-round observation;
- proper use of mirrors;
- long, near, middle distance vision.

Priority giving way

- priority at crossroads, intersections and junctions;
- giving way at other occasions (eg. changing direction, changing lanes, special maneuvers).

Correct position on the road

- proper position on the road, in lanes, on roundabouts, in bends, suitable for the type and the characteristics of the vehicle;
- pre-positioning.

Keeping distance

- keeping adequate distance to the front, the rear and the side;
- keeping adequate distance from other road users.

Speed

- not exceed the maximum allowed speed;
- adapt speed to weather/traffic conditions and where possible up to national speed limits;
- drive at such speed that stopping within distance of the visible and free road is possible;
- adapt speed to general speed of same kind of road users.

Traffic lights and road signs

- acting correctly at traffic lights;
- obey indications from traffic controllers;

- acting correctly at road signs (prohibitions or commands);
- take appropriate action of road markings.

Braking and stopping

- decelerating in time, braking or stopping according to the circumstances, if necessary using the third brake;
- anticipating.

Important remark: “If these points are done properly, a driver automatically drives economically and environmentally friendly”.

6. CONCLUSIONS

And because road safety is the most important will conclude with some useful tips and maximum:

- Quality is not essential to drive slowly, but it is to drive well [4];
- Many people think they are exceptional drivers, but among those snooty recruitment is producing most of the serious accidents;
- Experience is an important factor, but not exclusively;
- Nearly 90% of all crashes are caused by about 10% of drivers [4];

- No man, however experienced it can not provide everything;
- A good driver uses as little clutch pedals and especially the brake;
- Especially at night to drive so we can turn to where we see;
- “Better late in the earth, than in advance ... underground” [4].

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NOTES FOR AUTHORS

When editing the articles which are to be published in the review some rules will be respected as follows: the whole paper must be written with no free space between lines using the Times New Roman CE; the margins of the text: Top – 28mm, Bottom – 20mm, Inside – 25mm, Outside – 20mm, Header – 18mm, Footer – 15mm, Mirror margins activated, Paper format A4 210X297)

The paper will have an even number of pages (maximum 6). All pages will be sent to the e-mail address of the Academy.

The title will be printed in Upper cases 14pt, bold, centred.

The name of the author will be written two free spaces below the title of the paper: First name, surname, font 12pt, bold, centred. A free space (12pt) below the name will be left before writing the name of the institution of the authors', font 11pt, centred.

Papers must be prefaced by a brief abstract in English up to 150 words. The text will be written in 11pt high, Italic, justified, left-right alignment.

A number of maximum 8 keywords will be written 12pt below the abstract. The words will be 11pt high, Italic, left alignment, separated by a comma.

The text of the paper will be written in English two free spaces below the keywords divided into two columns separated by a 5 mm free space. The characters will be 12pt high, justify (left-right alignment).

The main parts of the paper will be introduced by numbered titles with Arabic figures and printed in capitals, font 12pt, bold, centred. A free space will be left above the text and another one below it. Paragraphs will be 6mm indented.

Drawings diagrams and charts will be separated by a free space from the text and be printed as close as possible to the first reference. Their width will not exceed that of the column they belong to. Should this be impossible to achieve then they will be printed

across the whole breadth of the page either at the top or the bottom of the page.

Diagrams and charts will be numbered by using Arabic figures and will be accompanied with captions. Ordinal numbers and figure captions will be printed leading of free space 8pt below the drawings, centred, font 11pt.

Ordinal numbers and the charts explications will be printed above the chart, right alignment, font 11pt.

Mathematical formulae will be printed 6mm left alignment. Ordinal numbers will be printed within round brackets right alignment. Characters will be Times New Roman straight: Full - 12 pt.; Subscript / Superscript - 9 pt.; Sub-Subscript / Superscript - 7 pt.; Symbol - 16 pt.; Sub-Symbol - 12 pt.

Long mathematical formulae will be broken up so as not to be wider than the column or they can be printed integrally on the whole width of the page either at the top or bottom of the page.

Names of firms will be printed in Upper case, straight and the names of military technology products in Upper case, Italic. Neologisms, already accepted and registered in DEX will be printed in regular characters. Those which have not yet been registered in DEX will be printed in Italic.

Bibliography will be printed at the end of the article and will be numbered in Arabic figures. The text will be left alignment, 6mm indented. The titles of the reference articles, books and papers will be printed in Italic.

Reference citations will be numbered in the text successively as they appear in the text, within square brackets [2]. Several successive reference citations will be abbreviated as follows: [2,5,12].

A separate file will include the names of authors, titles of article an abstract, both in Romanian and English.

The authors take full responsibility for the contents and scientific correctness of the paper.