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REGIONAL DEPARTMENT OF DEFENSE RESOURCES MANAGEMENT STUDIES

INFORMATION RESOURCES MANAGEMENT

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CRITICAL INFRASTRUCTURE PROTECTION

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INTRODUCTION

The complexity and diversity of risks and threats, more interconnected and characterized by multiple determinations, requires an approach systemic, and comprehensive security objectives, focusing on protecting those vital components for safety and proper conduct of socio-economic life.

Critical infrastructure protection activity not taken national boundaries and involves joint efforts within the meaning identification and assessment of all their weaknesses. As therefore, critical infrastructure protection - factor for maintain the stability and security - require amplification main concerns of international actors (states and international organizations) development and harmonization of strategies in the field. They should allow the identification and early warning risks, while adopting and initiating timely decisions/ steps of preventive intervention and countermeasures.

The issue entered the field and outside the remit intelligence, performing for knowledge anticipate, prevent and counteract threats critical infrastructures. The efficiency of data structures depends on the ability of other state institutions to ensure security of the nation.

I. ROLE AND IMPORTANCE OF CRITICAL INFRASTRUCTURE IN THE SECURITY AND STABILITY PLAN

1. INTERNATIONAL CONTEXT

The issue of critical infrastructure to set up more strongly that topical issue especially in the late twentieth century and the beginning of the current escalation as a consequence of risk asymmetrical.

The terrorist attacks of September 11, 2001 were beginning of a "new era" in international[1] relations, the crucial moment for global expansion of the concept of "infrastructure Critical" and unified measures, coagulated in the strategies at national and regional levels to protect them from risks and threats, in particular of a terrorist. There have been remarkable developments in

[1] Smith, Michael N., *Counter-terrorism and the use of Force in International Law*, The Marshall Center
Papers, No.5, November 2002

law and institutional, line definition and protection of critical infrastructure, both in USA and the NATO and its Member States the European Union.

In accordance with the NATO, the Committee Superior for Civil Planning Situations Emergency Alliance, steps have been taken to find and application of unified strategy identification, risk analysis and infrastructure protection, in the sense that organizations are similar to those critique[2].

Especially after the terrorist attacks in Madrid products (2004) and London (2005), the European Union started a series of measures to ensure the legal and operational configuration identify and improve critical infrastructure protection.

Is relevant in this connection:

- launched in December 12, 2006, the European Program Critical Infrastructure Protection (EPCIP), which stated 11 sectors and 32 of their vital services related to the level Europe;
- adopted on 8 December 2008 EU Council Directive nr.114/2008/CE on "Identify Critical Infrastructure and the assessment of need improve their protection "[3].

2. DEFINE AND IDENTIFY INFRASTRUCTURE

Considering the importance of infrastructure to support all mechanisms for stability and functionality in safe and secure economic and social systems, literature classifies facilities into three categories:

- Common infrastructures framework is a structure that provide construction and operation of a system;
- Special infrastructures have a consistent role in the functioning systems and processes with a high degree of stability and security mechanisms in all economic and social life regional interest. These types of infrastructure, subject of dysfunctions and vulnerabilities, and in a context of insecurity, may enter the category of critical;
- Critical infrastructures are usually decisive in stability, security and safety systems and processes, having an important role in the development of economic and social processes, political and military. The degree of criticality of these infrastructures is linked to significant effects induced by disturbance or removal from office, including a very short period.

Although approaches vary, with the starting point common elements on the importance of safe operation and induced effects, the concept of "critical infrastructure" can be assimilated with any

[2] http://europa.eu.int/eulex/lex/LexUriServ/site/fr/com/2004/com2004_0702fr01.pdf
[3] http.//ec.europa.eu/energy/infrastructure/critical_en.htm

functional economic entity that provides products, goods and public services, vital to society and whose degradation or downtime bring to produce a state of major impact on economic and social plan, at micro and macro regional[4].

An assembly of infrastructure or infrastructure can be considered critical due to:

- unique conditions, and complementarities in the infrastructure of a system or process;
- importantly role that you fulfill the stability reliability, safety, functionality and, in particular, security systems;
- increased vulnerability to direct threats, as well as those relating to systems / processes that are part;
- particular sensitivity to changes in conditions and particularly to sudden changes situation[5].

Evaluation of critical infrastructure can be achieved by the following criteria[6]:

- physical, or presence criteria - place among other infrastructure, size, dispersion, endurance, reliability, etc..;
- functional, or criterion role - what "is" relevant infrastructure;
- of security - the role of infrastructure and safety security system (measured in terms of effects that can be damage caused by the basic conditions);
- of flexibility - some of those included in the ordinary can be transformed, under certain conditions, the critical infrastructures and vice versa;
- of unpredictability - which shows that some of the infrastructure become regular or special, contextual, critical.

As part of a system or process, but also by its elements complete the whole network infrastructure critical operations can be configured by[7]:

- which part has infrastructure nodes: employees, departments, contractors and subcontractors (institutions that to collaborate / cooperate), plant and equipment;
- interactions (links) established between nodes: services provided, hierarchical routing (change / shift), schemes and critical network links for evaluation safety, efficiency,

[4] „*International Journal of Critical Infrastructures*", vol. 1, nr.1/2004

[5] prof. univ. dr. Rizea, Marian; Marinică, Mariana; Barbăsură, Alexandru; drd. Dumitrache, Lucian; Ene, Cătălin, *Protecţia infrastructurilor critice în spaţiul euroatlantic*, Editura Ani, 2008, Bucureşti, p.7

[6] dr. Alexandrescu, Grigore; dr. Văduva, Gheorghe, *Infrastructuri critice. Pericole,ameninţări la adresa cestora.*
Sisteme de protecţie, Editura Universităţii Naţionale de Apărare „Carol I", Bucureşti, 2006, p. 8

[7] *Infrastructurile critice,* în revista „Profil" nr.10, din martie 2006, p. 23, Bucureşti, publicaţie a S.R.I

sustainability, sustainability;

- characteristics of critical infrastructure (people, plants, equipment, systems) and their evaluation according to the degree of security, operating life, efficiency etc..

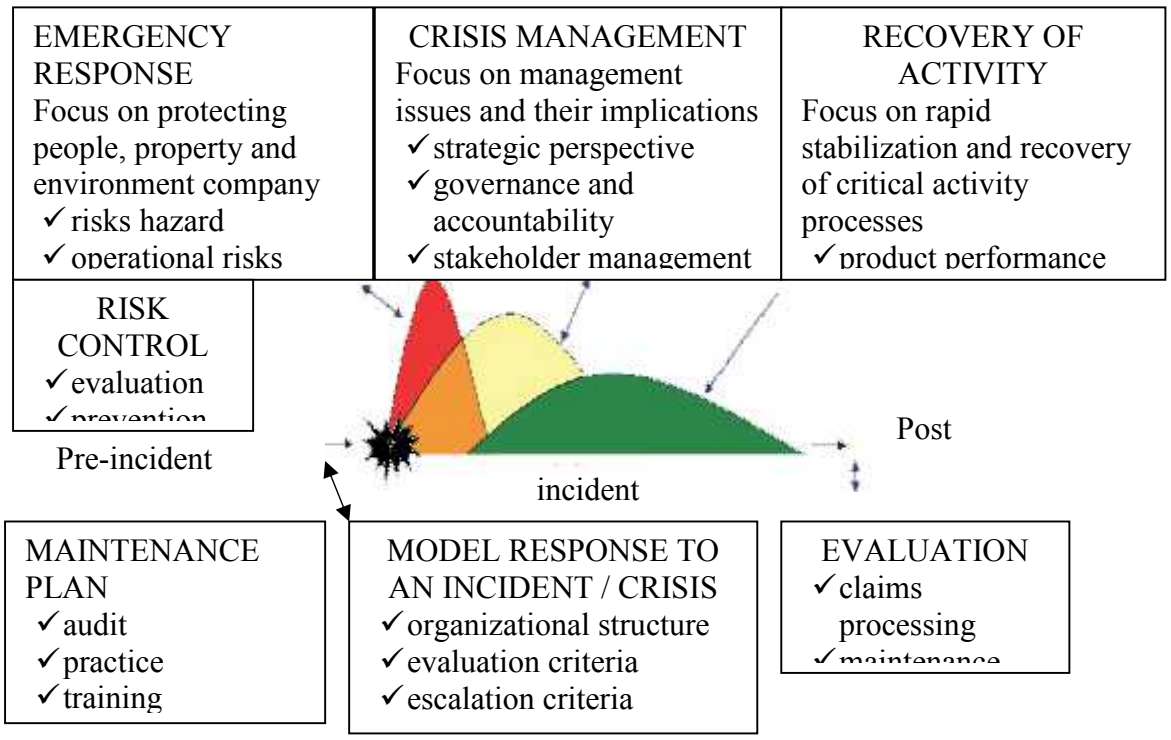
Depending on various factors, conditions or circumstances, causes determinants (risk associated with terrorism, weather extreme or outstanding technological risks) and effects, mainly in economic and social development that can get type "Bulgaria snow "infrastructure can meet at some point, the criteria inclusion or exclusion of essential critical category.

EU Council Directive nr.114/2008/CE on "Identification and designation of European Critical Infrastructure and needs assessment to improve their protection "(December 8, 2008) defines critical infrastructure as follows:

"An item, system or part thereof, situated on the Member States, which is essential to maintain vital social functions, health, safety, security, social or economic welfare of people, and whose disruption or destruction would have a significant impact in a Member State because of failure to maintain these vital functions."

At the same time, "European Critical Infrastructure" is "critical infrastructure located in the Member States, whose disruption or destruction would have a significantly on at least three Member States ".

Diagram phases of continuous activity plan[8]



[8] Ibid

Climate of stability and security is determined by proper functioning of critical infrastructure networks, need for their protection as an essential condition to avoid serious disruption to the company's viability. According to European Directive nr.114/2008/CE, Critical infrastructure protection is "any activity that aims to ensure functionality, continuity (note - see diagram attached) and the integrity of critical infrastructures to discourage, diminish and neutralize a threat, risk or vulnerability."

3. TYPOLOGY OF RISK ELEMENTS, TO ADDRESS CRITICAL INFRASTRUCTURE

Making effective protection of critical infrastructure requires a thorough knowledge of the elements that could affect their work:

A. VULNERABILITIES

Actually means those states, processes or phenomena reduces responsiveness to risks or potential or favoring the emergence and development, with consequences in terms of functionality and usefulness of critical infrastructure. These are the consequences of system failures that disorders generates information-decision-making processes, the connections, relationships and relationships between system components or intersystem relations, with effects on the functionality, stability and socio-economic balance. Failure to identify or poor management can degenerate dysfunction by perpetuating the risks and risk factors, threats, state of danger or aggression against the objectives, values, interests and national security needs.

Vulnerabilities of critical infrastructure can be consequences objective elements, prefiguring of potential interventions or human exploitation and mismanagement.

In the context of critical infrastructure protection measures, a crucial element is the assessment of vulnerabilities individual and systemic.

B. RISK FACTORS

Refers to situations, circumstances, factors, conditions or internal and external circumstances, sometimes coupled with action, which cause or promote the realization of threats infrastructures, generating effects of insecurity. Critical Infrastructure Risks can be classified by:

- structure and extension of defects, damage, interference, degree of probability of their occurrence and potential of human action;
- trigger and vulnerability of a system or systems;
- the nature, degree of ambiguity and uncertainty.

Importance of identifying and preventing manifestation of factors involves risk assessment and comprehensive risk analysis, starting the dysfunctions and vulnerabilities.

C. THREATS

Are the skills, strategies, intentions, plans that enhances a threat to critical infrastructure, materialized the attitudes, gestures, acts, which creates state of imbalance or states generate instability and danger, the impact on national security.

D. STATE OF DANGER

Highlights usually result threat materializes or imminent aggression against infrastructure critical.

E. ATTACKS

Materializes in violent or nonviolent carried out by armed means, electronic, psychological or information based on strategies and plans by an entity (states, pressure groups, non-state actors, centers power etc.).

PROBABILITY VERSUS IMPACT

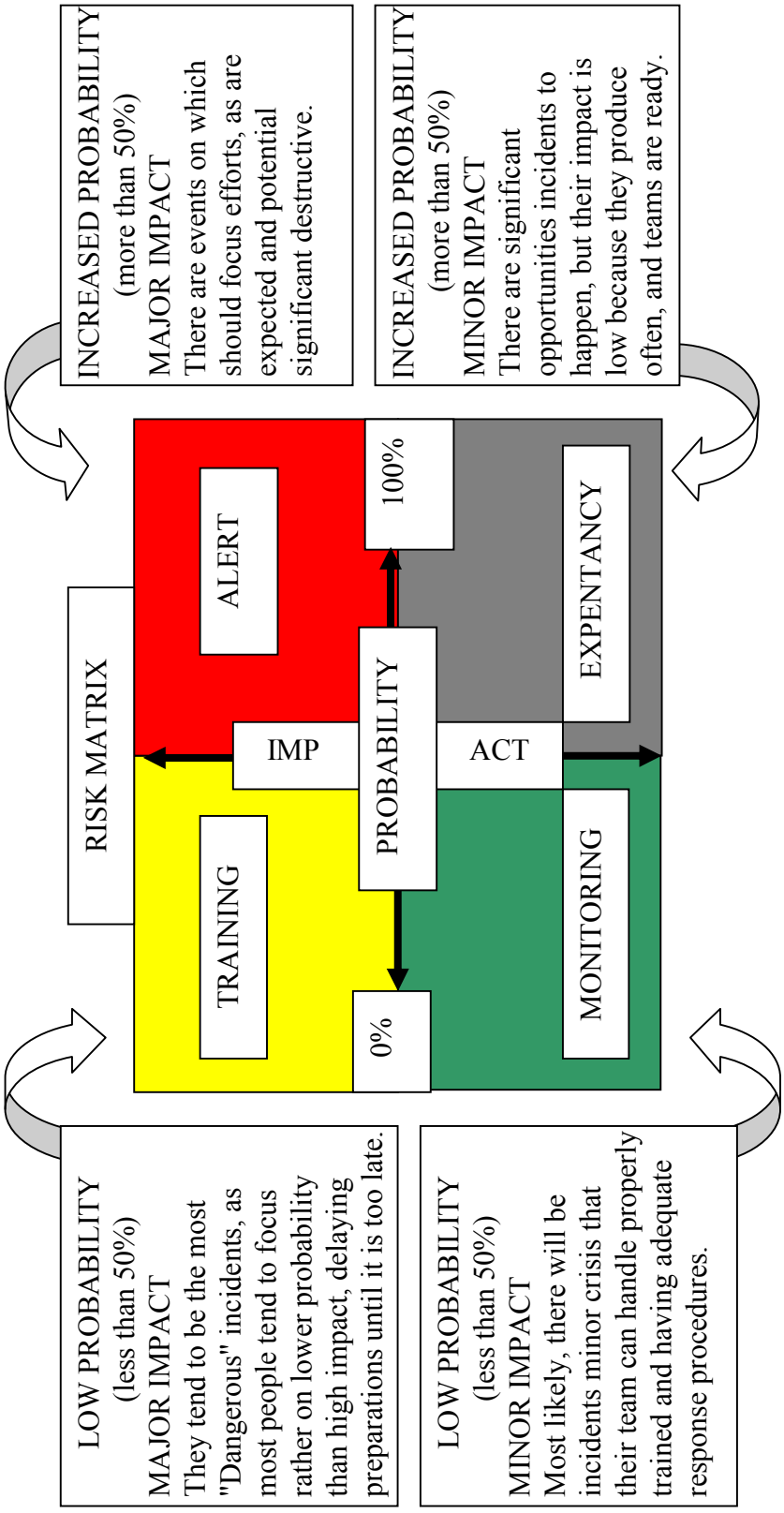
The vulnerability of critical infrastructure is given by the ratio the likelihood of threats to the proper functioning and its induced consequences.

4. THE SYSTEM OF NATIONAL INFRASTRUCTURE

The system of national infrastructure, the characteristics development, technical performance and security level, gives premises real manifestation of vulnerability and risk factors likely to cause serious imbalances in terms of stability them, with major implications for socio-economic order national and regional macro. Thus, the negative effects of poor technical condition of specialized transport infrastructure stands out strongly in increased operating time, reduced work efficiency, with direct impact in terms of providing competitive services and standards high quality and safety.

Similarly, systems for energy, oil and natural gas (by reducing the study to those that are subject to European Directive) face failure significant due to lack of rehabilitation measures, leading to maintenance of the technical performance of exploitation low yield and reliability.

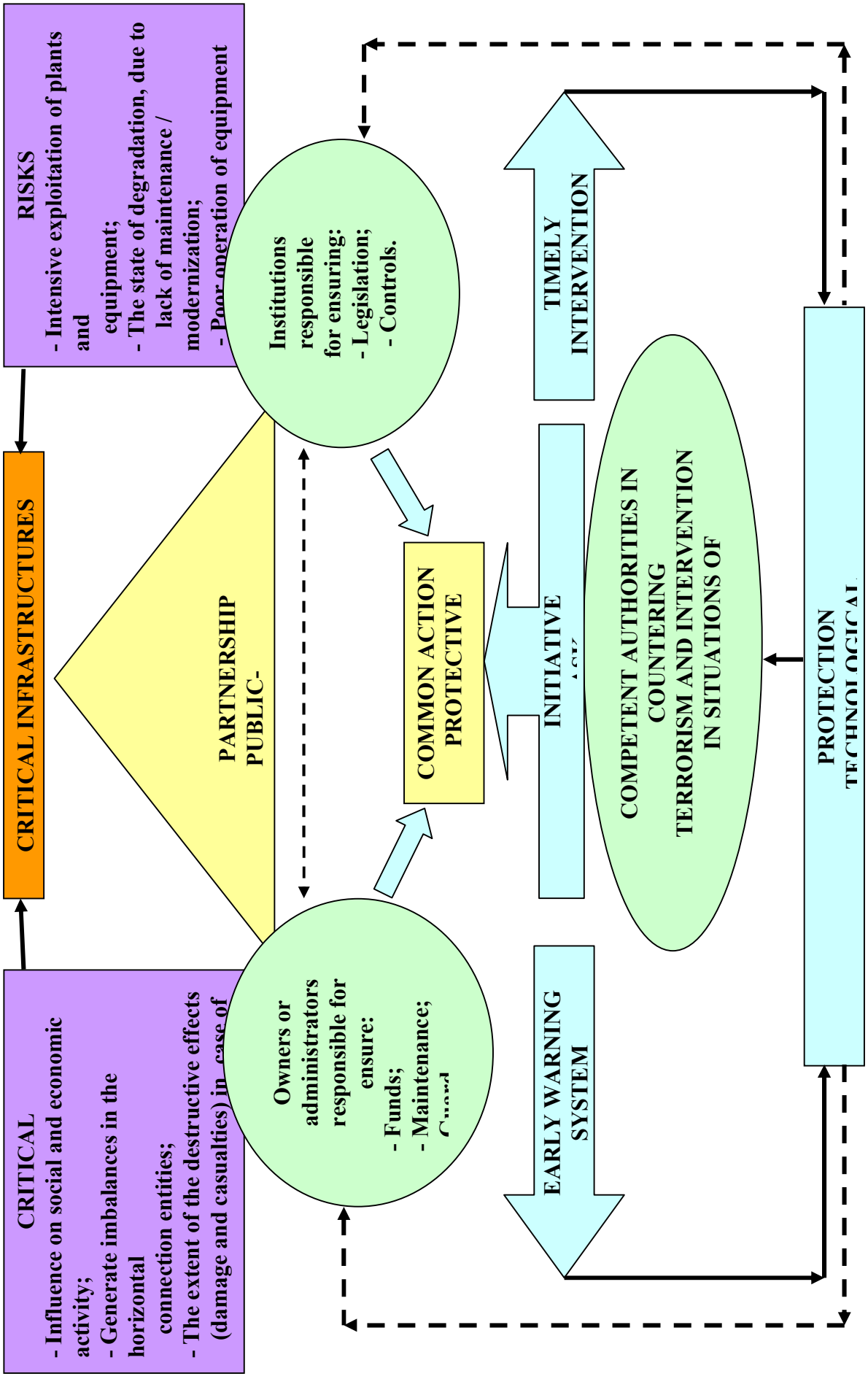
Insufficient physical protection of such infrastructure allows amplification acts of theft and transported materials increased risk of deliberate aggressive interventions, such significantly disrupt the distribution system such elements / services of public utility, with economic and social impact.



RISK MATRIX (MODEL)

[9] Arion, Stelian, *Protecţia infrastructurilor critice – managementul securităţii la nivelul deţinătorilor şi al operatorilor*, expunere în cadrul mesei rotunde „Protecţia infrastructurilor critice şi parteneriatul public-privat. Direcţie prioritară pentru realizarea securităţii naţionale”, Braşov, 12 mai 2009.

Management of risks to critical infrastructure (model)



II. THE ROMANIAN INTELLIGENCE SERVICE TASKS IN NATIONAL CRITICAL INFRASTRUCTURE PROTECTION

From the perspective of the powers conferred by law, SRI acting on this dimension by:

1. INFORMATION MEASURES (INTELLIGENCE)

Aimed at identifying threats of any kind to address critical infrastructure and vulnerabilities, states the danger and risks that affect security, followed of transmission to recipients of legal issues.

SRI has the task of consistently and timely information makers in the state, by providing some information documents (according to Law No. 51 / 1991 and Law No. 14 / 1992) and cooperate with other national state structures (according to the Law nr.535 / 2004).

Activity in the field of critical infrastructure information includes all actions and operations permanently planning, seeking, obtaining, verifying, processing analytical data and information relevant to the protection critical infrastructure and information empowered decision makers the field.

Reliable, accurate and timely - with character mainly anticipatory / predictive - is the instrument of alert authorities to adopt counter-measures appropriate and avoid a crisis or "strategic surprises". Also reveal, in the shortest time, actual developments in crisis and the potential effects contribute to optimizing management.

Information for Critical Infrastructure Protection is a part of national security information - defined as product of intelligence, including new knowledge compared with the pre-existing situations on / events / facts / states which are or may become threats or sources of risk to national security or to carry their vectors.

As such, the specific activities carried out by structures SRI appears:

- obtain primary data and information relating to risk factors affecting the integrity and functionality of critical infrastructures;
- develop comprehensive assessment and analysis of the state of security of critical infrastructure to enable identification and notification of potential threats;
- providing information on the situation / state potential threats to critical infrastructure, authorities, legal institutions responsible for substantiating decisions and actions needed in each situation.

Dissemination of secret data to beneficiaries is governed by the "need to know", so that policy makers in various areas will receive information the competences conferred upon them by law.

People who have access to certain classified information to perform official duties of the relevant regulations are laws governing access to this category information.

Given the imperative of efficiency work for SRI emerges form a more acute need for feedback institutionalized - timely and efficient - the beneficiary's legal of information on critical infrastructure problem that adaptation and modeling capabilities allow service ensure the needs of knowledge / information and setting authorities agenda at the tactical and operational priorities.

It may be considered business information has reached order when the authorized user receives the knowledge of aspects of competence. The existence of a feedback from on his part - which is confirmed appreciated disability / fined or required contents by analytical data add - determine the onset of a new process / cycle analytical can complete a new document information.

In terms of regulation and planning own work, that relevant information strategy – document program which provides implementation strategies national security and defense in the area of responsibility service - includes critical infrastructure protection issues priorities for the category of SRI, ensuring orientation in this sense of human, material and financial and information and operational capabilities of the institution.

2. MEASURES TO ENSURE THE PHYSICAL PROTECTION OF CRITICAL INFRASTRUCTURE

SRI quality derived from the national authority the terror and technical coordinator of the National Prevention and Combating of Terrorism (NSPCT), measures are applied gradually, depending on the level of risk, identified by specialized information and risk assessments, and can be coordination or operated, respectively:

- granting approval for antiterrorist protection / intervention imminent threat materialize if this nature - task forces specialized competence NSPCT members;
- counterterrorist action, when performing an attack terrorist - SRI strict competence, and support of other NSPCT forces members;
- ensuring control and antiterrorist protection of civil airports – in SRI competence.

Preventing and combating terrorism - one of the most major threats to critical infrastructure – is performed in accordance with national law of international conventions to which Romania is part, and of international regulations. Specific Tasks in the field are provided in domestic legislation.

3. SERVICE QUALITY MEASURES DERIVED FROM AUTHORITATIVE THE NATIONAL CYBER-INTELLIGENCE (CYBERINT)

Information systems that operate most Critical Infrastructure is a favorite target of attacks cyber becoming better organized and more sophisticated. Attacks on computer systems belonging to

official institutions or privately owned, treated as infrastructure Critical become more dangerous and more difficult to prevent. They can be initiated targeting organized crime groups in most cases, obtaining financial resources, but also by hostile states, as weapons to achieve political goals.

From this perspective, the transformation and SRI is considering upgrading the basis for a concept and their institutional architecture of the Service to ensure an appropriate response to such threats (prevention, protection, response and consequence management in case of cyber attacks), establishing in 2008 the Centre National CYBERINT that is:

- collaboration platform within System institutions National Security;
- interface for cooperation with similar structures in the NATO.

4. MEASURES OF PHYSICAL PROTECTION, LEGAL AND PROCEDURAL CLASSIFIED INFORMATION ON CRITICAL INFRASTRUCTURE

SRI, as designated by the security authority competence in the protection of classified information, running circumscribed activities classified information security managed by public authorities and institutions or legal persons public or private law who are within its jurisdiction, accordance with Law No. 182 / 2002 on the protection classified information and the subsequent legislative acts.

To exercise all its tasks in the application these regulations, specialized structure of the services provided:

- NATO and EU classified information managed by SRI;
- overall coordination and control measures to protect classified information from the responsibility of the SRI, to prevent compromise of classified information state, namely, NATO / EU classified;
- develop national standards of protection classified information;
- steps taken by the surveillance and public institutions, businesses owned or part of state and other public legal persons private or state secret protection and confidentiality service;
- cooperation in the protection of classified information, security authorities and structures designated specialized foreign partner services;
- specialized assistance entities holding classified information and enforce the law by sanctions, according to regulations.

CONCLUSIONS

Economic and social developments in national and international threats implicit in terms of predictable or unpredictable effects on the population and economies of states and state union, leading to calls for measures urgent protection of critical infrastructure, the most important are:

- Establish national framework for defining and selecting infrastructures that can be included in the critical category. It is important to point out the need for conjugation its urgent efforts, including within compliance perspective - 12 January 2011 – to EU Council Directive no.114 / 2008;
- Set up the institutional framework, to provide uniformity and efficiency in terms of regulation and enforcement critical infrastructure protection measures;
- Involvement of administrators/operators of infrastructure all critical legislative efforts, but also application;
- Developing expertise;
- Strengthening inter-institutional cooperation at national, European and regional macro;
- Providing the best and effective "early warning" and preventive intervention against the risks that may affect integrity and functionality of the infrastructure.

REFERENCES

- Alexandrescu G., Văduva Ghe.,*Infrastructuri critice. Pericole,amenințări la adresa acestora. Sisteme de protecție*, Editura Universității Naționale de Apărare „Carol I”, Bucureşti, 2006
- Arion, Stelian, *Protecția infrastructurilor critice – managementul securității la nivelul deținătorilor şi al operatorilor*, expunere în cadrul mesei rotunde „Protecția infrastructurilor critice şi parteneriatul public-privat. Direcție prioritară pentru realizarea securității naționale”, Braşov, 12 mai 2009.
- Rizea M si colaboratori. *Protecția infrastructurilor critice în spațiul euroatlantic*, Editura Ani, 2008, Bucureşti,
- Smith, Michael N., *Counter-terrorism and the use of Force in International Law*, The Marshall Center Papers, No.5, November 2002;
- *Infrastructurile critice,* în revista „Profil” nr.10, 2006 Bucureşti, publicație a Serviciului Român de Informații
- ******** „*International Journal of Critical Infrastructures*”, vol. 1, nr.1/2004
- http://europa.eu.int/eulex/lex/LexUriServ/site/fr/com/2004/com2004_0702fr01.pdf;
- http.//ec.europa.eu/energy/infrastructure/critical_en.htm

DATABASE MANAGEMENT FOR HUMAN RESOURCES

CPT LTC Liviu Cordun TOMA

INTRODUCTION

First and foremost, I think that is necessary standardization and interoperability between NATO forces make a vital contribution to the combined operational effectiveness of the military forces of the Alliance and enable opportunities to be exploited for making better use of human resources. Extensive efforts are therefore made in many different spheres to improve cooperation and eliminate duplication in research, development, procurement and support of defence systems.

What topic have identified? **Barcode for DNA encoding** – support for defence database in different areas – medical , logistic, but not least human resources.

The sign of identity is required for all soldiers.

It is used in both peacetime and war, in this case in the theatres of operations.

The basic idea of this paper is the efficient use of elements inscribed on the sign of identity through printing individual DNA barcode.

Why ?

People/Man is the main concern of any nation.

For this reason it is necessary to apply those methods designed to protect soldiers.

These methods should support the idea of rescue personnel and solve different situations with dramatic consequences.

For this purpose I analysed this need and followed next steps:

1. It requires a database prepared by the medical service.
2. The database managed by Human Resources.
3. Barcode DNA encoding.

We can apply on identity signs each barcode DNA encoding through printing at hot or could be manufactured bracelets resistant at high temperatures.

Database of Human Resources and Medical Department could provide and could receive information through identity sign from barcode.

This system could to render presence permanently personnel, but in same time provide information about health status of fighters or needs for medical attendance.

The subject itself is sensitive and has both supporters and opponents, so that forced me to submit a proposal.

I think that is necessary for this method to be used in situations and special missions.

In fact I liked the idea that the technical solution. Nowadays this method is used for U.S. military personnel and firefighters involved in very difficult situations.

I. Database prepared by the medical service

Personal Privacy and Access to Medical Databases. What are Medical Databases?

With the rapid advances in the computerization of medical data, the question of the protection of medical records privacy has begun to arise. Storing a large amount of sensitive information in a central location (databases) could open the door to "invasion of privacy" issues that were not as common as with the keeping of paper files. People are beginning to ask some important questions:

This method represents a threat to military personnel in such a database ?

People against these methods ask authority - information may be used for other purposes?

I try to present technical solutions witch are used in the sense that they were designed.

Medical Database Professional Edition.

Medical Database is a smart medical office solution. It is interesting-to-use professional interface and more features will make your work as simple as it can be. This database requires enabled and will only work for a finite period of time before to Software function by you. In time of functioning, you will ensure your unique key together with the Software purchase receipt. If you do not fill out the functioning within the established period of time, the requirement will stop to work as special framework until activation is complete, which will restore this program functionality. However if you don't put in function the software you can always use the program functionality.

The medical database program is a smart and light-to-use of medical offices solution. This soft has a little part of the characteristics found in the Pro version. If all you want is primarily to use a electronic medical record way, will serve you very well. This edition does not require activation. Screenshots

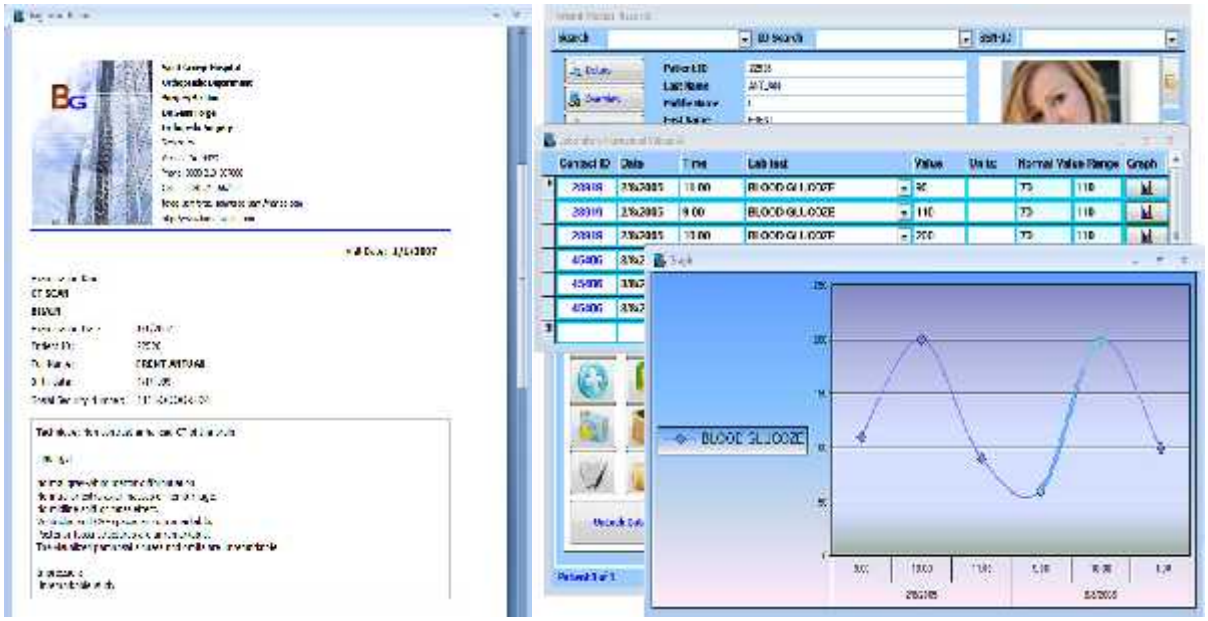
II. Database managed by Human Resources

The human resources database management

Strategy coordinating and human resources planning is an essential aspect of the efficient use of capacities through use of RESMIL web application in the Romanian Army.

A **web application** is an achievement with database information that are accessed over a network such as the Internet or an intranet.

This screenshots explain the time-management web application – format capture.



Ajax web application is used in US Army and include webmail, online retail sales, online auctions, wikis and many other functions or database information about proper personnel**.**

Use the database to identify fallen soldiers.

Home Track is a web-enabled ASP program designed for a Health Care Facility to track the use of any product or service by a patient at point of use/delivery. It is HIPAA compliant for both the Privacy and Security Rules. Being web based, this process is real time using cellular, wireless (802.11) or cabled Internet access[1]. With this connectivity, one can use any web-enabled device with Internet Explorer to capture these transactions, including PDA's, Tablet PC's, Barcode Scanners or Personal Computers. It includes a Clearinghouse that evaluates each transaction, reviews user-defined parameters to establish coverage requirements, captures the usage and processes the information for billing and reordering. Information captured within the solution includes:

- Patient receiving the product or service
- Item or service provided
- Date and time of receipt
- Nurse dispensing product

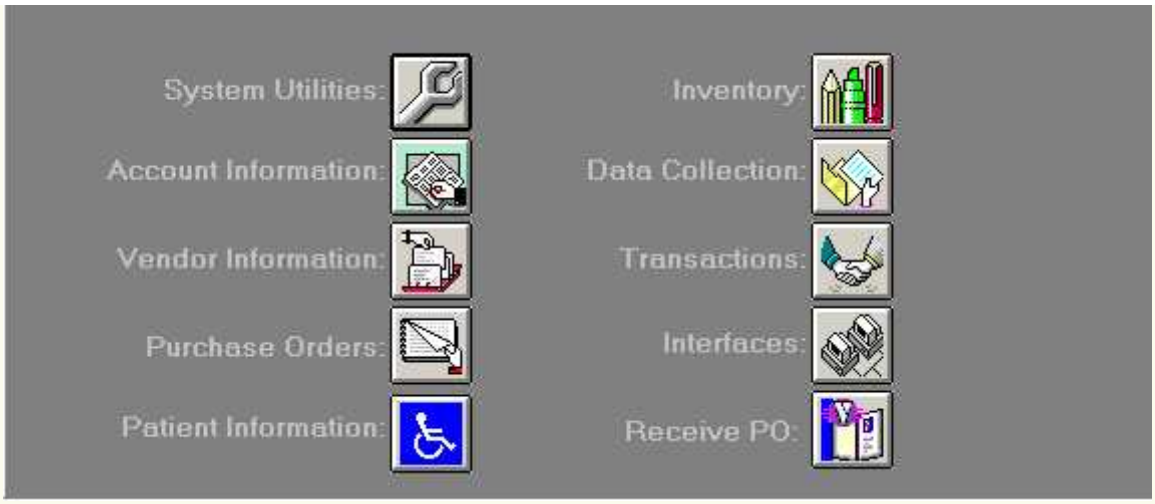
Integrated with the solution is the ability to scan barcodes to increase efficiency and accuracy. The program can be integrated with either an ASP Material Management solution or the Medical Barcode Systems Windows Barcode program to maintain inventory levels and manage reordering of products. Finally, product usage can be interfaced to the facility's Accounting System for billing or reconciliation.

The solution automates the Health Care Facility by capturing activity real time at point of service. It improves the Facility's efficiency by identifying the service provided to the patient, tracks any items used, generates billing information and reorders any used products. With the Clearinghouse, the company can set requirements to assure that any required information is obtained before the transaction is final.

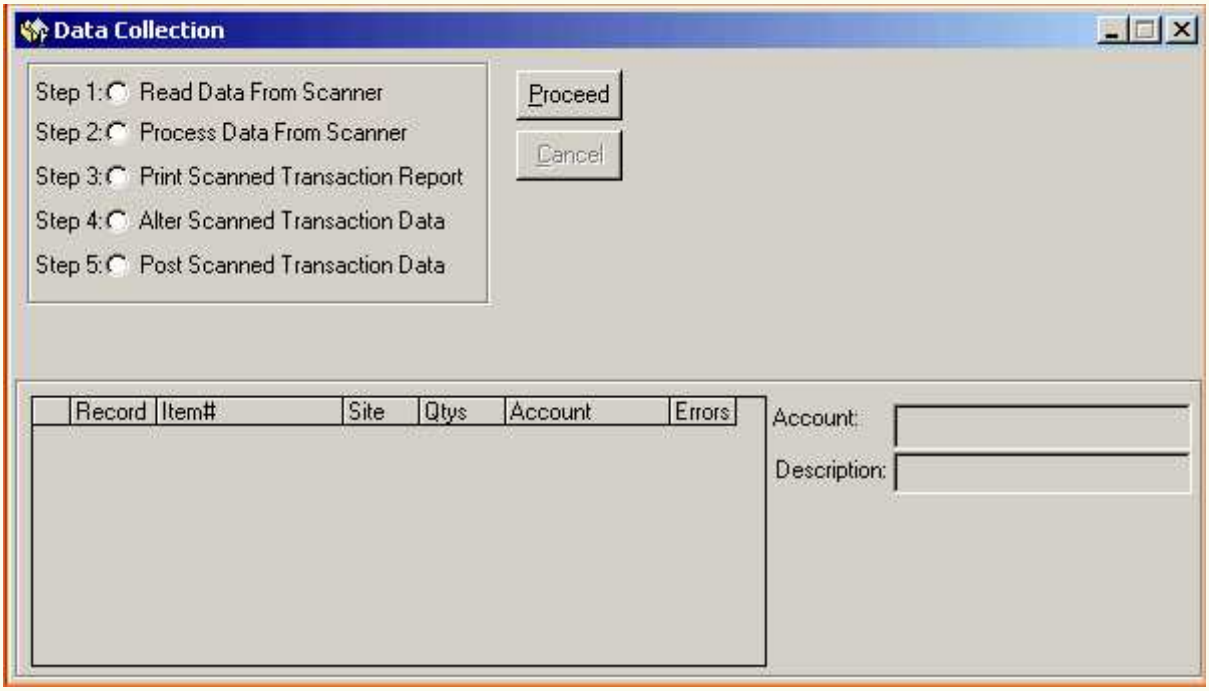
The optional Material Management solution is either a browser-based application which provides a secure and reliable platform for collaborative Just-In-Time (JIT) and Low-Unit-of-Measure (LUM) inventory management or the Windows-based Barcode program from Medical Barcode Systems.[2] These will automate a significant portion of your organization's procurement processes. The solutions help eliminate many manual, non-value-added activities that are part of traditional processes for managing supplies. The Material Management solutions are also available without Home Track for facilities needing only inventory control.

Features Include:
- Supports multi-Organization Entities
- Multiple facility locations
- Unlimited Inventory Locations
- Purchase Orders
- Receiving
- Department Usage
- Inventory Master
- Inventory Transactions
- Auto-replenishment
- Barcode Processing

Barcode Overview - Data Collection
Note : This Overview will give you a brief understanding of the Barcode program. To learn about each individual function, click on the appropriate icon.



Data Collection



Step 1 - Read Data From Scanner

Step 2 - Process Data From Scanner

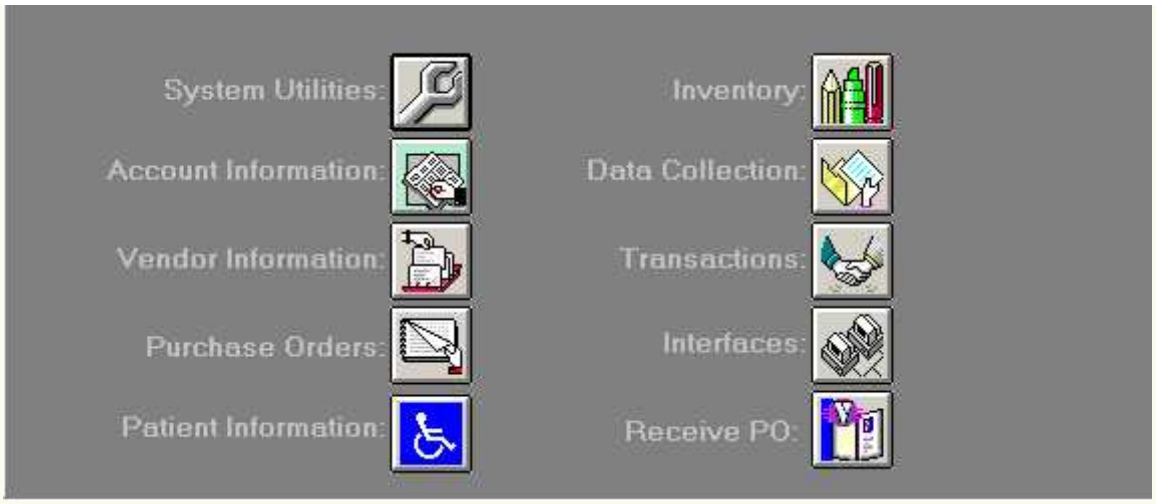
Step 3 - Print Scanned Transaction Report

Step 4 - Alter Scanned Transaction Data

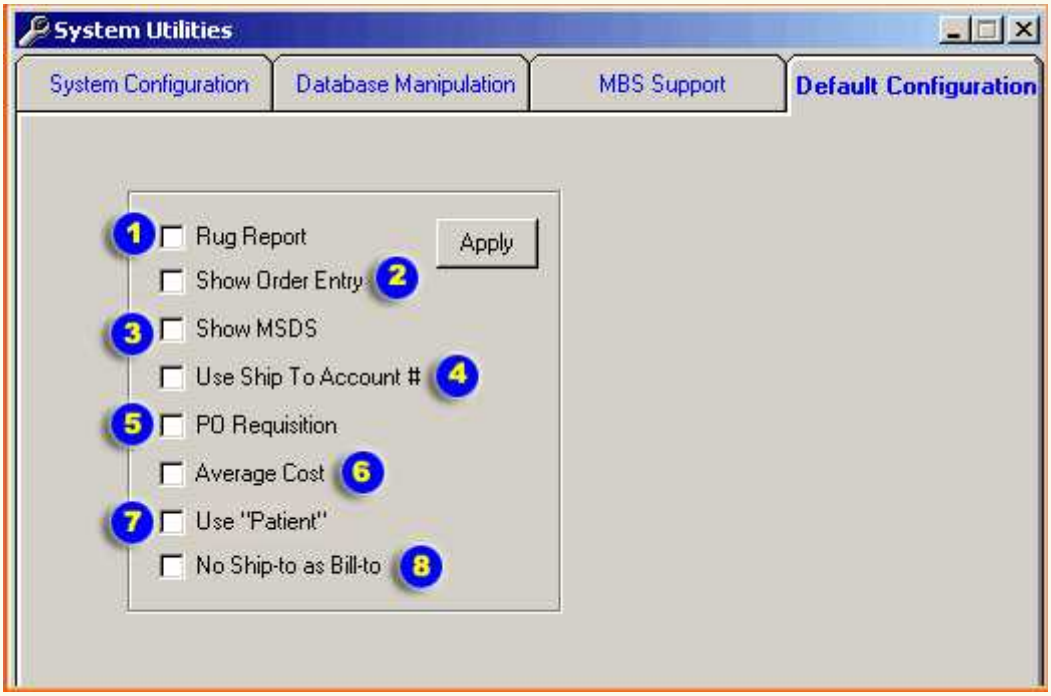
Step 5 - Post Scanned Transaction Data

Barcode Overview - System Utilities

Note : This Overview will give you a brief understanding of the Barcode program. To learn about each individual function, click on the appropriate icon.



System Utilities - Default Configuration



7. Use "Patient" - If you look at the start page on top of this page where the Account Information is located. By choosing Use "Patient" the Account Information would go away and the Patient Information would be populated. The Patient Information is the handicap image. There is not much difference between these two beside one is Patient and one is Account. Also the Patient Information would give you option on how to bill the patient and which insurance the patient have.

III. Barcode DNA encoding.

Introduction - Barcodes Types

The barcodes are the optical representations of data. Originally, barcodes explained data as parallel lines and the spacing's, referred to as linear or 1D (1 dimensional) barcodes or symbols. They also come in patterns of squares, dots, hexagons and other geometric patterns within images termed 2D (2 dimensional) matrix codes or symbols. Also 2D systems use symbologies other than bars, they are usually named to as barcodes as well. [1][2]

Barcodes could be read by optical scanners called barcode readers, or scanned from an image by special software. Barcodes were invented for supermarket with checkout systems, however in time could become universal. [3][4].

Barcodes Types

All barcodes start with a special in front character and finish with a special final character. The conventions help the barcode scanner to identify and read the symbol in the right position. Some barcodes may include a control character. A key control is calculated when the barcode is created using the characters in the barcode. The reader takes the same calculation in order to detect errors in the symbol. If the two checksums don't fit, the reader accepts that something is wrong, casts out the data, and attempts again.

1D Numeric and Alphanumeric Barcodes

A Barcode Symbols is the technical details of a particular type of barcode: the width of the bars, character set, method of encoding, checksum specifications, etc. Barcode users are usually interested in the general capabilities of a particular symbols (how much and what kind of data can it hold, what are its common uses, etc) and not in the technical details.

2D Barcodes

Two dimensional – 2D symbols encode data in two dimensional shapes. They fall contents two general categories:

Overlapped barcodes, constructed like a layer of barcodes stacked on top of the other; they could be read by special 2D scanners or by many CCD (charge-coupled device) and scanners with the help of conventional decoding software.

Casts Codes, built on a true 2D chart; they are normally more intact than a overlapped barcode, and they could be read only by 2-D scanners.

The big advantage of 2D barcodes is the capacity to encode more information in a little space. If 1D barcodes can encode 20 to 25 characters, 2D symbols could encode from a few to over 2,000 characters.

DNA Barcode

DeoxyriboNucleic Acid Two Dimensional Barcode

Any genetic information (species, hair color, number of limbs etc) is encoded as DNA (Deoxyribonucleic acid). DNA is represented through symbols – nitrogenous bases or nucleotides. All these symbols form the genetic alphabet: A, T, G, C. Three associated symbols form code words: the codons. The sequence of several code words describes logical sentences: proteins (peptides and polypeptides). These sentences are combined to convey a message – a trait. DNA therefore contains all information in a living organism.

RNA (Ribonucleic Acid) is very similar to DNA. DNA's nitrogenous base timine(T) is replaced with uracil (U).

DNA Barcode

DNA information means nowadays obtained through sequencing process. That determines DNA from a tissue sample (blood, hair etc). The result of a sequencing operation is a given in text format, and in graphical form, but DNA sequences is mainly stored as text files, for portability. A DNA Sequencer can read more than 2 million nucleotides in 24 hours. Although there can be read fragments of up to 1.000 nucleotides, modern sequencers are able to operate with several sequences simultaneously, which significantly raises their capacity and productivity.

CO1 gene is based on the barcode assigned.[5][6] The initiative of Paul Herbert was contested by various religious groups. However, the idea of representing DNA with barcodes was born and nowadays it finds justification in the latter 2D barcode representation. Being able to introduce and keep in safety more information in a little space, 2D barcodes are a great solution in bringing the hundreds/thousands DNA symbols closer to their users. It will be enough to read a 5 cm square shape from a piece of paper to have DNA data otherwise occupying half of page or registered in a Database among other million records. These shapes instead, could be placed on medical files, laboratory recipients, taking little space a giving large info in the shortest time.

Barcode Encoding Scheme

This section explains a solution for DNA encoding/decoding as two dimensional barcode - 2D matrix. The DNA string will be translated into 3 bit code words (CW), according to proprietary symbols. The result code will then be added a checksum for error detection. Correction CWs could be further added, making possible to recover lost DNA data. Data can be lost in the printing process or by physical damaging of the printed code (scratching, staining etc.), that makes the code symbols not fully readable. Further on, the 3bits CWs will be split into rows, matrix positioning patterns will be added and the resulting matrix will be converted into one binary string. This string is printable as 2D barcode with individual drawing of each bar using a graphical interface, or with custom fonts using a text editor.

The decoding process is the reverse of the one described above: a graphical symbol could be translated into binary string based on bars and spaces, and the process continues, the string developing into a DNA sequence.

The following point will refer only to the encoding process, since decoding means applying the algorithm in reverse.

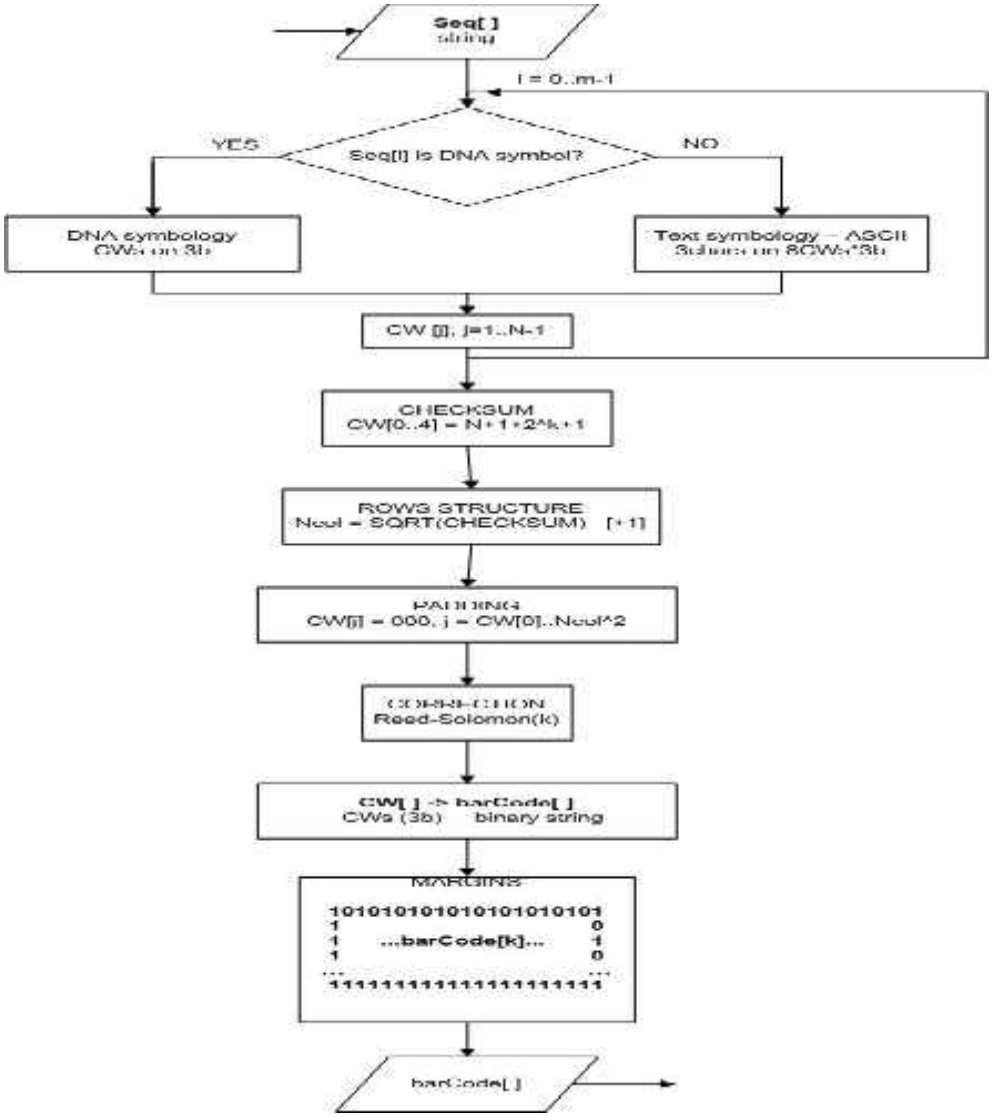


Fig. 2 DNA to 2D barcode logical chart flow

Input and Output

The algorithm will have as input a DNA string. The main purpose is to translate this sequence into a string printable as bar code symbols.

A DNA string means basically a string of only four possible symbols (A, C, G, T/U). But in practice, DNA sequence rarely comes alone, but having some explaining data(metadata) about sequence origin, method used to identify it.

The output of the algorithm is a binary string with NxN elements, N being the dimension of the 2D barcode matrix. Using a graphical interface, the binary string could be transformed into a printable image. Each 1 value in the string will become a dot/square, while 0s will remain blank spaces. The resulting image will be squared form, with a continuous border on the left and down sides of the square and with dotted borders on the right and upper sides. The two continuous lines could be used in matrix positioning when reading the symbol.

CONCLUSION

I wish to present the advantages for using 2D barcode in order to do DNA code embedded in our symbols.

Improve Operational Efficiency

Barcodes can respond more quickly to inquiries changes and could be tracked precisely.

Save Time

Depending on the application, time for savings can be significant. Instead of reading a code from a patient chart, type it in the computer and search it through the database, one simple symbol scan will take 2 seconds.

Reduce Errors

Clerical errors could be a dramatic impact: wrong diagnostics, unhappy and untreated patients. Accuracy is vital in genetic diagnosis or blood bank applications.

Save Space

2D codes have the capacity to introduce and keep in safety more information in a little space added to all the above advantages.

Cut Costs

Barcodes represent effective tools that can save time and reduce errors, therefore resulting in a reduction of costs.

REFERENCES

References Database human resources:

[1] James Duncan Davidson, Danny Coward (1999-12-17). - pp. 43–46. http://java.sun.com/products/servlet/download.html. Retrieved 2008-07-27.

[2]-Multiple"Webapplicationframework".Docforge. http://docforge.com/wiki/Web_application_framework. Retrieved 2010-03-06.

References DNA encoding:

[1] Data Matrix 2D barcode standard ISO/IEC 16022:2006

[2] http://grandzebu.net/index.php?page=/informatique/codbar-en/pdf417

[3] http://makebarcode.com/info/info.html

[4] http://en.wikipedia.org/wiki/Barcode

[5] QR 2D barcode standard ISO/IEC 18004:2006

[6] http://www.asciitable.com

INFORMATION TECHNOLOGY AND DECISION-MAKING FOR C4ISR

LTC. Daniel-Dumitru BLIDEA

INTRODUCTION

The rate of change in the business world will inevitably get very fast. To survive in this environment, we and our organization must learn to be flexible and responsive to your customers' needs. Knowing about computers and using them appropriately is no longer an option. We'll be dead if we don't.

All organizations must manage information, just as all businesses must make a profit, but for a chief executive to tell us to improve our information management, like telling us to improve profits, is no help at all. What we need is more specific direction on the route to those overall goals.

However well we manage information, without profits our business will fail. But without information decisions are impossible, and profitability depends upon good decision-making throughout the organization. Decision-making is central to every manager's role. Decisions are impossible without information and managers are constantly seeking more and better information to support their decision-making, hence the growth of information system – a term which today is often taken to mean networks of computers, but strictly speaking should also include non-computerized channels of communication such as regular meeting, the in- and out - trays full of memos and reports, and of course the phone. To survive, every organization collect information, communicate it internally and process it so that managers can make decisions quickly and effectively in pursuit of organizational objectives in a changing, competitive environment. The information system is the nervous system which allows an organization to respond to opportunities and avoid threats; to be effective it must reach into the furthest extremities of the organization.

I. INFORMATION TECHNOLOGY AND MANAGEMENT

Computers and electronic communications networks are destined to play an ever bigger role in the handling of information, for three reasons:

- Processing: computers are more accurate, and cheaper than people.
- Communication: electronic messaging is faster, and cheaper than paper.

- Storage: electronic files are more accessible, and cheaper than paper.

I.1. Management information systems

In this introductory chapter we have taken a tour through many areas where information is used in organizations. Computers are common place at work now, but still only a small proportion of a manager's total information needs are supplied by computers. However, you must know from your own experience that personal computers are so cheap that department managers can buy them out of petty cash almost, and as a result they pop up like mushrooms wherever there is a need to store or process information. A couple of your more reliable staff have been going on for some time about how the records should be held on computer and so you decide to give them their chance. For you to automate on an ad hoc depart mental basis like this is fine up to a point, because it is an efficient way of solving local problems. However, separate managers solving their individual problems like this create 'islands of information', which do nothing for the flow of information and co-operation between departments.

What should happen in theory is that someone should take a look at the information requirements of organization as a whole and then develop an efficient system to meet those requirements. If this is to happen it is often necessary to hire computer consultants who have experience of developing such systems. This so-called top-down planning is not entirely incompatible with the bottom-up implementation that is so common. However if implementation is allowed to proceed too far before a plan is place, the existing heavy investment in incompatible subsystems will pre-empt its execution.

Technology and politics are changing the business world. We as manager need to be aware of these changes. We need to be aware of what is going on and equip you with the new skills required by organizations for survival in a rapidly changing environment.

Flexibility and responsiveness are paramount, and these abilities course depend on information — the way it is collected, processed and acted upon.

The way in which organizations handle information is important because it affects just about everything they do. For instance, bureaucratic organizations are formal, slow and ponderous in the way they handle information, whereas new, small organizations with everyone working in the same room perhaps, tend to be less formal, fast and flexible.

Specialists who study the way organizations handle information used to be called O&M analysts and they spent most of their time designing pro-forma forms, reports and other paperwork. Their modern equivalents are known as systems analysts and designers. They also spend most of their time thinking about how best to handle information, but that now often means getting rid of paperwork.

I.2. Information type and channels

Is information a corporate resource, in some ways similar to other resources such as capital equipment, raw materials, or finance? The courts seem to think so for certain types of information, such as product designs, best-sellers and computer programs, which they refer to as 'intellectual property'. This kind of information has required effort and expense to produce and it has value because copies of it can be sold. The courts recognize the rights of ownership of this kind of property and are prepared to protect it.

But information is different from finance or capital equipment, because a particular machine can only manifest itself once, and copies are almost as difficult to make as the original, whereas a software program or a novel can be reproduced easily, millions of times if necessary. In fact the marginal cost of providing one extra copy of an information product to a customer across the Internet is actually close to zero.

We can categorize information according to its market value. Broadly, there are three types of information:

a) Information for sale, such as software which can be used, or news which informs, or a video or novel which entertains.
b) Information given freely, such as train and passenger jet timetables which has been made available by the owners, because it is in their interests to do so.
c) Information for internal use by organizations, which is never intended to be sold, and is only of legitimate value to the user, such as production schedules, sales forecasts, budgets and minutes of meetings.

All organizations use these types of information. Organizations cannot function for long without it. It is their life blood, essential for decision-making and control. It allows them to anticipate changes in an increasingly changeable business environment and to respond effectively to their clients and customers. Information on actual performance must be compared with planned performance and, in the event of a difference, appropriate action must be decided upon. Also, to maintain efficiency, information on outputs must be compared with information on inputs, so that appropriate action can be taken to the ratio.

We do know that its value depends upon factors such the following:

- relevance
- completeness
- accuracy
- clarity
- timeliness

— because these factors affect its usefulness in decision-making, and have a direct bearing on

the organization's ability to respond to market needs. Today the consumer is king That is truer now than it has ever been before.

Information can be communicated in many ways. Here are a few examples:

- Telephone — for quick, informal one-to-one communications.
- Meetings — for more formal discussions.
- Written material — for less immediate, more permanent messages, e.g. memos, reports, house journals.
- Computer networks — for e-mail
- Computer disks — for transferring data, also for training material.
- Videos — for training.
- Audio tapes — for training, also for note taking.

I.3 Information to aid decision-making

Managers make their decisions in support of the objectives of their organization. But the types of decision taken — and the information needs — are different at different levels in the organization. According to R. N. Anthony of Harvard:

- Senior managers must carry out the strategic planning. They must develop overall goals and methods of achieving them.
- Middle managers have the job of management control. They must ensure these overall goals are achieved effectively and efficiently.
- Junior managers are responsible for task or operational control.

They must ensure specific tasks are carried out effectively and efficiently.

Quality, flexibility and responsiveness are the strategic issues of today. Organizations that don't understand this new discipline are declining and will eventually disappear, as other more flexible organization take over their role by offering better perceived value. It has already happened too much of the UK manufacturing industry as a result increased competition from Japan and other countries during 1970s and 1980s. Japan in particular understands the vital importance of quality and flexibility, and they are now moving into our ser sectors too. For instance, in the London financial markets, Japanese banks already own more banking assets in the City than do UK banks.

To succeed in the new era of global competition, organizations need relevant, timely and accurate information on:

- Market research, to be responsive.
- Quality control, to produce high quality.
- Progress, to deliver on time.

• Budgets and costs, to offer good value.

• Design, to offer variety.

• Sales, to match demand.

An information system is needed to co-ordinate and control the flow of information in an organization, like the nervous system animal. Paperwork systems used to be satisfactory, but like the dinosaurs are becoming extinct because they are too cumbersome to survive in today's world markets. For organizations of any size, a computer network is now virtually essential.

Also, the shape of the information system must reflect the chains of command and channels of communication shown on the organization chart.

I.4. Computers, programs and communications

Computers are business machines: they are as relevant to business advantage today as the telephone and typewriter when they were first used in the era of the carrier pigeon. There is a difference thought. The computer is more complex than the phone or typewriter, and it is not so immediately obvious how to use it for business advantage.

Does it matter that some managers don't know much about how their business machines work? You don't need to know what goes on under the bonnet when you drive your car to the supermarket or pick up the kids from school. But professional users should know more about their machines than casual users. You can be sure that Damon Hill knows a lot about engines, gearboxes, differentials and brake systems. Extensive knowledge can be crucial, especially in today's competitive business environment.

Computers are changing our jobs as managers:

• We can use them to reach out through networks to find the information we need, and to communicate more freely with customers, colleagues and suppliers.

• We can make better decisions by modeling and forecasting, and we can understand situations better through 'what-if' analysis.

• We can store virtually unlimited numbers of files — and find any one of them in seconds.

Professional users need to know more than just how to drive their machines: when the going gets tough, those that do will come through in better shape.

II. COMMAND AND CONTROL

The design of general support systems for military activities would greatly facilitate co-ordination and co-operation between different positions throughout the organization, increase flexibility in solving unknown tasks, and provide more cost-effective solutions. Command and

Control (C2), as well as other types of business and military management, show generic features that should be emphasized when developing such general systems. DISCCO (Decision Support for Command and Control) is an integrated set of tools to support this work. It includes Command Support that facilitates the manual work in describing the situation and formulating solutions to accomplish tasks. It also includes Decision Support that, based on AI and simulation technology, enhances the human capability by automatic and semi-automatic generation and evaluation of solutions. Outsourcing the situation awareness, a Common Situation Model enables the integration of these support tools but also the collaboration between individuals. The set of tools is generic, since it could be adapted to different situations, and hence support work at different positions in military, as well as civilian, defense organizations.

II.1 Decision Support for Command and Control

Flexibility is the keyword when preparing for the uncertain future tasks for the civilian and military defense. Support tools relying on general principles will greatly facilitate flexible co-ordination and co-operation between different civilian and military organizations, and also between different command levels. Further motivations for general solutions include reduced costs for technical development and training, as well as faster and better decision- making. Most technical systems that support military activities are however designed with specific work tasks in mind, and are consequently rather inflexible. There are, admittedly, large differences between for instance fire fighting, disaster relief, calculating missile trajectories, and navigating large battle-ships. Still, there is much in common in the work of managing these various tasks. We use the term C2 (Command and Control) to capture these common features in management of civilian and military, rescue and defence operations.

DISCCO (Decision Support for Command and Control) is a set of network-based services including Command Support Tools helping commanders in the human, cooperative and continuous process of evolving, evaluating, and executing solutions to their tasks. The command tools provide the means to formulate and visualize tasks, plans and assessments, but also the means to formulate and visualize changes of the dynamic organization, regarding roles, mandates, and obligations. Also included in DISCCO are Decision Support Tools that, based on AI and simulation techniques, improve the human process by integrating automatic and semi-automatic generation and evaluation of plans. The tools provided by DISCCO interact with a Common Situation Model capturing the recursive structure of the situation, including the dynamic organization and the goals of own, allied, neutral, and hostile resources. Hence, DISCCO will provide a more comprehensive situation description than has previously been possible to achieve.

The iterative and dynamic decision-making process supported by DISCCO is constituted by a successive development of the tasks, specifying what to accomplish, but also the solutions, specifying how to accomplish it. The potential plans are assessed by predicting the future consequences given that they are executed, and comparing these consequences to the goals of the task. Since this process disregards the actual details of the tasks, it will be useful through all phases of the operation, through all command levels, and through all the different organizations and activities that are involved. Taking this general approach, DISCCO may be used both for civilian and military purposes.

II.2 A definition for C2

To exercise authority and direction effectively in combat and other military operations, commanders must have situational awareness. Use of information technology to make a commander's situational awareness better also creates the potential to improve the effectiveness with which the commander directs and controls his forces.

Extending the definition given in [Wallenius, 2002], we propose the following definition of C2, from this point of view:

C2 is the act of fulfilling a task assigned to an organization, in terms of designing, evaluating, approving, and executing, a solution on a lower level of abstraction. Hence, a solution is constituted by its subtasks, and by a subordinated organization of available resources, to fulfil these subtasks.

According to this definition, the design of organization is a substantial part of solving the task. Hence it emphasizes that the future military organization will be dynamic and flexible. Depending on the situation and current tasks, new units will be assembled to meet the requirements. Also, novel chain-of-command structures may arise, allowing for different, multiple, or virtual, organizations. [Borchert and Jones,1999], e.g., investigate such multiple organization trees that change over the different phases of the mission.

Also emphasized in the definition, is that C2 is an art of decision-making. There are different descriptive and prescriptive models representing how decision-making should be performed, and is performed in practice [Klein, 1989] [Schmitt and Klein, 1999] [Thunholm, 2003] [NATO, 1998] [Montgomery, 1992]. The suggested generic decision-making process in Figure 1 aims at representing these different models from a conceptual perspective.

From this point of view, decision-making always involves defining the goals of a task as well as developing one or several solutions to this task. The development of solutions includes iteration between, on the one hand, suggesting improved solutions, and on the other hand, assessing these solutions. The assessment is performed by predicting the outcome,

and by comparing this assumed outcome to the goals. The actual decisions are made when the task, or one of the solutions, is either approved or disapproved.

II.3 Levels of Situation Awareness

Fundamental for the design of tools to support interaction between commanders must be the structure of the information that is to be shared by this interaction. We argue that this interaction essentially deals with describing the situation, including the recognition of different problems, and the possibilities and decisions to deal with these problems.

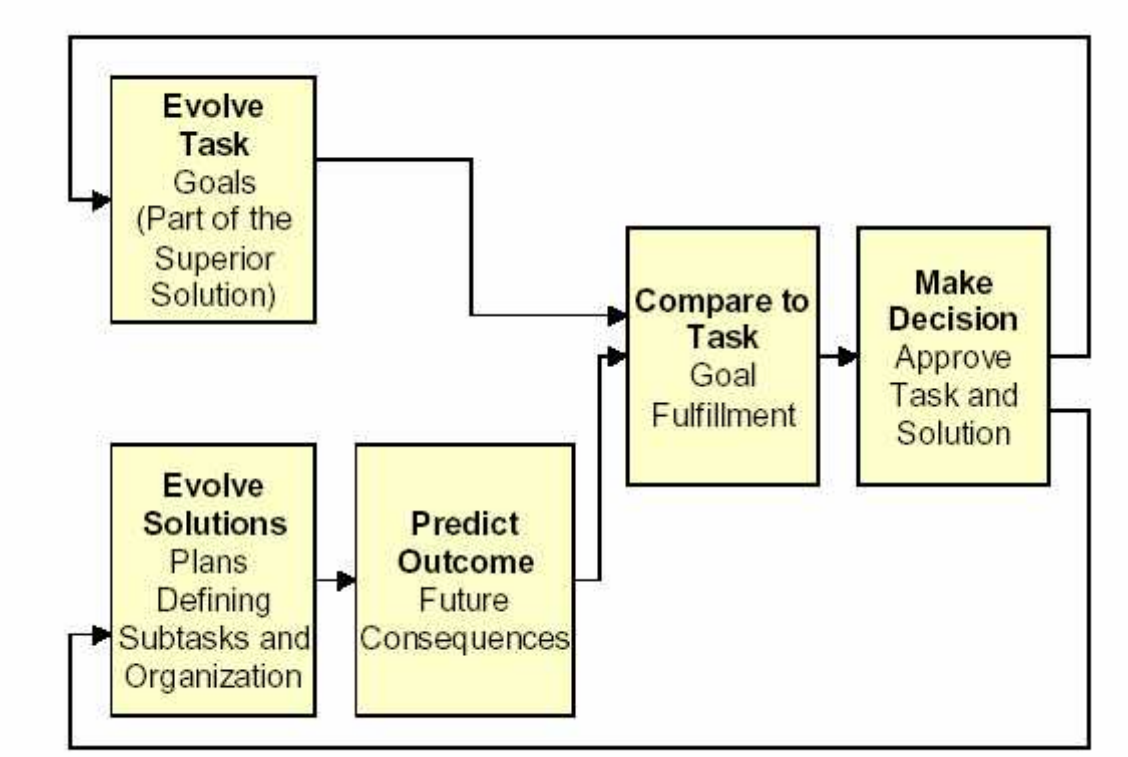


Figure 1 The generic decision-making process

As proposed by [Endsley, 1995], there are different levels of *Situation Awareness: Level 1,* representing the perception of the elements in the environment within a volume of time and space, *Level 2,* representing the comprehension of their meaning, and finally, *Level 3,* representing the projection of their status in the near future. To support the sharing of awareness, we thus need the means to describe separate elements. Belonging to the enemy, these elements represent threats or problems. Belonging to the own forces, they instead represent either values that need to be protected from the threats, or the possibilities to deal with them. We also must be able to express the capabilities of the different objects, their potential actions, and the assessed impact of these actions. The awareness of these aspects is

based on known facts, but also, in lack of facts, it relies on beliefs and assessments.

II.4 Decision support

Decision Support provides clever tools to enhance the human cognitive capability to make decisions. It would thus be of great interest to design these tools with a human decision-making process, such as the generic process depicted in Figure 1, as a baseline. Providing automated tools that support each of the different stages in the process, according to Figure 2, will hence keep the work performed by computers open for interaction. Also, as the different stages could be automated to various extent, the cognitive work could be delegated to the computer for matters when the commanders feel trust in doing so, and when admitted by the current stage of technical development.

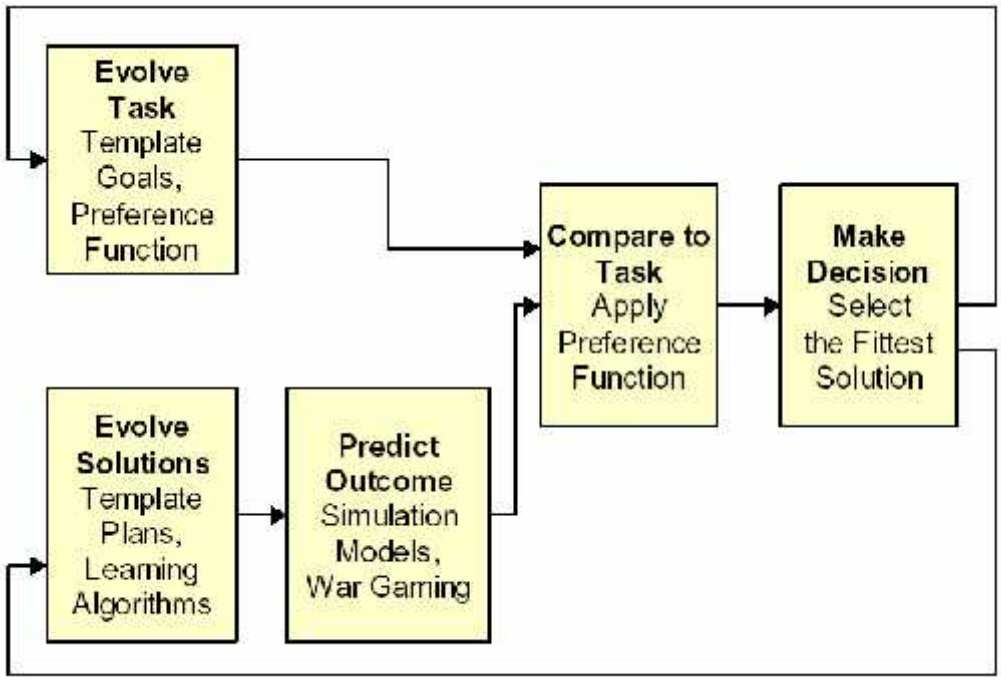


Figure 2. Automated tools supporting the generic decision-making process

II.5 Management levels

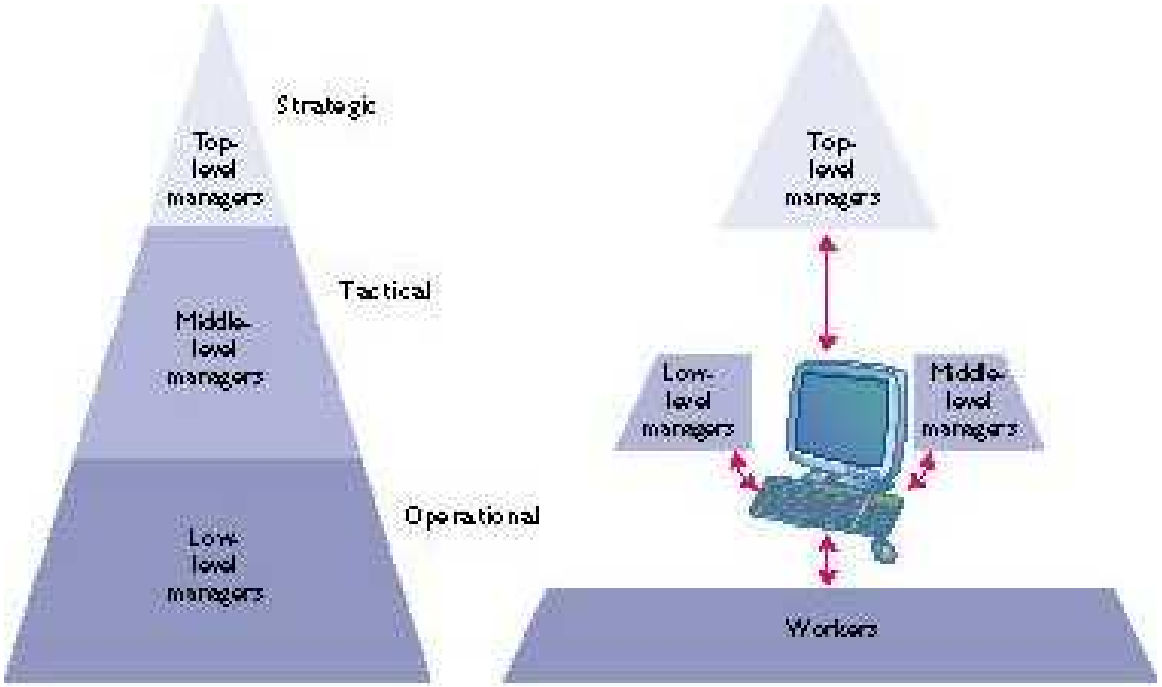


Figure 3 Management levels

III NETWORK-CENTRIC WARFARE

III.1 Net-Centric Warfare

The Network Centric vision is to enhance operational capabilities by using the power of modern information technology to provide each warfighter with a more comprehensive, timely, and mission-focused view of the battlespace so that better decisions can be made faster, maintaining unity of command through distributed collaboration and self-synchronization. This vision builds upon the success achieved in both the military and commercial worlds in leveraging the Internet and related technologies to achieve greater efficiency and effectiveness across large and complex enterprises. Extension of these successes to the battlespace enterprise is a natural progression.

- Network centric operations are military operations that exploit information and networking technology to integrate widely dispersed human decision makers, situational and targeting sensors, and forces and weapons into a highly adaptive, comprehensive system to achieve unprecedented mission effectiveness.
- Operational Benefits
  - Increased Speed of Command
    - Operate Inside the Enemy's "OODA Loop"
    - Achieve Capability for Sustained High OPTEMPO
  - Distributed Self-Synchronization

- Unity of Command Without the Burden of Centralized Control
- Ability to Take Individual Initiative Within a Force-Wide Decision Context
- Flexibility and Adaptability to the Operational Situation

– Decision Superiority
  - Effective Use of All Available Information
  - Effective and Efficient Use of Force Assets and Capabilities

In NCW, the Network is the *center of gravity:* the focus on which all elements of combat power depend.

We are building an information –centric force and networks are increasingly the operational center of gravity.

However, our networks are vulnerable now and barring significant attention, will become increasingly vulnerable. So we must have an IA strategy that is dynamic, able to keep pace with our evolving net-centric environmen.

We need a strategy that enables us to develop and field:

The tools that PROTECT our center of gravity.

The operation construct that enables us to DEFEND that center of gravity along with the ABILITY to see or have SITUATIONAL AWARENESS of that center of gravity The PROCESSES that sustain the viability of that center of gravity. And most important the EMPOWERED IA WORKFORCE upon whom that center of gravity is totally reliant.

The information systems include everything from tactical radios to pay systems to satellite communications to intelligence collection systems. We have a huge customer base and require to partner with just about everyone else.

III.2 Future Warfare: Further Challenges

NCO is more than a better, faster, more coordinated way of putting ordnance on target

It must encompass the entire spectrum from peace to war

It must enable human beings to make appropriate decisions

It must enable decision making at all levels in the hierarchy

New metrics of performance and effectiveness reflect transformed military operations

– POutcome is a critical new measure
– Human performance models, metrics and testing are integral to assessing overall systems' performance
  - Sailor / soldier performance is part of system performance

- If the warfighter can't do his job, it is a system failure

Humans resolve ambiguity, Humans decide – Machines calculate

III.3 Knowledge Warriors

- These Knowledge Warriors are active – even proactive – users of information provided in the form of multiple screens
- They "drive" the wall – they are not passive recipients of the information
  - They know what information they want, when and in what format
  - They know when to drill down for details, and when to stand back to see the big picture
  - They are good at making inferences – interpolating or extrapolating the information as appropriate
- For Network Centric Operations to work optimally, we shall need first class ***Knowledge Warriors,*** **supported by first class** ***Knowledge Managers***
- Knowledge Warriors are the Commanders and Decision Makers at whatever level they are operating. They are first and foremost warfighters who have a deep understanding of the whole situation from a broad systems perspective.
- Knowledge Managers are those who support and feed information to the Knowledge Warriors – they may be operators or specialists in Information Management or Knowledge Management

IV Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR)

IV.1 Information technology hopes for C4ISR

Rapid development of information technology and the expectation that C4I technology can dramatically increase force effectiveness have made this technology a critical element of future military modernization. Hardware technologies will continue to evolve at a rapid pace to produce significantly improved capabilities at ever- lower cost--an order-of-magnitude improvement in performance every 5 years for the same cost is likely to continue to be the norm for progress in computing capability (Moore's law), memory and storage capacities, and communications speed.

A key challenge to DOD and the services will continue to be to develop an appropriately responsive acquisition system that can procure, deploy, and exploit these commercial hardware and software capabilities for the military in a timely and cost-effective way.

Much of, although by no means all, the sensor technology essential to C4I systems is specifically developed by the military and for military applications. The pace of growth in capability is slower than for the base information technologies. Continued focused investment by DOD is expected to maintain a significant margin of leadership in critical sensor technologies.

IV. 2 Computers

The rate of progress predicted by Moore's law means that capabilities seen today in raw processing power of individual computers, as well as associated memory and storage capacities, are about 1% of what will be available at the same cost a decade hence. In addition, major progress will continue on other fronts with significant implications for military application. Decreases in physical size, power consumption, and cost will lead to expanded flexibility and scale of application at the systems level. Expanded and qualitatively more capable applications will become available. For example, more highly automated decision-support systems using intelligent agents will be able to search large databases, including images and other non-coded information, for specific information and features, process the results, and present tactical alternatives to a commander. Continued rapid progress will be made in technologies enabling easier human interaction with computers, including spoken input, high-resolution personal heads-up (e.g., helmet-mounted or windshield) displays, and distributed wearable systems.

IV. 3 Communications

The trend in information distribution and control systems is toward a communications medium that is completely transparent and robust to the military user. These systems will provide global coverage, consisting of highly automated digital networks utilizing both military and commercial transmission media. Current and future developments will enable multimedia service (voice, data, video) to all military users.

Key areas of progress in communications technology applicable to C4I will include advanced video and data compression techniques to transfer expanded information sets through limited-bandwidth channels; wireless wide area network/local area network packet-switched networks utilizing mobile base stations; wider-bandwidth optical communications networks for low-cost, robust terrestrial connectivity; advanced waveforms to maximize coding gain; advanced modulation approaches to increase bandwidth efficiency, given the pressures on military spectrum allocation; "software" radios that provide broadband digital processing; and multifunction, multiband phased array antenna technology that will find application in both communications systems and sensor development.

IV. 4 Sensors

The capability of active and passive multispectral high-resolution sensors in all physical domains (acoustic, thermal, electromagnetic, electro-optical, nuclear, biological, and chemical) is expected to progress at a pace somewhat slower than that of the base information technologies, but still at a rate that will yield impressive opportunities for application to all types of military systems. Continued miniaturization of these sensors and their associated processing units will make them deployable on a variety of platforms, including spacecraft, unmanned aerial vehicles and manned aircraft, land vehicles, ships, and personal battlefield systems. For example, radar technology advances are expected in solid-state transmit/receive modules for higher output power, greater direct current to radio frequency conversion efficiency, increased miniaturization, and wider frequency band operation. Multispectral imaging sensors will prove to be of significant military value in detecting manmade and natural objects.

Technologies for geospatial referencing (such as the Global Positioning System and enhancements to it) that enable the location of targets, events, and friendly forces will also be important. Such technologies confer the ability to register events and objects in the same coordinate system, and underlie the ability to generate a common operating picture.

Some of this capability, originally military in its focus, will become readily available at low cost in the commercial world; some will be specifically developed by the military for its unique requirements. Examples of widely available technologies that were once predominantly military include low-cost Global Positioning System devices and satellite imaging. Examples of military-unique sensor systems include the Airborne Warning and Control System, the Space-based Infrared System, and the Joint Surveillance Target Attack Radar System. DOD will be faced with determining and implementing the appropriate and timely application of this wide array of technologies.

IV. 5 Weapons

Future weapons systems will have integrated digital information subsystems (versus simply having digital communications) that are tightly integrated with the overall C4I system of systems. This capability will allow information available on individual platforms to be simultaneously shared and acted upon across the battlefield (and airspace). Targets acquired by sensors in ground systems and aircraft will be seen concurrently by multiple platforms and will be rapidly targeted by surface weapons, given pre-established rules. Over time, the value of remote, precision weapons will increase relative to that of other platforms (e.g., tanks,

airplanes) as long as the challenge of target identification is solved.

V ARCHITECTURE FOR C4ISR

V.1 DEFINITIONS OF THE ARCHITECTURE VIEWS

There are three major perspectives, i.e., views, that logically combine to describe an architecture.These three architecture views are the operational, systems, and technical views.

V.1.1 Operational Architecture View (OAV)

The operational architecture view is a **description of the tasks and activities, operational elements, and information flows required to accomplish or support a military operation**. It contains descriptions (often graphical) of the operational elements, assigned tasks and activities, and infor mation flows required to support the warfighter. It defines the types of information exchanged, the frequency of exchange, which tasks and activities are supported by the information exchanges, and the nature of information exchanges in detail sufficient to ascertain specific interoperability requirements.

V.1.2 Systems Architecture View(SAV)

The systems architecture view is a **description, including graphics, of systems and interconnections providing for, or supporting, warfighting functions.**

For a domain, the systems architecture view shows how multiple systems link and interoperate, and may describe the internal construction and operations of particular systems within the architecture. For the individual system, the systems architecture view includes the physical connection, location, and identification of key nodes (including materiel item nodes), circuits, networks, warfighting platforms, etc., and specifies system and component performance parameters (e.g., mean time between failure, maintainability, availability). The systems architecture view associates physical resources and their performance attributes to the operational view and its requirements per standards defined in the technical architecture.

V.1.3 Technical Architecture View(TAV)

The technical architecture view is **the minimal set of rules governing the arrangement, interaction, and interdependence of system parts or elements, whose purpose is to ensure that a conformant system satisfies a specified set of requirements.**

The technical architecture view provides the technical systems implementation guidelines upon which engineering specifications are based, common building blocks are established, and product lines are developed. The technical architecture view includes a collection of the

technical standards, conventions, rules and criteria organized into profile(s) that govern system services, interfaces, and relationships for particular systems architecture views and that relate to particular operational views.

V.2 REPRESENTATIVE ROLES OF THE OPERATIONAL, SYSTEMS, AND TECHNICAL ARCHITECTURE VIEWS

War fighter information capabilities must be able to "plug and play" in a Joint, global environment. To achieve this ability, there must be a mechanism for incorporating information technology consistently, controlling the configuration of technical components, and ensuring compliance with technical "building codes." Architectures provide this mechanism.

V.2.1 Operational Architecture View

The operational architecture view describes the tasks and activities of concern and the information exchanges required. These kinds of descriptions are useful for facilitating a number of actions and assessments across DoD such as examining business processes for reengineering or technology insertion, training personnel, examining doctrinal and policy implications, coordinating Joint and multinational relationships, and defining the operational requirements to be supported by physical resources and systems, e.g., communications throughput, specific node-to-node interoperability levels, information transaction time windows, and security protection needed. Operational architecture views are generally independent of organization or force structures. However, for some specific purposes, it may be necessary to document how business processes are performed under current structures in order to examine possible changes to those business processes under a different structure.

V.2.2 Systems Architecture View

The systems architecture view describes the systems of concern and the connections among those systems in context with the operational architecture view. The systems architecture view may be used for many purposes, including, for example, systems baselining, making investment decisions concerning cost-effective ways to satisfy operational requirements, and evaluating interoperability improvements.

A systems architecture view addresses specific technologies and "systems." These technologies can be existing, emerging, planned, or conceptual, depending on the purpose that the architecture effort is trying to facilitate (e.g., reflection of the "as-is" state, transition to a "to-be" state, or analysis of future investment strategies).

V.2.3 Technical Architecture View

The technical architecture view describes a profile of a minimal set of time-phased standards and rules governing the implementation, arrangement, interaction, and interdependence of system elements. The appropriate use of the technical architecture view is to promote efficiency and interoperability, and to ensure that developers can adequately plan for evolution.

V.3 LINKAGES AMONG THE ARCHITECTURE VIEWS

To be consistent and integrated, an architecture description must provide explicit linkages among its various views. Such linkages are also needed to provide a cohesive audit trail from integrated mission operational requirements and measures of effectiveness (MOEs) to the supporting systems and their characteristics, and to the specific technical criteria governing the acquisition/development of the supporting systems.

Figure 10 illustrates some of the linkages that serve to describe the interrelationships among the three architecture views. "Interoperability" is a typical architecture focus that demonstrates the criticality of developing these inter-view relationships.

V.4 High-Level Operational Concept Graphic

The High-level Operational Concept Graphic is the most general of the architecture-description products and the most flexible in format. Its main utility is as a facilitator of human communication, and it is intended for presentation to high-level decision makers. This kind of diagram can also be used as a means of orienting and focusing detailed discussions.

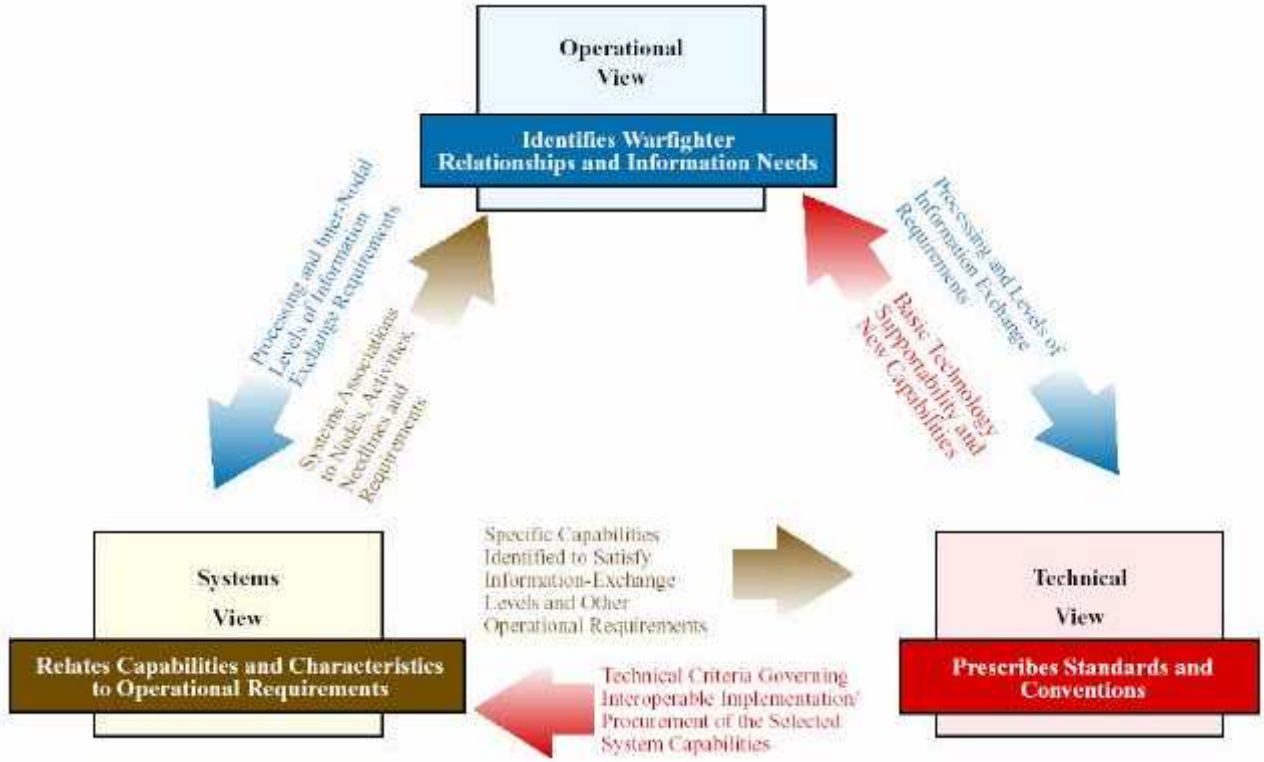


Figure 10

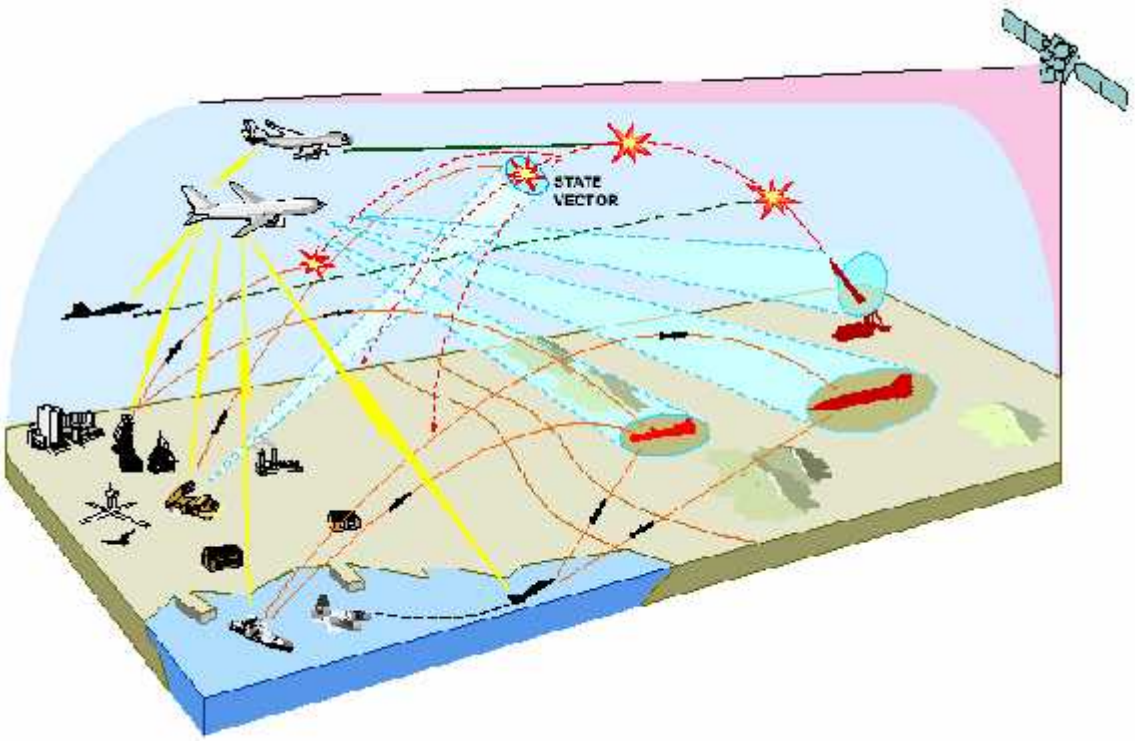


Figure 11

V.5 Systems Communications Description

The Systems Communications Description represents the specific communications systems pathways or networks and the details of their configurations through which the physical nodes and systems interface. This product focuses on the physical aspects of the information need lines represented in the Operational Node Connectivity Description and also depicts pertinent information about communications elements and services (e.g., the kind of processing performed onboard a satellite, the locations of network switches or routers, the existence of amplifiers or repeaters in a particular communications path, or the location of cable "bulkheads" on both shores of an ocean). The graphical presentation and/or supporting text should describe all pertinent communications attributes (e.g., waveform, bandwidth, radio frequency, packet or waveform encryption methods). Depending on the analytical focus of the architecture, Systems Communications Descriptions detail the interfaces described in the System Interface Description and can present either *internodal* or *intranodal* perspectives.

The *internodal perspective* details the communications paths and/or networks that interconnect systems nodes or specific systems (from one node to other nodes).

Figure 12 provides a template for the *internodal perspective* of the System Communications Description. Note that this figure translates the single-line representations of interfaces into a more detailed representation of the communications infrastructure that provides the connections.

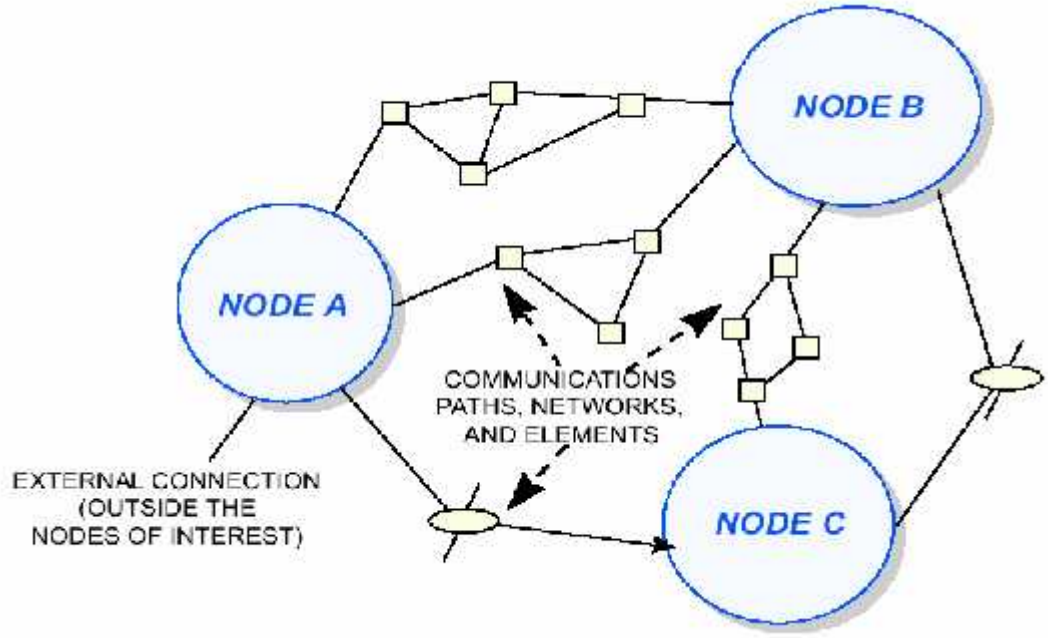


Figure 12 Systems Communications Description, Internodal Perspective

The *intranodal perspective* of the Systems Communications Description looks inside each of the represented nodes to illustrate the interfaces between specific systems.

Figure 13 provides a template for the *intranodal perspective* of the Systems Communications Description.

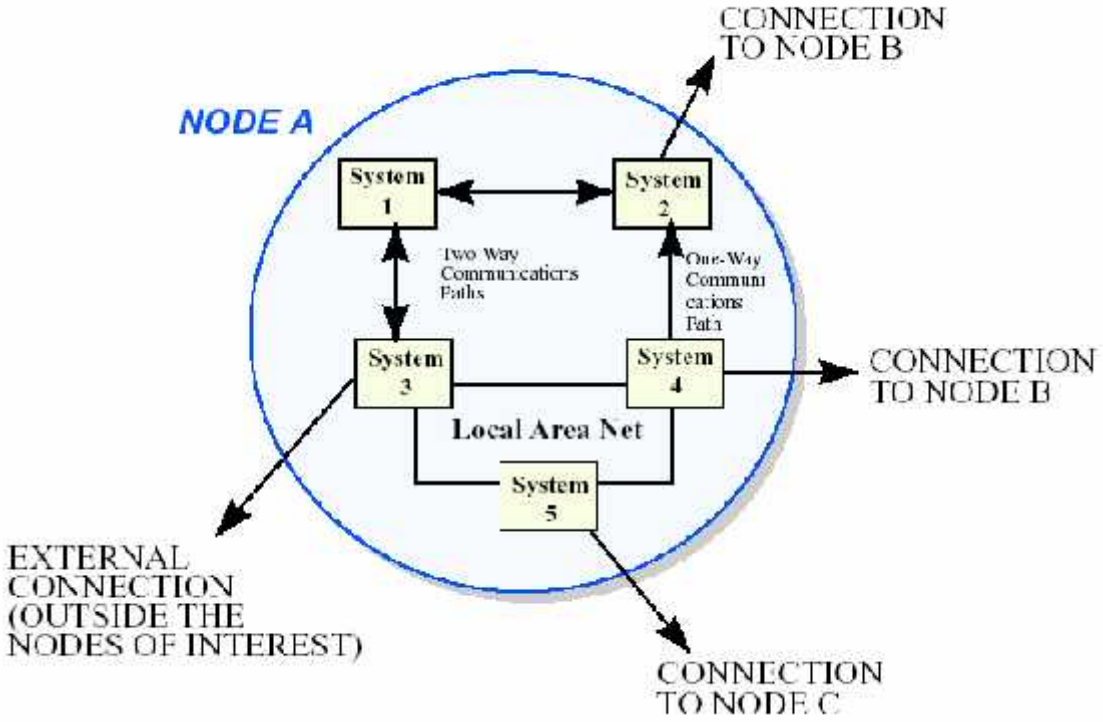


Figure 13 Systems Communications Description, Intranodal Perspective

Figure 14 provides a notional example of the *intranodal perspective.*

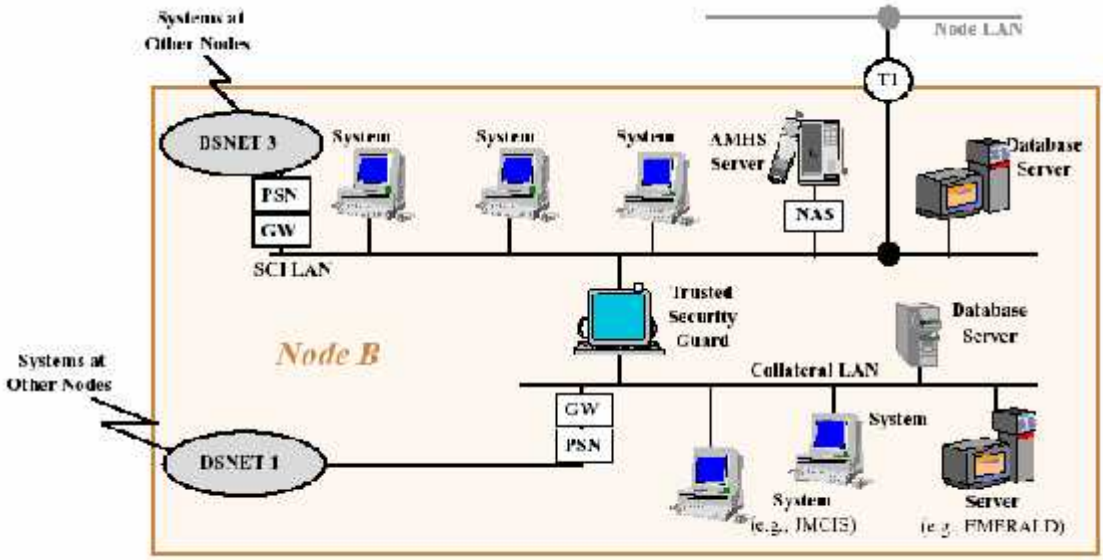


Figure 14 Systems Communications Description, Intranodal Perspective—LAN-Based Notional Example

CONCLUSIONS

We strongly believe that the development according to the roadmap will result in tools that will be useful already after the first stage by increasing the efficiency of a restricted class of users in their work to plan for missions. The framework thus provided will also admit a continuously increasing functionality. From the experiences reached in the first stage of development, the scope could be successively expanded to support an increasingly larger class of users. Hence, further decision levels, further military services than the army, but also civilian services such as rescue services and police, may be supported. The C4I work for these different users will be significantly enhanced in terms of better situation awareness and faster decision making. The most important benefit is however that the interaction between the users will be greatly facilitated by the support to share the mental awareness of the situation, and the awareness of the decisions made on how to deal with it. Consequently, generic support tools, such as provided by DISCCO, will play a significant role in taking full advantage of the network in the future defense.

REFERENCES

1. Alistair Borchert, Carl R. Jones. Organizational Fitness of a Proposed Network Centric Organization. In *1999 Command and Control Research and Technology Symposium,* United States Naval War College, Newport, RI, June 29-July 1, 1999.

2. David A. Wilson – *Managing information*, Second edition, Ed. Butterworth Heinemann, Oxford, 1998.

3. Mica R. Endsley. Toward a theory of situation awareness in dynamic systems. In *Human Factors,* 37(1), 32-64, 1995.

4. Gary Klein. Strategies of Decision Making. In *Military Review,* pp 56-64, May, 1989.

5. Henry Montgomery. Decision-Making (in Swedish). In L.-G. Lundh, H. Montgomery, and Y. Wærn, editors, *Cognitive Psychology,* chapter 6, pages 171.188. Studentlitteratur, 1992.

6. NATO *Strategic Commanders Guidelines for Operational Planning (GOP).* IMSTAM (OPS). 243. 98 SHAPE. NATO HQ, Military Committee, Brussels, 1998.

7. J. Schmitt, G. Klein. A Recognitional Planning Model. In *Proceedings of the 1999 Command and Control Research and Technology Symposium.* Newport, Rhode Island: Naval War College, 1999.

8. Klas Wallenius. A Generic Model of Management and Command and Control. In 7th International Command and Control Research and Technology Symposium, Loews Le Concorde Hotel, Quebec City, QC, Canada, September 16-20, 2002.

9. Architecture Working Group, *C4ISR Architecture Framework, V1.0, Lessons-Learned and Issues for Consideration.,* February 1997

10. C4ISR Integration Task Force, *C4ISR Architecture Framework,* Version 1.0., 7 June 1996

11. Data Model and Analysis Tools Panel / Architecture Working Group, 15 September 1997, *C4ISR Core Architecture Data Model*, Version 1.0

CONCEPT OF COMPUTER NETWORKS

CDR Sebastian Gabriel POPESCU

INTRODUCTION. WHAT IS A NETWORK?

The generic term "**network**" refers to a group of entities (objects, people, etc.) which are connected to one another. A network, therefore, allows material or immaterial elements to be circulated among all of these entities, based on well-defined rules.

- **network**: A group of computers and peripheral devices connected to each other. Note that the smallest possible network is two computers connected together.
- **networking**: Implementing tools and tasks for linking computers so that they can share resources over the network.

Depending on what kind of entity is involved, the term used will differ:

- **transportation network**: A combination of infrastructure and vehicles used for transporting people and goods between different geographic areas.
- **telephone network**: Infrastructure for transporting voice signals from one telephone station to another.
- **neural network**: A group of brain cells connected to each other
- **criminal network**: A group of con artists in cahoots (wherever there's one con artist, there's usually another!)
- **computer network**: A group of computers linked to each other with physical lines, exchanging information as digital data (binary values, i.e. values encoded as a signal which may represent either 0 or 1)

We focus on computer networks and there isn't just one kind of network, as there have historically been different kinds of computers, which communicate using various different languages. The need for multiple types of networks also arises from the heterogeneity of the physical transmission media that link them together, whether that means the data is transferred the same way (such as by electrical pulses, light beams, or electromagnetic waves) or uses the same kind of physical medium (such as coaxial cable, twisted pairs, or fiber-optic lines).

HISTORY OF COMPUTERS NETWORK

A network is a communication system that allows users to access resources on other computers and exchange messages with one another. It allows users to share resources on their own system or access shared resources on other systems. Obviously, it is the topic of this entire book, so this section will guide you to the appropriate sections that discuss networking technology.

In the late 1960s and early 1970s, a community of researchers started developing the concept of connecting computers together and using packets and packet switches to exchange information. They were creating the early Internet by connecting large mainframes and minicomputers.

In the late 1970s, microcomputer systems began to appear. They soon dominated small offices and workgroups everywhere. It made sense to connect them together so users could communicate with one another and share network resources like printers and disks. The LAN (Local Area Network) concept took hold in corporations.

Actually, the LAN concept was developed by Robert Metcalfe, who was working with the Internet engineers. He developed the idea after running across a paper describing a satellite communication system called ALOHA at a friend's house. Metcalfe applied the concept to a cabled system and called it Ethernet. Internet engineers loved UNIX and soon connected their systems with Ethernet. In turn, these networks were connected to the Internet via routers.

Meanwhile, LANs (primarily PC and Macintosh LANs) were being installed everywhere. While Ethernet is the dominant LAN technology today, ARCNET had its day and IBM made token ring popular, although it didn't catch on like Ethernet. In the mid-1980s, most LANs were still confined to workgroups and departments. Some organizations connected these LANs to their mainframes and allowed users to exchange e-mail using mainframe e-mail systems. But soon it just made sense to interconnect the entire organization. For a while, this was attempted by joining LANs with bridges, but bridged networks have scalability and security problems.

Fortunately, the Internet engineers had already developed an internetworking device called the router. Routers were developed as gateways devices for the Internet. They interconnect different types of networks while providing a secure barrier between them. This is critical on the Internet, where interconnected networks are autonomous systems operated by different authorities.

The TCP/IP protocol suite provides the internetwork addressing scheme and transport scheme for router-connected networks. IP provides the "overlay" addressing scheme and internetwork routing.

Routers were soon appearing in corporate networks to join department and workgroup LANs into enterprise-wide networks. This meant a conversion to TCP/IP protocols. At first there was some resistance, but when the World Wide Web exploded on the scene in the 1990s, no one doubted the advantage of the Internet protocol suite. Web technologies solved an incredible number of hardware and software interoperability problems. In fact, the term "interoperability" is rarely heard today because Web technologies minimized the problem.

LAN technologies improved over the years. Ethernet went from 10 Mbits/sec to 100 Mbits/sec (Fast Ethernet) to 1,000 Mbits/sec (Gigabit Ethernet). In addition, switching technologies improved not only performance but the way that networks were designed.

Another improvement was the multilayer switch, which combined switching and routing into a high-performance hardware-based device that allowed network designers to put routing wherever needed at a relatively inexpensive price in order to segregate networks, provide security, or control traffic.

Application development in LAN and internetwork environments was dominated by client/server computing for years, but more recently distributed object computing technologies have prevailed, partly as a result of the Web. The traditional two-tiered client/server model grew into the three-tiered distributed object model. Middleware and messaging technologies simplify the process of connecting applications and processes across global networks.

As mentioned, Web technologies played an important part in redefining access to data, the sharing of data, and the design of network applications. An intranet is an internal network built with Web technologies while an extranet is a business-to-business network with links across the Internet.

Recently, core Internet networks have improved with optical switching and the over provisioning of bandwidth. The last bottleneck is the local access network, which not surprisingly is still controlled to a large extent by the incumbent telephone companies. They require packet-switched network users to adjust to their TDM (time division multiplexing) hierarchy in order to take advantage of metropolitan and wide area network links. These T1, T3, and fractional T1 lines are expensive and inefficient. Fortunately, the access market is changing. In the last few years, competitors have installed fiber-optic cable throughout metropolitan areas and are offering flexible bandwidth options using native protocols (Ethernet) at less than half what the carriers were charging.

The final part of this story (at least for this edition) is that the Internet is becoming the network. With fast connections, enterprises are starting to outsource much of their data services to service providers that run Internet data centers. These service providers have data centers that are staffed by professionals 24/7 and that provide all the security and high availability to keep an enterprise up and running.

Outsourcing makes sense because the Internet provides global connections and Internet data centers with direct connections to fast backbones. The cost of equipment and management is shared by all the customers of the service providers. Secure connections can be made across virtual private networks.

Even users are taking advantage of this scheme. Many are using Web appliances, which are Web-based terminals that rely on Internet applications servers, storage servers, and e-mail servers. All information is stored on the Web. The Internet is essentially becoming a giant storage network.

Why networks are important

A computer network can serve several distinct purposes:

- Sharing resources (files, applications or hardware, an Internet connection, etc.);
- Communication between people (email, live discussions, business, etc.);
- Communication between processes (such as between industrial computers);
- Guaranteeing full access to information for a specified group of people (networked databases);
- Multiplayer video games.

Networks are also used for standardizing applications. The term groupware is generally used to refer to tools that let multiple people work over a network. For example, email and group scheduling can be used to communicate more quickly and efficiently. Here's a glimpse of the advantages that such systems have:

- Lower costs, due to sharing data and peripherals,
- Standardizing applications,
- Providing timely access to data,
- More efficient communication and organization.

Today, with the Internet, networks have become more unified. It is clear, then, that there are several reasons to install a network, whether for a business or an individual.

Similarities between types of networks

The different types of networks generally have the following points in common:

- **Servers**: computers which provided shared resources to users, by means of a network server.
- **Clients**: computers which access the shared resources provided by a network server.
- **Connection medium**: how the computers are linked together.
- **Shared data**: Files that can be accessed on the network servers
- **Printers and other shared peripherals**: files, printers, or other elements employed by the network's users
- **Miscellaneous resources**: other resources provided by the server

TYPES OF NETWORKS

There are usually said to be two types of networks:

- **Peer-to-peer networks;**
- **Networks organized around servers (Client/Server):**
    - clouds computing;

- unified communications.

These two types of networks have different capabilities. Which type of network to install depends on the following criteria:

- Size of the business;
- Level of security required;
- Type of activity;
- Skills of the administrators available;
- Volume of traffic over the network;
- Needs of the network's users;
- Budget set aside for operating the network (not just purchasing it, but also upkeep and maintenance.

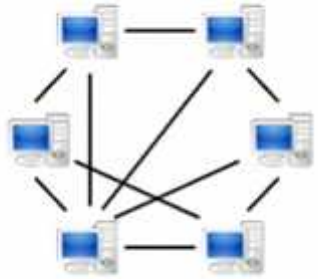


Figure 1. A peer-to-peer system of nodes without central infrastructure.

Peer-to-peer networks

P2P (peer-to-peer) (Figure 1) A peer-to-peer system of nodes without central infrastructure., made famous by Napster community-based file sharing, disrupts the traditional centrally managed storage model. End users host personal collections of music, electronic books, videos, photographs, technical information, software drivers, and so forth on their own computers. P2P software then helps the community of users locate and access files on other user's computers. In this model, end-systems become informal Web storage devices, or what some have called "media collection devices." P2P bypasses the central control that administrators have over information stored on file servers and promotes user-to-user data exchange on the Internet. P2P software features have expanded to support instant messaging, advanced searching, and mailing list support.

Networks organised around servers

Client/server (Figure 2) networking grew in popularity many years ago as personal computers (PCs) became the common alternative to older mainframe computers. Client devices are typically PCs with network software applications installed that request and receive information over the network. Mobile devices as well as desktop computers can both function as clients.

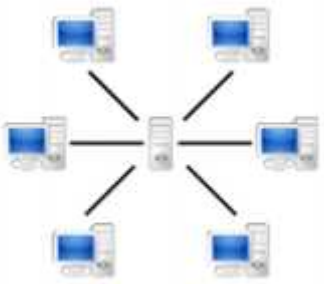


Figure 2. Centralized server-based service model (not peer-to-peer).

A server device typically stores files and databases including more complex applications like Web sites. Server devices often feature higher-powered central processors, more memory, and larger disk drives than clients.

Client-Server Applications model distinguishes between applications as well as devices. Network clients make requests to a server by sending messages, and servers respond to their clients by acting on each request and returning results. One server generally supports numerous clients, and multiple servers can be networked together in a pool to handle the increased processing load as the number of clients grows.

A client computer and a server computer are usually two separate devices, each customized for their designed purpose. For example, a Web client works best with a large screen display, while a Web server does not need any display at all and can be located anywhere in the world. However, in some cases a given device can function both as a client and a server for the same application. Likewise, a device that is a server for one application can simultaneously act as a client to other servers, for different applications.

Cloud Computing

Grid computing - the ability to access computing and storage from a pool of resources, such as multiple autonomous systems - gained prominence beginning in the early 1990s, often for massive academic or scientific computational applications. Cloud computing is an evolution of the same concept; the linking of backend resources to provide web-based services, applications, and storage. Recently, cloud computing (Figure 3.) has spawned several subcategories, including:

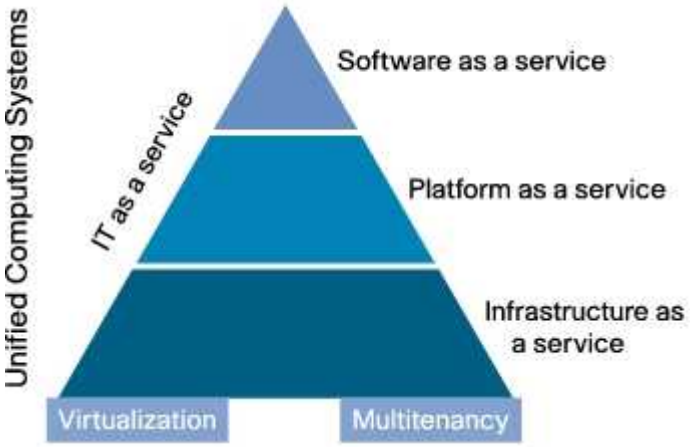


Figure 3 Cloud Computing concept

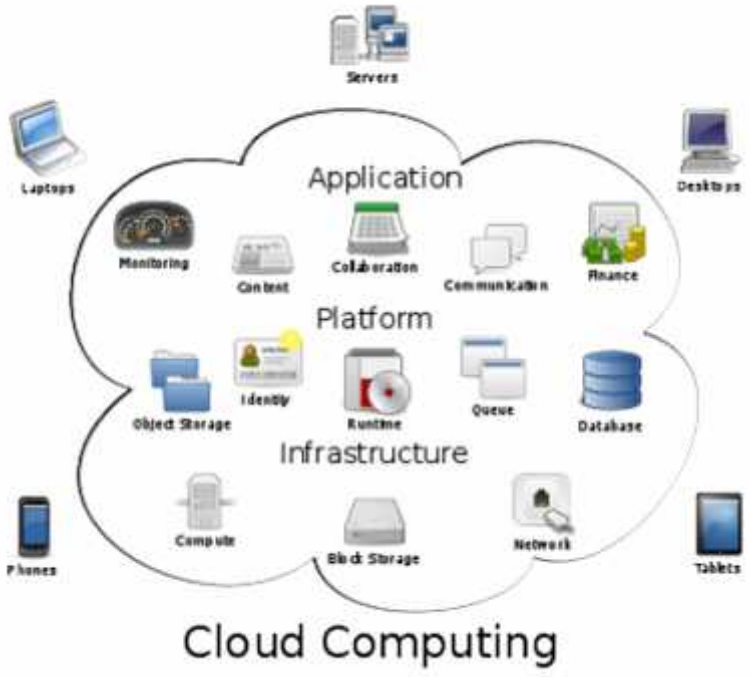
• IT as a service (ITaaS) is a service model where an organization or individual contracts with a service provider to obtain network connectivity and either individual or bundled services (for example, network backup, disaster recovery, VPN, VoIP, hosting, video surveillance, and web conferencing)

• Software as a service (SaaS) enables service subscribers to access a software application from a software vendor through the web. The SaaS provider hosts and operates the application. Customers do not pay to own the software but instead only pay to use it through a web API. The term SaaS has replaced the older designation for these software vendors, application service providers (ASPs).

• Platform as a service (PaaS) makes raw computing power and disk space available from a platform of resources in the network cloud. A recent example is the Google App Engine, a

developer tool that enables developers to create scalable web applications and run them on Google's infrastructure (including 500 MB of persistent storage and bandwidth and CPU to enable five million monthly page views).

• Infrastructure as a service (IaaS) refers to the delivery of a virtual computer infrastructure environment as a service. Instead of purchasing servers, software, data center resources, network equipment, and the expertise to operate them, customers can buy these resources as an outsourced service delivered through the network cloud.



Cloud Computing has become a buzzword now a days in the hosting industry. With the advancements in it companies like Google and Microsoft has extended their search/ investigations towards cloud computing. One of the hottest trends in small business and enterprise-sized IT is cloud computing. Cloud computing represents a major shift in the way companies view their technology infrastructure. In this post I am going to explain some basics of cloud computing as to understand it in a more simplified way.

Cloud Computing is one of the hottest trends in the industry. This has proven as a bliss for small business and enterprise-sized IT. Cloud hosting has considered as the major shift in the way companies use to look their IT infrastructure. This type of approach to IT relies on the Internet, and usually involves provisioned, scalable, dynamic and virtual solutions. Cloud computing pulls the details of IT infrastructure management away from the business and puts it squarely in the hands of true experts.

Cloud has been used as the metaphor for the internet computing.

While SaaS is by far the most common type of cloud computing implementation today, other types are rapidly gaining popularity as companies see the cost and expertise advantages of each. It also makes use of Web 2.0 and other virtual technologies, applications are provided to users via the net with the data stored on the provider’s servers.

The basic need of the rapid improvement of the capacity of online connectivity gave birth to cloud computing. In a way we can say that it is a collage of many different computers and

linking them together to form one very big computer. The simplest thing that a computer does is allow us to store and retrieve information.

This is an alternative of investing in one's own infrastructure and software. Cloud hosting is considered as a utility for the internet services- much like electrical & water utility services where you pay only for the computing and storage that you use, as opposed to paying the overhead of creating & maintaining your own data center. Instead, through Cloud Computing, companies can subscribe to an online service using a per use model, thus reducing capital investments and making computing a variable.

This concept has made many people and organization to change their thinking about the way they use to think previously. This has given the platform on which they have the liberty of choosing the IT infrastructure as per their wish and requirements. This is in a simpler way can be defined as cloud computing is taking services and moving them outside an organizations firewall on shared systems. Applications and services are accessed via the Web, instead of your hard drive. In cloud computing, the services that are delivered and used over the Internet are paid for by cloud customers on an "as-needed, pay-per-use" business model. The infrastructure is also maintained by the cloud provider, not the individual cloud customers.

The cloud computing phenomenon is generating a lot of interest worldwide because of its potential to offer services on demand, at lower cost than current options, and with less complexity, greater scalability, and wider reach. The opportunities for providers of managed services to benefit from this model are significant and exciting.

But confusion over cloud terminology, existing services versus vaporware, and evolving service models are widespread. Many potential customers are uncertain about whether to adopt these services and many service providers are unsure of how to best integrate and market the cloud architecture.

Cloud Computing Architecture

Cloud Computing Infrastructure Model

Government agencies need to consider several infrastructural models when evaluating cloud-computing architecture. There are four categories of cloud currently in the marketplace or emerging in the near future: public clouds, private clouds, virtual private clouds, and eventually inter-clouds.

Public Clouds

Public clouds are "stand-alone," or proprietary, clouds mostly off-premise, run by third party companies such as Google, Amazon, Microsoft, and others. Public clouds are hosted off

customer premises and usually mix applications (transparently) from different consumers on shared infrastructure.

Private Clouds

Private clouds are typically designed and managed by an IT department within an organization. A private cloud is usually built specifically to provide services internally to an organization. Private clouds may be in a collocated facility or in an existing data center. This model gives a high level of control over the cloud services and the cloud infrastructure.

Virtual Private Clouds

Virtual private clouds allow service providers to offer unique services to private cloud users. These services allow customers to consume infrastructure services as part of their private clouds. The ability to augment a private cloud, with on-demand and at-scale characteristics, is typical of a virtual private cloud infrastructure. Private cloud customers can seamlessly extend the trust boundaries (security, control, service-level management, and compliance) to include virtual private clouds. The virtual private cloud concept introduces the complexities of migrating workloads and related data from a private cloud. There are already developed unique set of capabilities in the form of protocols and solutions, which enable long-distance, workload mobility scenarios from private clouds to virtual private clouds.

Inter-cloud

By example, Cisco envisions, that in long term, the inter-cloud will emerge as a public, open, and decoupled cloud-computing internetwork, much like the Internet. In a sense, the inter-cloud would be an enhancement and extension of the Internet itself. Just as the Internet decouples clients from content (i.e., you don't have to have a preexisting agreement with a content provider to find and access its website in real time), the inter-cloud will decouple resource consumers (enterprises) from cloud resource providers, allowing the enterprises to find resources on demand with providers. Workload migration will be the dominant use case for the inter-cloud, as an open market, establishes trust standards and public subsystems for naming, discovering, and addressing portability and data/workload exchange.

Service Layers of Cloud Computing

The concept view of cloud computing is all encompassing, in terms of the architectural stack in a typical service value chain. These are services that are offered in a traditional IT data center. In a cloud value chain, they are virtualized and delivered on demand.

Cloud Computing Workflow

A simplified vision of the cloud computing architecture, Figure 3, includes this basic flow of information:

1. Client sends service requests
2. System management finds correct resources
3. Systems provisioning finds correct resources
4. Computing resources are found and service request is executed
5. Results of the service requests are sent to the clients

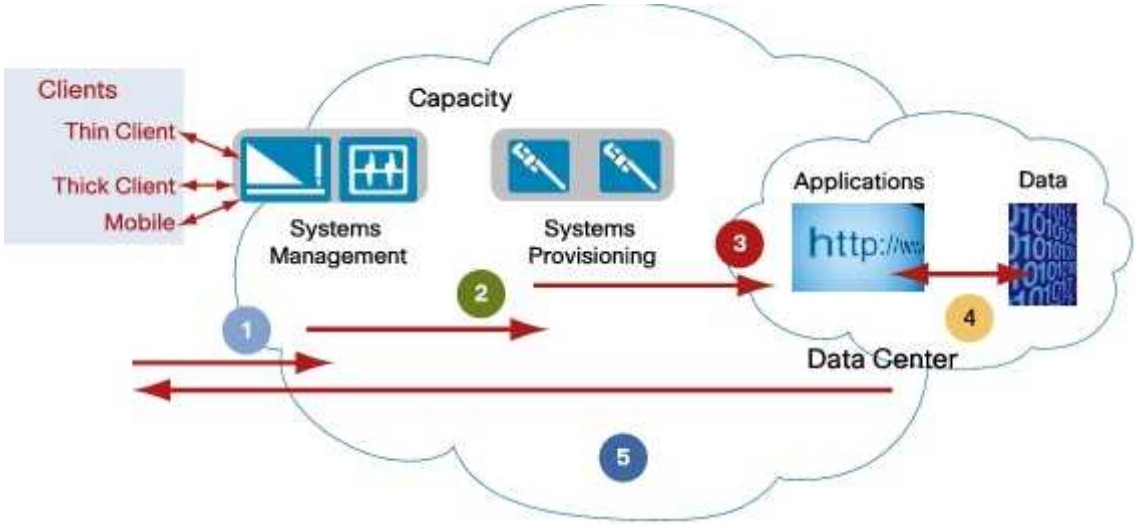


Figure 4. Cloud Computing Workflow

The End-User Perspective

Examples of applications that are well suited to cloud computing, including:

- Mobile, interactive applications that respond in real time to information provided by users or sensors or both must be highly available and rely on large data sets that are most conveniently hosted in large data centers. Services that combine two or more data sources or other services are a good example of interactive applications. The cloud environment is an excellent architecture for these applications, especially for mobile devices that are connected to the cloud nearly all the time.
- Parallel batch processing is uniquely suited to cloud computing because users can take advantage of the ability to utilize hundreds or thousands of computers for a short period of time to get the job done.
- Analytics is another computing-intensive activity that can be well served in the network cloud. A rowing share of computing resources are being spent understanding customers, buying habits, and other factors through business analytics.
- Computing-intensive desktop applications such as symbolic mathematics that involve a lot of computing per unit of data, image rendering, and 3D animation can be offloaded to

the extensive resources of a cloud computing environment (in this case a private cloud) served by a large data center.

Cloud Computing Service Opportunities

Much like triple-play service bundles offered to consumers, cloud computing bundles will be capable of bringing a wide array of services and applications to individuals and businesses, including:

- SaaS opportunities: Customer relationship management (CRM) and enterprise resource planning (ERP) applications, email, web conferencing, digital content creation
- ITaaS opportunities: Storage, backup, unified threat management, security posture analysis, compliance
- IaaS and PaaS: Disk space, raw computing power for testing and development

Summary of Cloud Computing

The cloud computing phenomenon is gaining popularity because of its lower TCO, scalability, competitive differentiation, reduced complexity for customers, and faster and easier acquisition of services, even as its infrastructure and standards continue to evolve. Many types of services can be delivered through the network cloud to augment the infrastructure of service providers and end customers.

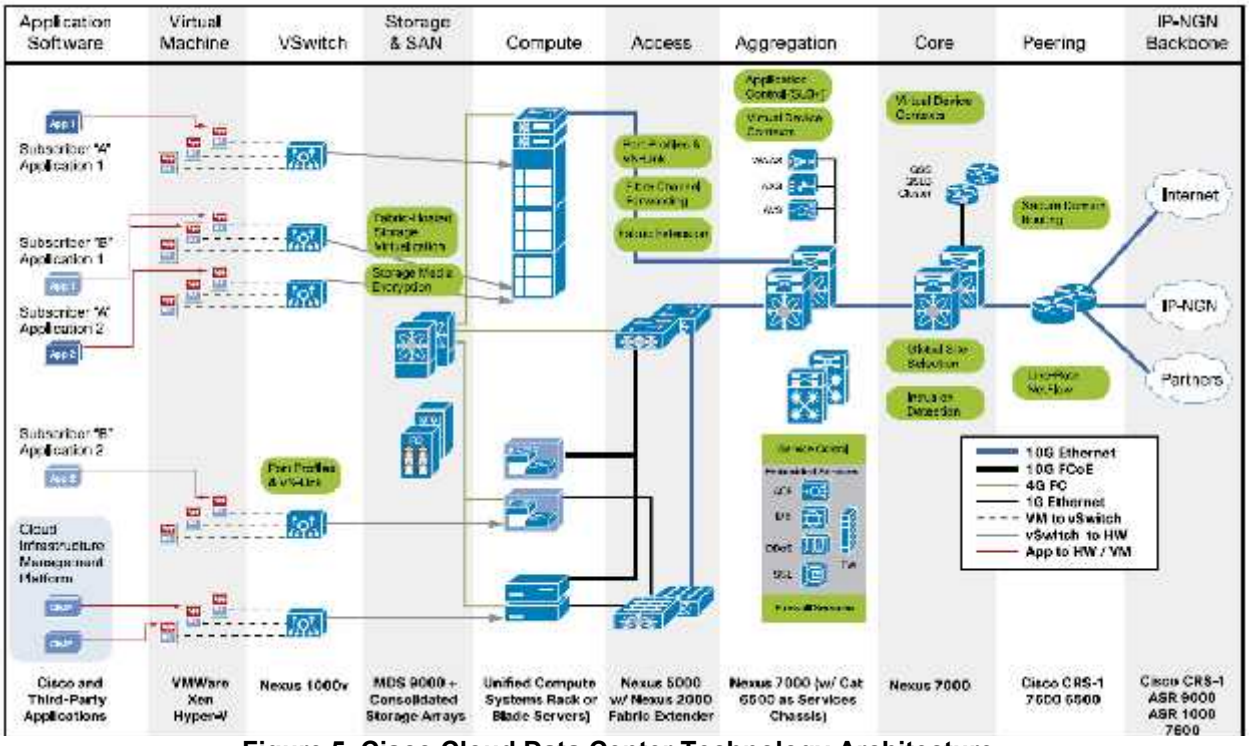


Figure 5. Cisco Cloud Data Center Technology Architecture

The technology architecture in Figure 6, represents a next-generation cloud data center. It is based on Cisco's and the ecosystems partners' data center building blocks. The above technology architecture represents only a sample of building blocks of a cloud data center. Moreover, the end-state technical architecture would not only contain the components listed above and below but would also be governed by different types of service and regulation/compliance requirements.

Unified Communications

Unified communications (UC) is the integration of real-time communication services such as instant messaging (chat), presence information, telephony (including IP telephony), video conferencing, data sharing (including web connected electronic whiteboards aka IWB's or Interactive White Boards), call control and speech recognition with non-real-time communication services such as unified messaging (integrated voicemail, e-mail, SMS and fax). UC is not a single product, but a set of products that provides a consistent unified user interface and user experience across multiple devices and media types.

In its broadest sense UC can encompass all forms of communications that are exchanged via the medium of the TCP/IP network to include other forms of communications such as Internet Protocol Television (IPTV) and Digital Signage Communications as they become an integrated part of the network communications deployment and may be directed as one to one communications or broadcast communications from one to many.

UC allows an individual to send a message on one medium and receive the same communication on another medium. For example, one can receive a voicemail message and choose to access it through e-mail or a cell phone. If the sender is online according to the presence information and currently accepts calls, the response can be sent immediately through text chat or video call. Otherwise, it may be sent as a non real-time message that can be accessed through a variety of media.

Market Trends

The definition of service provider for UC is expanding beyond traditional fixed or converged telecom operators to include mobile operators and ISP/ASPs, which are also entering the market for Cloud UC services.

Gartner recently categorized Mobile UC as having a "transformational impact" resulting in major benefits to enterprises by transforming their business operations. Furthermore, many Over-the-Top players who provide traditional hosted/cloud services such as email, web hosting, storage, etc., are also enhancing their product offering by providing voice and UC services to

their business customers; Google and Microsoft/Skype are such example but many national or regional players also exist.

Another important trend in the market is the "consumerisation of IT" which has been led by innovative products from the likes of Skype or Apple delivering intuitive and easy-to-use user interfaces, (near) automatic configuration, and all-in-one functionality allowing "non-techies" to enjoy new and advanced technologies.

No longer are users willing to accept the limitations of location-restricted, device, network, or OS specific applications. They expect to have intuitive solutions and applications accessible from any location, utilizing multiple devices on various networks – mobile, home, hotel, or public hotspots. Gartner predicts that by 2014, 90% of organizations will support corporate applications on personal devices including tablets/pads.

However, if enterprise IT does not provide the type of applications or features that employees are using in their personal lives, then users will turn to consumer cloud applications, such as collaboration or storage, even though these may not meet the enterprise security or business process requirements.

Benefits for Customers

Small and medium size enterprises (SMEs), which depending on country/region may be defined as businesses from 5 to 500 employees, are a market segment that will greatly benefit from cloud-based voice & UC services. It is also a market segment more likely to be early adopters of cloud services as it allows them to refresh and grow their IT solutions without large capital expenditure and IT staff expenditure by utilizing cost effective and more predictable pay-as-you-go pricing models.

Traditionally, SME's have not been able to procure and implement more advanced UC features such as video, collaboration, presence, ACD/contact center, and mobile integration due to prohibitive product and project costs. Through this enhanced level of access to services, in many ways, the cloud serves as a great equalizer for SME's, because it allows them to use new and advanced applications and tools, made affordable as cloud services, which enables them to be more productive and competitive by focusing on growing their core business and profitability.

Cloud Services

Some example cloud services available to a cloud consumer are listed below:

<u>SaaS services:</u>

- *Email and Office Productivity*: Applications for email, word processing, spreadsheets, presentations, etc.
- *Billing:* Application services to manage customer billing based on usage and subscriptions to products and services.
- *Customer Relationship Management (CRM):* CRM applications that range from call center applications to sales force automation.
- *Collaboration:* Tools that allow users to collaborate in workgroups, within enterprises, and across enterprises.
- *Content Management:* Services for managing the production of and access to content for web-based applications.
- *Document Management:* Applications for managing documents, enforcing document production workflows, and providing workspaces for groups or enterprises to find and access documents.
- *Financials:* Applications for managing financial processes ranging from expense processing and invoicing to tax management.
- *Human Resources:* Software for managing human resources functions within companies.
- *Sales:* Applications that are specifically designed for sales functions such as pricing, commission tracking, etc.
- *Social Networks:* Social software that establishes and maintains a connection among users that are tied in one or more specific types of interdependency.
- *Enterprise Resource Planning (ERP):* Integrated computer-based system used to manage internal and external resources, including tangible assets, financial resources, materials, and human resources.

PaaS Services:

- *Business Intelligence:* Platforms for the creation of applications such as dashboards, reporting systems, and data analysis.
- *Database:* Services offering scalable relational database solutions or scalable non-SQL datastores.
- *Development and Testing:* Platforms for the development and testing cycles of application development, which expand and contract as needed.
- *Integration:* Development platforms for building integration applications in the cloud and within the enterprise.
- *Application Deployment*: Platforms suited for general purpose application development. These services provide databases, web application runtime environments, etc.

IaaS Services:

- *Backup and Recovery*: Services for backup and recovery of file systems and raw data stores on servers and desktop systems.
- *Compute:* Server resources for running cloud-based systems that can be dynamically provisioned and configured as needed.
- *Content Delivery Networks (CDNs):* CDNs store content and files to improve the performance and cost of delivering content for web-based systems.
- *Services Management:* Services that manage cloud infrastructure platforms. These tools often provide features that cloud providers do not provide or specialize in managing certain application technologies.
- *Storage:* Massively scalable storage capacity that can be used for applications, backups, archival, and file storage.

CONCLUSION

The cloud computing phenomenon is gaining popularity because of its lower TCO, scalability, competitive differentiation, reduced complexity for customers, and faster and easier acquisition of services, even as its infrastructure and standards continue to evolve. Many types of services can be delivered through the network cloud to augment the infrastructure of service providers and end customers.

The tremendous impact of cloud computing on business has prompted the federal United States government to look to the cloud as a means to reorganize their IT infrastructure and decrease their spending budgets. With the advent of the top government official mandating cloud adoption, many agencies already have at least one or more cloud systems online.

REFERENCES

- http://www.linktionary.com/n/network_concepts.html
- http://compnetworking.about.com/od/basicnetworkingconcepts/Networking_Basics_Key_Concepts_in_Computer_Networking.htm
- http://www.red-scientific.co.uk/future-core-network-concept-phase-technology-study
- http://searchunifiedcommunications.techtarget.com/definition/unified-communications
- http://www.cisco.com
- http://www.businesscloudnews.com

FIREWALLS AND INTRUSION DETECTION SYSTEMS

Cpt. Cdr Mihai DIACONU

INTRODUCTION

Security of information and communication systems has become a major issue that manufacturers must take into account both, equipment and application developers in the same manner with system integrators and network administrators. The integrity of information systems and communications on the hand, and confidentiality of data protection requirements on the other hand, can be addressed through a variety of techniques and methods.

There has been a major change in business and processes across the world. More and more people are getting connected to the Internet every day to take advantage of the new business model popularly known as e-Business. Businesses on the Internet offer two sides. Firstly, the Internet brings in tremendous potential to business in terms of reaching the end users. Second it also brings in lot of risk to the business. On the Internet can be considered that activate, harmless and harmful users. While an organization makes its information system available to harmless Internet users, at the same time the information is available to the malicious users as well. Malicious users or hackers can get access to an organization's internal systems in various reasons. The malicious users use different techniques like Password cracking, sniffing unencrypted or clear text traffic etc. to exploit the system vulnerabilities mentioned above and compromise critical systems. Therefore, there needs to be some kind of security to the organization's private resources from the Internet as well as from inside users as survey says that eighty percent of the attacks happen from inside users for the very fact that they know the systems much more than an outsider knows and access to information is easier for an insider.

Current security solutions are based on the hardware and software mechanism, capable to detect suspicious items which could be considered intrusions, illegal actions and their consequences. However, detection of events with intrusive character in a computer system connected to the network is not enough. In principle, intrusion detection (IDS) is based on the types of behavior or the patterns ("signatures" of malicious entity) which have occurred after hackers began interact with systems already attacked. In this respect, very important would be the intrusion prevention (IPS) capability. This would ensure a level of higher security by blocking any interaction between a malicious entity and system information need to protect. Of course, in systems where IDS (Intrusion Detection Systems) are additionally implementing the intrusion prevention functions, the question is whether such a capability can lead to an inefficient service

operation system, affecting practical applications of end users. Therefore, problem of efficient implementation detection / intrusion prevention is very important. To deal with those things effectively, is required knowledge of potential solutions that typical intrusion detection and prevention come up with.

How the IDS do compares with the firewall? IDS are commonly confused with the firewall or as a substitute for a firewall. While they both relate to network security, an IDS differs from a firewall in that a firewall looks out for intrusions in order to stop them from happening. The firewall limits the access between networks in order to prevent intrusion but does not show an attack from inside the network. An IDS evaluates a suspected intrusion once it has taken place and alarm. An ID also watches for attacks that originate from within a system. The network-based intrusion protection system can also detect malicious packets that are designed to be overlooked by a firewall's simplistic examining rules. An IDS is not a replacement for either a firewall or a good antivirus program. IDS should be considered a tool to use in conjunction with your standard security products (like anti-virus and a firewall) to increase your system specific or network-wide security.

I. FIREWALLS

Across the institution, organization etc. firewalls are used to protect private network from the public network. The issue became more complicated when is matter to secure a private network from the internet using firewalls, that because no network can be hundred percent secured. There are involved some aspects which sustain upper statement such as: the business requires some kind of access to be granted on the Internal systems to Internet users; the firewall provides security by allowing only specific services through it; the firewall implements a policy for allowing or disallowing connections based on organizational security policy and business needs; the firewall also protects the organization from malicious attack from the Internet by dropping connections from unknown sources.

1.1 Definition

Firewall is a system designed to deny unauthorized attempt trough the informatic systems and to prevent unauthorized users from accessing private networks connected to the Internet. Firewalls can be implemented in hardware, software or a combination of both. All the digits which proceed in both directions, entering or leaving the internet, will be the subject of firewall examination. It will be examinated each sequence that do not meet the security criteria.

In other words, is „something" protective that interferate, in essence, between the private computer network and the internet. The job of a firewall is to carefully analyze the data in order

to ignore information that comes from an unsecured, unknown or suspicious locations. If the network or computer has open access via the internet, then the necesity to have a firewall to protect your network, individual computer and data is absolutely mandatory.

Also in order to limit the access to the specific computer or network, a firewall is useful for allowing remotely to a private network through secure authentication certificates and logins.

Unfortunately many people do not completely understand the importance and necessity of a firewall, or consider it to be a product for businesses only.

1.2 Types of firewall (concerning the techniques)

There are several types of firewall techniques:

1.2.1 **Packet filter:** Analyzes each information entering or leaving the network, then apply the rules set up by the user for acceptance or rejection. Package selection is quite efficient and open to the user, but it is difficult regarding the configuration;

1.2.2 **Application gateway:** Uses security technique and protocols to the specific applications, (FTP, TELNET, etc. servers). In spite of a good effectiveness, over the time could prove a low performance.

1.2.3 **Circuit-level gateway:** Security algoritm are applied when a TCP or UDP connection is established. Packets are travelling between the hosts without further checking, after the connection has taken place.

1.2.4 **Proxy server:** The proxy server hides the real network addresses and survey all messages entering and leaving the network..

Many firewalls consist in two or more of these techniques, mixed. A firewall is set up like a first shield of defense in private information protection. In order to increase the data security, it would be used encryption algoritms.

1.3 Types of firewall (concerning the environments)

Firewalls can be either hardware or software**.** The ideal firewall configuration will consist of both. The differences between a software and hardware firewall are vast, and the best protection for your computer and network is to use both, as each offers different but much-needed security features and benefits. Updating your firewall and your operating system is essential to maintaining optimal protection, as is testing your firewall to ensure it is connected and working correctly.

1.3.1 **Hardware firewalls**

Hardware firewalls can be achieved as a stand alone product. Recently, hardware firewalls are found in routers, and should be considered an important part of the system and network set-up, especially for anyone on a broadband connection. Hardware firewalls can protect every machine on a local network and can be effective with very little or without configuration.

A hardware firewall analizes the top of a data packet in order to determine its source and destination. This information is compared to a set of predefined or user-created rules that determine whether the packet is to be forwarded or dropped.

Most hardware firewalls will have a minimum of four network ports to connect other computers, but for larger networks, firewall solutions would be necessary.

1.3.2 **Software firewalls**

Software firewall is the most popular choice for individual home users. It is installed on the computer (like any software) and can be customized (allowing you some control over its function and protection features). Many software firewalls have user defined controls for setting up safe file and printer sharing and to block unsafe application from running on the system. A software firewall will protect your computer from outside attempts to control or gain access your computer, and, depending on your choice of software firewall, it could also provide protection against the most common trojan programs or worms. Additionally, software firewalls may also incorporate privacy controls, web filtering and more. Becouse the software firewalls will protect only the computer they are installed on, not a network, so each computer will need to have a software firewall installed on it.

Like hardware firewalls there is a vast number of software firewalls to choose from. Because your software firewall will always be running on your computer, you should make note of the system resources it will require to run and any incompatibilities with your operating system. A good software firewall will run in the background on your system and use only a small amount of system resources. It is important to monitor a software firewall once installed and to keep up to date permanently.

The question is where the Intrusion detection system fit in the design does. The Intrusion detection system in a similar way complements the firewall security. The firewall protects an organization from malicious attacks from the Internet and the Intrusion detection system detects if someone tries to break in through the firewall or manages to break in the firewall security and tries to have access on any system in the trusted side and alerts the system administrator in case there is a breach in security. Moreover, Firewalls do a very good job of filtering incoming traffic from the Internet; however, there are ways to circumvent the firewall. For example, external users can connect to the Intranet by dialing in through a modem installed in the private network of the organization. This kind of access would not be seen by the firewall.

II. INTRUSION DETECTION SYSTEM

Intrusion detection

Is the process of monitoring events occurring at a computer system or network, and analyzing them to search for signs of intrusions, defined as attempts to achieve some unauthorized penetration action, bypassing security mechanisms of a system calculation and / or networks. Intrusions are caused by any of the following situations: that attackers system accesses the Internet, authorized users system of trying to obtain additional privileges for which no permission or users authorized using unduly privileges allocated to them. Detection systems intrusion (IDS, Intrusion Detection Systems) are software or hardware that provides monitoring and intrusion analysis.

Intrusion Detection Systems overview

An intrusion detection system (IDS) is essentially an ad-hoc security solution aimed to protect vulnerable computer systems. Major tasks of an intrusion detection system (IDS) are to collect data from the system, to analyze them, data to discover relevant security events and to present the analysis results to the system administrator.

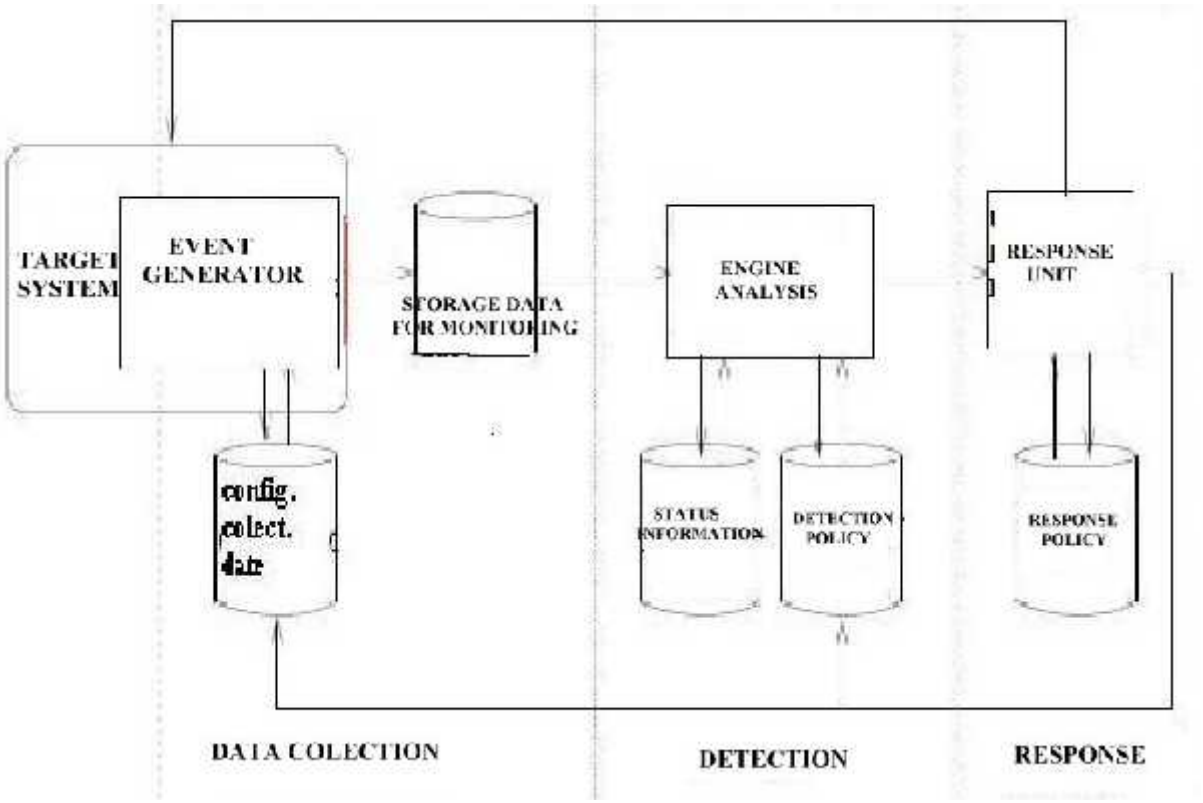


Fig. 1 The principle block diagram of an intrusion detection system

Figure 1 illustrates a schematic diagram of generic IDS (intrusion detection system). Generic components are highlighted an intrusion detection system. The three general blocks, the

collection of data, detection block and response block, include the functional modules which carry out specific actions for an intrusion detection system. The chain of interactions between those functional modules should be observed.

Target system has mechanisms to collect various types of data, such as those relating to network traffic, system wide events OS or application level. Functional block by events keep track of information collected and may acquire data itself. Some pre-processing activities can be performed by this component (such as to transform data into a common format and to achieve a certain data filtering). Often MONITORING DATA STORAGE component is used to archive data before they be sent to the "ENGINE OF ANALYSIS".

This mode of the storage can be used to investigate alarms. ANALYSIS ENGINE functional block implements detection algorithm. Simple method detection is to use scripts matching strings of text that are unique to different types of intrusions (which are "signature" specific). Other types of recognition techniques patterns can also be used. This approach is similar to that used several of current anti-virus solutions, requiring basic data "signatures" of all events known malicious that need to be detected. Alarm thresholds can be imposed for certain types of events. Signatures can be for an event or sequence of events. Expert systems can be used to implement advanced forms of detection signatures. All these methods have in common that they are pre-programmed to detect events considered intrusive default.

Another way to perform detection notification is based on the distinction between behavior 'Normal' and 'Abnormal' in target system. The method consists in creating profiles behavior for programs or users classification system and the possible intrusion those who deviate from established profiles. This can be achieved using simple statistics or methods "smart", such as those based on networks neural modeling and simulation techniques extracting relevant data. In any case, the engine analysis can combine several methods detection to achieve a more complete intrusion determination.

DETECTION political component contains pre-programmed information about how intrusion can be detected. Basically, here are stored signatures intrusion and alarm thresholds. Information anomaly detection setup, and rules the information to be submitted to response unit, are also stored in this level. Database state information (state information) contains information used for dynamic detection. They are status information about intrusion signatures and the partially completed behavior of the system.

Information about events that are categorized as intrusive or abnormal by analysis engine is sent to UNIT ANSWER. Based on pre-programmed rules RESPONSE POLICY database, it is decided how to respond to different events. The decision may be affected by the parameters and features such probability of confirmation of the event or its potential impact. In a distributed

system, response unit can receive inputs from more multiple analysis engines and also can correlate alarms. Possible response actions are those for notifying the administrator, the automatic reconfiguration target for blocking author intrusion actions, or to implement specific mechanisms to support manual response (the user). Another response option would be to allow the IDS system to change configuration for data collection and policy detection for collecting more information about an event in progress.

2.3 Typical intrusion detection mechanisms

Since the systems have become more complex (in order to run applications different), intrusion detection systems have been originally incorporated as components of operating systems, so that separate applications. In principle, most IDS systems try to detect suspicious events to be considered unauthorized intrusions, which then report them through alerts to system administrators. Also technologies of automatic response to events intrusion type are evolving. The first Intrusion detection systems aimed at systems independent calculation with a single processor; detection of post-facto processing consists of records record of the events recorded the system. Current computer systems have often multiple processing nodes running different operating systems, often linked networked or distributed systems. Intrusions can execute actions involving several hackers' penetration. However, the presence of several entities changes only the complexity, not the essence of the problem. However, increase in complexity is substantial.

Intrusion detection determines whether that a particular entity (the intruder) tried to obtain, or even worse, have succeeded to access unauthorized system. None of the methods current automatic detection does not identify an intruder before it can initiate interaction with the system. Of course, system administrators can apply measures routine to prevent intrusion. They can include requiring passwords to be supplied before users can get any access to system, known vulnerability remediation that a potential intruder might try to exploit in order to obtain unauthorized access blocking certain types of network access or limiting physical access. IDS are also used in addition to preventive measures.

Intruders can be classified into two categories. External intruders having no authorized access to systems they attack. Internal attackers are authorization level, but they aim to obtain fraudulently, additional capabilities. In dealing with mechanisms Intrusion detection should be noted that present detection methods fall into two basic categories: anomaly detection and misuse detection ("Misuse"). The first approach (anomaly detection) is based on defining and characterizes the dynamic behavior and condition correct system and the detection changes (deviations) from them. The second approach (Misuse detection) requires characterization known ways to penetrate a system. Each of these can be described as a rule through a pattern.

The method follows the discovery of patterns known explicit. Such a pattern may be a fixed number of characters, such as a specific signature of a virus. Alternatively, the pattern can describe a suspect set or sequence of actions.

The new generation of intrusion detection systems considers the major aspects of the network. In this case, the challenges are: Volumes of data management, which are transmitted and processed in large networks; Increasing the coverage (IDS system must be able to recognize as many types of behavior suggestive of intrusion); Reduce the frequency of false alarms (behaviors erroneously reported as benign intrusions); Intrusion detection in progress, and reaction in real time to alert about with an intrusion or to limit potential damage.

2.4 Common types of IDS systems

The three common types of detection systems intrusion IDS products are networked based systems, host based systems and systems based on the application. Each type of product offers optional intrusion prevention capabilities.

Network - based IDS. These systems detect IDS attacks by capturing and analyzing packets traveling over the network. By filtering a network data segment or passing trough a switch, a network-based ID can monitor network traffic that reaches multiple hosts connected to that network segment.

Host - based IDS. These systems operate on information collected within an individual calculation system. This approach allows determining exactly what processes and user accounts are involved in a particular attack on system operation. Moreover, unlike the systems Network-based IDS systems host - based IDS can more easily determine the outcome intentional attack attempted because they can directly access and monitor data files and system processes that are usually covered by attackers.

IDS based on the application. This is a special subset of systems Host-based IDS that analyzes events occurred in the execution of software applications. The most common sources of information used by such intrusion detection systems are record files (log) of events created default application.

2.5 Intrusion prevention

Current systems Intrusion detection often additionally offers capabilities intrusion prevention. This means that they not only can detect the activities of an intrusive, but it can try and stop them, before those actions to achieve targets concerned. Intrusion Prevention is more valuable intrusion detection only because the Intrusion detection only "observed" events in progress, without trying to stop them. Unfortunately, cause of intrusion prevention unwanted operational

problems and because Intrusion detection is not precise mechanism, prevention may incorrectly block legitimate activities classified as malicious.

2.6 Important features of IDS solutions for practical applications

If support systems for practical applications with high demands on data protection and other types of resources involved, an effective IDS solution must have the following characteristics: be easy to operate; be adaptable by setting appropriate various process parameters specific detection / intrusion prevention, not hinder normal operation of the application; to run continuously; be tolerant to faults; to determine the minimum load of the system; to determine the precise deviations from the normal behavior; be well adapted to the specific requirements protected system; be easy to maintain; be based on implementation for which provide regular updates of signatures; be able to keep track of events, and store data in a location Secure also ensure sending messages to alert security administrators.

CONCLUSION

Security issues affecting systems and computer networks connected to the Internet, require the use of solutions to consider different types of incidents and threats that may affect the resources necessary data applications such as and support systems. Antivirus products, firewalls, VPN solutions, antispyware products, etc. are commonly used to protect against different types of malware, against interception confidential data transmitted over IP networks public and to protect internal networks organizational against hostile foreign action. Detection/ prevention systems provides mechanisms to detect activities, suspected to be considered as having the character intrusive, and can affect data integrity and applications implemented. Intrusion detection, as such is not sufficient to limit the consequences various malicious intrusions from within or outside the organizational network. The major challenge, in this case refers to the fact that the implementation an effective mechanism to prevent intrusion can affect the normal function system to be protected. Therefore, need to implement effective solutions detection / intrusion prevention involves providing detection and prevention methods that do not affect the services provided by the system, but also prevent the consequences of fraudulent actions launched by intruders from outside the organizational network.

REFERENCES

1. Gregg M., Kim D. Inside Network Security Assessment. Guarding Your IT Infrastructure,TechRepublic,http://search.techrepublic.com.com/search/Network+Security+Assessment.html
2. Grime R. Implementing Vulnerability Scanning in a Large Organisation, SANS Institute, June 2003, http://www.sans.org/reading_room/whitepapers/case studies/1103.php
3. Jones A., Sielken R. Computer System Intrusion Detection: A Survey, White Paper, http://www.cs.virginia.edu/~jones/IDS-research/Documents/jones-sielken-surveyv11.pdf
4. Lundin E., Jonsson E. Survey of Intrusion Detection Research, Technical Report nr. 02-04, 2002.
5. Petersen R. Security Breaches: Notification, Treatment and Prevention, EDUCAUSE review, July/August 2005,http://www.educause.edu/ir/library/pdf/erm05413.pdf
6. Walters N. Into the Breach: Security Breaches and Identity Theft, AARP Public Policy Institute, July 2006,http://assets.aarp.org/rgcenter/consume/dd142_security_breach.pdf
7. Zdrnja B. Two Factor Authentication Evaluation Project,White Paper, The University of Auckland, New Zealand,November 2005, http://www.auckland.ac.nz/security/

1 images/2FAReportv1.pdf

8. *** Recommended Practices on Notice of SecurityBreach Involving Personal Information, Office of PrivacyProtection, February 2007, http://www.privacyprotection.

2 ca.gov/recommendations/secbreach.pdf

9. *** Next Generation Data Auditing for Data BreachDetection and Risk Mitigation, TIZOR Mantra, 2007,http://hosteddocs.ittoolbox.com/Tizor021507b.pdf
10. *** Using a Network Analyzer as a Security Tool, Network Instruments, 2004, http://www.netinst.com/assets/pdf/SecurityWhitePaper.pdf

INFORMATION RESOURCES MANAGEMENT AT THE RO NAVY LEVEL IN A NEW GEOPOLITICAL BLACK SEA ENVIRONMENT

CPT CDOR ENG. Dragoş DINCĂ

"The sea brings great hope to each man, as sleep brings dreams"

Cristofor Columb

INTRODUCTION

Sea and planetary Ocean means for humanity source of life and wealth at the same time. Maritime transport accounts for almost 90% of total world trade. In conditions in which the world powers have risen due to the ability to master and use the vast waterways, also Romania needs to capitalize at full capacity build facilities by the Danube and Black Sea opening. Gathering information from the Black Sea, their timely transmissions and dissemination to decision makers and protect the information flow in zone to hold supremacy in the area, are vital in this context. So, in a word, strengthen information resources management in the area will play a decisive role in zonal policy that Romania will apply in the near future.

I. BLACK SEA GEOPOLITICAL ENVIRONMENT

I. 1. Black Sea - confluence of risks and threats area

Since ancient times, the Black Sea was a transit zone of economic, political and strategic interests. In support of this claim, recall the ancient caravans and shipping lines which have established the Silk Road linking East and West civilizations, and frequent trips of major strategists of the time for military and economic purposes from south to north and vice versa. It

should be noted that South-East Europe, including the Wider Black Sea is the only European region where there is still "frozen conflicts" of which settlement is the subject of the international security structure's debate.

The struggle between East and West is going to encompass the entire Black Sea region in the coming years, often with military implications and power stakes, but Romania and Bulgaria will have won. One reason is energy security, which brings up South Stream pipeline that will transport billion cubic meters of natural gas from Russia under the Black Sea to Bulgaria and then in Western Europe.

Then all through Bulgaria, pass its competitor South Stream, Nabucco project, a pipeline that would carry huge amounts of gas from Iran and Central Asia through Georgia, Azerbaijan, Armenia and Turkey to Europe.

So, these pipelines that carry Russian fuel and its alternative to long challenged, the Iranian one, offer economic context for these emerging conflicts.

In according with the National Security Strategy's provisions, Romania is located in an area of strategic military interest sensitive to the transformations and influences of the four areas: Central European (future regional prosperity pole), South-Eastern Europe (generator of instability) at the CIS (deal with the crisis of legitimacy) and the Black Sea (southern flank of strategic importance for NATO and the EU and transit route for energy resources from Central Asia to the West).

Started with political and military visible reality, "increasing the role and place of the Black Sea in Europe's energy and security concerns", Romania's security strategy makes that medium and long term objective "building a climate of security and prosperity" in this area, a process in which Romania, by position of member of NATO and the EU, wants to become a "dynamic array" of stability and welfare in the Black Sea area.

The force elements of to the Black Sea region are the region's geostrategic status and oil's geopolitical. Geostrategic status of the Black Sea as a regional platform for security is closely linked to the European fight against terrorism and asymmetric threats. Black Sea represents a barrier and also an outpost of global European fight against asymmetric threats from Asia and the Middle East.

Geopolitics of oil and natural gas supply corridors highlights the importance of the link between the Black Sea and Caspian Sea. Black Sea was also seen along a bridge between Europe and Asia, as an intersection of transport energy and resources roads, characterized by a large shipping and dense port infrastructure.

Romania's major interests in the area concern of:

- To promote improvement and update the international regime of the Danube and Black Sea;
- The development of Romanian logistics services and infrastructure maintenance;
- Deterring and dismantling organized smuggling mechanism;
- Deter acts of obstruction of navigation, training and maintaining safety image and sense of the path of transport, cargo and crew in river-maritime area of Romania;
- Maintaining optimal military river-maritime safety structures.

I.2. The concept of maritime security

International shipping and maritime community uses four basic terms for the concept of maritime security: maritime security, maritime safety, maritime security operations, sea warning on the situation. Thus:

- Maritime security is international and inter-agency work, civil and military, which aims to minimize risks and to counter the threats posed by illegal or dangerous activities of maritime, to enforce law, protect citizens and the national and international interests. Maritime security will focus on specific measures to counter the use of illegal maritime domain.
- Maritime safety include the measures taken by national and international authorities to ensure safe navigation of vessels, to transport goods by sea, prevention of accidents, pollution, undesirable and accidental effects of maritime legal activities.
- Maritime security operations refers to actions taken at sea by specially equipped military and civilian authorities with appropriate resources and authority to act against risks and threats that affect maritime security.
- Warning maritime situation relates to the field of naval domain management information that may impact on maritime security. Ideally sea warning on the situation should include as many sources of information, international and inter-agency, possibly, more alert on the situation involving maritime timely exchange and analysis of various information from various sources to extract some conclusions to the action and that in other circumstances would go unnoticed.

The main subject treated on this paper refers especially to the last sub concept that is listed above in the field of marine information management, technical support and its operations.

I.3. Information operations to counter security risks from maritime space

To be able to contribute effectively to the prevention of terrorism and the achievement of maritime security, future naval actions require commitment of forces and means (in coordination with other political and diplomatic activity level) to act on the information system of actors which working in marine environment in order to protect one's own.

This involvement in the information environment is more obvious today, when in the NATO-led operations, we see that are planned and conducted information operations to ensure an appropriate response actions to the opponents in this environment.

The terrorist activities in marine environment have specific characteristics. Those who are plotting terrorist acts at sea, enjoy complete freedom in the choice of location, timing, target and how to carry out the attack. It is impossible to judge precisely the areas where attacks may occur.

This threat is long-range and includes several regions that use different languages and traditions. Under these conditions, the actions of public information and damage information influencing terrorist organizations are difficult to planned, executed and evaluated.

Information can be manipulated using disinformation / deception, electronic warfare and computer network operations. modified information by such methods can determine that any decision which was based on such information may be incorrect or at least made for ourselves. It can act to prohibit access to information by using the opponent's security measures operations, electronic measures or destruction and degradation of information or communication systems. Such actions may also prevent the opponent's decision.

Systems used to process information obtained by the enemy can be our actions target to prevent the proper functioning of their systems.

The enemy command and control process can be slowed or prohibited by destroying or damaging the system, structures or personnel which operating the system. The opponent’s prohibition or command and control system damage reduces its ability to maintain command and control of political and military activities and affect its efficiency.

During the maritime security operation, the information operations work to influence and / or shape the opponents decisions or potential opponents especially with landlocked countries. The activities carried out by naval forces have effects in the information environment such mere presence of naval forces in the area of operations determined to prevent illegal actions.

I.4. Developments in the security environment in the Black Sea

Romania's Navy go through a period of structural change and action related to the need full integration into NATO and the adaptation to the requirements of common European objectives of quality defense in the new EU member Romania.

Romania's status as a member of NATO and the European Union, the evolution of geopolitical relations in the Black Sea and its adjacent regions have major implications on the role, place and destination of the armed forces in general and Navy in particular. Romania's option of achieving a future naval forces, capable of performing both traditional naval missions and combat missions asymmetric risk was determined by the current capacity of the Romanian economy to support military and reduced structures and by the diversity of actions that Navy are engaged.

In the same context is the participation of Romanian Navy, in cooperation with other state institutions involved in these tasks, to the naval combat terrorism and other risks prevent and threats to the security such as organized crime, drug trafficking, trafficking illegal arms and illegal exploitation of marine resources in the maritime and inland sovereignty of Romania. Navy may lead military action and / or non-military framework for both national and

international, independent and / or in cooperation, under national or management-led NATO / EU / UN.

The assessment of political and security situation in the Black Sea, have proposed various options for ensuring maritime security and the definition of military operations to combat new types of threats, especially terrorism, transnational organized crime and illegal activities. Variants started from different risk assessment and perception of involvement of NATO in the region by regional states as follows:

- Extension BLACKSEAFOR missions in missions to prevent terrorism and illicit trafficking of weapons of mass destruction and related materials;
- Conducting a national permanent operations in territorial waters, contiguous zone and exclusive economic zone;
- Planning and execution of naval operations own BLACKSEAHARMONY type can be developed with the support of interested allies and could be connected with the OAE and CC MAR Naples.

This should be an inter-organizational, sitting as a whole run.

The operation is performed in accordance with the UN Charter and Security Council resolutions 1373, 1540 and 1566 which call for cooperation of States in the common effort to deter, prevent and destroy terrorist threats and illegal trafficking of NMA and their carriers.

II. RO NAVY AREA OF RESPONSIBILITY, MISSIONS, GOALS AND OBJECTIVES

II.1. RO Navy area of responsibility

Area of responsibility will be between parallel Vama Veche to the South, limits of territorial waters to the East and parallel Cardon to the Nord and will include: Danube maritime territorial waters, contiguous zone and exclusive economic zone that has not been defined.

Romania's territorial sea comprises large strip adjacent shoreline or, where appropriate, the inland marine waters with the width of 12 nautical miles measured from baselines.

Contiguous zone of Romania's territorial sea is adjacent strip of sea that stretches into the distance offshore to 24 nautical miles measured from baselines. On the contiguous zone, Romania exercises control to prevent and suppress violations of laws and regulations on customs, taxation, health, and illegal crossing the state border.

Romania's exclusive economic zone is established in maritime space Romanian Black Sea coast, located beyond the territorial sea and adjacent waters, in which Romania exercises sovereign rights and jurisdiction over resources and in the various activities related to exploration, operation, protection, environment conservation and all management. In specific conditions,

determined by the size of the Black Sea, the extent of economic zone shall be determined by agreement with neighboring countries, taking into account that the maximum width of the exclusive economic zone in accordance with United Nations Convention on Law of the Sea, ratified by Romania by Law .110/1996 can be 200 nautical miles measured from the baseline. Just two years ago, Romania scored a major legal and diplomatic success.

So, by the decision 2009 / 9, in The Hague International Court of Justice ended the dispute between Romania and the Ukraine regarding the Serpent Island. Of 12,200 km square seas, 9700 km square returned of our country. The court's decision end negotiations started 42 years ago, in 1967, between Romania and the former USSR.

II.2. RO Navy Missions

The main RO Navy missions are:

- Support national authorities in combating illegal activities at sea and river;
- Naval surveillance and early warning at sea, sea and river;
- Participation in the evacuation of Romanian citizens abroad (noncombatants evacuation operations);
- Protection of river and maritime communications;
- Participation to repel aggression from the sea and river;
- Hydrographic survey, land navigation, map editing and providing marine and river road Hydro-meteorological Service;
- Participation in collective defense operations, crisis response, peace support, humanitarian assistance, led by NATO, EU, OSCE and the UN;
- Participation in regional initiatives for cooperation in defense and implementing measures to increase confidence and stability in the Black Sea;
- Participation in limiting and reversing the effects of natural disasters, evacuation and protection of people and property;
- Support search and rescue activities organized by maritime authorities

II.3. RO Navy Strategic Goals

The main RO Navy goals are:

- To protect and promote the interests and sovereign rights of Romania, the sea and the river, alone or with other forces, alongside the NATO, EU and other regional and international organizations in carrying operations in the responsibility area, sea and from sea to land, the Danube and in the lagoon to: protect and maintain access to the sea of Romania, preserving its territorial integrity, maintaining freedom of navigation on the waterways communications, victory;
- To contribute to measures to ensure regional stability, the collective defense alliance and coalition military systems, through participation in peace support operations in maritime security operations and regional initiatives;
- to assume for Romania a role as regional security factor, the dynamic vector of security in the Black Sea region and to empower Romania's NATO and EU missions resulting from the Romanian Navy General of the Romanian Army missions: Romania's contribution to security in times of peace, participation in the defense of its allies and promoting regional stability and support local governments in civil emergencies;

II.4. RO Navy Objectives

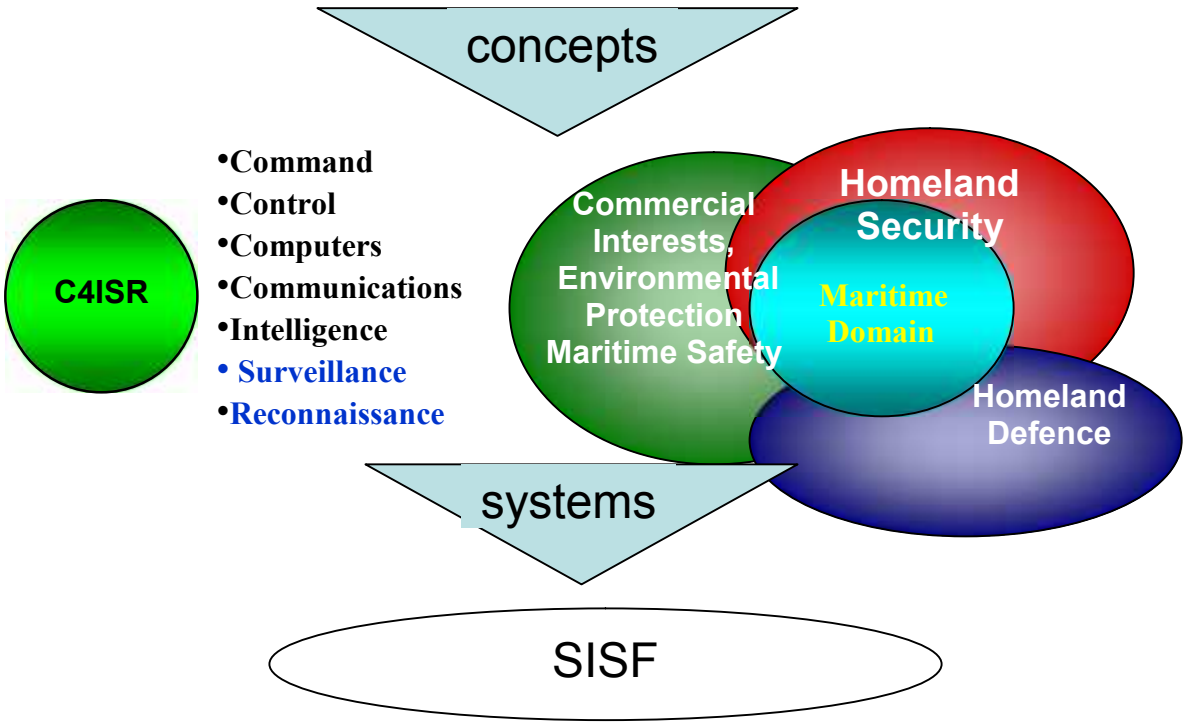
The main RO Navy objectives are:

- Support the Navy structural modernization ;
- Support the navy training (the Navy Forces shall be organized, trained, and equipped primarily for prompt and sustained combat incident & operations at sea and Danube river);
- Support the force goals assumed;
- Support of next military actions: naval representation, humanitarian assistance, search and rescue, disaster and accident involvement, non-combatants evacuation and transport troops and material, support EOD, naval presence, naval development, demonstration of force, embargo and quarantine , arms control, military support of civil authorities, combating piracy and armed robbery at sea, restoring the rule of law, combating terrorism, naval interdiction, information operations, psychological operations, monitoring and research, banning / blocking the action of enemy forces in the areas / districts and alignments of particular importance to establish control over an area or point / district required crossing, naval blockade, naval cover, mine - bad and mine clearance, hitting targets in sea, search and attack surface ships and submarines, amphibious operations, special operations and fire support.
- Support the international missions and in theaters of action (Navy personnel are expected to perform a broad range of missions – from conventional and irregular warfare to humanitarian and disaster relief – using newer, more advanced platforms and technologies. These capabilities require Sailors to develop new competencies to meet evolving mission needs);
- Support the procurement and modernization programs, especially:
  - Strategic programs;
  - Further the carrying out programs:
    - ❖ NAVCIS to support the concept C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance) when implementing the concepts of network-based war (Network Centric Warfare - NCW) capabilities and NATO Network Enabled (NATO Network Enabled Capabilities - **NNEC)**.
    - ❖ SCOMAR to support the concept supervisory and monitoring of maritime traffic.

III. RO Navy information resources management integrated system (RO NAVY IRMIS)

III.1. Romanian Navy's contribution in the information resources management on the Black Sea Region

Starting from the basic tasks in conjunction with the RO Navy's strategic objectives it can easily see the involvement which RO Navy have on management and taking advantage of information resources in the Black Sea. Of course this is a complex process that can not be removed from a national context in which RO Navy have a substantial technical and operational input. **RO Navy information resources management integrated system (RO NAVY IRMIS)** is the system that allows Romania to manage resources information and take the role as enabling regional security factor and dynamic vector of security in the Black Sea region. Since 2004 to present the RO Navy decided to modernize its IRMIS parts by running in parallel the development of three interconnected systems. IRMIS development not come only a requirement that Romania is a NATO member and has a strategic position political and military speaking but also as a natural replacement of an obsolete soviet origin equipment.



RO NAVY IRMIS is interconnected with similar systems of cooperative institutions in the following ministries: Ministry of Interior and Public Administration, Ministry of Defense and Ministry of Transport. IRMIS fulfill 4 mains Navy missions, such as:

- Naval surveillance and early warning at sea and river.
- Support national authorities in combating illegal activities at sea and river;

- Support search and rescue activities organized by maritime authorities
- Assume for Romania a role as regional security factor, the dynamic vector of security in the Black Sea region and to empower Romania's NATO and EU missions resulting from the Romanian Navy General of the Romanian Army missions.

  The implementation of this system was strictly adhered to two basic concepts:
- The concept of C4IS in according with national plans and those developed by NATO;
- The concept of surveillance and monitoring of maritime traffic.

RO Navy can participate not only in national supervisory operation of shipping but also in the collection, dissemination, processing and transfer of information to decision makers in the area of interest. Technically this process is supported by:

- Sea and river military vessels;
- SIGINT systems installed on ships;
- NAVCIS Navy integrated communications and IT system;
- BRASS Broadcast ship-shore system;
- SCOMAR complex integrated system of observation, surveillance and control of traffic on the Black Sea.

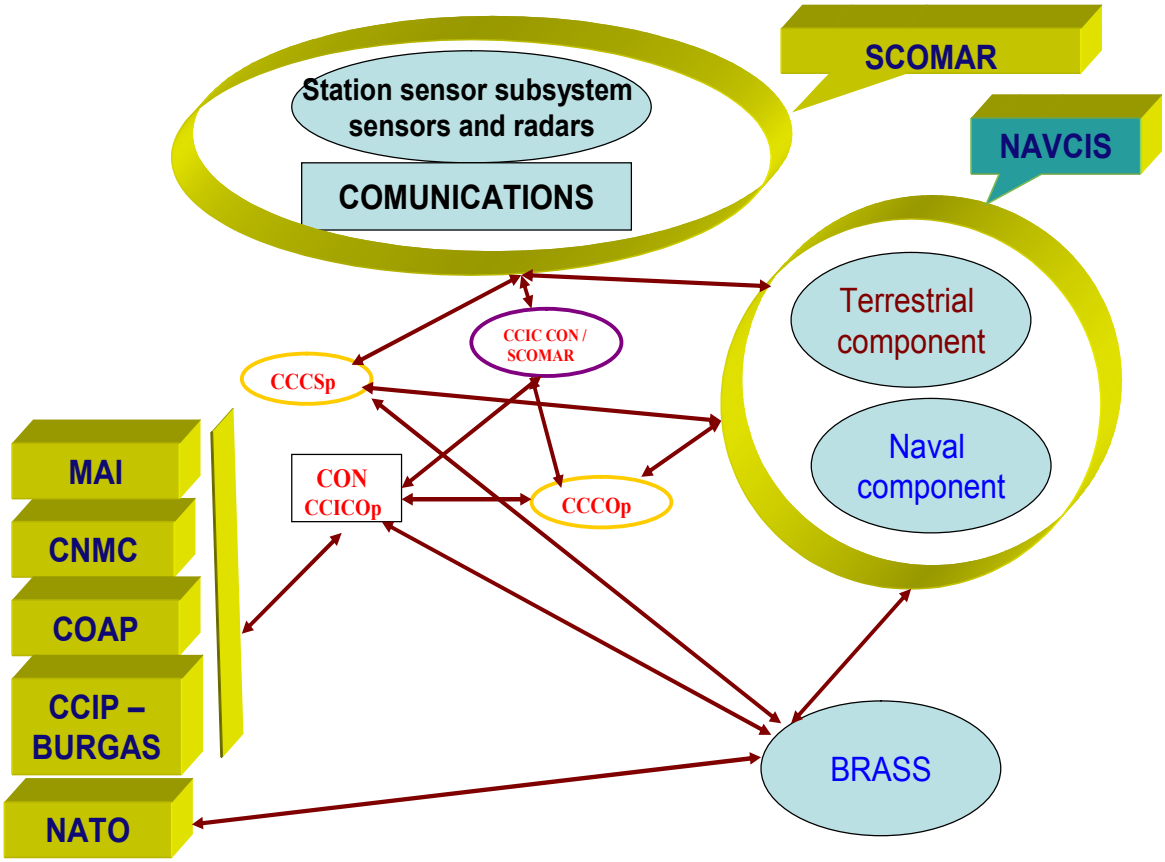
By existing ships in the Navy at this time, we can run missions in the naval operations, ships type frigate, corvette, minesweeper, escort ships and river vessels.

For missions essential requirements ships have special equipment such as:

- Data transmission equipment in real time, on the naval situation;
- Encrypted communications and information management;
- Standard equipment VBSS team
- Boats on minesweeper board to transport VBSS teams for execution of the inspection of suspected ships ;
- SIGINT systems installed on ships (information captured systems)

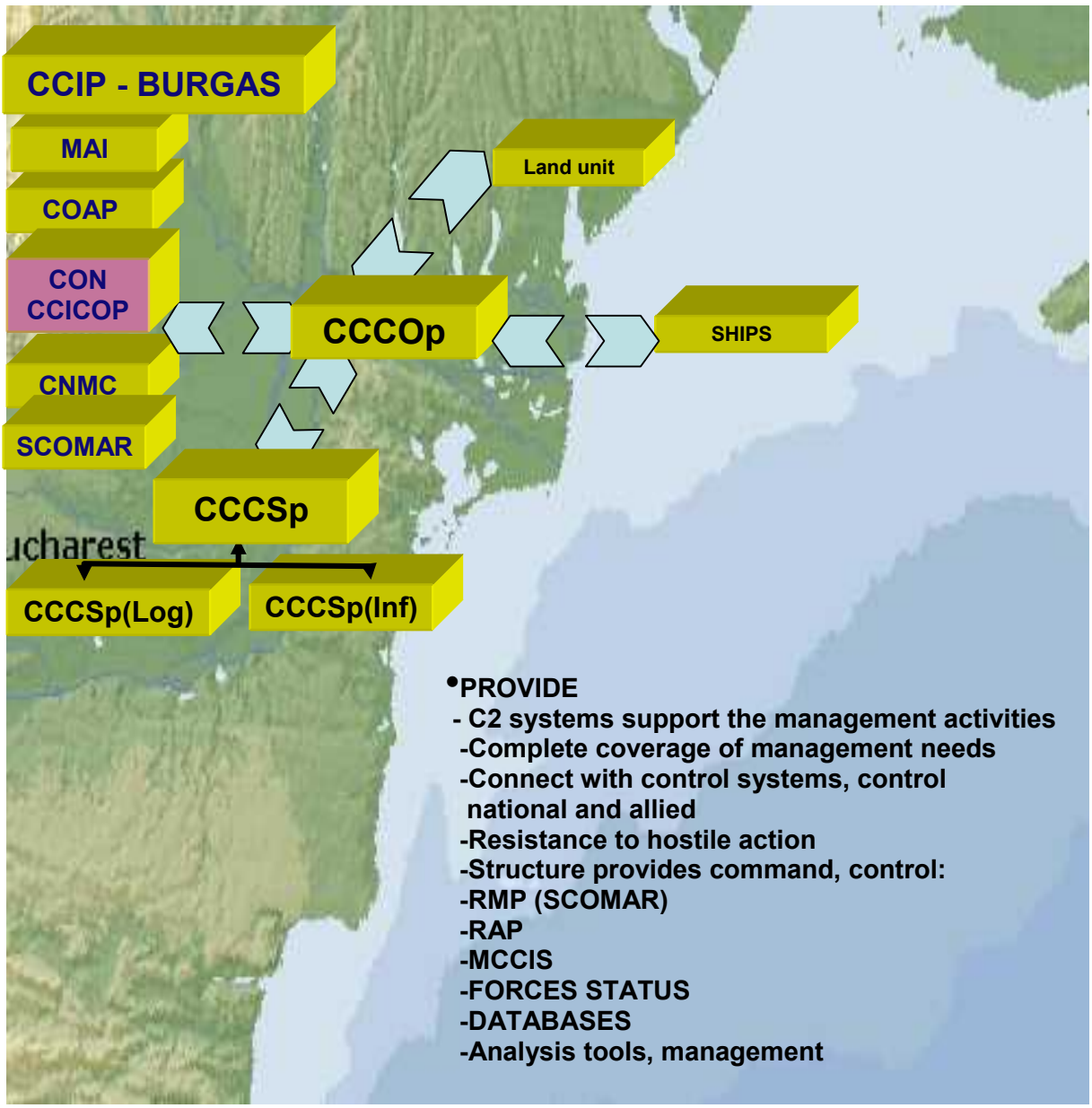
Another essential element of the Romanian Navy participates in this process is SCOMAR which has as main objective observation, supervision and control of the Black Sea Romanian border. Once captured, the information are processed and transmitted to users / decision makers through the Navy integrated communications and IT system in support for theirs appropriate transfer activities, unaltered and protected. The operation of maritime traffic monitoring is connected to VRTMS (Virtual Maritime Transfer Management System) and also with the Coordination and Information Center of the Border Police on the Black Sea - Bourgas concerning to illegal activities in the Black Sea.

The simple chain of the BPs at the *(IRMIS) level* – nodes and information flow



Central node of this system that operating at the RO Navy level is Naval Operational Command that it provides not only the centralization of information captured in the area of interest but also centralizing data received from NATO, border police and Romanian Naval Authority. Also Naval Operational Command send the decisions made to own ships and other institutions involved like MAI, MoND, CCIP Burgas.

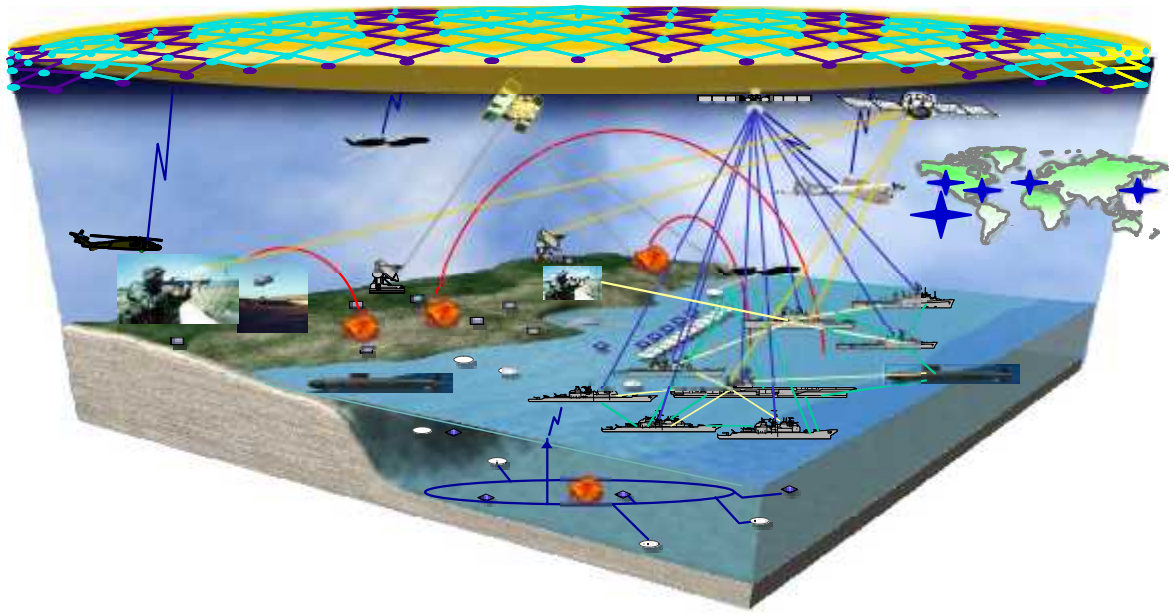
Exchange information with Center of the Border Police on the Black Sea (CCIP) is through RO border police. It's necessary to take in considerations that the CCIP Burgas handles more than sea smuggling and not to the terrorist activities or weapons of mass destruction traffic.



III.2.The concept of C4IS in according with national plans and those developed by NATO

The *C4I For The Warrior (C4IFTW)* concept sets forth a 21st century vision of a global information infrastructure, referred to as the *global grid*, that will provide virtual connectivity from anywhere to anywhere instantaneously on warrior demand.

This grid connects commanders, sensors, weapons systems, etc., and is made up of a web of computer controlled telecommunications grids that transcends industry, media, government, military, and other non-government entities.



The *Network-Centric Warfare (NCW)* concept) develops these ideas somewhat further. Network-Centric Warfare is described as a derivative of *network-centric computing*. Just as network-centric computing is being exploited to provide competitive advantage in the commercial business sector, the emerging concepts of Network-Centric Warfare exploit information superiority to provide a competitive edge in warfare. Grid concepts are key elements in Network-Centric Warfare.

C4ISR coherent approach derives from the urgent requirements to provide the fighter with a number of network enabled capabilities such as information collection, processing and sharing, forces tracking, joint operational picture, quality of decisions and commands efficiency. NATO capabilities expanded involve improved methods or new methods of command and control operations. This means that the introduction of new capabilities can lead to profound changes in defense organization, both technical systems and by using tactics and personnel training. The process of making and developing C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance) solutions keeps account of the implementation of network-based concepts of war (Network Centric Warfare - NCW) and NATO capabilities Network Enabled (NATO Network Enabled Capabilities - NNEC).

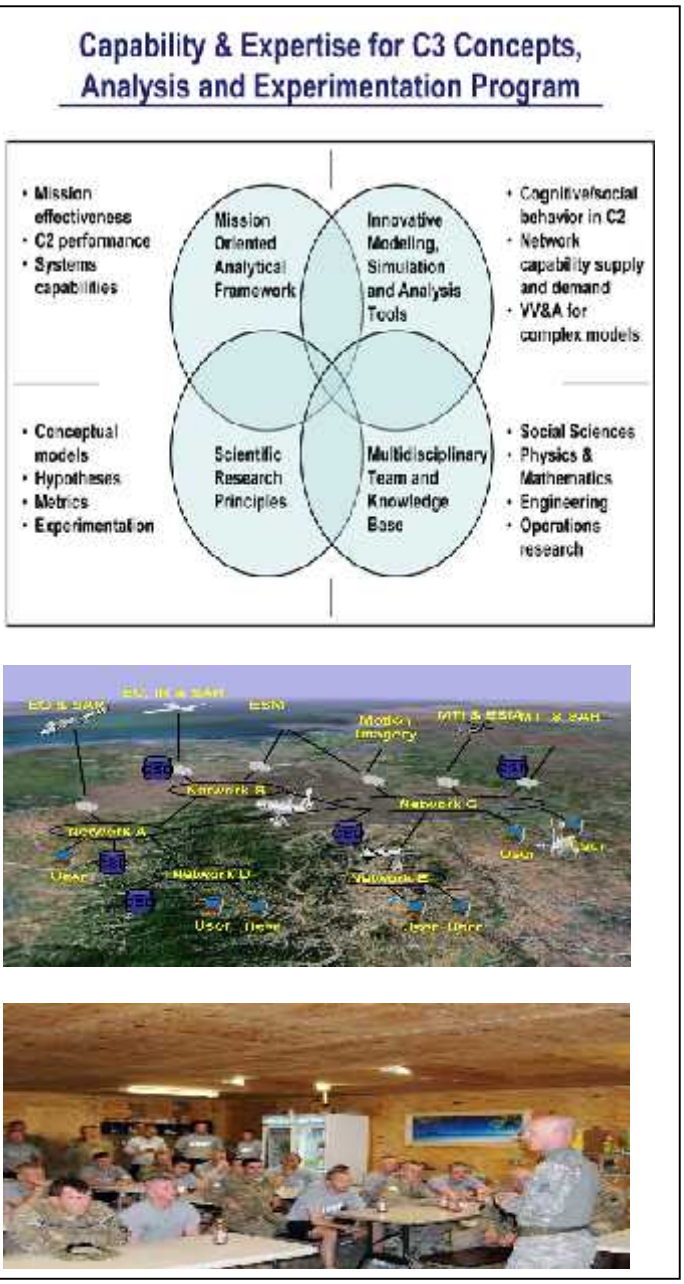
At the NATO level, when we discus about defense transformation one of the important concepts that we must address is that NNEC which, on medium and long term, will produce changes in certain areas of doctrine, organization, training, technical, management, personnel, facilities and interoperability. The main purpose of achieving NNEC is to develop the most aspects of network capabilities and transforming information. To achieve and transform JISR its necessary to run an development program of its components as follows:

- Sensors HUMINT (human research);
- IMINT sensors (picture research);
- Sensors SIGINT (Signals Research);
- Communications and information systems (CIS) fixed or deployable;
- Command and control systems (C2) for AIR and NAVY.

- *Joint Intelligence **D**octrine, **O**rganization, **T**raining, **M**ateriel, **L**eadership, **P**ersonnel, **F**acilities, **I**nteroperability* - (Effective C2 Capability)

- *Joint Intelligence Surveillance and Reconnaissance* – **JISR**

- *Joint Common Operational Picture* - **JCOP**



Navigation systems should be considered as part of technical component. Facilities can be platforms for sensors, fusion centers, data processing sites, warehouses or other physical locations. Leadership must be developed to ensure that JISR means are optimally used in order to ensure command and control. Meanwhile doctrinal component must be prepared to engage JISR means at full capacity. Staff training should cover both the professional and ethical and educational areas to ensure optimal coexistence with the human dimension and technical information. Interoperability must be above all the entities involved in JISR activities in order to improve cooperation and disseminating data and information.

III.3. The concept of surveillance and monitoring maritime traffic

Supervision is an important element for the exercise of national sovereignty at sea and its running in other areas besides the military. These areas are fisheries protection, environmental protection, transport safety at sea, border police. Increase interoperability and achieving integration between maritime surveillance and monitoring systems of different agencies cooperate in the marine environment is an important factor in achieving a uniform approach to these activities and to form an integrated maritime doctrine. To achieve an integrated surveillance system Navy intended to develop an interoperable system in order to coordinate, monitoring and tracking all of existing and which are used for security, safety and marine environment, fisheries control and border protection.

Such an integration of existing systems or those to be implemented is considered a key action to improve activities in this field.

- AIS

- Vessel Traffic Services VTS

- Oil tancks (WETREP).

- LRIT – Long Range Identification and Tracking

- Vessel Monitoring System-VMS

The most important VTS (vessels traffic surveillance) system is intended to establish the safety of navigation in certain areas with heavy traffic. It operates primarily in ports and coastal areas where there is a high risk on safety of navigation, usually in these areas VTS operate in conjunction with the TSS (Traffic separation system). VTS infrastructure consists of a state willing to shore, where staff monitor maritime traffic situation in the region. Are used radar and radio on ultra short-wave where ships transiting the area.

In general are made visual observations and using sometimes video cameras or infrared. Can be used auxiliary systems such as direction finding device for determining bearing to a radio

transmitting station. In most cases the control center and sensors (radar, cameras) are placed in the same place, but for most VTS systems sensors are disposed in other locations than the Control Center due to increase the coverage distance. Currently AIS signals received in the same location with VTS systems are integrated and displayed on the same screen. The VTS is designed primarily to ensure the safety of large ships, equipped with sensors can not detect small vessels. System operating requires installation on shipboard of an navigation equipment for safety achievement (a radio station and small vessels of a passive radar reflector). International Association of headlights operators (ALA) provides a list of ports and coastal regions where VTS is installed. This can be accessed on the Internet. Can be access the necessary data to sailors which sailing in the region. In this database are includes only those that meet a certain level required by international standards, but actually there are many more operating systems. The implementation of this concept is almost finished at the MoND and MAI level creating the SISF (integrated border security system). SISF is the main instrument in order to exercise the integrated management of the state border of Romania. By its nature, SISF is part of complex systems and has multiple sub-autonomous complex component in a close networking, different technological, contextual, operational, geographical and conceptual framework. It completion it's a priority to Romania, in terms of security of their borders and the EU's external border, in the perspective of the European area of freedom, security and justice. In the light of EU accession, making SISF is a commitment by the Schengen Action Plan, revised in 2006. SISF has two components the operational and the technical component. Border surveillance subsystem provides observation and specific actions border by applying technology-based sensors, radar, or their combination.

Information from sensors is transmitted to the control centers by communications subsystems using and are processed by the IT subsystem. Border surveillance is based on mobile and fixed surveillance platforms. For monitoring the inland marine waters, territorial sea, contiguous zone and exclusive economic zones of Romania is using an integrated traffic control and surveillance of vessels from the Black Sea named SCOMAR, including:

- Costal stations sensors;
- Communications infrastructure;
- Command and control center;
- Units of naval intervention..

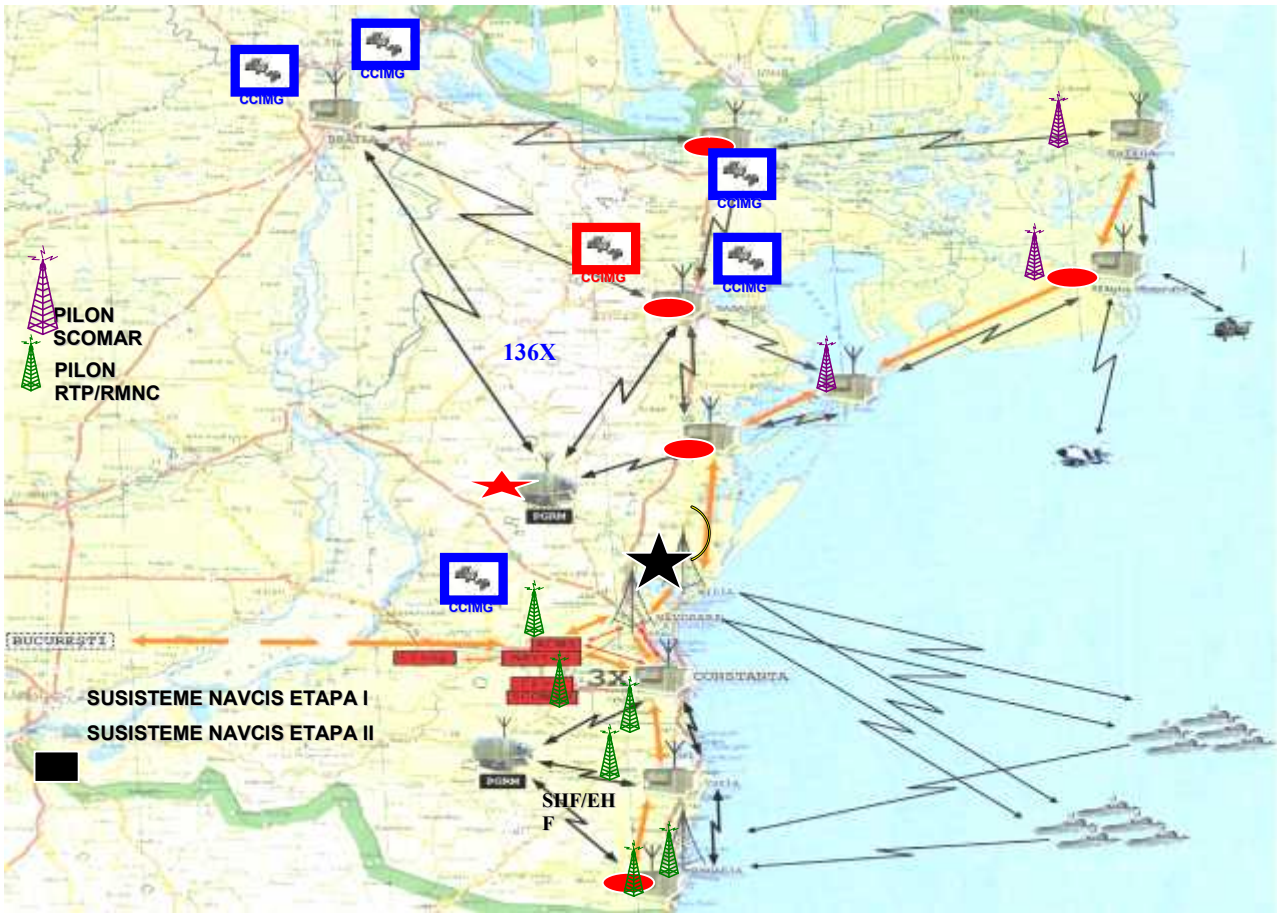
SCOMAR exchange information and tactical surveillance by linking with similar systems belonging to the collaborating institutions in the following ministries: Ministry of Interior and Public Administration, Ministry of Defense and Ministry of Transportation. Also it provides the following functions:

- Detection and identification of targets by radar sensors and optoelectronics;
- Transport and fusion of information in command and control center;
- Sending provisions to their intervention units land, sea or air.

IV. RO NAVY – IRMIS ARCHITECTURE AND BUSINESS PROCESS

IV.1. NAVCIS- RO Navy integrated communications and IT system

NAVCIS is intended to support information management activities appropriate to its transfer, unaltered and unconspiracy, from suppliers to users, and between correspondents, and its processing for the command-control support act



Missions

- modernization and development of communications and structures already in place;
- Development of communications and computing capabilities to enable full interoperability new specialty with national and NATO structures;
- Providing unified communications and computer equipment;
- Ensuring own maintenance capabilities and to equip the Navy institutions with specialized equipment necessary of the educational process.

Architecture

Terrestrial component:

- Command and control center operational level-CIS CCCOp
- Command and control centers support) - CIS CCCSp (information, logistics)
- Joint Communications and Information Center - CCIC CON / SCOMAR
- Structures communications and tactical level-SCTL
- Communications and regional centers, mobile - CCIZM
- Centers for communications and mobile group - CCIMG
- Repeater site equipment RSE
- Individual communications equipment
- Command and control center level operative CCCOp
- Centre command and control support (information, logistics), tactical-level CCCSp

Naval component

Command and control systems on ships CCS:

- Command ships serve as the flagships of the Commander - CS
- Integrated communications and information systems on ships CIS
- Command center (often called a war room) - CCW
- Command and control warfare C2W
- Electronic warfare (EW)
- Signals intelligence (often contracted to SIGINT-COMINT,ELINT, MASINT/IMINT, Optoelectronic, UWDAR)
- Automatic Identification System (AIS)
- Identification, friend or foe (IFF)
- NBC
- SATCOM

Individual subscribers;

- Retransmitters centers;
- Tactical level C2 systems;
- Communications equipment
- Equipment Link 11;
- Encryption equipment,
- TETRA System
- RTP / RMNC equipment

IV.2. Data and information collecting system installed on ships

Due to technological development for military systems, almost all naval platforms, regardless of destination, may have on board, to a lesser degree or higher, data collection capabilities and information for tactical and operational-tactical. In this regard it is noted the measures adopted by several Western countries, which have continued to use and develop specialized ships, equipped with last generation systems.

Even if in the last 30 years no many ships were built specialized in military intelligence, we can say that naval powers have maintained interest in such ships and activities, while the information operations have become new values and have been used increasingly often satellite devices, maritime surveillance aircraft, electronic warfare aircraft and early warning and automated modern technical means (eg., during the Cold War, radio communications were intercepted and analyzed later).

Moving fast in the areas of operations, ships are able to collect information directly from the areas of action. So lately we have seen an increase in equipment for electronic support measures (ESM), and the collection of information signals (SIGINT), both in communications (COMINT) and the non-communications signals (ELINT) and electronic signal from the measurement footprint, by performing measurements and telemetry signal footprint.

This last fact has resulted in the emergence of new systems, performance, allowing the collection of scientific and technical information by measuring and analyzing the functional and technical parameters (quantitative and qualitative: the metric, angle, space plasma wavelength, modulation, etc..). From this point of view we noted the development of means performed for the following components in order to gather information: ACOUSTINT / ACINT, CBINT electro-OPTINT, LASINT, NUCINT, RADINT, RF / EMPINT, RINT and information from spectroscopy.

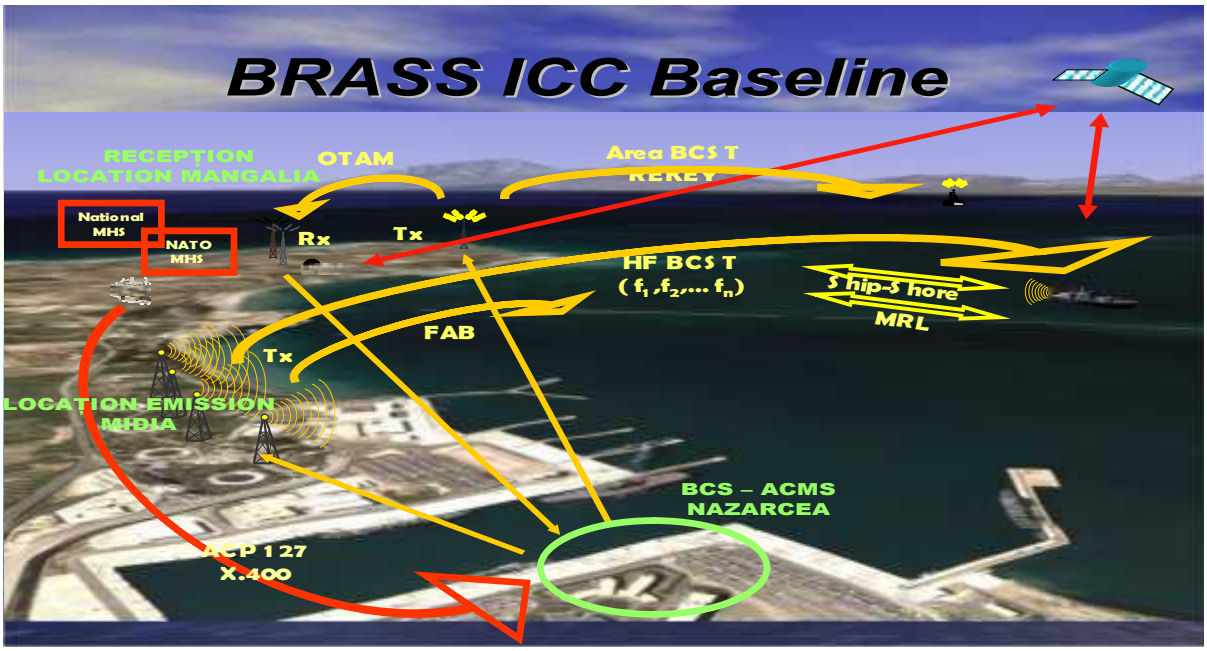
Many of these components are developed on board, as distinct elements from action, as well as items temporarily craft to participate in certain types of information support mission of combat forces.

In recent years, the development component of shipboard electronic warfare was conducted in accordance with the new concept of global action beeing emphasized, in particular, in the war against terrorism. Actually it is considered a routine to install ESM SIGINT systems capable of monitoring and intercepting radio traffic, GSM communications or radar emissions on many types of military ships and civil , from patrol boats to frigates and submarines.

IV.3. BRASS (broadcast ship-shore system) maritime communications willing to land surface, for command and control

Designation

Capability Package "Maritime Shore-Based Command and Control (C2) Surface Communications provides implementation: rekeying facility (relay), broadcasting messages sent by CC Mar Napoli and Broadcast transmissions Monitoring Facility (OTAM-Over the Air Monitoring).



As we mentioned earlier, the fleet broadcast is the primary means for delivering messages to afloat commands. This section discusses a few of the other types of circuits by which a ship can transmit its message traffic ashore or to other ships for delivery or relay.

There are three methods of operating communications circuits: duplex, simplex, and semi-duplex. The mode of operation at any given time depends upon equipment and frequency availability.

Missions

- Retransmission of messages sent by NATO - CC March Naples
- Monitoring of transmission
- Delivering messages afloat commands.

Ship-Shore (S-S) architecture

Terrestrial component:

- NODE ACMS (Automatic Control and Management System).

Naval component:

- Re-keying BCST:

- Transmitters;
- RX- OTAM facility;
- Transmitting antennas ;
- Modems;
- Encrypted;
- Auxiliary equipment interconnection.

IV.4. SCOMAR complex integrated system of observation, surveillance and control of traffic on the Black Sea.

It is an operative surveillance system based on the latest technology, which allows early detection, tracking, recognition and identification of vessels that carries illegal traffic activities on the Black Sea. Provide technical support to the transmission in real-time of the information obtained from sensor stations to a Command and Control Center and dispositions necessary to intercept threats and carrying out search and rescue missions.

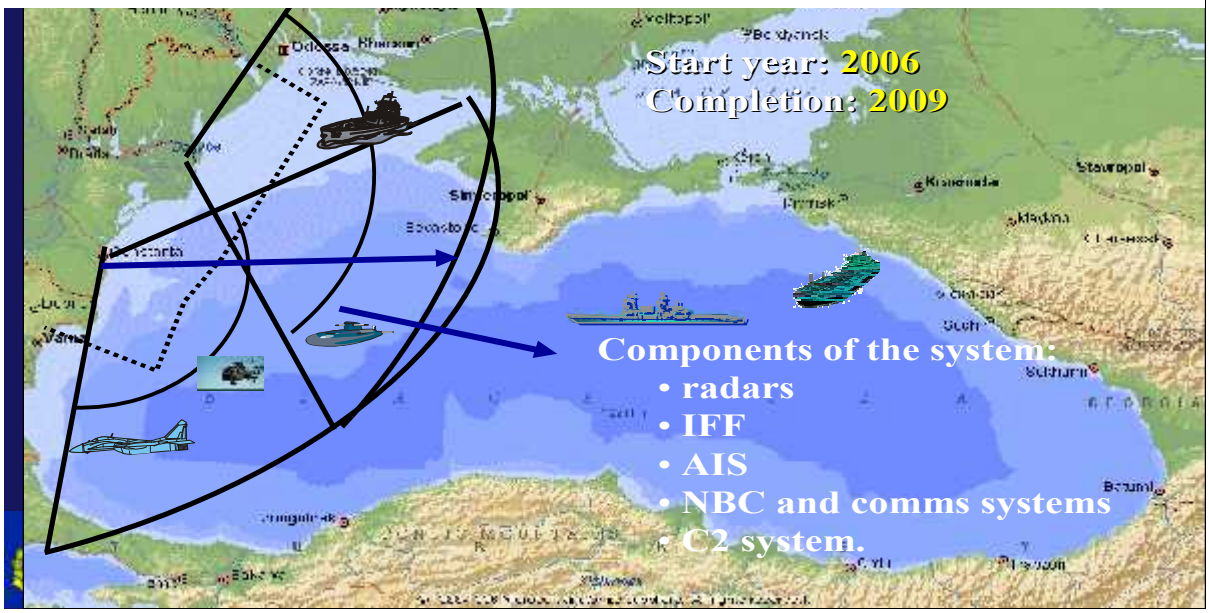
Purpose and mission:

The system is designed for awareness maritime and electronic situation in areas of responsibility and of Navy information interest. Main tasks are

- Electronic situational and awareness in maritime areas of responsibility and interest of Navy
- Electronic surveillance of the interesting information area
- Creating Single Image Recognized Maritime Black Sea (RMP-Recognized Maritime Picture) and putting it to the beneficiaries.
- Research, observation and supervision continuously evolving sea surface targets with active media (with radiation) and passive means (under the "silence" radio and radar) and the possibility of extending the research, observation and surveillance of air targets at low altitude evolving ;
- Processing of information from radar stations and from other sensors located throughout the supervised;
- Data concerning the movement of vessels (or their targets), their position and display the data of interest to Command and Control Center for the decision;
- Real-time continuous monitoring of all positions and movements of ships and navigation markers placed in the controlled area;
- Ensuring the protection of sensors and computer equipment to the action of natural and artificial disturbances;

- Permanent and mutual exchange of information on navigation and maneuver between CCC and ships;
- Computerized registration and management as much information from the system, which required: radar image, calculated by the system elements, alarms and warnings, operator actions, including trafficking telephone, radio, system status;

Integrated System for Observation, Surveillance and Control at The Black Sea (SCOMAR)



SCOMAR Allow:

- Improving surveillance process in the state border on the sea region;
- Improve navigation safety in the zone of system operating;
- Reduce illegal activities in the territorial sea and contiguous zone;
- Ensure continuous surveillance in the area covered;
- Creation of a database concerning maritime activities in the sea;
- Reduce the number of patrol boats, surveillance missions and therefore important fuel economy and resources.

System description

The system consists of the following subsystems:

- Communications subsystem, which allows data exchange (transmission images, voice and data) in real time between sensors station and Command and Control Center;
- Station sensor subsystem including sensor stations (SS) equipped with photoelectric sensors and radar;
- Command and Control Center which centralizes and analyzes all the information from sensors and send the information to other interconnected systems;

- operative intervention units (naval, land, air).

SCOMAR Architecture

- Communications
- Coastal radar
- OTH radar long-distance
- COMINT HF, VHF / UHF, ELINT, MASINT, IMINT
- Optoelectronic
- Hydro-location
- IFF, AIS
- NBC
- Software
- Center Operations

SCOMAR is ready for surveillance and monitoring, permanent (24 hours a day, 7 days a week), providing a tactical picture of the surface water of the territorial sea, contiguous zone and exclusive economic zone (up to 100 nautical miles offshore), air activity and land situation. To achieve this goal, the proposed system was designed to ensure early detection of ships and boats so as to be located before approaching the shore of the coast and thus providing Romanian Border Police reaction time essential to take appropriate action. Subsystem stations sensor detects, identifies and tracks suspicious vessels using radar and the sensor functions, by transmitting video or signals obtained to ther Command and Control Center, where the threat is analyzed and appreciated. Decisions are made by centralized command and control center (CCC), in which all information collected by the sensor system are available and presented in an organized and structured way. In addition, communication links are available for top CCC and other agencies or external organizations. Futher are transmitted interception and / or rescue dispositions, on a case by case, by specially designed structures. Overview provided by this integrated system also will be operated by other co-beneficiary authorities, such as: Ministry of National Defense, Ministry of Transport, and Ministry of Agriculture.

The main subsystems features

Communications

Are composed of a radio relay network providing voice and data communications for locations where cameras are installed in the X band and partly network RTP / RMNC which must provide the necessary communications for all SCOMAR subsystems and to disseminate information to beneficiaries.

DATA:

- PDH microwave radio equipment and SDH;

- Multiprotocol ATM switches;
- VHF radio modem installed on their ships;
- 65m 3G CDMA2000 and their ships;

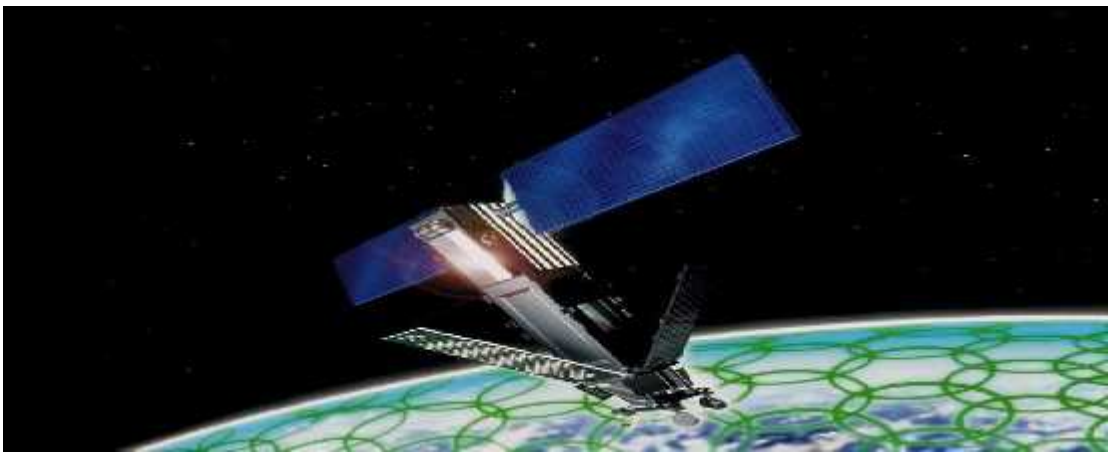
VOICE:

- TETRA network.;
- Private fixed telephone network.;
- Fixed public telephone network;
- VHF and HF communications encrypted by mobile radiotelephone;
- Mobile;
- SATCOM , IRIDIUM .

Current MoND communications satellites provide military forces with near-global, high-capacity voice, data and video communications links. These systems provide the essential conduits to supply combatant commanders with the information vital to the full range of successful military operations to include global power projection. SATCOM network provides the near-global coverage and flexibility unavailable through terrestrial-based communications networks.

The present SATCOM architecture includes both military-unique systems and MoND use of commercial services. SATCOM assets encompass the satellite payload, payload control facilities, platform control facilities and terminal capabilities required for Ultra High Frequency (UHF), Super High Frequency (SHF) and Extremely High Frequency (EHF) communications. Each frequency band has operational advantages while the aggregate combination of frequency bands provides a robust, complementary SATCOM architecture for combatant commander applications.

The Iridium System is a satellite-based, wireless communications network providing a robust suite of Voice and Data services to virtually any destination anywhere on earth.

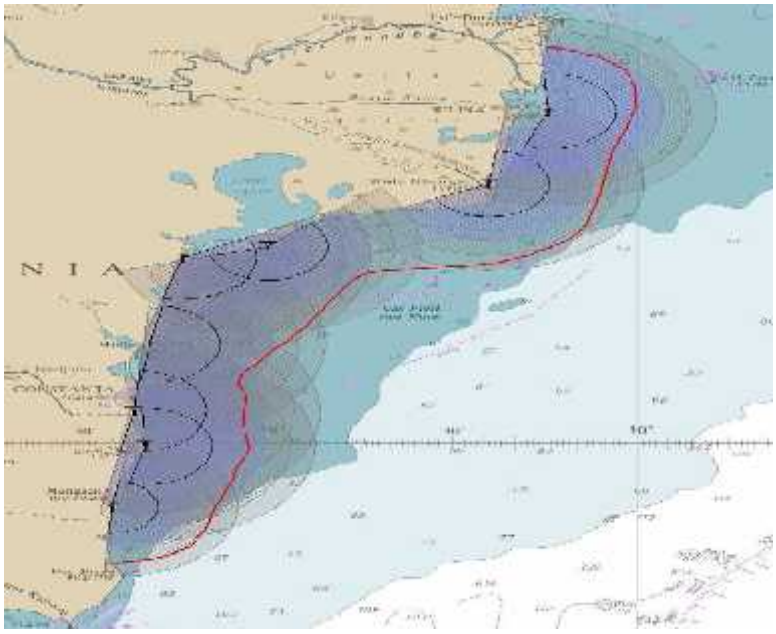


With 66 satellites forming a cross-linked grid above the Earth, the Iridium system is the first low-earth orbiting system for telephone service. Only 780km (450 miles) high, these satellites work different from those at a much higher orbit (26,000km) in two major ways. First they're closes enough to receive the signals of a handheld device; and second, they act like cellular towers in the sky - where wireless signals can move overhead instead of through ground based cells

Radar, a word created as an acronym of "radio detection and ranging", is an extremely useful family of techniques not limited to its original role of detecting the location and course of aircraft. It is used for both navigation and collision avoidance by ships and aircraft. It can detect artillery shells, rockets, and mortar shells, and track back to their point of origin so the artillery can be counterattacked. Sometimes annoyingly, it can tell when a car is exceeding the speed limit. Purpose-built radars characterize weather and the state of a water surface. Certain types can penetrate the ground and detect buried objects. Spinoffs from radar technology led to medical devices for controlled heating of tissue, and then the microwave oven. Radars have been adapted not only to be able to give range and bearing to a target, but to characterize the size and number of objects in the target, and, with more advanced techniques, actually create pictures of objects. These techniques can work through clouds and at night, where photographic imaging would be useless.

X band radars system

Compose by n radars provides naval discovery means up to 24 Mm (for large targets σ> 1,000 m2)), n receivers (AIS ship is found up to 90 mm) and Command Center with C2DB server and display stations



X –band research

The X band is a segment of the microwave radio region of the electromagnetic spectrum. In some cases, such as in communication engineering, the frequency range of X band is rather indefinitely set at approximately 7.0 to 11.2 gigahertz (GHz). In radar engineering, the frequency range is specified by the IEEE at 8.0 to 12.0 GHz.

The term "X-band" is also used informally and inaccurately to refer to the extended AM broadcast band, where the "X" stands for "extended".

X band is used in radar applications including continuous-wave, pulsed, single-polarization, dual-polarization, synthetic aperture radar, and phased arrays. X band radar frequency sub-bands are used in civil, military, and government institutions for weather monitoring, air traffic control, maritime vessel traffic control, defense tracking, and vehicle speed detection for law enforcement. X band is often used in modern radars. The shorter wavelengths of the X band allow for higher resolution imagery from high-resolution imaging radars for target identification and discrimination.

OTH radars system

This radar operates in the high frequency (HF) portion of the electromagnetic spectrum (3-30 MHz), where the electromagnetic waves "bounce" off the ionospheric layer of the upper atmosphere. OTH radar of this type can give coarse early warning of targets up to 2,000 Nmi away.

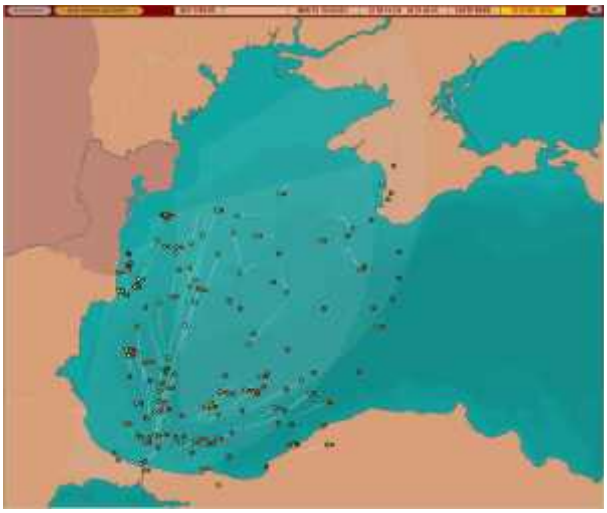
Over-the-horizon radar, or **OTH** (sometimes also *beyond the horizon*, or **BTH**), is a design concept for radar systems to allow them to detect targets at very long ranges, typically up to thousands of kilometers. Several OTH radar systems were deployed starting in the 1950s and 60s as part of early warning radar systems, but these have generally been replaced by airborne early warning systems instead. OTH radars have recently been making something of a comeback, as the need for accurate long-range tracking becomes less important with the ending of the Cold War, and less-expensive ground based radars are once again being looked at for roles such as maritime reconnaissance and drug enforcement. Radio waves, a form of electromagnetic radiation, tend to travel in straight lines. This generally limits the detection range of radar systems to objects on their horizon due to the curvature of the Earth. For example, radar mounted on top of a 10 m (33 ft) mast has a range to the horizon of about 13 kilometers (8.1 mi), taking into account atmospheric refraction effects.

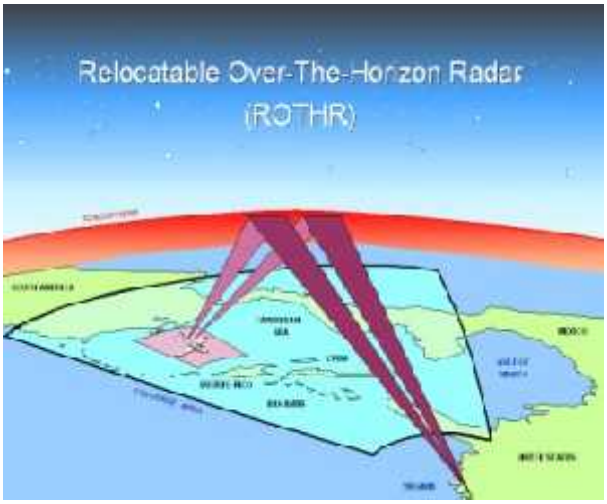
If the target is above the surface this range will be accordingly increased. so a target 10 m (33 ft) high can be detected by the same radar at 26 km (16 mi). In general it is impractical to build radar systems with line-of-sight ranges beyond a few hundred kilometers. OTH radars use various techniques to see beyond the horizon, making them particularly useful in the early warning radar role.

The most common method of constructing of OTH radar is the use of ionosphere reflection. Given certain conditions in the atmosphere, radio signals broadcast up towards the ionosphere will be reflected back towards the ground. After reflection off the atmosphere, a small amount of the signal will reflect off the ground back towards the sky, and a small proportion of that back towards the broadcaster. Only one range of frequencies regularly exhibits this behavior: the high frequency (HF) or shortwave part of the spectrum from 3 – 30 MHz. Given certain conditions in the atmosphere, radio signals in this frequency range will be reflected back towards the ground.

The "correct" frequency to use depends on the current conditions of the atmosphere, so systems using ionosphere reflection typically employ real-time monitoring of the reception of backscattered signals to continuously adjust the frequency of the transmitted signal. Given the losses at each reflection, this "backscatter" signal is extremely small, which is one reason why OTH radars were not practical until the 1960s, when extremely low-noise amplifiers were first being designed.

Since the signal reflected from the ground, or sea, will be very large compared to the signal reflected from a "target", some system needs to be used to distinguish the targets from the background noise. The easiest way to do this is to use the Doppler effect, which uses frequency shift created by moving objects to measure their velocity. By filtering out the entire backscatter signal close to the original transmitted frequency, moving targets become visible. This basic concept is used in almost all modern radars, but in the case of OTH systems it becomes considerably more complex due to similar effects introduced by movement of the ionosphere itself.





OTH - research

The resolution of any radar depends on the width of the beam and the range to the target. For example a radar with a 1/2 degree beamwidth and a target at 120 km (75 mi) range will show the target as 1 km (0.62 mi) wide. Because of the long ranges at which OTH radars are used, the resolution is typically measured in tens of kilometers. This makes the backscatter system almost useless for target engagement, although this sort of accuracy is more than adequate for the early warning role. In order to achieve a beamwidth of 1/2 degree at HF, an antenna array several kilometers long is required.

Signals intelligence (often contracted to SIGINT)

Signals intelligence (often contracted to SIGINT) is intelligence-gathering by interception of signals, whether between people ("communications intelligence" COMINT), whether involving electronic signals not directly used in communication ("electronic intelligence" ELINT), or

combinations of the two. As sensitive information is often encrypted, signals intelligence often involves the use of cryptanalysis. Also, traffic analysis the study of who is signaling whom and in what quantity can often produce valuable information, even when the messages themselves cannot be decrypted. As a means of collecting intelligence, signals intelligence is a subset of intelligence collection management, which, in turn, is a subset of intelligence cycle management.

SIGINT is defined as:

- A category of intelligence comprising either individually or in combination all communications intelligence (COMINT), electronic intelligence (ELINT), and Foreign instrumentation signals intelligence, however transmitted.
- Intelligence derived from communications, electronic, and foreign instrumentation signals.

Other definition may overemphasize "foreign instrumentation signals". That part should be considered in combination with measurement and signature intelligence (MASINT), which is closely linked to foreign instrumentation such as telemetry or radio navigation. An ELINT sensor may find a radar, and then cue a COMINT sensor for listening in on the talk between the radar and its remote users. A nonspecific SIGINT sensor can cue a Frequency Domain MASINT sensor that can help identify the purpose of the signal. If MASINT cannot identify the signal, then the intelligence organization may task an IMINT aircraft or satellite to take a picture of the source, so photo interpreters can try to understand its functions:

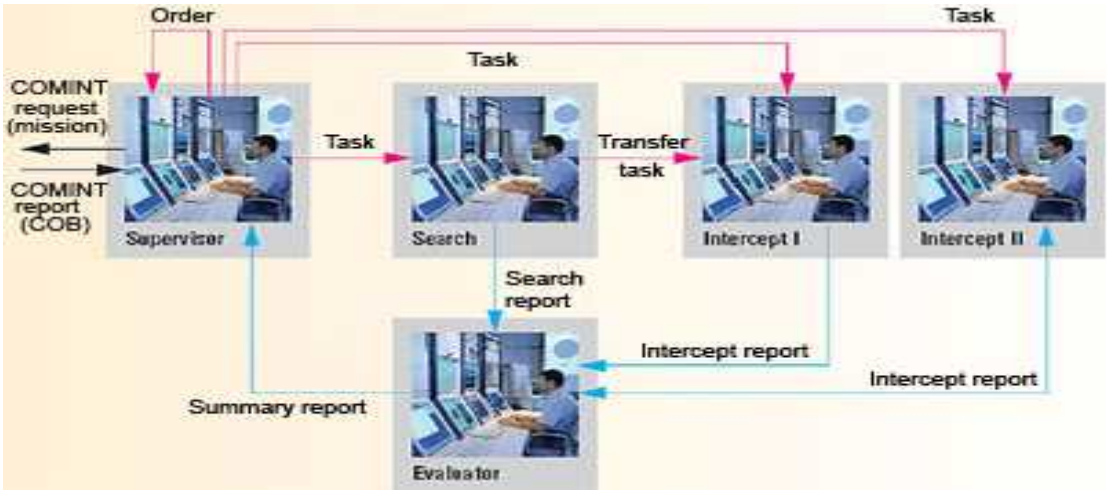
- Targeting;
- Intercept management;
- Signal detection;
- Countermeasures to interception - Spread-spectrum communications is an electronic counter-countermeasures (ECCM) technique to defeat looking for particular frequencies. Spectrum analysis can be used in a different ECCM way to identify frequencies not being jammed or not in use,
- Direction-finding,
- Traffic analysis - when locations are known, usage patterns may emerge, from which inferences may be drawn. Traffic analysis is the discipline of drawing patterns from information flow among a set of senders and receivers, whether those senders and receivers are designated by location determined through direction finding, by addressee and sender identifications in the message, or even MASINT techniques for "fingerprinting" transmitters or operators. Message content, other than the sender and receiver, is not necessary to do traffic analysis, although more information can be helpful;

- Electronic Order of Battle.

Being a broad field, SIGINT has many sub-disciplines. The two main ones are communications intelligence (COMINT) and electronic intelligence (ELINT).

COMINT equipment consists of:

- COMINT HF equipment provides communications research in the range n-x Mhz and automatic location of emission sources
- COMINT VHF / UHF equipment provides communications research in the range wide-x Mhz. Installed on mobile systems.
- Command center and control analysis;



COMINT (Communications Intelligence) is a sub-category of signals intelligence that engages in dealing with messages or voice information derived from the interception of foreign communications. It should be noted that COMINT is commonly referred to as SIGINT, which

can cause confusion when talking about the broader intelligence disciplines. COMINT, which is defined to be communications among people, will reveal some or all of the following:

- Who is transmitting;
- Where they are located, and, if the transmitter is moving, the report may give a plot of the signal against location;
- If known, the organizational function of the transmitter;
- The time and duration of transmission, and the schedule if it is a periodic transmission;
- The frequencies and other technical characteristics of their transmission;
- If the transmission is encrypted or not, and if it can be decrypted.
- If it is possible to intercept either an originally transmitted clear text or obtain it through cryptanalysis, the language of the communication and a translation (when needed).
- The addresses, if the signal is not a general broadcast and if addresses are retrievable from the message. These stations may also be COMINT (e.g., a confirmation of the message or a response message), ELINT (e.g., a navigation beacon being activated) or both. Rather than, or in addition to, an address or other identifier, there may be information on the location and signal characteristics of the responder.
- Voice interception
- Text interception
- Signaling channel interception
- Monitoring friendly communications like is:
- Position:
- Capabilities:
- Operations:

Electronic warfare **(EW**): "Friendly or enemy electronic warfare (EW) or emanations control (EMCON) intentions, progress, or results. Intention to employ electronic countermeasures (ECM); results of friendly or enemy ECM; ECM objectives; results of friendly or enemy electronic counter-countermeasures (ECCM); results of electronic support measures/tactical SIGINT (ESM); present or intended EMCON policy; equipment affected by EMCON policy."

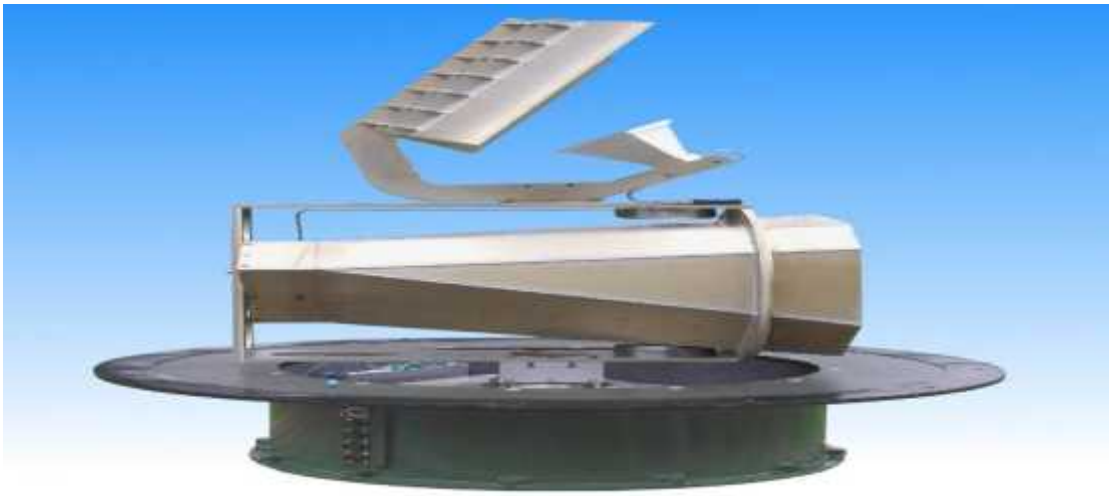
- Friendly or enemy key personnel
- Communications security (COMSEC):
- Wrong circuit:
- Other codes as appropriate for the situation may be defined by the commander.

ELINT compose by:

- ELINT equipment provides non-communications research xy GHz range. installed on mobile

- command center and control analysis;

Electronic signals intelligence (ELINT) refers to intelligence-gathering by use of electronic sensors. Its primary focus lies on non-communications signals intelligence. Signal identification is performed by analyzing the collected parameters of a specific signal, and either matching it to known criteria, or recording it as a possible new emitter. ELINT data are usually highly classified, and are protected as such.



The data gathered are typically pertinent to the electronics of an opponent's defense network, especially the electronic parts such as radars, surface-to-air missile systems, aircraft, etc. ELINT can be used to detect ships and aircraft by their radar and other electromagnetic radiation; commanders have to make choices between not using radar (EMCON), intermittently using it, or using it and expecting to avoid defenses. ELINT can be collected from ground stations near the opponent's territory, ships off their coast, aircraft near or in their airspace, or by satellite

Technical analysis of signals and images (MASINT / IMINT) consists of electronic systems for technical analysis signals and imaging analysis of photographic records

Optoelectronic composed of Optoelectronic camera with views by day and night

UWDAR composed of:

- Broad-component (passive operating mode);
- Coastal component (working mode active / passive);

Ensure the protection of ports and offshore drilling platforms, oil and gas pipelines between industrial Midia-Năvodari area and the central platform and undersea cable in Mangalia area.

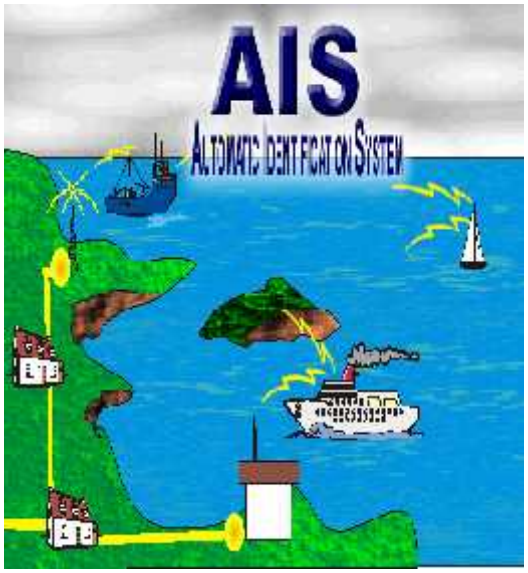
Target identification (IFF, AIS) consists of:

- IFF equipment to identify military targets,
- AIS equipment to identify civilian targets

Automatic Identification System –AIS

The Automatic Identification System (AIS) is an automated tracking system used on ships and by Vessel Traffic Services (VTS) for identifying and locating vessels by electronically

exchanging data with other nearby ships and VTS stations. AIS information supplements marine radar, which continues to be the primary method of collision avoidance for water transport



A marine traffic coordinator using AIS and radar to manage vessel traffic

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Information provided by AIS equipment, such as unique identification, position, course, and speed, can be displayed on a screen or an ECDIS. AIS is intended to assist a vessel's watchstanding officers and allow maritime authorities to track and monitor vessel movements. AIS integrates a standardized VHF transceiver with a positioning system such as a LORAN-C or GPS receiver, with other electronic navigation sensors, such as a gyrocompass or rate of turn indicator. Ships outside AIS radio range can be tracked with the Long Range Identification and Tracking (LRIT) system with less frequent transmission.

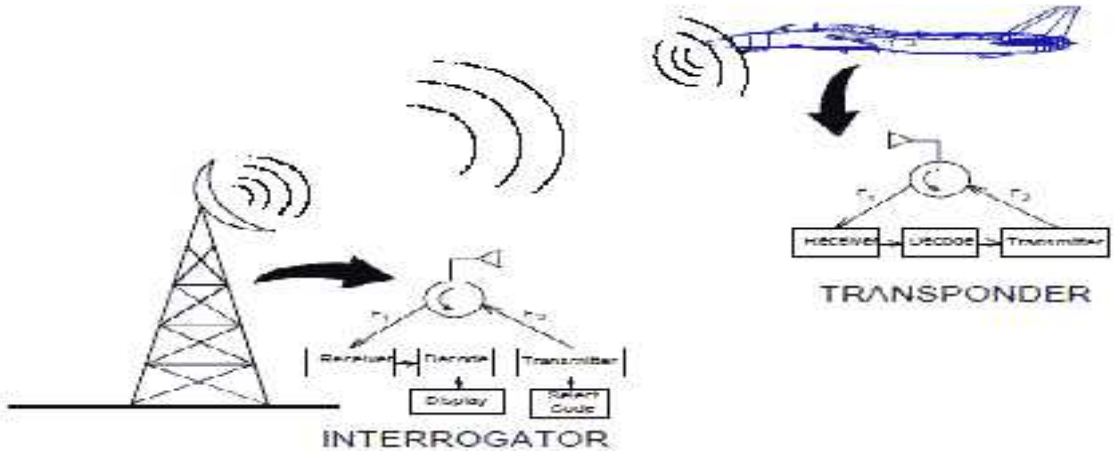
AIS is a device installed on board ships, intended primarily to ensure safety of navigation and in particular to avoid a collision. The equipment is composed of a GPS transponder comprising equipment for transmission / reception VHF and screen. The system issues messages at regular intervals including identification, position, speed, route and other information about the ship and

cargo such as length, draft, cargo type, port of departure and destination. Ship identification data (MMSI number - Maritime Mobile Identity Serum) is incorporated into the system on board ship together with data about the ship, geographical location can be obtained automatically from the GPS receiver, but other data must be entered manually by operators to board and therefore are not always reliable. AIS provide data transmission on ultra short wave and normally they are detected to the horizon. Data transmission frequency increases with the speed of the ship. Installing AIS on board is required in accordance with IMO SOLAS 1974 Convention on the Safety of Life at Sea.

AIS system installed on ships signals can be received by the receivers located at the coast. In this way the authorities can obtain a continuous real-time maritime traffic in the vicinity of their coasts. AIS systems installed beating the shore is 40 Mm but can be higher if the receiver is installed at a height appropriate and suitable weather conditions also favor the spread of high-frequency waves. Propagation distances can be achieved up to 100 Mm, as in the Mediterranean during the summer. AIS messages received by a vessel can be retransmitted and this discovery helps increase distance especially when traffic is very intense. Installing AIS on maritime patrol aircraft allows increase the distance of discovery. At the moment are used experiments to receive satellite signals AIS / Class B that can be installed voluntarily.

IFF System

In telecommunications, identification, friend or foe **(IFF)** is an identification system designed for command and control.



It is a system that enables military and national (civilian-located ATC) interrogation systems to identify aircraft, vehicles, or forces as friendly and to determine their bearing and range from the interrogator.

NBC: composed of alert sensors

Software: software for managing, analyzing and interpreting data

Operations Center

• provides the functions of integration and sensor fusion and performed duties SCOMAR command SCOMAR control.

• LAN network;

• Application servers, databases, video storage;

• multimonitor dive operation stations;

• video screen (video wall);

• substitute videoconferencing;

• VHF radio terminals / HF;

• TETRA terminal;

• CDMA2000 mobile / GSM

Operative intervention units (naval, land, air)

CONCLUSIONS

To find all potential hazards must be made known maritime situation in the responsibility area. Clearly to achieve and improve maritime surveillance should be combined input from various sources under various national authorities.

When several systems are used to research the same areas, combining data from these will make fewer targets to be excluded from the common image obtained. At the same time as more systems are included in obtaining research recognized maritime picture, the number of targets increases and thus becomes more difficult to determine which of these illegal acts. So including in surveillance system of a cooperating means disposed on board is essential to determine which targets are known and are not dangerous.

Combining data from different equipment increases the number of known targets and thus very few of them, contained in recognized maritime situation, remain unknown and thus the number of targets potentially dangerous and which require special attention are reduced.

So when several authorities executed research in the same areas with different equipment, the integration of their obtained data ensure achieve one recognized maritime situations in all benefit.

REFERENCES

www.worldvtsguide.org

www.wikipedia.org

Technical Bulletin, November-December. 2007 Cdor (r) Valeriu Blind

INFORMATION RESOURCE MANAGEMENT ALIGNMENT WITH THE MISSION AND PERFORMANCE OF THE PERSONNEL AND MOBILIZATION DIRECTORATE

LTC Constantin CAVAL

INTRODUCTION

Today's private and public organizations are increasingly dependent on information technologies for achieving their strategic and operational objectives. Over the past decade alone, enterprise systems have been expanded to provide secure, electronic linkages with suppliers and customers, and the Internet has become a mainstream channel for communications and business transactions. As a result, decision making about information technology resources has also become even more visible as the roles and accountabilities of the Information System function have become important not only operationally but also strategically[9].

Personnel management requirements evolve as society changes, technology become more complex, new tools become available, the pace of life quickens rapidly and we have less time to act, react, and make the best decisions. Even given all the potential advantages we have over our predecessors, success is never guaranteed. In fact, the more options we have, the bigger chances of reaching golden goal. Performance makes the difference. "Performance is more than the bottom line. It is setting an example and being a mentor. And this requires integrity" [10].

I. INFORMATION RESOURCES MANAGEMENT

I.1. Definition

The term "Information Resources" means information and related resources, such as personnel, equipment, funds, and information technology[11].

Information Resources Management represents the process of managing information resources to accomplish the organization missions and to improve its performance, including through the reduction of information collection burdens.

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[9] Prentice Hall, Carol V. Brown, Daniel W. De Hayes, Jeffrey A. Hoffer, E. Wainright Martin – *Managing Information Technology*, Seventh Edition, 2012, 2009, 2005, 2002, 1999 Pearson Education, Inc., publishing as Prentice Hall, One Lake Street, Upper Saddle River, New Jersey 07458, page XVII.

[10] Peter Drucker, My Years with G.M.

[11] Section 3502 (6) of Title 44, United States Code (Paperwork Reduction Act of 1995).

Information Resources Management could be defined like a philosophical and practical approach to managing government information. Information is regarded as a valuable resource which should be managed like other resources, and should contribute directly to accomplishing organisational goals and objectives. Information Resources Management provides an integrated view for managing the entire life-cycle of information, from generation, to dissemination, to archiving and/or destruction, for maximising the overall usefulness of information, and improving service delivery and program management.

Information Resources Management views information and Informational Technology as an integrating factor in the organization, which is, the various organisational positions that manage information are coordinated and work together toward common ends. Further, Information Resources Management looks for ways in which the management of information and the management of Information Technology are interrelated, and fosters that interrelationship and organisational integration.

The term "Information Technology" has the same meaning as the term "Automatic Data Processing Equipment"[12].

Information Resources Management includes the management of the broad range of information resources, printed materials, electronic information, and microforms, the various technologies and equipment that manipulate these resources, and the people who generate, organise, and disseminate those resources.

Information Resources Management is a management concept that brings together: individual's knowledge and skills, information, organizational goals and objectives, and information technology.

The final goal is using Information Resources Management to effectively accomplish the organization's mission.

Overall the intent of Information Resources Management is to increase the usefulness of government information both to the government and to the public[13].

I.2 Information Resources Management Planning

Planning is the process of establishing a course of action to achieve desired results with available resources. Planners translate organizational missions into specific goals and, in turn, into measurable objectives.

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[12] Section 3502 (9) of Title 44, United States Code (Paperwork Reduction Act of 1995).

[13] Gary D. Blass et al. "Finding Government Information: The Federal Information Locator System (FILS)", Government Information Quarterly, JAI Press, Inc., Greenwich, Connecticut. Vol. 8, No. 1, pp. 11-32. 1991.

The Paperwork Reduction Act of 1995 introduced the concept of information resources management and the principle of information as an institutional resource which has both value and associated costs[14].

Information resources management is a tool that managers use to achieve organization's objectives. Information resources management is successful if it enables managers to achieve organization's objectives efficiently and effectively.

Information resources management planning is an integral part of overall mission planning. Organisations need to plan from the outset for the steps in the information life cycle. When creating or collecting information, organizations must plan how they will process and transmit the information, how they will use it, how they will protect its integrity, what provisions they will make for access to it, whether and how they will disseminate it, how they will store and retrieve it, and finally, how the information will ultimately be disposed of. They must also plan for the effects their actions and programs will have on the public state and local administrations.

Training is particularly important in view of the changing nature of information resources management. Decentralization of information technology has placed the management of automated information and information technology directly in the hands of nearly all organization personnel rather than in the hands of a few employees at centralized facilities.

Organizations must plan for incorporating policies and procedures regarding computer security, records management, protection of privacy, and other safeguards into the training of every employee and contractor.

Each stage of the information life cycle carries with it records management responsibilities. Preserving records for future generations is the archival mission. Advances in technology affect the amount of information that can be created and saved, and the ways this information can be made available. Technological advances can ease the task of records management; however, the rapid pace of change in modern technology makes decisions about the appropriate application of technology critical to records management. Increasingly the records manager must be concerned with preserving valuable electronic records in the context of a constantly changing technological environment.

Records schedules are essential for the appropriate maintenance and disposition of records. They also evaluate organization's records management programs to determine the extent to which they are appropriately implementing their records management responsibilities.

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[14] Section 8a (1), 3. Analysis, Appendix IV to OMB Circular No. A-130.

II. INFORMATION SYSTEM

Information System represents a discrete set of information resources organized for the collection, processing, maintenance, use, sharing, dissemination, or disposition of information.

Business firms, other organizations, and individuals in contemporary society rely on information systems to manage their operations, compete in the marketplace, supply services, and augment personal lives. For instance, modern corporations rely on computerized information systems to process financial accounts and manage human resources; local and state administration rely on information systems to provide basic services to its citizens; and individuals use information systems to study, shop, bank, and invest.

Creation or collection of information should be carried out in an efficient, effective, and economical manner. When organization creates or collects information - just as when it performs any other program functions - it consumes scarce resources. Such activities must be continually evaluated for their relevance to organization missions.

Information technology can help the government provide better service to the public through improved management of government programs. One potentially useful application of information technology is in the government's collection of information. While some information collections may not be good candidates for electronic techniques, many are. Organizations with major electronic information collection programs have found that automated information collections allow them to meet program objectives more efficiently and effectively. Electronic data interchange and related standards for the electronic exchange of information will ease transmission and processing information.

Benefits to the public and agencies from electronic information collection appear substantial. Electronic methods of collection reduce paperwork burden, reduce errors, facilitate validation, and provide increased convenience and more timely receipt of benefits.

It should be making a distinguished between the terms "access to information" and "dissemination of information" in order to separate statutory requirements from policy considerations. The first term means giving members of the public, at their request, information to which they are entitled by a law. The latter means actively distributing information to the public at the initiative of the organization. However, popular usage and evolving technology have blurred differences between the terms "access" and "dissemination" and some people are confused by this distinction. For example, if an organization "disseminates" information via an on-line computer system, one speaks of permitting users to "access" the information, and on-line "access" becomes a form of "dissemination".

An Information System (IS) - or application landscape[15] - is any combination of information technology and people's activities that support operations, management, and decision making.[16] In a very broad sense, the term information system is frequently used to refer to the interaction between people, processes, data, and technology. In this sense, the term is used to refer not only to the information and communication technology (ICT) an organization uses, but also to the way in which people interact with this technology in support of business processes.[17]

Some make a clear distinction between information systems, computer systems, and business processes. Information systems typically include an ICT component but are not purely concerned with ICT, focusing instead on the end use of information technology. Information systems are also different from business processes. Information systems help to control the performance of business processes.[18]

Alter argues for an information system as a special type of work system. A work system is a system in which humans and/or machines perform work using resources to produce specific products and/or services for customers. An information system is a work system whose activities are devoted to processing (capturing, transmitting, storing, retrieving, manipulating and displaying) information.[19]

As such, information systems inter-relate with data system on the one hand and activity systems on the other. An information system is a form of communication system in which data represent and are processed as a form of social memory. An information system can also be considered a semi-formal language which supports human decision making and action.

Information systems are the primary focus of study for the information system discipline and for organizational informatics.[20]

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[15] "Definition of Application Landscape" Software Engineering for Business Information Systems (sebis). Jan 21, 2009. http://wwwmatthes.in.tum.de/wikis/system-cartography/application-landscape. Retrieved January 14, 2011.

[16] SEI Report., "Glossary".

[17] Kroenke, D. M.(2008). Experiencing MIS. Prentice-Hall, Upper Saddle River, NJ

[18] O'Brien, J A. (2003). Introduction to information systems: essentials for the e-business enterprise. McGraw-Hill, Boston, MA.

[19] Alter, S. The Work System Method: Connecting People, Processes, and IT for Business Results. Works System Press, CA.

[20] Beynon-Davies P. (2009). Business Information Systems. Palgrave, Basingstoke.

III. OPTIMIZING THE MANAGEMENT HUMAN RESOURCE AT THE PERSONNEL AND MOBILIZATION DIRECTORATE LEVEL

III.1 Mission, goal and objectives

.Transformations inherent in society in general have over the last years significant environmental influences military in particular. Each stage in the transformation part of society has brought new issues to be considered important and the Romanian Army is also only part of the whole. The deterioration of social status, unpredictable currency fluctuations, jobs becoming fewer, low-paid job insecurity appearance etc. are only some of the issues that willingly or without affecting personnel policies and national military environment could not exception.

This system of personnel management, as called in the past, suffered for years among a number of changes and adjustments, improvements, optimizations and many other names given by the personalities of the time. Every time the military has suffered because of the rigidity of personal rules, those entitled to do so have initiated measures to adjust the functioning of the entire mechanism, all being made with the purest intentions. It can't be said in any situations described above that the results of these adjustments had a different effect than positive when that goal was the implementation and operation parameters other than optimal management system of personalities.

The question is whether now, after 22 years of development more or less slow, renamed personnel management system for personnel management in the meantime is a viable, responsive to the needs and requirements of the moment. It is so true that the current system meet a Romanian Army has been and continues restructuring and resizing, which is constantly under the threat of reducing both the number of staff and resources available in the name of efficiency as a strategy to fight longer than most can understand.

The fact that the Romanian Army is for some time member of that select circle of famous armies from both Central and Western Europe and North America brings additional obligations on the Romanian side to align personnel policies with the Euro-Atlantic Structures. These obligations are in fact so-called guidelines and not mandatory title in most situations.

Thus, elements that have the task of national and implement these recommendations into practice, they can take into account fully, partially or totally ignore them. It is normal or it isn't, to selectively choose only the multitude of elements that can be introduced and adapted existing personnel management system. This system is a system evolved, gone through many changes and adjustments and now can answer to the national requests.

Personnel and Mobilization Directorate, like part in composing General Staff, is consisting of two services (personnel and mobilization), sections, a technical secretariat and independent offices. Also it co-ordinate the regional military centres.

The main mission of this structure is to manage the available human resource.

The strategic goal is the necessity to project and develop a modern management system, capable of ensuring the maintenance of competitiveness in the military employment market.

The achievement of this goal presupposes the following objectives:

- The implementation of a new military career management system;
- The introduction of a new system of assessment of the military, which provides the framework and organizational tools in meant to improve and streamline the activities of each military man and to support analysis and selecting process for selection committees;
- The development of a set of principles and rules defining the functions of the Romanian Armed Forces professionalized military personnel, based on which the new organizational charts of the military structures have been projected and materialized.

The achievement of these objectives presupposes:

- To implement a new military career management system, to introduce the selection commissions in order to provide the favourable conditions so that the principles of transparency, equal chances and fairness with regard to the promotion of military personnel and their interest in self-improvement and own career projection could be applied;
- To introduce a new military personnel assessment system to provide the organizational framework and instruments to enhance and render effective the activity of each military man, as well as the support for the selection commissions in the analysis and selection process;
- To draw up a set of principles and norms designed to define the positions of the professionalized military personnel in the Romanian Armed Forces, norms and principles that lie at the basis military structures organizational charts;
- To put in practice a new recruitment and selection system able to assure the enhancement of the quality and number of the candidates for the military profession, as well as the public regarding the role and the place of the armed forces and the military profession in society;
- To create the legal framework for the development of the professionalized military personnel linguistic competence, this lies at the basis of achieving the necessary infrastructure.

Starting from the motto *"the quality of the armed forces and subsequently the outcomes always depend on the quality of the personnel"*, the Personnel and Mobilization Directorate, through its

well-defined role and place, has permanently contributed to the military personnel selection and preparation to accomplish the mission of the General Staff.

III.2 IT system - a pillar of modern career management individual staff

At this time, the Romanian Army, human resource management is carried out both by conventional procedures (with pencil and books) and automated procedures included in the computer subsystems in scope and possibilities of solving the reduced need for information. Information can be found, only sometimes, in databases operated by various computer programs, these are not managed by an integrated and consistent record, which causes the human resource management activities take place mainly in the circulation of documents written between structures, regardless of the type of subordination.

Information contained in these information products are mostly limited to human resources, data on job description (necessary personnel management) is missing or can not be obtained by operating systems. This is the result of the introduction into the army, in the period after 1990, some systems based on individual programs, the knowledge and skills of each structure. They solved concrete problems caused by short term needs of various functional departments. The benefits are aimed at end users point and whose work is facilitated. Computer applications, made at any given time are working with teams using heterogeneous and information technologies have not taken into account constantly changing technology have infrastructure type network, which drastically reduces the possibilities of integration.

Disadvantages are:

- Information is not accessible to all who need it, is inserted into the system several times in parallel, favoring increased errors and redundancy;
- Information is not accessed in real time;
- Managing human resources-staff a little benefit from the advantages of synthesis and analysis of performance data;
- Executive-staff performing routine without performing analysis of phenomena;
- Security and data security are reduced;
- Update information is not done in real time resulting in further processing of the information to carry out;

IT applications and databases or data warehouses operational human resource management structures can be integrated and managed, but this requires a special effort, expensive.

A solution for implementing a system for management of human resources was considered in 2000 using Oracle products. Concept study for Management Information System Human Resources (SIMRU) points out that this product was the most advantageous price/performance

and represent the lowest risk investment. A solution could be to use information systems at the Human Resources Management Directorate - for personnel management, and at the Organization, Personnel and Mobilization Directorate of the General Staff for the management positions. The cost of integrating these two systems was relatively small but growing efficiency, given the considerable number of existing records covering a large extent the need for an efficient system.

Integrating the two systems would be giving rise to a single information product through its adaptation to the requirements of individual career, so that management restrictions would be disappeared and would be allowed to obtain:

- Information about job vacancies;
- Correlation between the skills and job requirements;
- Unlimited access to the information provided;
- Amending and updating data in real time;
- Establishing a dynamic human resources to the restructuring of military structures etc.

This system could be a pillar of support for career management, ensuring quality and efficiency of decision documents and specific activities of each functional department. Under the pretext of lack of necessary funds the project, lack of specialized personnel, lack of technical means of translation of existing data in another form, systematically implementation of this product was delayed until the fall of its ridiculous. Funds not even by neglected, which were allocated over time, recruited and trained human resources for product development have gone into a mountain of bad faith. Any effort to channel expertise towards commissioning of this project is struck by waves of so-called gaps, gaps that masked the resistance response of the system (and not persons) implementation of this modern tool. And all this because:

- The first key feature is the active control system developments in human resources, is a system that simultaneously manages posts and staff are registered as job descriptions and characteristics of the specific data of all staff;
- This information system for managing human resources solves integrated management of human resources during peace and war, job projection, recruitment, administration, remuneration and motivation of staff and not least, individual career management (analysis and job description, analysis and description of personal qualifications, formulation of proposals of "man in the right place at the right time") and modeling, simulation, predictions and forecasts necessary;
- This system has a high degree of data protection. It provides limited access to areas of responsibility, encrypted data transmission and archiving periodically with limited

access. It doesn't allow unauthorized use of resources, services or information, comply with regulations on safety, privacy and data protection;

- The system is reliable in operation 24 h/7 days, while providing security, storage and data recovery possible. It works under both central and distributed under, the functional connections between the central structures, staffs of military force categories and their subordinate structures;
- Human resource management system offered allows to the military organization to manage its employees so that to exist in any moment clear and objective information about them, their training professional position within the organization. The history keeps people: personal data on jobs that have passed, salary history, training courses etc;
- The technical architecture is centralized type using Oracle suite of products for the Internet. It is a three-tier architecture which includes server databases, one or more application servers and workstations equipped with Internet browsers only all sites located in national territory or abroad. Processing in such a three-tier architecture is done as follows: all the information resides on the database server, applications are installed on application servers and clients running Internet browsers to download applications and run them directly on the central database.
- This solution is chosen due to functional benefits: proactive management of human resources at work; increased visibility on the internal processes of human resources, providing support for decisions and in real time; automation and seamless continuity of the processes at the borders between elements structural; providing flexibility and modularity support for potential future development and reorganization; the final costs of operation and maintenance are reduced.

Unfortunately, as mentioned above, the solution was "last reserve" so called because of a lack of resources.

III.3 Individual career management information using I.T. product. Interface and its use.

By persons with a vision of future management and staff to manage their careers as in September 2010 to implement a large-scale product using MILNET network (INTRAMAN). This, even if does not meet the requirements of a modern system of personnel management is a huge step forward, promising a future decision element and the middle management.

A military that seeks information about individual career management, could access via a computer connected to the site INTRAMAN that can titled "RESMIL". Here he could find

general information about individual career management, including links to the websites of the Ministry of Defense who have information in this field and ending with the link to the newsletter of the Army that can be published online with the necessary restrictions.

Going further, through various links, he could find details on the latest announcements made by the management career structure, answers to frequently asked questions, evaluation mode in different situations and assessments of service, educational institutes and career courses organized, the selection committees staff with their working program provided, vacancies from the establishments of the country and vacancies from abroad where the Romanian Armed Forces are taking part in such missions. Basically, on this page (pages) basic, everyone finds all unclassified information to inform the choice of reference elements for individual model career.

To view personal information, classified information to a certain level, the station with their requirements, it is necessary to access another site, where this time, access is possible only by identifying personal data. The transition from free information site on the publication is classified information through various security features continuously monitored by product managers. Full name and password can be the identification requirement for all staff, the personal password allowing access only to information about themselves. Even in this place it could be information to which access is restricted. In order to be reached these details, he must contact persons or locations at addresses or phone numbers listed.

This product which is in discussion, can't to substitute a career manager but is a powerful tool in his hand and in the same time, an advocate for each individual who is seeking his advancement in career. Other document or friend couldn't be more exactly in personal data of an individual than an updated database, who knows how to present the elements of utmost importance.

Individual career management in general and this particular model is based on a set of principles. Any proposed optimization system or individual must be in conjunction with this set of principles. Deviations from these are not possible in the ascendant sense of career development, they can give the worst results for the maintenance of the system horizontally. Also milestones during their career path have as a reference system, principles of individual career.

CONCLUSIONS

The alignment of information resource management with the mission and performance of the Personnel and Mobilization Directorate, using and developing of such product can provide the following opportunities:

- An automated system for recruitment and selection for a post - reduces costs and time for this aspect, substantially increase the quality of personnel recruited;

- Flow management staff - always kept tight control of the system inputs and outputs and can act in time to cover the needs of human resources for certain specialties or periods of time;
- Easy integration of new staff - having a route to achieve certain career desire mandatory career points is much larger increase motivation and improve "speed" of obtaining the necessary professional expertise;
- Management of professional expertise - resources are used more effectively by matching personal skills to the requirements of each job, thus increasing individual Preformed, increase job satisfaction and thus decreases the number of people who want to leave the system - high efficiently;
- Performance management - individual objectives with the objectives of the institution, stand out more easily those who are dedicated to the job and thus increase performance by initiating development plans with appropriate staff;
- Financial reward - is directed to the staff with outstanding results what is leading to preservation of the values on the occupied positions and decrease valued staff dissatisfaction;
- Institution relationship management – military - increase communication with its staff of the institution, increase mutual trust leads to better results at work and loyalty required in relation to each other.

Without this new system, flexible and accurate human resource management, personnel staffing structures would continue to waste about 60% of their time on administrative tasks that often prove ineffective. Lately though, it takes strategic thinking and perspective of human resource training and use. The set of individual career management of human resources provides the opportunity and it should not be wasted.

REFERENCES

1. Alter, S. The Work System Method: Connecting People, Processes, and IT for Business Results. Works System Press, CA;
2. Beynon-Davies P. (2009). Business Information Systems. Palgrave, Basingstoke;
3. Blass Gary D. et al. "Finding Government Information: The Federal Information Locator System (FILS)", Government Information Quarterly, JAI Press, Inc., Greenwich, Connecticut. Vol. 8, No. 1, 1991;
4. Drucker Peter, My Years with G.M.;
5. Hall Prentice, Brown Carol V., De Hayes Daniel W., Hoffer Jeffrey A., Wainright Martin E. – *Managing Information Technology*, Seventh Edition, 2012, 2009, 2005, 2002, 1999 Pearson Education, Inc., publishing as Prentice Hall, One Lake Street, Upper Saddle River, New Jersey 07458;
6. Kroenke, D. M.(2008). Experiencing MIS. Prentice-Hall, Upper Saddle River, NJ;
7. O'Brien, J A. (2003). Introduction to information systems: essentials for the e-business enterprise. McGraw-Hill, Boston, MA;
8. Predescu I., Ionescu A. - *Tematica pentru întocmirea lucrarii*, Ed. Teora, Bucureşti, 1998;
9. "Definition of Application Landscape" Software Engineering for Business Information Systems (sebis). Jan 21, 2009. http://wwwmatthes.in.tum.de/wikis/system-cartography/application-landscape. Retrieved January 14, 2011.
10. OMB Circular No. A-130;
11. Paperwork Reduction Act of 1995 - Section 3502 (6) of Title 44, United States Code.
12. SEI Report, "Glossary".

INFORMATION MANAGEMENT ROLE IN A SUCCESSFUL ORGANIZATION

LTC Sorin TRIFAN

INTRODUCTION

Managing information is an essential component in the effective management of business of an organization. Information management is the collection and management of information from one or more sources and the distribution of that information to one or more audiences. This sometimes involves those who have a stake in, or a right to that information. Management means the organization of and control over the structure, processing and delivery of information.[21] Using and managing information is part of how an organization conducts business. Information is created, gathered, stored and made available in various formats and for various purposes. Information technology (IT) is a key enabler to achieving well-managed information in support of policies, programs and services.[22]

Clear accountabilities for information management ensure that information retains its value throughout the entire period for which it is required for organization business. An organization behaves as an open system that takes in information, material and energy from the external environment, transforms these resources into knowledge, processes, and structures that produce goods or services which are then consumed in the environment. The relationship between organizations and environment is thus both circular and critical: organizations depend on the environment for resources and for the justification of their continued existence. Because the environment is growing in complexity and volatility, continuing to be viable requires organizations to learn enough about the current and likely future conditions of the environment, *and* to use this knowledge to change their own behavior in a timely way (Choo 1991, Choo and Auster 1993).[23]

I. INFORMATION MANAGEMENT IN AN INTELLIGENT ORGANIZATION

The intelligent organization is able to mobilize the different kinds of knowledge that exist in the organization in order to enhance performance. It pursues goals in a changing environment by

[21] http://en.wikipedia.org/wiki/Information_management - cited on 18th of November 2011
[22] http://www.tbs-sct.gc.ca/pol/doc-eng. - cited on 15th of November 2011
[23] http://choo.fis.utoronto.ca/fis/imio/ - cited on 16th of November 2011

adapting behavior according to knowledge about itself and the world it thrives in. The intelligent organization is therefore a learning organization that is skilled at creating, acquiring, organizing, and sharing knowledge, and at applying this knowledge to design its behavior. Organizational learning depends critically upon information management, the capacity to harness the organization's information resources and information capabilities to energize organizational growth. Information management is a cycle of processes that support the organization's learning activities: identifying information needs, acquiring information, organizing and storing information, developing information products and services, distributing information, and using information. An analysis of each of these processes suggests new strategies for maximizing the value of information in organizations.

I.1. Information Management Goal

The basic goal of information management is to harness the information resources and information capabilities of the organization in order to enable the organization to learn and adapt to its changing environment (Choo 1995, Auster and Choo 1995)[24]. Information creation, acquisition, storage, analysis and use therefore provide the intellectual latticework that supports the growth and development of the intelligent organization. The central actors in information management must be the information users themselves, working in partnership with a cast that includes information specialists and information technologists. Information is given meaning and purpose through the sharing of mental and affective energies among a group of participants engaged in solving problems or making sense of unclear situations. Conceptually, information management may be thought of as a set of processes that support and are symmetrical with the organization's learning activities. Six distinct but related information management processes may be discerned (Fig. 1): identifying information needs, acquiring information, organizing and storing information, developing information products and services, distributing information, and using information (Davenport 1993, McGee and Prusak 1993).[25]

I.2. Information Needs and Information Acquisition

The identification of information needs should be sufficiently rich and complete in representing and elaborating users' true needs. Since information use usually takes place in the context of a task or problem situation, it is helpful to recognize that information needs consist of two

[24] Auster, Ethel and Chun Wei Choo, Ed. 1995. *Managing Information for the Competitive Edge*. New York, NY: Neal Schuman;
[25] T.H Davenport, L Prusak, Blow up the corporate library, *International Journal of Information Management*, Volume 13, Issue 6, December 1993, Pages 405-412.

inseparable parts (Taylor 1986, 1991)[26]: that pertaining to the subject matter of the need (*what information is needed*), and that arising from the situational requirements of utilizing the information (*why is the information needed and how it will be used*). Depending on the information use requirements, information could emphasize hard or soft data, elaborate existing goals or suggest new directions, help define problems or make assumptions explicit, locate historical precedents or provide future forecasts, and so on. Identifying information needs therefore not only involves determining the topics of interest to the user, but also the attributes of the information to be provided that will enhance its value and usefulness.

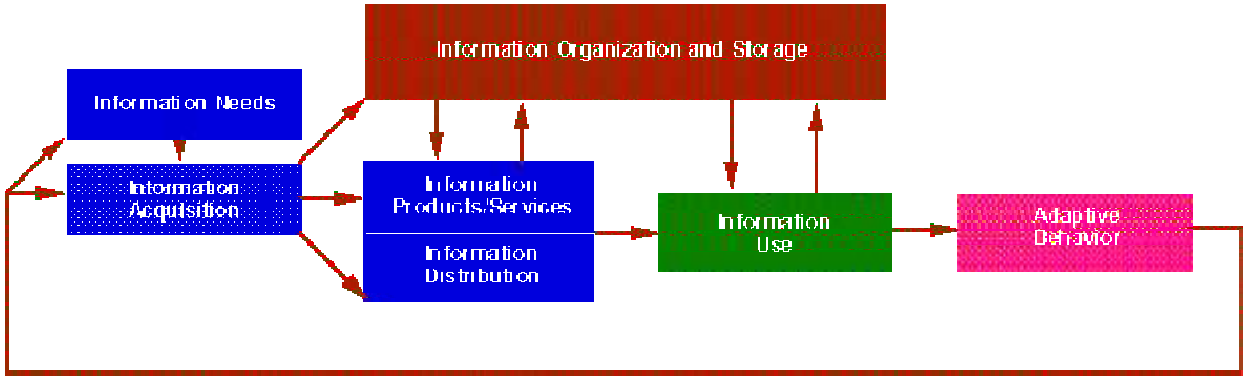


Fig. 1. Information Management Cycle

Information acquisition has become a critical but increasingly complex function in information management. Information acquisition seeks to balance two opposing demands. On the one hand, the organization's information needs are wide-ranging, reflecting the breadth and diversity of its concerns about changes and events in the external environment. On the other hand, human attention and cognitive capacity is limited so that the organization is necessarily selective about the messages it examines. The first corollary is therefore that the range of sources used to monitor the environment should be sufficiently numerous and varied as to reflect the span and sweep of the organization's interests. While this suggests that the organization would activate the available human, textual, and online sources; in order to avoid information saturation, this information variety must be controlled and managed.

A powerful way of managing information variety is to involve as many persons as possible in the organization in the gathering of information, effectively creating an organization wide information collection network. People, not printed sources or electronic databases, will always be the most valuable information sources in any organization. People read widely; communicate frequently with customers, competitors, suppliers; work on a variety of projects; and accumulate specialized knowledge and experience. Unfortunately, information acquisition planning typically

[26] Taylor, Robert S. 1991. Information Use Environments. In *Progress in Communication Science*, ed. Brenda Dervin and Melvin J. Voigt, 217-254.

does not include human sources. This is a serious deficiency. Human sources are among the most valued by people at all levels of the organization: human sources filter and summarize information, highlight the most salient elements, interpret ambiguous aspects, and in general provide richer, more satisfying communication about an issue. Information acquisition planning should therefore include the creation and coordination of a distributed network for information collection. Complementing the network could be a directory or database of experts: both the business and subject experts who work within the organization, and the external consultants or professional specialists who have worked with the organization. A well maintained database of internal and external experts can become a prized information asset of the organization, as people seeking information use it to connect with the best available expertise. The database may also be used to locate knowledgeable experts who can assist in evaluating current information resources, recommending new materials, assigning priorities, and so on.

The selection and use of information sources has to be planned for, and continuously monitored and evaluated just like any other vital resource of the organization. Furthermore, incoming information will have to be sampled and filtered according to their potential significance. Such sampling and filtering is an intellectual activity best performed by humans it requires human judgment based on knowledge of the organization's business as well as the strengths and limitations of information resources.

I.3. Information Organization and Storage

Organizing and storing information may be facilitated with the application of information technology. Traditional data processing technologies were first used to raise work efficiency. The operational use of computers generated an abundance of detailed information about transactions, customers, service calls, resource utilization, and so on. While such systems are tuned to provide high throughput performance, they are inefficient and sometimes incapable of retrieving the information that decision makers need to have for planning and problem solving. Organizations with significant volumes of transactional information could need to reorganize and unify operational data from several sources, and provide friendly but powerful analysis tools that allow decision makers to trawl the raw data for strategic insight, so that, for example, they can discover patterns and opportunities buried in the lodes of data about customer transactions or service calls. The information assets of an organization are not confined to the transactional; they vary from the highly ordered to the ephemeral, and some of the most valuable information may be hiding in sales reports, office memos, study reports, project documents, photographs, audio recordings, and so on. The organization, storage, and retrieval of textual and unstructured information will become a critical component of information management. The learning

organization needs to be able to find the specific information that best answer a query, and to collate information that describes the current state and recent history of the organization. Well integrated archival policies and records management systems will enable the organization to create and preserve its corporate memory and learn from its history.

I.4. Information Products and Services

In developing information products and services, the objective is not only to provide information that is relevant to the users' areas of interest, but also to provide information in a form that increases their usability. In other words, information products and services should deliver and present information so that their content, format, orientation, and other attributes address the situational requirements which affect the resolution of the problem or class of problems. This represents a value-added approach to the design of information products and services. The potential usefulness of messages is enhanced by increasing their ease of use, reducing noise, improving data quality, adapting the information to increase its pertinence, and saving the user time and money. Information services need to be constantly innovating, in a continual effort to move closer to satisfying the many facets of the users' information needs.

To stay well-informed and build up its knowledge base, the intelligent organization needs to feed on a balanced diet of high quality information supplied through a varied menu of information products and services. Some information products disseminate urgent news that require immediate attention; others report developments that would take time to unfurl over the short term; while others still peer into the more distant future. For each of these time horizons, the information provided may be sharply focused describing particular events, objects or organizations; or the information may be general and broad, surveying the terrain on which the organization's future will make its course. The guiding principle is that each information product must be of value to the end user.

Users want information not just to give answers to questions (`What is happening here?') but also to lead to solutions for problems (`What can we do about this?'). Moving from questions to problems means moving from a subject-based orientation in which knowing is a sufficient end state to an action orientation in which information is being used to formulate decisions and behaviors. To be relevant and consequential, information products and services should therefore be designed to address not only the subject matter of the problem but also the specific contingencies that affect the resolution of each problem or each class of problems.

I.5. Information Use and Distribution

Information use is a dynamic, interactive social process of inquiry that may result in the making of meaning or the making of decisions. The inquiry cycles between consideration of parts and the whole, and between practical details and general assumptions. Participants clarify and challenge each other's representations and beliefs. Choices may be made by personal intuition, political advocacy, as well as by rational analysis. Managers as information users, for example, work in an environment that has been described as informational overloaded, socially constrained, and politically laden. As new information is received and as the manager reflects and acts on the problem situation, the perception of the situation changes, giving rise to new uncertainties. The problem situation is redefined, the manager seeks new information, and the cycle iterates until the problem is considered resolved in the manager's mind. The organization's information structures and processes will have to be as open, flexible, and vigorous as the processes of inquiry and decision making they support. Information managers and specialists should be participants in decision processes so that they have a first-hand understanding of the information needs that emerge as the process unfolds and the extent that these needs are satisfied.

In organizational learning, information is used by individuals to create knowledge, knowledge not just in the sense of data and facts, but knowledge in the form of representations that provide meaning and context for purposive action. In summary, information use for the making of meaning and understanding requires information processes and methods that provide for a high degree of flexibility in information representation and that facilitate the vigorous exchange and evaluation of multiple representations among individuals. Labeling or naming of concepts and categories has to be relevant to the users' interpretive discourse, and be flexible and easy to change. Information is to be shared easily but without loss of cognitive richness.

The purpose of distributing information is to encourage the sharing of information. A wider distribution of information promotes more widespread and more frequent learning, makes the retrieval of relevant information more likely, and allows new insights to be created by relating disparate items of information. The separation between information provider and information user should be dissolved: both ought to collaborate as partners in the dissemination and value-adding of information to help ensure that the best information is seen by the right persons in the organization. To encourage users to be active participants, it should be made easy for them to comment on, evaluate, and re-direct the information they have received.

II. THE ROLE OF INFORMATION MANAGEMENT IN ORGANIZATIONS

II. 1. The Role of Information Management in Handling Business Complexities

Dealing with the intricacy of Information Management is actually a very demanding subject particularly in international organizations. These companies consist of more than a few entities with dissimilar strengths and weaknesses. What is important here is that they recognize the need to make a decision regarding the common goals. Companies are starting nowadays to devise a plan and techniques that are related to these in order for them to apply the measures properly on the information management goals. It actually starts on the first level of the business which is the strategic level and then proceeds itself into the procedure of operating not only on the measures but also on the goals that are now targeted to the application level. Organizational and technological aspects are all relevant factors and they should be included in the measures. In addition, the interdependencies must be highlighted or emphasized. Organizations can take advantage of this benefit presented by the methodology due to the fact that it props up the proposal and means of the Information Management activities.

Most of the time the information management measures are used by organizations in order for them to track down and monitor the performance of commodity exchange. As a matter of fact, there are even more individuals that begin to apply this in the information system of their Human Resources. Since this department is usually piled up with documents, there is a need to implement tough measures that will help the organization provide good management amidst the convolution of the whole company. No matter what kind of usage an organization employs in the risk management measures, it will have to ensure that it utilizes the right kinds of methods and tools for the industry it belongs in.

These will include the criteria in which you will be basing the matters that are important for the business. These may comprise of customer support, employee productivity, internal functions and overall efficiency of the company. These categories must be aligned with the business goals in order to fully achieve your plans as you reach the short term objectives. When an organization have properly used the measures, it can benefit from different matters such as satisfied customers, better cost estimation, successful measurement of new functionalities and additional support for priority requests.

These are helpful when in comes to controlling, directing and managing the customer perspectives, internal processes, financial perceptions and the development perspective, which are actually the substance of the balanced scorecard.[27]

[27] http://ezinearticles.com/ - cited on 16th of November 2011

II. 2. The Role of Management Information Systems in Decision Making

Management information system is a managerial decision-making tool. A company uses it in all of its business operations and processes. As the management is in complete know of everything transpiring in the company, it leverages on this advantageous position. Using it, a company is able to record and document all facts pertaining to its procedures and methodologies. The basic intent is to manage and control all of the company's employees and material through management information system.

Using a management information system, an organization is able to establish its hierarchical structure and work-flow charts. Every employee in the organization knows the employees he has authority over and to whom he is responsible for work. The work then progresses without glitches. The company's operating and procedures are listed by a management information system.

Organizations use different types of management information system for different needs and scenarios. At a given point of time an organization might be using several types in isolation and in combination. Organizations essentially use the transaction processing system. The business tabulates all its recurring transactions like inventory and customer orders using transaction processing system. The operations information system is used by managers to plan out their production and scheduling activities. The decision support system is used by the top management to find feasible solutions and options to different scenarios.

There are numerous pluses in using a management information system. The organization records and tabulates all its key strategic functions. As and when deviations from the planned course happen, the organization is able to take corrective action at once. Communication channels are enforced. As the authority-responsibility diagrams are well established, the superiors delegate work to their subordinates and the subordinates turn to them for guidance and suggestions. The management information system mechanism enables the organization to weigh the pros and cons of several methods of accomplishing a task and choosing the most practical one.

Management information systems and computing systems were both built in the 1960s. Companies all over the world use them both for efficient and effective business operations.

With a management information system, company leaders must be mindful of two things. First, as very often it is consultants who develop the management information system for the company, they must be knowledgeable of all of the company's prevalent policies and practices. Secondly, a company must every year allocate funds for maintaining and sustaining the management information system.

Management Information Systems provide information to help managers make decisions. The quality of managerial decision-making depends directly on the quality of available information.

Management Information Systems provide analytical models, specialized information, real-time updates and hypothetical scenarios to assist managers with the decision-making process.

Management Information Systems give managers quick access to information. This can include interaction with other decision support systems, information inquiries, cross-referencing of external information and potential data mining techniques. These systems can also compare strategic goals with practical decisions, giving managers a sense of how their decisions fit organizational strategy.

Managers need to understand the complexities, limitations and benefits of their systems when relying on them to aid in the decision-making process. Automated systems are only as valuable as the information that is put into them, so employee training is essential.

Management Information Systems provide regular information to managers to allow them to make decisions based on data rather than guesses. Certain data and analysis can play a very useful role in making good decisions about where and when to use human and other resources to achieve the mission of an organization. Management Information System can answer questions such as: *Would it be better to add staff at the beginning or end of a manufacturing process? How do we choose the most efficient way to use our space? Do we need more patient exam rooms or a bigger lab? How much inventory should we store and when do we order more stock? What hours have the most customers, so we will have an adequate staff to serve them?*

The world is developing an increasingly global market and economy. Managers know that one tool they need is regular, clear and consistent information to help them in guiding their organization. This does not happen by chance. A system needs to be thoughtfully created with the purpose of providing useful information in the simplest and most elegant way possible. The basic management information system measures inputs and/or outputs, allowing managers to analyze the relationship between them and make decisions based on the outcomes they desire.

The amount of information available for analysis is almost infinite, so it is important to choose the critical information that will let managers see their situation clearly. When airlines and hotels developed management information systems that included the revenue lost in not selling empty seats or rooms, they developed ways to get some value from the rooms by offering them to latecomers at deep discounts. The key information for these managers was not the end of the month profit or gross sales, but the occupancy rate by time of year, day of week, routes, and so on.

Retail managers need to balance inventory on hand with rate of sales and type of goods sold. Healthcare managers need to know how many hours a physician or other essential care provider can work safely and provide staffing to allow adequate coverage.

Soup kitchen managers need to know how much food to prepare, so they don't have hungry people on the one hand or an excess of food that goes to waste on the other. They need to know the clientele they serve and if there are some special needs that need attention.

III. THE IMPORTANCE OF MANAGEMENT INFORMATION SYSTEM

III. 1. Management Information System and the Organization's Purpose

Organizations exist for reasons. Legislators review the needs and demands of the citizens to decide how to allocate tax revenues to promote the sometimes competing economic and social goals of the state. Perhaps the reason for the legislature is to seek the greatest good for the greatest number some others operate from the position that the goal is to assure that the needs of the most vulnerable in the population are not ignored. Airlines exist to get people to distant locations efficiently and safely and make a profit for the shareholders. The balancing of those three goals is critical.

It is essential that the information system designed for management helps them support the organization's purpose. Toyota is legendary for its management system in which any employee can stop the assembly line to make an improvement to the process.28

Management steers the organization to achieve the organization's purpose. To have the information necessary to make changes in resource allocation or personnel use, management needs key indicators as to how the process is working. A Management Information System provides regular information about the health and function of the organization. It also needs to provide timely, accurate, clear and consistent information that gives managers a view of the entire organization.

Businesses worldwide make extensive use of Management Information Systems. Management Information System designed by the top management of an organization is a tool for assembling and accumulating facts and figures about all the important business processes. The Management Information System particularly aims at controlling the technologies, work force and the policies, procedures and practices of the business.

Management Information System aids the organization in effective and efficient decision making. The organizational data, like information on the processes, standard operating procedures and audit preparation methodology, are all tabulated and presented in the forms of reports. Also the internal controls for each department that list the flow of work between

[28] http://www.ehow.com/ - cited on 16th of November 2011

employees, the authority-responsibility relationship, all are listed by the Management Information System.

An organization that uses Management Information System is able to record, process, route and tabulate all important business transactions. As and when need arises, the organization is able to incorporate necessary changes and improvements to its areas of concern. For example when an organization sees that the actual and projected sales figures are not in tune with each other, it can take steps to make changes and thus align the two figures.

Management Information System facilitates informed decision making. It usually represents a number of options from which the organization usually picks the best trade-off for sales, operations and other strategic areas. The top management also analyzes whether its resources are being utilized optimally.

III. 2. The Objectives of a Management Information System

A Management Information System is a system of processing data in an organization to collect information, which is later communicated to various departments to facilitate solid decision making. In a Management Information System, computerized systems constantly gather data that is processed, integrated and stored in the organization's database for access by anyone in the organization who needs it to make an important decision.

Production records have always been helpful in measuring the success of a business. It was with the advent of computer technology in the 1950s and 1960s that information systems began to collect basic data on sales and employee payroll; however, as applications became simpler in the 1980s, more and more businesses began to use computers to maintain and process data more extensively. Today, a Management Information System helps maintain data that helps organizations with decision making, risk management strategies, supply chain management, resource management, employee management and project management.

An effective Management Information System manages, maintains and processes data in an organization, and thereby supports decision making. It provides the organization's board and management with the whole picture, supplying them with information like data that is needed to make strategic decisions, keeping the organization's best interests in mind.

A Management Information System is a very important part of the organization's risk management strategy. A good Management Information System helps the organization conduct regular reviews to assess any risks that the organization may face, and come up with an appropriate strategy to counter them. A Management Information System can help the organization recognize any potential risks, measure the threat posed by the risk and limit its effects with a sound strategy. A Management Information System that monitors all the data from

an organization and processes it can help the organization monitor its working systems and processes. Reviewing this data gives the management feedback on the efficiency of its systems, and helps measure the productivity of the employees in particular, as well as that of the organization in general. The data maintained by the management information system helps smooth out the working processes and helps identify where the organization can cut costs and boost profits.

CONCLUSIONS

- Organizations could not reach their goals without a well-defined Management Information System adapted to their strategic target;
- Organizations must get the right information to the right person at the time required to make the right decision;
- Management Information System aids the organization in effective and efficient decision making;
- A Management Information System provides regular information about the health and function of the organization;
- Organizations should adapt permanently their behavior to the changes of the market environment using the benefits provided by modern IT technology;
- To be on the businesses' top, organizations need to allocate a part of their yearly budgets for building, maintaining and sustaining a sound Management information system in place.

REFERENCES

1. Auster, Ethel and Chun Wei Choo, Ed. 1995. *Managing Information for the Competitive Edge*. New York, NY: Neal Schuman.

2. Choo, Chun Wei. 1991, Towards an Information Model of Organizations. *The Canadian Journal of Information Science* 16, no. 3 (September): 32-62.

3. Choo, Chun Wei and Ethel Auster. 1993. Scanning the Business Environment: Acquisition and Use of Information by Managers. In *Annual Review of Information Science and Technology*, Ed. Martha E. Williams. Medford, NJ: Learned Information, Inc. For The American Society for Information Science.

4. Choo, Chun Wei. 1994. Perception and Use of Information Sources in Environmental Scanning. *Library & Information Science Research* 16, no. 1: 23-40.

5. Choo, Chun Wei. 1995. *Information Management for an Intelligent Organization: The Art of Environmental Scanning.* Medford, NJ: Learned Information.

6. Davenport, Thomas H. 1993. *Process Innovation: Reengineering Work through Information Technology.* Boston, MA: Harvard Business School Press.

7. Davenport, Thomas H. and Lawrence Prusak, 1993. Blow Up The Corporate Library. *International Journal of Information Management vol. 13*, no. 6 (Dec 1993): 405-412.

8. McGee, James V. and Laurence Prusak. 1993. *Managing Information Strategically.* New York, NY: John Wiley & Sons.

9. Taylor, Robert S. 1986. *Value-added Processes in Information Systems.* Norwood, NJ: Ablex Publishing Corp.

10. Taylor, Robert S. 1991. Information Use Environments. In *Progress in Communication Science*, ed. Brenda Dervin and Melvin J. Voigt, 217-254. Norwood, NJ: Ablex Publishing Corporation.

11. http://choo.fis.utoronto.ca/fis/respub/dlc95.html

12. http://www.aiim.org/What-is-Information-Management

13. http://ezinearticles.com/

14. http://www.tbs-sct.gc.ca/pol/doc-eng

15. http://www.ehow.com/

INFORMATION AND KNOWLEDGE MANAGEMENT

LTC Laurenţiu ŞERBAN

INTRODUCTION

The information universe is permanently changing. The technological developments of the latest years have created an ever-expanding universe of information, from pure content creation to the endless statistics created by every people interaction with the new technological environment.
This development in the ability to create and share information, and the facility to notice its use, offers enormous cultural, educational and financial benefits for those who know how to manage it.

I. INFORMATION MANAGEMENT

Information management has been in fashion for more than two decades. Many authors date its beginning in 1980 when U.S. federal agencies were forced to introduce information resource management. Concerning its exact origins, there was a substantial growth in literature dealing with this topic at the beginning of the eighties. At the end of the nineties, the term knowledge management became more popular.

I.1. Technology-oriented information management

The general purpose of information management is to make available the proper information at the proper time and in the proper place. For technology-oriented information management, computer-based information systems are the primary means to this end. Information management from this angle highlights the importance of information technologies. This is justified by the high degree of IT integration, the complexity of its application, and its visible consequences for an organization.
Within technology-oriented information management, the following aspects can be reminded:

- data management,
- IT management, and
- strategic use of IT.

I.1.1. Data management

In a larger sense, data management can be defined as all organizational and technical tasks concerning the planning, storage, and provision of data, both for computer personnel and end-

users (Schulte 1987). Its purpose is to maximize the quality, applicability and value of the data resources in an enterprise (Hoven 1995). In the literature, often two components are suggested for data management: data administration and database administration (Gilllenson 1985; Henderson 1987; Lytle 1986). Data administration mainly serves a planning and analysis function. It may be responsible for data planning, accountability, policy development, standards setting, and support. One of the major tasks includes the design of the data architecture of an organization. Database administration provides a framework for managing the data at the operational level. Its role may include performance monitoring, troubleshooting, security monitoring, physical database design, and data backup.

I.1.2. IT management

There is a broader view of information management that data management is a part of or a precondition for information management. The management of hardware, software, and IT personnel must be included as well. The focus here is on the technological aspects of electronic data processing.

Information infrastructures provide means for all possible types of data processing open to different use (e.g., computers, networks). They constitute the basis for the information systems that, in contrast, support specific tasks of an organization. The information systems provide, in particular, the means for information use and exchange. The main role of information systems management is the management of the development and operation of an organization's information systems. Information management from this view can be defined as the planning, organization, and control of information use, information systems, and information infrastructure in an organization.

I.1.3. Strategic use of information technology

A strategic orientation should go along with an increased valuation of information processing in an organization. This should be met by the creation of a new position at strategic management level: the chief information officer. The main purpose behind this is to ensure that information processing is coordinated with corporate objectives.

Strategic aspects play an important role in nearly all concepts that are concerned with the management of information technology. Strategy is viewed as a fundamental characteristic of information [technology] management.

I.2. Content-oriented information management

Authors in this area of information management usually have a background in library and information science, records management, or a closely related discipline. Contrary to technology-oriented information management, these approaches focus on information content.
Publications can be classified here as follows:

- records management,
- provision of external information,
- human-centred information management, and
- information resources management.

I.2.1. Records management

Records management is described as a discipline which is concerned with the management of document-based information systems (Robek, et al. 1996).
The main goals of records management are:

- to furnish accurate, timely, and complete information in order to enable efficient decision making processes;
- to process recorded information as efficiently as possible;
- to provide information and documents at the lowest cost;
- to render the maximum utility to the users of documents;
- to dispose of records which are no longer needed.

As can be seen, the main feature of records management is the management of the information life cycle. According to Robek, it consists of production, dissemination and use, storage and provision for current access, decisions on the retention/destruction, and archiving of documents.
Records management deals less and less with documents recorded on paper. The management of electronic documents has become more central instead using support systems like intranets, electronic imaging systems, and workflow management systems.

I.2.2. Provision of external information

Content-oriented information management concentrates on the provision of external information. Kuhlen and Finke (1988) claim that external information concerning changes in relevant segments of the environment is much more important for the success of an organization than the management of information technology. Choo (1998) has similar arguments. According to him, the survival of a company depends on how well it processes information about its environment and, as a result, succeeds in adapting efficiently to environmental changes.

I.2.3. Human-centered information management

Humans play a much more important role in content-oriented management approaches. For instance, Wersig's approach to information management does not centre on information technology or formal theories but on how humans handle information in reality (Grudowski 1995). Some approaches do not only consider information handling and/or information behavior of individuals but of the organization as a whole. They also include an information culture that according to Davenport (1997) results from the total information behavior of the organization's staff. Schneider (1990) even calls the approach developed by her 'culture-conscious information management'. It takes into consideration that information management is embedded into a certain organization with a specific history and based on general assumptions that influence the behavior of its staff.

I.2.4. Information resources management

According to Bergeron (1996), IRM is grounded in the following assumptions:

- recognition of information as a resource;
- an integrative management perspective;
- management of the information life cycle;
- a link with strategic planning.

One important feature of information resources management consists is that it is a framework that seeks to integrate different information professionals and functions under one umbrella.

In a wide sense, information resources management can be defined as the management of those resources (human and physical) that are concerned with the systems support (development, enhancement, maintenance) and the servicing (processing, transformation, distribution, storage, and retrieval) of information (Schneyman 1985). Marchand and Horton (1986) distinguish between information resources and information assets. Information resources include information specialists; information technology; facilities like the library, the data processing department, and the information centre; and external information brokers. Information assets cover all the formal information holdings of an organization (data, documents, technical literature), know-how (rights on intellectual property, practical experience of staff), as well as knowledge about the environment (competitors; political, economic, and social environment). While the information assets concern information itself, the information resources are a means by which information can be gained. Lytle (1988) has a somewhat narrower view. He differentiates between data, hardware, software, information systems and services, as well as personnel.

II. KNOWLEDGE AND KNOWLEDGE MANAGEMENT

II.1. Data, information and knowledge

By scanning the various literature sources, the study identified various attempts by different authors to explain knowledge by contrasting it to concepts such as data and information. Some attempts go no further than merely stating that knowledge is not data.

Drawing a distinction between information (meaningful data) and knowledge is more complex. The researcher asserts that the apparent failure to draw clear distinctions between knowledge and information has a major impact on the chance of KM to advance as a discipline. Unless this is done, knowledge management will forever be confused with information management. This apparent dilemma is explored below.

Denning (1998), the well-known author and knowledge management consultant to the World Bank, asserts that the distinction between information and knowledge has become blurred as a result of theoretical objections raised by post-modernists concerning the concept of truth and the particular views held by the positivist school regarding the concept of reliability.

A popular approach has been to explain the difference between knowledge and information and data by referring to knowledge as a higher order of information – see Figure 1.

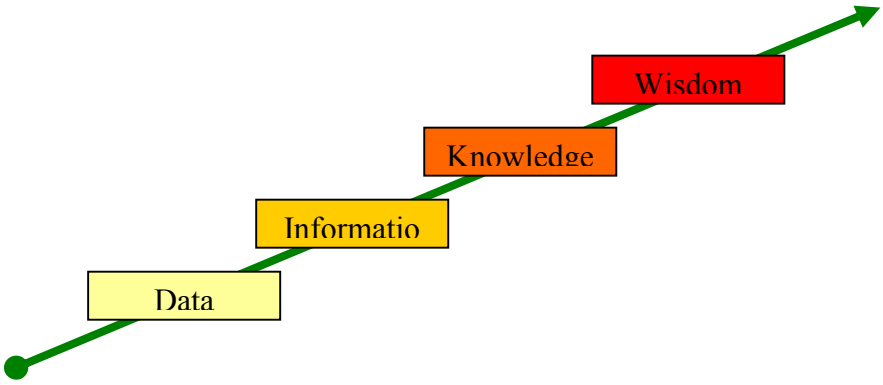


Figure 1: Data to Wisdom Hierarchy

(Source: Snowden, 2003a, Power Point Slides)

Davenport and Prusak (1998) assert that, intuitively, we are able to ascertain that knowledge constitutes something deeper and richer than information and data.

Furthermore, we also have a capacity to sense that someone has that special "knack", something that distinguishes him or her from others. Though we can't always explain it, we know it has something to do with wisdom, intelligence; a higher order of "knowing" gained from past experience.

The above hierarchy or pyramid representation has been criticized by various authors such as Snowden (2003a), who rejects the notion that knowledge is a higher order form of information. The author (Snowden, 2003a, Power Point Slides) argues that knowledge is "the means by which we inform". Snowden's view is presented graphically in Figure 2.

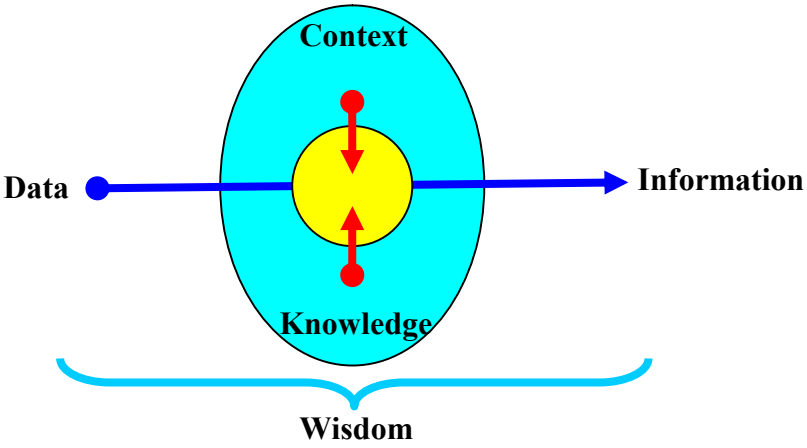


Figure 2: Snowden's view on knowledge and information

(Source: Snowden, 2003a, Power Point Slides)

Firestone and McElroy (2003a) view knowledge as a subset of information that has been subjected to a process of evaluation and validation; knowledge is thus not a superset of information. In Figure 3 data, knowledge and "just information" are types of information and problems are used to produce more information, including new knowledge.

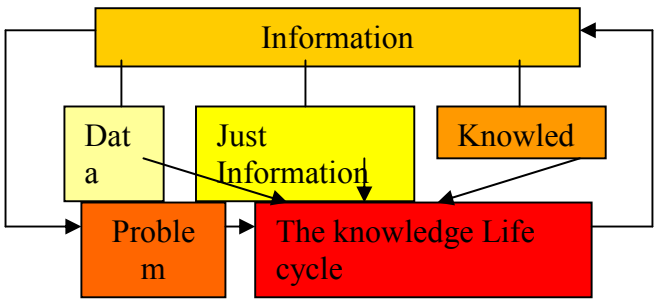


Figure 3: Life Cycle View of Data, Information and Knowledge

(Source: Firestone and McElroy, 2003a p.19)

It should be noted that the ideas of authors such as Firestone, McElroy and Snowden reflect relatively contemporary work done in the area of knowledge management. It is the contention of the researcher that scholars such as Firestone and McElroy have provided significant impetus to

the understanding of knowledge management. These authors' ideas will be expanded on in later discussions.

Despite the apparent difficulty in understanding the exact meaning of knowledge, the concept has nevertheless made its way into the jargon of many disciplines. The discussion that follows looks at phenomena such as the knowledge economy, knowledge society and knowledge-based organization, to name a few. These concepts have gained widespread popularity in the literature and are sometimes used interchangeably. A discussion of such phenomena serves as an introduction to the more detailed discussion about knowledge management, to follow in the next chapter.

II.2. An introduction to knowledge management

Despite the infancy of Knowledge Management as an area of study, its body of knowledge has grown substantially over the past few years. This chapter comprises a selective overview of literature pertaining to the field of knowledge management. This section is not intended to provide an exhaustive view of Knowledge Management.

II.2.1. Defining knowledge management

Knowledge management is a debatable and emerging term and has many different definitions. The term knowledge management was first introduced in a 1986 keynote address to a European management conference. Alternative definitions have been proposed since that attempt to capture the complexities of knowledge management. The American Productivity and Quality Center defined knowledge management as "the strategies and processes of identifying, capturing and leveraging knowledge" (Atefeh et al., 1999, p. 172).

The knowledge management could be defined as an ongoing, persistent, purposeful interaction among human-based agents through which the participating agents manage (handle, direct, govern, control, coordinate, plan, organize, facilitate, enable and empower) other agents, components, and activities participating in basic knowledge processing (knowledge production and knowledge integration), with the purpose of contributing to the creation and maintenance of an organic, unified whole system, producing, maintaining, enhancing, acquiring, and transmitting the enterprise's knowledge base.

II.2.2. Knowledge management processes

Alavi (2000) notes that organizations continuously engage in certain knowledge management processes. The above author identifies four processes that are depicted in Figure 4.

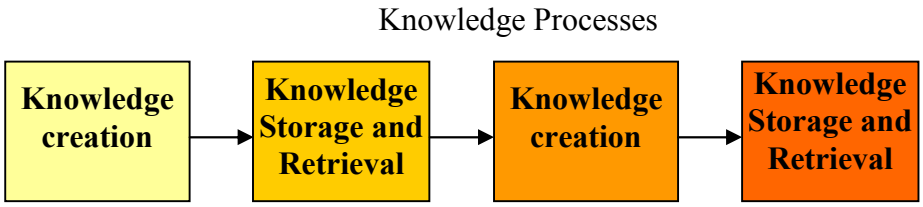


Figure 4: Generic Knowledge Management Processes by Alavi

(Source: Alavi, 2000 p.7)

Gauging from an analysis of various knowledge management approaches followed in Europe, the European KM Forum - EKMF (2001), concluded that with few exceptions (Davenport and Nonaka), most approaches have the same basic structure and identifiable modules, stages or phases. Most approaches considered by the EKMF include the phases identified by Alavi above.

Notably, Davenport and Prusak do not describe a knowledge management process (EKMF, 2001). Davenport and Prusak (1998) provide a detailed discussion of knowledge markets, compelling the reader to view knowledge markets as a framework for understanding and improving the transfer of knowledge. Knowledge Management, according to the authors, is an effort to improve the efficiency of such knowledge markets. For Davenport and Prusak (1998), as the organization interacts with its environment, it absorbs information, turn it into knowledge and takes action based on experiences, values and internal rules. They, (Davenport and Prusak, 1998 cited in EKMF, 2001) highlight knowledge generation, knowledge codification and coordination and knowledge transfer as key focus areas in a knowledge management initiative.

Nonaka, who did not adopt Knowledge Management as an approach in the first place, focuses solely on knowledge creation. However, certain concepts used by Nonaka in his popular SECI model, correspond with some of the knowledge management phases identified by the various other KM approaches in the EKMF study.

Martennson's (2000) research, referred to earlier, revealed results that are consistent with those found by the EKFM study. He identified the following four stages: knowledge acquisition, storage, providing access and knowledge use.

II.2.2.1. Knowledge creation

A discussion of knowledge creation will be lacking if it does not consider the contribution of Nonaka. Alavi (2000) draws special attention to the emphasis that Nonaka places on appropriate organizational mechanisms to support and nurture each of the modes of knowledge creation discussed earlier. For the sake of convenience, Nonaka's modes of knowledge conversion are again listed; they are socialization, externalization, combination and internalization.

Davenport and Prusak (1998 pp.52-67) propose five options available to organizations through which knowledge is created:

- Acquisition; refers to knowledge acquired by the organization from external sources including knowledge internally generated. This is not necessarily new knowledge; it includes knowledge copied from competitors or other industries, also knowledge bought via mergers
- Rental; e.g. through an external research unit or hiring a consultant with specific expertise
- Dedicated resources; utilizing resources exclusively for this purpose e.g. R&D units
- Fusion; the deliberate introduction of complexity, diversity and conflict to create new synergy
- Adaptation; external changes causes organization to "adapt or die"; warns against the complacency, "core rigidities" or the tendency to stay on well-known paths. Some organizations sometimes generate a crisis in order to stimulate creativity
- Networks – informal, self-organizing networks of people that might become formalized, e.g. Community of Practice (COP)

Davenport and Prusak do not explicitly refer to learning as a result of the knowledge creation process. Liebowitz and Beckman (1998) regard learning of the individual, the team and the organization as an integral part of knowledge creation. The two authors cite Kolb's learning cycle as a framework to understand the effects of participation in new experiences, reflective activity, concept formulation and the development of hypotheses (Kolb, 1983 cited in Liebowitz and Beckman, 1998). Liebowitz and Beckman's arguments show glimpses of second-generation KM thinking when they cite Couger's work on the Creative Problem Solving (CPS) method (Couger, 1996 cited in Liebowitz and Beckman, 1998). The six problem solving steps proposed by Couger are: define the problem, analyze the problem, generate solution ideas, evaluate and select the solution, test and implement the solution and lastly, document and share the results (Couger, 1996 in Liebowitz and Beckman, 1998).

II.2.2.2. Knowledge storage and retrieval

Alavi (2000) asserts that to create new knowledge is not enough; people and organizations simply forget and mechanisms are needed to store acquired knowledge and to retrieve it when needed. One such mechanism identified by the knowledge management community is "organizational memory" (Alavi, 2000). Organizational memory includes individual memory (individual experiences) as well as shared knowledge and interpretations resulting from social interactions, including organizational culture, work processes and procedures, structure, ecology and archives (Alavi, 2000). It is fair to assume that the organization that keeps track of its

experiences, e.g. by recording and retrieving knowledge about best practices, internal and external to the organization, stands to benefit as opposed to one that keeps on reinventing the wheel. However, citing the work of Argyris and Schon, Alavi warns about the negative effects associated with organizational memory (Argyris and Schon, 1978 cited in Alavi, 2000). Organizations have to constantly guard against rigidity in terms of structure, capabilities, outlook and current knowledge. A complacent attitude can prevent the organization from engaging in continuous learning, and innovation as a result of inability to adapt to change.

This above phase of KM has traditionally been fertile ground for proponents of codification strategies, which include, amongst others, efforts to extract tacit knowledge from experts using a combination of elicitation methods and technology systems and to make that knowledge available to the organization in some form.

II.2.2.3. Knowledge distribution

Alavi (2000) is of the opinion that the knowledge distribution process, despite its importance, is under-studied. The author (Alavi, 2000) postulates that the knowledge distribution process is subject to the same influences as the communication process that is often neglected in organizations. Comparing and contrasting the communications process and the knowledge distribution process, the researcher crudely depicts the parallels in Table 1.

Components of the communication process*	Factors influencing knowledge distribution**
Sender (Source)	Perceived value of source unit`s knowledge stock Motivational disposition of source
Message receiver	Nature of message (tacitness and explicitness) Motivational disposition of receiving unit (willingness to acquire knowledge from source) Perceived value of source unit`s knowledge stock
Channel Coding/Decoding	Existence and richness of transmission channels Absorptive capacity of the receiver

Table 1: Comparison of communications model with knowledge distribution

* (Source: Krone et al, 1987 cited in Alavi, 2000)

** (Source: Gupta and Govindarajan, 1999 cited in Alavi, 2000)

The distribution of knowledge is arguably where most of the knowledge management activities occurs. It is also in this sphere that technology is playing a significant role, referring to the use of intelligent agents to customize information delivery, email, data mining, Intranets and Web portals (Liebowitz, 2000).

II.2.2.4. Knowledge application and use

According to the knowledge-based theory of the firm, knowledge itself does not constitute a competitive advantage; it is the application and integration thereof with business processes that makes a difference (Alavi, 2000). Grant (Grant, 1996 cited in Alavi, 2000) identifies the following three mechanisms for integrating knowledge into the organization:

- Directives; sets of rules, standards, procedures and instructions converted from tacitly held specialist knowledge into explicit forms for communication to non-specialists
- Organizational routines; relate to patterns for task performance and coordination, interaction protocols and process specifications
- Self-contained task teams; refer to the creation of teams to attend to tasks where a high degree of uncertainty exists and where group synergy can be exploited. Group problem solving often requires coordination and facilitation of frequent interaction and intense collaboration

Liebowitz and Beckman (1998 p.104) state that "knowledge can be applied by people or machines to perform work" The researcher disagrees with the notion that a computer or some type of machine is able to apply (directly or indirectly) knowledge in a business activity.

III. KNOWLEDGE MANAGEMENT IN THE US ARMY

The widely held belief that the richest resource of today's organizations is the knowledge residing individually and collectively among employees reflects the importance of processes for promoting the creation, sharing, and leveraging of knowledge.

This focus on knowledge and knowledge processes has led to the evolution the concept and practice of knowledge management (KM). Knowledge management is hard to define. There are numerous definitions, but what is critical to understand is that the purpose of KM is to "enhance organizational performance by explicitly designing and implementing tools, processes, systems, structures, and cultures to improve the creation, sharing, and use of…knowledge that [is] critical for decision-making" (Delong and Fahey, 2000, para 14). Although KM has been seen by many as just another management "fad", the practice is gaining a strong foothold in many industries. According to Davenport and Grover, what began "first in industries and functions that [were] basically selling knowledge - professional

services, pharmaceuticals, research and development functions…is quickly moving into other industries, including manufacturing, financial services, and even government and military organizations." (2001, p. 4)

III.1. Military interest in knowledge management

The military faces many of the same challenges as the private sector in dealing with realities of the Information Age. Specifically, Joint Vision 2020 and service doctrines all tout the concept of "information superiority" and "knowledge superiority" as critical core competencies necessary for fighting wars in the future (Joint Chiefs of Staff, 2000; Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (OASD/C3I), 2000a). The primary focus of the military, however, centers around developing new strategies that allow it to maintain a dominant military position in spite of funding constraints (Owens, 2001). Although tragic events, such as the World Trade Center and Pentagon destruction, and the accompanying realization of a serious homeland terrorist threat, may precipitate near-term relief from military cuts, the future role of our military force remains uncertain. While funding may become a non-issue in the short term, the military requirements for fighting terrorism are likely to require a major transformation, relying heavily on Information Age technologies for future missions.

In military circles, the terms "revolution in business affairs" (RBA) and "revolution in military affairs" (RMA) describe the two significant spheres of change being experienced by the military as a result of the Information Age (Johns, Shalak, Luoma, and Fore, 2000; OASD/C3I, 2000b). RBA represents the changes concentrated in the commercial sector, which are also significantly affecting military business processes, such as e-commerce, business process improvement, and re-engineering (OASD/C3I, 2000b). RMA, however, centers on the "use [of] new technology to transform the way in which military units can wage war" (Owens, p. 10; OASD/C3I, 2000b). Both RBA and RMA are "driving the services to transform their structures and war-fighting doctrines from an Industrial Age model to one embodied in today's successful Information Age corporations" (Johns et al., 2000, p. 4). Knowledge management is seen as central to that transformation.

In order to effectively approach the implementation of knowledge management processes and systems in organizations, one must be aware of the possible factors that can influence its success or failure. Research has shown that a wide range of factors can affect KM implementation, including culture, leadership, technology, organizational adjustments, evaluation of knowledge management activities and/or knowledge resources, governing/administering knowledge activities and/or resources, employee motivation, and

external factors (Holsapple and Joshi, 2000; 2002). The authors state that these factors can be grouped into three broad categories: managerial influences, resource influences, and environmental influences. Managerial influences "emanate from the organizational participants responsible for administering the management of knowledge" (Holsapple and Joshi, 2000, p. 239). Resource influences include the human, financial, knowledge, and material resources (Holsapple and Joshi, 2000, p. 241) that make KM a reality. And, finally, environmental influences affect what "knowledge resources should or can be acquired in the course of KM, as well as what knowledge manipulation skills (e.g., human or technical) are available" (Holsapple and Joshi, 2000, p. 242). Both managerial and resource influences are considered internal to the organization while environmental influences originate from external sources (Holsapple and Joshi, 2000; 2002).

This classification of influences provides a framework for evaluating those factors that may either contribute to KM success or impose barriers to achieving success. At the same time, however, the nature of these influences is contingent on the contexts in which they are found and investigated. By understanding both the potential enablers and barriers to KM within their contexts, organizations can have a clearer roadmap from which to start and guide their KM journey.

III.2. Army knowledge management

Army Knowledge Management (AKM) is the Army's strategy to transform itself into a net-centric, knowledge-based force and an integral part of the Army's transformation to achieve the Future Force. AKM will deliver improved information access and sharing while providing infrastructure capabilities across the Army so that warfighters and business stewards can act quickly and decisively. AKM connects people, knowledge, and technologies.

The goals of AKM are:

(1) Adopt governance and cultural changes to become a knowledge-based organization.

(2) Integrate KM and best business practices into Army processes to promote the knowledge-based force.

(3) Manage the infrastructure as an enterprise to enhance efficiencies and capabilities such as collaborative work, decision-making, and innovation.

(4) Institutionalize AKO/DKO as the enterprise portal to provide universal and secure access for the entire Army.

(5) Harness human capital for the knowledge-based organization.

The result of the AKM strategy is to align Army enterprise knowledge and the information infrastructure with the Global Information Grid (GIG) and the Future Force.

Army organizations will develop communities of practice (CoPs) or communities of interest (COIs) as an integral part of the transformation to a net-centric, knowledge-based force.

1. A CoP is a group of people who regularly interact to collectively learn, solve problems, build skills and competencies, and develop best practices around a shared concern, goal, mission, set of problems, or work practice.
2. Communities of Practice are supported by collaborative environments such as structured professional forums and knowledge networks.
3. A COI is a collaborative group of users that must exchange information in pursuit of its shared goals, interests, missions, or business processes. See also paragraph 4–8 of this publication.
4. All communications within CoPs and COIs are subject to applicable professional, ethical, and security guidelines.

The use of AKO/DKO and Army Knowledge Online-Secret (AKO-S) permits maximum sharing of Army information and knowledge resources across the Army enterprise and reduces the need for investment in duplicative IT resources. Army activities requiring collaborative tools will use those provided on AKO/DKO or as otherwise prescribed by the DA.

AKO/DKO is the single Army portal for authenticating Army users to gain access to enterprise systems and portals.

III.3. Chief Information Officer management

The CIO management focuses on those policies, processes, and organizational responsibilities necessary to accomplish the primary information resources management (IRM) missions in governing legislation and other guidance. Such responsibilities include strategic planning, business process analysis and improvement, IT architecture, resource management (to include capital planning and investment strategy), performance measurements, IT acquisition, IA, and the IT workforce.

A CIO's primary responsibility is IRM. The CIO provides advice to the senior management personnel to ensure that IT is acquired and information resources are managed consistently with established investment decisions and priorities.

The CIO process will not routinely address IT systems that are funded under the intelligence programs.

The Army CIO Executive Board (EB) plays a key role in the management and execution of CIO missions. The CIO EB is the primary vehicle for identifying and resolving enterprise-level CIO issues. Standing and ad hoc committees and working groups may also be established by the CIO or the board under its charter to conduct analyses and research or accomplish a given task. These groups will report recommendations/findings directly to the EB.

CONCLUSIONS

"Drowning in information, but starved for knowledge" (Naisbitt, 1984, p. 17) is the plight of many of today's public and private sector organizations. Being a very large (Nissen, 2001) public sector organization, the military is no exception. As society has transitioned from the Industrial Age to the Knowledge Age, the evolution of computing technology has changed the landscape of the modern world and workplace.

Unprecedented advances in information technology have allowed organizations to increase productivity, reduce cycle times, and expand operations. Simultaneously, however, this same technology has contributed to a proliferation of information - an information glut - that threatens to overwhelm, instead of help, its human users. What has resulted is an increasing awareness that it is "knowledge" and not "information" or "data" that is the key to future organization success and innovation (Amidon, 1997). This "knowledge", defined by some as "the most valuable form of content in a continuum starting at data, encompassing information, and ending at knowledge" (Grover and Davenport, 2001, p. 6) has become the "holy grail" for many of today's organizations including the U.S. military. Where the focus in the past has been on land, machines, or capital, knowledge is now being recognized as perhaps the most strategically significant organization resource (Earl, 2001, p. 215; Nidumolu, 2001, p.116; Zack, 1999, p. x).

REFERENCES

- Alavi, M. (2000) Systems for managing organizational knowledge, The Organisational Change Program for the CGIAR Centers.
- Amidon, D. M. (1997). Innovation strategy for the knowledge economy: the ken awakening. Boston: Butterworth-Heinemann.
- Army Regulation 25–1 (2008), Army Knowledge Management and Information Technology.
- Atefeh, S., McCamble, L., Moorhead, C. and Gitters, S. H. (1999) Knowledge management: the new challenge for the 21st century, Journal of Knowledge Management, Vol. 3, No. 3, pp. 172-179.
- Bartczak, E. (2002). Identifying barriers to knowledge management in the United States military
- Bergeron, P. (1996). Information resources management. *Annual Review of Information Science and Technology*, 31, 263-300.
- Choo, C. W. (1998). *Information management for the intelligent organisation: the art of scanning the environment*. Medford, NJ: Information Today Inc.
- Davenport, T. & Prusak, L. (1998). *Working knowledge: how organizations manage what they know.* Boston, MA: Harvard Business School Press.
- Davenport, T. (1997). *Information ecology: mastering the information and knowledge environment*. New York, NY: Oxford University Press.
- Davenport, T. H., & Grover, V. (2001). Guest editor's introduction Special Issue: Knowledge Management. Journal of Management Information Systems, 18(1), 3-4.
- DeLong, D., & Fahey, L. (2000). Diagnosing cultural barriers to knowledge management. The Academy of Management Executive, 14(7), 3-4.
- Denning, S. (1998) *What is knowledge management?*, World Bank.
- Earl, M. (2001). Knowledge Management Strategies: Toward a Taxonomy. Journal of Management Information Systems, 18(1), 215-233.
- EKMF (2001) *Common approaches in KM*. 2001, European KM Forum Consortium, Bremen.
- Firestone, J. M. and McElroy, M. W. (2003a) *Key issues in the New Knowledge Management*. KMCI Press/Butterworth-Heinemann, Burlington.
- Firestone, J. M. and McElroy, M. W. (2003b) *The Knowledge Life Cycle (KLC)*, Executive Information Systems Inc. and Mark W. McElroy.
- Firestone, J. M. and McElroy, M. W. (2003c) *The New Knowledge Management*, Knowledge Mangement Consortium International.

- Gillenson, M. (1985). Trends in data administration. *MIS Quarterly*, 9(4), 317-325.
- Grudowski, S. (1995). *Information management und Unternehmenskultur*. Unpublished PhD dissertaton, Freie Universitaet Berlin.
- Henderson, M.M. (1987). The importance of data administration in information management. *Information Management Review*, 2(4), 41-47.
- Holsapple, C., & Joshi, K. D. (2000). An Investigation of Factors that Influence the Management of Knowledge in Organizations. Journal of Strategic Information Systems, 9, 235-261.
- Holsapple, C., & Joshi, K. D. (2002). Knowledge management: a three-fold framework. The Information Society, 18, 47-64.
- Hoven, J. van den, (1995). Information resources management: an enterprise-wide view of data. *Information Systems Management*, 12(3), 69-72.
- Johns, S., Shalak, M., Luoma, M., & Fore, D. (2000). Knowledge Warriors for the 21st Century. Defense Fellows Project. Unpublished manuscript.
- Joint Chiefs of Staff. (2000). Joint Vision 2020. Washington, D.C.: U.S. Government Printing Office.
- Kuhlen, R. & Finke, W. (1988). Informationressourcen-Management: Informations- und Technologiepotentiale professionell für die Organisation verwerten. *Zeitschrift für Führung und Organisation*, 57(5), 314-323.
- Liebowitz, J. (2000) Building organizational intelligence: a knowledge management primer. CRC Press LLC, Boca Raton.
- Liebowitz, J. and Beckman, T. (1998) Knowledge organizations: what every manager should know. St Lucie Press LLC, Boca Raton.
- Lytle, R.H. (1986). Information resource management. *Annual Review of Information Science and Technology*, 21, 309-336.
- Lytle, R.H. (1988). Information resource management: a five-year perspective. *Information Management Review*, 3(3), 9-16.
- Marchand, D.A. & Horton, F.W. (1986). *Infotrends: profiting from your information resources*. New York, NY: Wiley.
- Martennson, M. (2000) A critical review of knowledge management as a management tool, Journal of Knowledge Management, Vol. 4, No. 3, pp. 204-216.
- Naisbitt, J. (1984). Megatrends. New York: Warner Books, Inc.
- Nidumolu, S., Subramani, M., & Aldrich, A. (2001). Situated Learning and Situated Knowledge Web: Exploring the Ground Beneath Knowledge Management. Journal of Management Information Systems, 18(1), 115-150.

- Nissen, M. (2001). Toward a Program of Research on Knowledge Flow in the Very-Large Enterprise. (Navy Printing Service-GSBPP-01-003). Office of Naval Research. Arlington, VA.
- Nonaka, I. & Takeuchi, H. (1995). *The knowledge-creating company: how Japanese companies create the dynamics of innovation*. New York, NY: Oxford University Press.
- Nonaka, I. (1991) The knowledge-creating company, Harvard Business Review, November-December 1991, pp. 96-104.
- Office of the Assistant Secretary of Defense/C3I. (2000). Advancing Knowledge Management in the DoD: A Primer for Executives.
- Owens, B. (2000). Lifting the Fog of War. New York: Ferrar, Strauss, and Giroux.
- Robek, M.F., Brown, M.F. & Stephens, D.O. (1996). *Information and records management*. New York, NY: McGraw Hill.
- Schneider, U. (1990). *Kulturbewusstes Informationsmanagement*. Munich: Oldenbourg.
- Schneyman, A.H. (1985). Organizing information resources. *Information Management Review* , 1(1), 35-45.
- Schulte, U. (1987). Praktikable Ansatzpunkte zur Realisierung von Datenmanagement-Konzepten. *Information Management*, (4), 26-31.
- Snowden, D. (2003a) *Complex knowledge*, MS Power Point Slides, IBM Cynefin Centre for Organisational Complexity, Hursley
- Snowden, D. (2003b) *Knowing what we know*.
- Vlok, Daniel (2004). An Assessment of the Knowledge Processing Environment in an Organization, MBA Rhodes University.
- Zack, M. H. (1999) Developing a knowledge strategy, California Management Review, Vol. 41, No. 3, Spring 1999, pp. 125-145.

BALANCED SCORECARD

Cpt. Daniel IONIȚĂ

INTRODUCTION

In the early 1990s, Robert Kaplan, an accounting professor at Harvard University, and David Norton, consultant also from the Boston area, sought to solve a measurement problem plaguing corporations around the globe. The dynamics of business were changing rapidly, globalization, customer knowledge, and the rise of intangible assets were all converging to forever change the way business was conducted. Strategy was considered a potent defense for succeeding in this changing landscape. However, the facts suggested that about 90% of organizations were unable to execute their strategies.

Kaplan and Norton made the startling discovery that performance measurement systems utilized by most firms were incapable of providing the information needed to compete in this new knowledge economy. Most were unchanged from those developed by the early industrial giants at the turn of the twentieth century. Characterized by an almost exclusive reliance on financial measures of performance, these systems were ill - prepared for the challenges faced by modern organizations.

Kaplan and Norton believed that organizations should attempt the introduction of balance to their measurement systems. Specifically, the historical accuracy and integrity of financial measures must be balanced with the drivers of future financial performance in an attempt to view a wider spectrum of performance and execute strategy. Their radical, yet profoundly simple, approach was labeled a *"Balanced Scorecard"* and featured measurement in four distinct, yet related areas: customer, internal processes, employee learning and growth, and financial.

Since introduction in 1990, the Balanced Scorecard has been embraced by corporations around the world. Recent estimates suggest that at least 60% of *Fortune 1000 organizations*[*] use a Balanced Scorecard system.

Once considered the exclusive domain of the for-profit world, the Balanced Scorecard has been translated and effectively implemented in both the nonprofit and public sectors. Success stories are accumulating from all corners of the globe as eager public and nonprofit sector leaders apply the Balanced Scorecard, enhancing their capacity, strengthening their core processes, and better

[*] **Fortune 1000** is a reference to a list maintained by the American business magazine *Fortune*. The list is of the 1000 largest American companies, ranked on revenues alone.

serving their constituents. While empirical evidence of Scorecard use and efficacy outside the private sector remains relatively scarce, in one public sector study funded by the Sloan Foundation, 70 % of respondents agreed that their governmental entity was better off since implementing performance measures.

I. WHAT IS A BALANCED SCORECARD?

Definition

The balanced scorecard (BSC) is a strategic planning and management system that is used extensively in business and industry, government, and nonprofit organizations worldwide. The main purpose of balanced scorecard is to align business activities to the vision and strategy of the organization, to improve internal and external communications, and to monitor organization performance against strategic goals.

The balanced scorecard suggests a four perspectives view the organization and the development of performance metrics, collection of data and the analysis of this data relative to each of these four perspectives:

- Financial perspective;
- Learning and growth perspective;
- Internal business process perspective;
- Customer perspective.

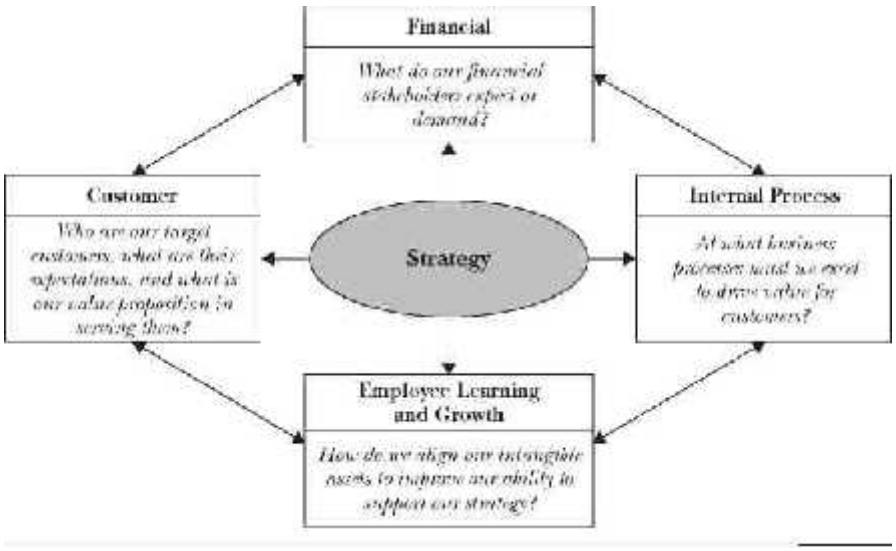


Figure 1. Balanced Scorecard

Why the Balanced Scorecard?

Before we explore the Balanced Scorecard in detail, it's important to examine some of the factors that have given rise to this proven framework for tracking organizational performance and executing strategy. Understanding these pillars of the Balanced Scorecard's success will not

only enhance your appreciation of the tool, but the insights gained will also assist you as you begin implementing the system within your own organization. In the pages ahead, we'll examine these three factors that are fundamental to the success of any organization, whether public sector, nonprofit, or private: the increasing role of intangible assets in creating value in today' s economy, our long - standing over - reliance on financial measures of performance to gauge success, and most importantly, the challenge of executing strategy. Let's look at each of these and discover how they've contributed to the need for a Balanced Scorecard system – a simple tool which has revolutionized the management of performance.

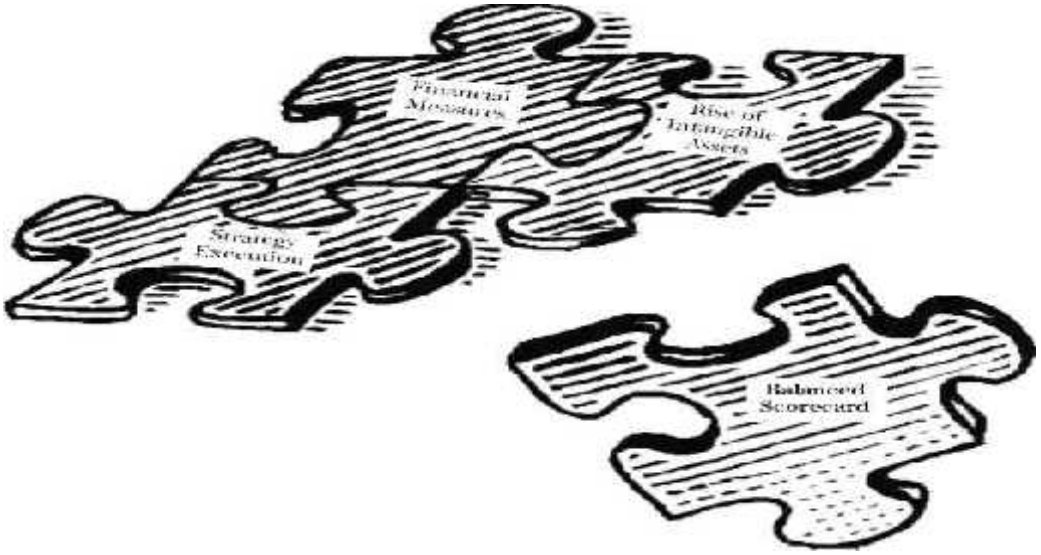


Figure 2: The Balanced Scorecard Solves Fundamental Business Issues

The Balanced Scorecard has emerged as a proven tool in meeting the many challenges faced by the modern organization: **as a communication tool**, **measurement system**, and **strategic management system**.

II. THE BALANCED SCORECARD AS A COMMUNICATION TOOL - STRATEGY MAPS

When Kaplan and Norton originally developed the Balanced Scorecard, their creation was a direct response to what some might realistically describe as the tyranny of financial measures. These dollar-based metrics seemed to wield unlimited power yet were utterly incapable of gauging value in what has become known as the "new economy" — one in which intangibles rule and execution of strategy is everything. The Balanced Scorecard posited a simple yet revolutionary idea: complement the financial numbers (which will always be required of any enterprise) with the drivers of future financial success represented by such disparate but critical elements as innovation, customer satisfaction, and employee engagement.

The Balanced Scorecard represented a profound and simple idea, but as with many such notions, it was not always easily implemented. Pioneers of the system, while anxious to develop the breakthrough metrics that would ensure strategy execution, often struggled when it came to actually articulating what they would track in each of the perspectives. For many, the challenge lay in translating vague and obtuse strategy dictums such as "quality service" or "product development" into meaningful measures, since the nebulous nature of such terms could lead to any number of suitable metrics based on one's individual interpretation.

Early Balanced Scorecard adopters faced this challenge and found themselves instinctively spanning the strategy/measures chasm with a discussion of *objectives*, or what needed to be done well, in order to implement the essence of the strategy. So, rather than beginning the Scorecard process with the sometimes futile effort of creating measures, they first asked themselves "What do we need to do well in order to execute"? For example, if the strategy devoted a section to new service development, stressing the need to bring new services to customers at a faster rate, this narrative was translated into the simple objective of "accelerate new service development" which may be accurately measured by the new service development life cycle.

As with any business tool, the Balanced Scorecard has a vocabulary of its own, and earlier, I distinguished between two of the most important terms you'll find in the Scorecard lexicon: objective and measure. Understanding the definitions of these terms is critical should you hope to derive the maximum benefit from your efforts. An objective is a succinct statement, normally beginning with a verb, describing what we must do well in each of the four perspectives in order to implement our strategy. Examples vary widely but could include: "improve service delivery time", "Leverage partnerships", and "Close our skills gap". Strategy Maps are comprised entirely of objectives. Tracking our success in achieving the objective is the domain of the measure, a (typically) quantitative device used to monitor progress.

Creating Objectives for the Four Perspectives of a Strategy Map

We must take in consideration four perspectives of our Strategy Map:

Customer Perspective When choosing objectives for the Customer Perspective of the Strategy Map, organizations must answer three critical questions: "Who are our customers?", "What do our customers expect or demand from us?" and finally, "What is our value proposition in serving them?" Sounds simple enough, but each of these questions offers many challenges. Most organizations state that they do in fact have a target customer audience, yet their actions reveal an "all things to all customers" strategy. This lack of focus will prevent an organization from differentiating itself from competitors. Understanding what customers truly value can pose no less of a challenge. Without near constant feedback and communication, we're often left gazing hopefully into a crystal ball to

determine customers'wishes. Finally, choosing an appropriate value proposition also represents a formidable test to most organizations. What is a value proposition? It simply represents how you propose to add value for your customers, what makes you stand out from others. When considering this important point many will choose one of three "disciplines":

- *Operational excellence.* Organizations pursuing an operational excellence discipline focus on low price, convenience, and often "no frills". Wal-Mart* provides a great representation of an operationally excellent company;
- *Product leadership.* Product leaders push the envelope of their firm's products. Constantly innovating, they strive to offer simply the best product in the market. 3M** is an example of a product leader in the private sector, a company long known for breakthrough products that frequently solve needs we didn't even know we had;
- *Customer intimacy.* Doing whatever it takes to provide solutions for unique customer's needs help define the customer intimate company. These organizations don't look for one - time transactions but instead focus on long - term relationship building through their deep knowledge of customer needs. In the retail industry, Nordstrom*** epitomizes the customer intimate organization.

As organizations have developed, and experimented with, value propositions, many have suggested it is difficult, if not impossible, to focus exclusively on just one. A more practical approach is to choose one discipline in which you possess particularly strong attributes, and maintain at least threshold standards of performance in the other disciplines. McDonald's, for example, is a truly operational excellent organization, but that doesn't stop them from continually introducing new menu items.

Internal Process Perspective: In the Internal Process Perspective of the Strategy Map, we identify the key processes at which the organization must excel in order to continue adding value for customers. Each of the customer disciplines outlined above will entail the efficient operation of specific internal processes in order to serve our customers and fulfill our value proposition. Our task in this perspective is to identify those processes and develop the best possible objectives with which to execute our strategy. To satisfy customers, you may have to identify entirely new internal processes rather than focusing your efforts on the incremental improvement of existing activities. Service development and delivery, partnering with the community, and reporting are examples of items that may be represented in this perspective.

Financial Perspective: Financial objectives are an important component of the Strategy Map, in

* is an American public multinational corporation that runs chains of large discount department stores and warehouse stores. The company is the world's 18th largest public corporation, according to the Forbes Global 2000 list, and the largest public corporation when ranked by revenue;

** is an American multinational conglomerate corporation based in Maplewood, Minnesota, United States;

*** is an upscale department store chain in the United States.

the for-profit, public, and nonprofit worlds. In the for-profit domain, the objectives in this perspective represent the end in mind of our strategic story, typically culminating in objectives such as “Increase shareholder value”, “Grow revenues”, and “Lower costs”. In the nonprofit and public sectors, financial objectives ensure we’re achieving our results, but doing so in an efficient manner that minimizes cost. Typical examples include: “Expand revenue sources”, “Contain costs” and “Utilize assets effectively”.

Employee Learning and Growth Perspective: If you want to achieve ambitious results for internal processes and customers, where are these gains found? The objectives appearing in the Employee Learning and Growth Perspective of the Strategy Map are really the enablers of the other perspectives. In essence, they are the foundation upon which this entire house of a Strategy Map is built. Once you identify objectives in your Customer and Internal Process Perspectives, you can be certain of discovering some gaps between your current organizational infrastructure of employee skills, information systems, and organizational climate (e.g., culture) and the level necessary to achieve the results you desire. The objectives you design in this perspective will help you close that gap and ensure sustainable performance for the future.

Many organizations are struggling in the development of Employee Learning and Growth objectives. It is often the last perspective developed and it’s likely that the teams are intellectually drained from their earlier efforts of developing new strategic objectives, or they simply consider this perspective “soft stuff” best left to the human resources group. No matter how valid the rationale seems, this perspective cannot be overlooked in the development process. The objectives you develop in the Employee Learning and Growth perspective are really the enablers of all other measures on your Map.

III. THE BALANCED SCORECARD AS A MEASUREMENT SYSTEM

Many organizations have inspiring visions and compelling strategies, but are often unable to use those beautifully crafted words to align employee actions with the firm’s strategic direction. Many leaders have personal visions that never get translated into shared visions that galvanize an organization. The Balanced Scorecard system allows an organization to translate its vision and strategies by providing a new framework — one that tells the story of the organization’s strategy through the objectives of the Strategy Map and measures chosen to represent those objectives on the Balanced Scorecard. Rather than focusing on financial control devices that provide little in the way of guidance for long - term employee decision -making, the Scorecard system uses measurement as a new language to describe the key elements in the achievement of the strategy.

Measures for the Balanced Scorecard are derived from the objectives appearing on the Strategy Map, which itself serves as a direct and clarifying translation of the organization’s strategy. A

Strategy Map may prove to be the most inspirational document you've ever produced but without the accountability and focus afforded by accompanying performance measures, its value is specious to say the least. Conversely, performance measures serve as powerful monitoring devices, but without the benefit of a clear and compelling Strategy Map, much of their contextual value is lost. Strategy Maps communicate the strategic destination, while performance measures housed within the Balanced Scorecard monitor the course allowing us to ensure we remain on track.

Financial measurement and its limitations

Despite the changes in how value is created today, estimates suggest that 60% of metrics used for decision - making, resource allocation, and performance management in the typical organization are still financial in nature. It seems that we remain stuck in the quagmire of financial measurement. Perhaps tradition — where the measurement of all organizations has been financial — is serving as a guide unwilling to yield to the present realities. Bookkeeping records used to facilitate financial transactions can literally be traced back thousands of years. At the turn of the twentieth century, financial measurement innovations were critical to the success of the early industrial giants like General Motors. The financial measures created at that time were the perfect complement to the machine - like nature of the corporate entities and management philosophy of the day. Competition was ruled by scope and economies of scale with financial measures providing the yardsticks of success.

Over the last one hundred years, we've come a long way in our measurement of financial success, and the work of financial professionals is to be commended. Innovations such as Activity - Based Costing (ABC) and Economic Value Added (EVA) have helped many organizations make more informed decisions. However, as we begin the twenty - first century, many are questioning our almost exclusive reliance on financial measures of performance, suggesting that these measures may be better served to report on the stewardship of money entrusted to management' s care rather than a means to chart the organization' s future.

Here are some of the criticisms levied against the over - abundant use of financial measures:

- ***Not consistent with today's business realities***. Tangible assets no longer serve as the primary driver of enterprise value. It is employee knowledge (the assets that ride up and down the elevators), customer relationships, and cultures of innovation and change that create the bulk of value provided by any organization — in other words, intangible assets. If you buy a share of Microsoft's stock, are you buying buildings and machines? No, you're buying a promise of value to be delivered by innovative people striving to continually discover new computing pathways. Traditional financial measures were

designed to compare previous periods based on internal standards of performance. These metrics are of little assistance in providing early indications of customer, quality, or employee problems or opportunities;

- ***Driving by rear view mirror***. This is perhaps the classic criticism of financial metrics. You may be highly efficient in your operations one month, quarter, or even year. But does that signal ongoing financial success? As you know, anything can, and does, happen. A history of strong financial results is not indicative of future performance;
- ***Tendency to reinforce functional silos***. Working in mission - based organizations, you know the importance of collaboration in achieving your goals. Whether it's improving literacy, decreasing HIV rates, or increasing public safety, you depend on a number of teams working seamlessly to accomplish your tasks. Financial statements don't capture this cross - functional dependency. Typically, financial reports are compiled by functional area. They are then "rolled - up" in ever - higher levels of detail and ultimately reflected in an organizational financial report. This does little to help you in meeting your noble causes.
- ***Sacrifice long - term thinking***. If you face a funding cut, what are the first things to go in your attempt to right the ship? Many organizations reach for the easiest levers in times of crisis: employee training and development, or even employees themselves! The short - term impact is positive, but what about the long - term impact? Ultimately, organizations that pursue this tactic may be sacrificing their most valuable sources of long - term advantage and often to no avail. Recent research suggests that tools such as downsizing not only damages workers who are laid off, but destroy value in the long - term. One study found that downsizing in the corporate world never improved profits or stock market returns.
- ***Financial measures are not relevant to many levels of the organization***. Financial reports by their very nature are abstractions. Abstraction in this context is defined as moving to another level leaving certain characteristics out. When we roll - up financial statements throughout the organization, that is exactly what we are doing: compiling information at a higher and higher level until it is almost unrecognizable and useless in the decision making of most managers and employees. Employees at all levels of the organization need performance data they can act on. This information must be imbued with relevance for their day - to - day activities.

Here we just reviewed some limitations of financial measures of performance, and with only a modicum of exaggeration, it could be suggested that a single - minded focus on financial success may be among the causes for the epidemic of scandals currently plaguing the corporate world. So, do financial metrics deserve a place on Balanced Scorecard? Absolutely. Despite their many shortcomings, financial yardsticks are an entirely necessary evil. This is especially the case in

the public and nonprofit sectors. In an era of limited, often decreasing, funding you must consistently tread the delicate balance between effectiveness and efficiency. Results must be achieved, but in a fiscally responsible manner.

The stakeholders will be looking to you to achieve your missions, and thus, nonfinancial measures of performance become critical in your efforts. However, pursuing your goals with no regard to the financial ramifications of your decisions will ultimately damage everyone: You'll be the victim of decreased funding as it becomes clear that you ' re unable to prudently manage your resources. The funders will be discredited, and potentially, unwilling to support you in the future. Most importantly, your target audiences will not receive the services they need as a result of your inability to reach them in both an effective and efficient way.

IV. THE BALANCED SCORECARD AS A STRATEGIC MANAGEMENT SYSTEM

For many organizations, the Balanced Scorecard has evolved from a communication and measurement tool to what Kaplan and Norton have described as a "Strategic Management System".

While the original intent of the Scorecard system was to balance historical financial numbers with the drivers of future value for the firm, more and more organizations experimented with the concept and found it to be a critical tool in aligning short-term actions with their strategy. Used in this way, the Scorecard alleviates many of the issues of effective strategy implementation - barriers and:

Vision Barrier	People Barrier	Management Barrier	Resource Barrier
Only 5% of the workforce understands the strategy	*Only 25% of managers have incentives linked to strategy*	*85%o of executive teams spend less than one hour per month discussing strategy*	*60 % of organizations don't link budgets to strategy*

Overcoming the Vision Barrier through the Translation of Strategy The Balanced Scorecard is ideally created through a shared understanding and translation of the organization's strategy into objectives (on the Strategy Map), measures, targets, and initiatives in each of the four Scorecard perspectives. The translation of vision and strategy forces the executive team to specifically determine what is meant by often vague and nebulous terms contained in vision and strategy statements, for example: "superior service" or "targeted customers". Through the process of developing the Strategy Map and Scorecard, an executive group may determine that "superior service" translates to the objective "provide fast turnaround". That may then be translated into the

measure of "response time to inquiries". All employees can now focus their energies and day - to - day activities toward the crystal clear goal of response times rather than wondering and debating about the cliché "superior service". Using the Balanced Scorecard system as a framework for translating the strategy, these organizations create a new language of measurement that serves to guide all employees' actions toward the achievement of the stated direction.

Cascading the Scorecard Overcomes the People Barrier To successfully implement any strategy, it must be understood and acted upon at every level of the firm. Cascading the Scorecard means driving it down into the organization, giving all employees the opportunity to demonstrate how their day - to - day activities contribute to the company's strategy. In this way, organizational "ranks" distinguish their value - creating activities by developing Scorecards that link to the highest - level organizational objectives.

Through cascading, you create a line of sight from the employee on the front line to the director's office. Some organizations have taken cascading all the way down to the individual level with employees developing personal Balanced Scorecards that define the contribution they will make to their team in helping it achieve overall objectives.

Rather than linking incentives and rewards to the achievement of short - term financial targets, managers now have the opportunity to tie their team, department or agency's rewards directly to the areas in which they exert influence. All employees can now focus on the performance drivers of future value, and what decisions and actions are necessary to achieve those outcomes.

Strategic Resource Allocation Overcomes the Resource Barrier Developing your Balanced Scorecard provides an excellent opportunity to tie resource allocation and strategy. When we create a Balanced Scorecard, we not only think in terms of objectives, measures, and targets for each of our four perspectives, but just as critically, we must consider the initiatives or action plans we will put in place to meet our Scorecard targets. If we create long-term stretch targets for our measures we can then consider the incremental steps along the path to their achievement.

The human and financial resources necessary to achieve Scorecard targets should form the basis for the development of the annual budgeting process. No longer will departments submit budget requests that simply take last year s numbers and add or subtract an arbitrary5 %. Instead, the necessary costs (and profits) associated with Balanced Scorecard targets are clearly articulated in their submission documents. This enhances executive learning about the strategy, as the group is now forced (unless they have unlimited means) to make tough choices and trade-offs regarding which initiatives to fund and which to defer.

The building of a Balanced Scorecard also affords you a tremendous opportunity to critically examine the current myriad initiatives taking place in your organization. As a consultant, when I begin working with a new client, one of the laments I hear repeatedly from front-line employees

is “Oh no, another new initiative!”. Many executives have pet projects and agendas they hope to advance, often with little thought to the strategic significance of such endeavors. Initiatives at every level of the organization and from every area must share one common trait: a linkage to the organization’s overall strategic goals. The Balanced Scorecard provides the lens for making this examination. Once we developed our Map and Score-card, we should review all the initiatives currently underway in your organization to determine which are truly critical in the fulfillment of our strategy, and which are merely consuming valuable and scarce resources. Obviously, the resource savings are beneficial, but more importantly, you signal to everyone in the organization the critical factors for success, and the steps you are taking to achieve them.

Strategic Learning Overcomes the Management Barrier In today’s rapidly changing environment, we need more than an analysis of actual versus budget variances to make strategic decisions. Unfortunately, many management teams spend their precious time together discussing variances and looking for ways to correct these “defects”. The Balanced Scorecard provides us with the necessary elements to move away from this paradigm to a new model in which Scorecard results become a starting point for reviewing, questioning, and learning about our strategy.

Much has been written in recent years about knowledge management strategies within organizations, and many schools of thought exist. One common trait of all such systems is the desire to make the implicit knowledge held within the minds of your workforce explicit and open for discussion and learning. We live in the era of the knowledge worker, the employee who — unlike his organizational predecessors who relied on the company’s physical assets — now owns the means of production: knowledge. There may be no greater challenge facing your organization today than codifying and acting on that knowledge. In fact, Peter Drucker, widely considered the father of modern management, has called managing knowledge worker productivity one of the great management challenges of the twenty - first century. Sharing Scorecard results throughout the organization provides employees with the opportunity to discuss the assumptions underlying the strategy, learn from any unexpected results, and dialogue on future modifications as necessary. Simply understanding the firm’s strategies can unlock many hidden organizational capacities as employees, perhaps for the first time, know where the organization is headed and how they can contribute during the journey. One organization I worked with conducted employee surveys before and after the development of the Balanced Scorecard. Prior to implementation, less than 50 % said they were aware of, and understood, the strategy. One year following a full Balanced Scorecard implementation, that number had risen to 87 %! If you believe in openly disseminating information to your employees, practicing what some would call “open-book management” then I can think of no better tool than the Balanced Scorecard to serve as your open book.

Strategy is probably among the most discussed and debated topics in the world of organizations. Of course, it's not just organizations that wrestle with strategy — the concept is one that has truly entered the mainstream of our society. Professional sports teams all have a strategy to beat their opponents (and their owners have a strategy to separate us fans from our money!). The interesting thing about strategy in the business sense of the word is that nobody seems to agree on what it is specifically. There are as many definitions as there are academics, writers, and consultants to muse on the topic.

Despite the challenges of creating a strategy, ultimately it is more important and valuable to demonstrate the ability to execute the strategy. It's one thing to sit down and craft what is seemingly a winning strategy, but successfully implementing it is another thing entirely. For those who can execute, the rewards are significant. In the for-profit world, a 35% improvement in the quality of strategy implementation, for the average firm, is associated with a 30 % improvement in shareholder value. Unfortunately, the vast majority of organizations fail miserably when attempting to execute their strategies. A *1999 Fortune magazine story* suggested that 70% of CEO failures were not a result of poor strategy, but rather of poor execution. More recently, The Center for Creative Leadership has reported that 40% of CEOs fail in their first 18 months.

CONCLUSION

The balance scorecard as a way to measure the organization performance (and the performance indicators developed during its use) in a holistic approach should not be separated from the monitoring and execution aspects. The development of performance indicators, although of crucial importance, is just a first step, which should be followed by a set of continuous control and reporting activities with the goal of following the performance targets achievement (and implicitly the achievement of the set goals). In this respect, the entire balance scorecard approach, starting with the identification of vision and strategies and finishing with the monitoring and control of the achievement of targets should be performed keeping in mind that resources need to be allocated for each of these steps.

REFERENCES

1. Paul R. Niven, *Balanced Scorecard Step by Step: For Government and Non-Profit Agencies, 2nd Edition* (Hoboken, NJ: John Wiley & Sons, 2006);
2. Paul R. Niven, *Balanced Scorecard Step by Step: Maximizing Performance and Maintaining Results, 2nd Edition* (Hoboken, NJ: John Wiley & Sons, 2006);
3. Robert S. Kaplan and David P. Norton, *"The Balanced Scorecard – Measures That Drive Performance"*, Harvard Business Review, January – February 1992;
4. R. Charan and G. Colvin, *"Why CEOs Fail"*, *Fortune*, June 21, 1999;
5. Robert S. Kaplan and David P. Norton, *"Using the Balanced Scorecard as a Strategic Management System"*, *Harvard Business Review*, January – February, 1996;
6. Predescu I., Ionescu A. - *Tematica pentru întocmirea lucrarii*, Ed. Teora, Bucharest, 1998.

IT ENVIRONMENT – COMMUNICATION SUPPORT

LTC Iulian Valentin BADULESCU

INTRODUCTION

Human communication is full of problems and difficulties. Very often we hear phrases like: "I wanted to say this", "It appears you have not understood."

The main objectives of communication are the following:

- going to be receptive (seen, heard or read);
- will be understood (our message to be decoded);
- will be accepted (message not rejected);
- will cause a reaction (a change of perception, of interpretation, the attitude or behavior).

If we failed to achieve any of these goals, it means we failed.

"Knowing why and how to express yourself, to know how to ask a question, to know how to listen, to know how to formulate, to know you sweat, always, instead of party, to know (almost) everything about you, are so many details that are within the scope of communication. In this context, any professional, regardless of his training, you must know to communicate effectively with ambition, patience and perseverance, to the smallest detail. "

How we present ourselves, how we speak and look, the way we show how to communicate our being. This, especially, how no one judges us based on what and how we think, but depending on what we do! ... ...[29]

According to dictionaries, COMMUNICATION means "exchange of meaning" or even wider "information exchange" (communication between systems, regardless of the Universe that we aim).

In defining organizational communication, there are several approaches: "the process of information exchange"," verbal process or written transmission and reception of messages cups "," social process of human interaction based on symbols and specific rules "

Communication is a dynamic process, which has the following characteristics:

- involved sources (transmitters) and receivers;
- encoding and decoding means processing transmitted or perceived meanings;
- assume jurisdiction;

[29] Dan Popescu, *Arta de a comunica,* Bucureşti , 1998.

- requires performance;
- requires the existence of messages;
- is done in an environment of "noise";
- implies the existence of communication channels.[30]

Focusing attention on the concept of meaning and pragmatic, to be understood symbol position, and message transmission protocols as tools for transmitting meanings.

Therefore, from this perspective, COMMUNICATION appears as "bi-univocal process of transmission and reception of meanings, symbols and messages mediated by using".

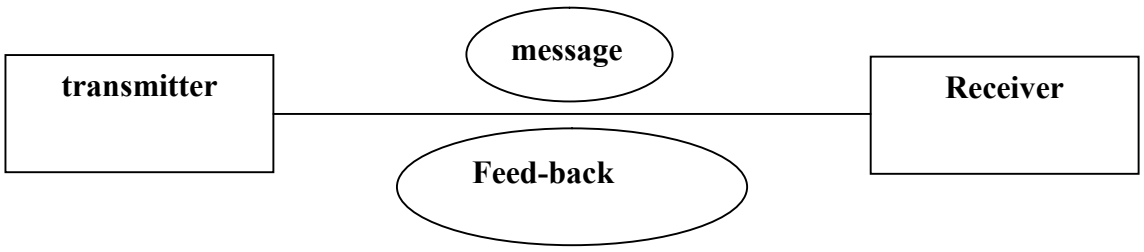
I. THE SIGNIFICANCE AND IMPORTANCE OF COMMUNICATION

I.1 Information - communication by computer object

Information is the primary object of communication and must meet the following qualities:

- **Consistency** - wide enough to be able to provide as much knowledge;
- **Relevance** - can provide the knowledge missing for a decision;
- **Accuracy** - its contents reflect the real situation of the phenomenon;
- **Opportunity** - to be provided in a timely manner;
- **Accessibility** - to be clear, easy to understand.

Information is based on data acquired through processing, meaning, purpose or use.



Classification of such information is necessary so as to form and by type and material used.

A classification of information according to form:

1. Analog representation of information is the physical phenomena, still images, sounds and moving images as perceived by technical means of recording, without the need for conversion or encoding them
2. Digital form of information is done either from real phenomenon; either from its analog form, in both cases taking places a numerical coding, a quantitative assessment, quantification of the phenomenon which is the subject of representation.

[30] Rodica Cândea, Dan Cândea, *Comunicarea managerială,* Ed. Expert, Bucureşti,

Classification of information according to its nature:

1. data: numeric, alphabetic, alphanumeric.
2. organized texts in the form of documents, pages of text, paragraphs, sentences, words and characters, intended to be processed with appropriate programs and editing text editing.
3. graphic that can contain graphics, drawings, etc. and can be viewed by displaying on the computer monitor or print them.
4. audio sequences generated by the human voice, phenomena of reality, musical instruments or electronic voice synthesizer and acoustic.
5. animal or video film, often accompanied by audio information: voice or sound.

Classification of information in terms of technical support used

1. information serving the technical media:
   - magnetic: magnetic tape, magnetic box, magnetic disk, floppy disk, magnetic card, etc..
   - reading optical media: optical discs whose information is read by optical laser devices.
2. information serving the graphic media:
   - Paper made from opaque media, such as classical documents, documents obtained from the printer information, documents produced by the drawing table (plotter).
   - Holders made of transparent photographic film, video tape, microfilm, etc..

I.2 Specifications for a communication process

The communication process inclues the following elements:

1. transmitter
2. message
3. middle of communication
4. language of communication
5. receiver
6. context

1. Initiator communication transmitter is the one who prepares the message. He chooses the means of communication and language so that the receiver can understand formulated massage. Transmitter has the right to choose the receiver that wants to communicate.
2. The sender encodes shape information can be an order, an idea, a thought. The message is aimed at informing, persuading, impress.

The message is subjected to a process of coding and decoding of the two, the transmitter encodes the message sent and the receiver decode the message. The message is the element that contains verbal and nonverbal symbols has a "text" - which is visible and has "music" - which may contain unwanted threat.

Example: "Please pass on to me when you return!"

3. Middle of communication or the communication channel is the road from the transmitter to the receiver of the message.

   It can be formal, hierarchical structure of communication going and informal organization - when communication comes from social interactions and connections informed of the organization. The latter may take the form: ideas, opinions, rumors.

   The middle of communication shall include discussion of official correspondence from person to person, meetings, phone, fax, internet.

4. Communication language can be:
   - verbal-words,
   - non-verbal body language, time, space, things imbracamintelor
   - paraverbal-through use tonality, emphasis, rhythm of speech
5. The receiver is the person receiving the message, but listening to the message is as important as its return.
6. The context is very important because the same words will ring in an office and even on the street.

I.3 Communication objectives

They are :

1. correct reception of the message
2. correct understanding of the message
3. acceptance of the message
4. causing a reaction (a change in behavior or attitude)

I.4 Communication functions

Regardless of the social system, communication in an organization meets eight functions: information, socialization, motivation, dialogue, education, advocacy entertainment, integration.

Communication management functions are:

1. Information
   - Ensure access to receive information

- Providing information necessary for developing an activity that allows the achievement
- Providing necessary information implementation decisions

2. Transmission of the decision
   - Decision-operative communication
   - Create a climate that stimulates decision to take responsibility

3. Influence Receiver

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   - Providing information necessary for developing an activity that allows the achievement
   - Providing necessary information implementation decisions
2. Transmission of the decision
   - Decision-operative communication
   - Create a climate that stimulates decision to take responsibility
3. Influence Receiver
   - Organizing dialogues with employees to provide feedback
   - Fostering communication between employees
   - Boosting initiative and creativity
4. Training employees
   - Transmitting the professional training knowledge needed improvement, spiritual development
   - Acquiring professional skills and competencies needed to perform
   - Enhancing the ability to perceive and interpret phenomena, to address and solve problems effectively
5. Imaging
   - Providing information needed to create personal and organizational image
   - Creation of a knowledge organization membership
6. Employees motivation
   - Providing information designed to enhance interest and participation of employees to tasks
   - Recognition performance achievements

- Correct evaluation of employees
- Maintaining a favorable climate for work
- Boosting self-confidence
- Increase personal responsibility

7. Organizational culture promotion
   - Transmitting organizational culture elements (slogans, norms, value systems)
   - Broadening cultural horizons of employees
   - Development of imagination and creativity
   - Fostering ethical and aesthetic needs
8. Organizing dialogues with employees to provide feedback
   - Fostering communication between employees
   - Boosting initiative and creativity

I.5 Types of communication

Types of communication are:

- Intrapersonal communication is an individual counseling with himself, when listening to "inner voice". Thus, it will judged himself, wonder and answer, think, analyze and reflect, evaluate decisions or repeated messages for others. It is necessary to balance mentally and emotionally.
- Interpersonal communication is the dialogue with each other. It helpes to know others and ourselves, by their image of us.
- Group communication is what ensures the exchange inside the organization team in small human communities. Here we share knowledge and experiences, to solve problems and develop new ideas.
- Mass communication is any set of tools and techniques that allow for messages written, spoken, visual, audio to an audience more or less broad and heterogeneous. The general wording is "Communication through the media."

Encoding function:

- *Verbal (oral), the meaning is encoded in words*

Is achieved through direct dialogue, the conversations in groups of different sizes, talks mediated distance telecommunications networks or calls from the same organization offices mediated communication networks intercom or telephone.

- Non-verbal communication, the meaning is carried by more than words (eg, written communication).

Written communication know a variety of forms and ways of communication by media (traditional documents, legislation, management decision-making documents, reports or controlled activities, demands, requests, complaints, contracts, the whole system of accounting documents , sketches, plans, drawings specialized images on paper or film, microfilm, etc.)..

I.6 Message and Media

The message is the semnification (information, knowledge, idea, emotion, feeling) sent by the transmitter, sent by channel (media), received and integrated receiver.

Before sending a message you must reflect the following:

- Why? (purpose)
- Who? (receiver)
- Where and when? (location and context)
- What? (topic)
- How? (tone and style).

When communicating, people send and receive messages designed to influence one's behavior. COMMUNICATION will reach its goals only with the following conditions:

- the message to be received, or heard, seen, read, etc..;
- a received message to be understood, decoded;
- a message intended to be accepted;
- the impact causes a reaction, a change of attitude, thinking and behavior favorable to the person who sent the message.

Media or channel of communication is the way the message is transmitted and distributed. In interpersonal communication it is rarely used a single channel. Even the most simple tête-à-tête conversation involved two, three or more channels (channel verbal visual channel, etc..). The process of sending and receiving messages can be achieved through a variety of channels, including:

Dialogue	Ideal form of communication for personal / confidential issues
Press, radio, television	Ideal to sent current opinion
Letter, report	Written communication
Meeting	Useful way to gather opinions and suggestions that are recorded in reports
Display table	Way of displaying information to a large number of people
teleconference	Telephone interconnect service
Megafon (mouthpiece)	Method of transmitting information simultaneously to a large number of people

Phone	Verbal communication system
Mobile Phone	On the go communication
Pager	Electronic contact system to send a remote message
Electronic robot	Telephone message recording device
Fax	High accuracy way to send documents to any distance.
PC computer	Complex technical system that allows large amounts of data storage and fast access to them
Computer network	Group of computers that were connected so that they can communicate with each other
Network Terminal	Interconnection via modem to a central computer terminal that provides data transmission capabilities and texts

In choosing a communication channel must take into account the following factors:

- execution speed
- information security
- duration
- method of communication, written or verbal
- transmission cost
- device to the receiver
- number of receptors, etc..

I.7 The context of human communication

Context affects both what is communicated and how it is communicated.

General context of communication covers the following aspects:

- physical context refers to immediate concrete and tangible physical environment: inside or open space, microclimate, ambience sound, light, color, etc..;
- cultural context aimed at the requirements, traditions, lifestyles, values shared by the group or community, moral norms, etc..;
- sociopsihologic context refers to the social status of partners, official or informal nature of their relations, to the concrete situation and specific stance in which communication occurs;
- temporary context concerns the timing and the chronological order in which the message is placed in a consecutive sequence of other messages**.**

II. COMPUTER ENVIRONMENT AND COMMUNICATION CHANNEL

II.1 Information Processes

Information process - all the methods, techniques and instruments used for collecting, recording, transmission, circulation, processing and use information.

In relation to nature, the information is processed differently, for which the following types of information processes:

- Data processing characterized by treating digital information as mathematical and logical rules and is present in activities that require a lot of calculations, statements and reports: economics, engineering, statistics, etc..
- word processing is a set of specific operations work with texts. Object processing, text, divided into pages, paragraphs, sentences and words, is subject to operations aimed at the form and character size, shape and page margins, how to place text on the page etc.. Word processing means also linguistic operations, such as separation of words into syllables automatic control grammatical, lexical and spelling of the text analyzed.
- Processing documents containing text, tables, graphics, images.
- Processing sound (human voice, sounds produced by electronic synthesis, natural sounds, music). Analog perceived sound information and converted to digital form provides "raw material" to be digitally processed using specialized programs in information processing sound.
- Image processing (moving). Dynamic visual information display and perception is the result of successive images per unit time (minimum 25 images per second). Sources of information video (moving images) are different: reality, surprised with the technique of film, images transmitted (analog or digital) through communication systems work-related video and pictures.

II.2 Information management

Use of automated data processing techniques immediate and future objectives aims to optimize the communication process.

Good ideas are not born from nothing, they are everywhere. In this era of communication, nothing remains hidden for long. In professional publications in technical documentation, in scientific sessions, any necessary information for decision making can be found.

Organizations are suffocated by the abundance of information. The secret of overcoming this situation is relatively simple: to know what your looking for and why you are looking for it, or otherwise said not to store in a passive mode any information received in the organization. Everyone in an organization needs to feel invested in a surveillance mission, but the synthesis and the decision should belong to the manager. For overseeing competition, all sources of information, formal or informal, are useful. Neither is magical, even the database. Some are expensive, some are free, the price doesn't necessarily have to do with the relevance of information.

Of course, the question is where to store this information. Many organizations have opted for an internal bank data can be enriched by anyone. There is a risk of falling into wrath documentation, which makes the plethora of information stored to turn into her enemy, no longer usable.

Information management problem is finding solutions for documents that still remain in use because the use of paper support through all stages which must pass a document becomes an activity increasingly difficult and expensive.

Information Management includes the following functions:

- taking information into the system;
- storing and retrieving information;
- information processing;
- printing and publishing;
- control and command system.

Retrieving information in the system includes:

- aquiring of information from national and international communications networks, public or private;
- taking information from a local data network;
- manual data and text entry or recording conversations with adequate equipment, image and sound.
- inputted information is processed immediately or saved for further processing.

Saving and retrieving information includes:

- internal store for information in process of being inputed;
- external store for information that is regularly consulted;

- electronic archive for "historical" information or very rarely consulted.

Information storage capacity and data access speed is the basic criteria for assessing the performance of a system. Through the process of memory, information can be processed or recovered by local consultation or communication applicants through communications networks.

Information processing includes:

- create and upload an information base, which involves a set of procedures to generate the structure and organization of information on technical support and effective information base load;
- updating information, requires the removal of information that became useless, the introduction of new information, changing existing ones to bring them into line with reality.
- proper treatment of information involved in making the various operations relating to or from the processing of texts, documents and images, or content for data processing.
- real-time consultation of information is done with programs that allow you to select and transmit the requested information to a peripheral device output (monitor, printer, network communication equipment, etc..)

  Consulting the information does not affect its contents.
- a release of required information to output requires different operations in relation to the nature of the information requested. For example, if data processing operations take place to obtain reports and complex situations that will be transferd to output devices (printing, viewing on a monitor or remote communicating via data networks).[31]

Printing and publishing documents

To professionally achieve the two functions, it is necessary to establish the organization of specialized compartments in electronic publishing, equipped with minicomputers and medium-large computers with appropriate software and media to facilitate storage of large quantities of documents. Managers are convinced that not only how the product looks can to influence customers, but also the quality of their presentation.

Control and command system *includes:*

- *directing and regulating the functioning of the whole system,*
- *an optimal allocation of system resources for the equipment,*
- *an internal memory management and database programs*
- *a takeover process control, process and output information, etc.*

[31] Dan Popescu, *Arta de a comunica,* Bucureşti , 1998.

The use of new PCs today is undoubtedly multimedia. PCs equipped with CD-RWs, combined with sound and graphics give the illusion of what the future will be digital - information highway - a mix of graphics, stereo sound and video.

In this context, the emergence and spread of multimedia systems which optimally combines telecommunications, computing and broadcasting, information processing acquires new dimensions, both qualitative and quantitative. In terms of quality, electronic processing of numerical information has been enriched with new forms: texts, documents, graphics, voice, sound and video. Quantitatively, through modern communications systems, information center of gravity shifted from specialists in computer software products to users.

The amount of information that floods the universe is apparently uncontrollable. In fact, most can not defend the "bombardment" of information, and can't turn it into an accessible stream. To support them, there are tools that facilitate communication and process control information.

II.3 The structure of computer hardware for communication

An electronic system is a complex functional calculation for automatic processing of data provided by users to obtain information. To achieve this objective, it needs the equipment (hardware), as well as a set of programs (software components).

Components of a computer system can belong to one of the following categories:

- Hardware
- Software
- Firmware

Hardware is the physical component of a computer system, meaning all equipment which make up the computing system. They consist of computer and peripheral equipment itself and are used for the collection, storage, processing, playback and transmission of results.

The software is a set of programs that make possible computer system function and information processing.. Software translation means "soft side" of the computer, unlike hardware, "the hard side". Software component of a computer system includes programs to turn grouped into several categories, according to the nature of the problems they solve. Equipment orders are given through special programs, called the programs (software based). They form the computer operating system and stored on magnetic or optical, which are loaded in memory.

Firmware is the software component loaded into memory ROM set by his computer system. This component is at the boundary between hardware and software, accounting software integrated into the hardware. Firmware of a computing system, microprogrammed instruction set loaded into memory ROM set, defines a certain way of functioning and, therefore, to use the computer system.

Basic structure of an electronic computer is as follows:

- UC - is the basic component of the computer system and consists :
  - a UAL - Arithmetic-logic unit- able to perform arithmetic and logical operations;
  - a UCC - command and control unit
  - an internal memory

    There are three types of memory, temporary storage media information:
    - ROM (Read Only Memory) contains program code and data set that form the BIOS - the system (basic Input Output System).
    - RAM (Random Access Memory) is where the information is used active in the computer. It is designed to temporarily store the operating system software interfaces required to use the system, time and work programs. The main feature of the dynamic RAM memory is the strategy information stored on the system when the power supply is interrupted.
    - The magnetic memory of a system is a type of memory that allows temporary data storage, environments that it can be stored on are flexible disks or any disks. DVD-RW is a type of memory used to retain data and programs on indefinitely, even after stopping the power supply system.
- output a Peripherals

• Equipment allowing reading of data input (data entry system): keyboard, mouse, scanner

• output peripheral equipment with which to extract results in a human readable format: printer, screen display, etc..

• storage peripherals that have auxiliary memory units capable of storing, in a form directly accessible computer, large amounts of data: magnetic disk drives, DVD-RW, etc..

• communication peripherals that allow remote data transmission via communication lines: coupler, modem, etc..[32]

Information about octet

Time	Short	form approx.	exact shape
Octet		1 octet	1 octet
Kilocet	K or KB	1.000 octet	1.024 octet
Megaocet	M or MB	1.000 000 octet	1.048.576 octet
Gigaocet	G or GB	1.000.000.000 octet	1.073.741.824 octet

[32] Mihaela Cârstea, Ion Diamandi, *Calculatorul pe înțelesul tuturor,* Editura AGNI, Bucureşti, 1996.

III. SOFTWARE USED IN COMMUNICATION

III.1 Operating System

The operating system is a set of programs that ensure optimal utilization of physical and logical resources of a computer system. It is designed to manage the hardware of the computer system, coordinate and control the execution of programs and to allow communication with the computer user. Using the hardware of a computer system would be difficult and inefficient in the absence of an operating system. Operating system software component that coordinates and oversees all activities of computer system and communicating with the computer user, must be able to make an interface between user computer itself and he is the interpreter user requirements expressed in a command language, executing these requirements by machine instructions.

The most important operating systems used in intranet, Internet and independent systems are:

- Windows
- Linux
- UNIX
- MAC OS

III.2 Using the Networks (Networks System)

III.2.1 Internet Network

Many believe that the Internet is a place where only computer science is discussed, where only computer enthusiasts meet and access information that are in the form of cryptic abbreviations that only specialists can understand. This impression is wrong. The ease with which you can share information, especially that any user can access information, Internet is the preferred environment. Structure of the Internet made it possible not only the distribution of information "static", but the existence of services. For example, based on a credit card can make all appointments for spending vacation in a beautiful country in the world, and can pay using your home computer.

Therefore the Internet is:

- A very fast way of communication between the people of this world attractive.
- The way people are anywhere in the world can communicate and exchange information more easily.
- The Internet is a network of networks. A network is a group of computers that were connected so that they can communicate with each other (exchange information). They can send messages to each other and may share information as files.

The Internet links more than 21,000 such networks and continually add to it more and more.

Some of the networks are run by government institutions, other universities, businesses, libraries, schools, etc..

Internet is an interconnected LANs, MAN's and WAN's over fast links (satellite, digital communication circuits, etc.).

All computers on a network to communicate with each other based on a set of fixed rules (language), called Protocol The protocol used was standardized and is called TCP / IP (Transmission Control Protocol / Internet Protocol).

To take advantage of Internet facilities, a user must connect his computer to one of the subnets specified above. In this way, the computer becomes a node in its Internet and using TCP / IP can use various programs with a client to transfer information from other computers with server role in turn connected to the Internet.

Who manages the Internet?

NO ONE! There is no company that would require some adjustment. The only rules governing the Internet are those of common sense.

There is however an organization's Internet users called ISOC (Internet Society), which is required to technically manage the Internet and to standardize the technology.

How do you connect to the Internet?

There are four main ways of connecting to the Internet:

- **Permanent link (permanent connection).**

Are used by large organizations like universities, schools, corporations. Costs for installation and operation of such a link are dedicated thousands of dollars.

- **direct connection via modem (dial-in direct connection).**

This type of connection is best, after the permanent link. It is individuals and small businesses access from this because the costs for installation and operation are approx. $ 50. Because the service is "dial-in", you need a modem and dial a number to phone you show him your service provider.

- **terminal connection via modem (dial-in terminal connection).**

This kind of connection lets you connect via modem and service provider, after the link, your computer acts as a terminal.

- **link by e-mail.**

This type of connection allows the transmission / reception of e-mail messages on the Internet.

The best way to connect to the Internet is the system OPM: Other People's Money (Money other). Many users of the Internet is connected through an organization that has a permanent connection to the Internet. Services available in INTERNET

Communication and information exchange in the Internet through the 'service', allowing exploration and search for information in this huge network. For any service request information is a computer – a customer of that service – from providing information to another computer, called server.

The most used Internet service in World Wide Web (WWW)

This is a system that will help hipertext2 move electronically around the world, searching for information. Web allows you to "follow" links.

To use WWW, you need a Web browser program that displays Web documents. (Internet Explorer, Firefox etc).

Almost every person (or entity) has created its own Web page, with public useful information. Currently, much of Web pages have a commercial aspect and therefore really useful information is constantly decreasing. This should not be worried because there are aspects where commercial and competition law is implicit. Thanks to her, only companies most "capable" will be able to survive the powerful wave. Although lately increased capacity and performance level of the Internet, users perceive a decline in service quality due to network congestion especially.

Factors causing congestion of the Internet are:

- assault of beginners, which under conditions of low-cost access, exhibits irrational behavior and uneconomic, resulting in "pollution" of the Internet;
- lack of technical solutions that make a difference access to required services and to allow for differentiated service priority;
- Internet services market imperfection, its structure reflected on the price and speed of communication

Functions of the Internet

- E-mail (electronic mail).
- Network World Wide Web (Web or WWW network, providing access to files, documents, images, sounds from thousands of Web areas).
- dialogue Usenet groups (Usenet newsgroups) - discussion groups on subjects related to science, events, music, computers, etc..
- transfer files using FTP protocol (File Transfer Protocol).

What information is needed to connect to the Internet? (taken from the service provider).

- connection type provided by SLIP (Serial Line Internet Protocol) or PPP (Point-to-Point Protocol);
- user name;
- A password;
- The telephone number for local access provider;

- IP Address (Internet Protocol) for Domain Name Server (DNS is short for Internet method to create unique names for each network server);
- authentication technique (the name for the login and password entered in a window or other methods.

All Web pages are identified by a unique address, called Universal Resource Locator (URL - universal system for locating resources).

WWW network addresses start in the same way:

- http:// stands for Hyper Text Transfer Protocol

III.2.2 Intranet Networks

Intranet means using internet technologies for binding a whole of an organization's information resources. Intranet derived from the Internet: is a computer network based on Internet protocols. Intranet is the current answer to the needs of information management and group work of an organization. Intranet facilitates communication between theorganization's peoples, resulted in technological infrastructure necessary for proper and effective collaboration.

The similarity between the two concepts makes it difficult to Internet and Intranet draw a border demarcation. However the most important difference is not so much the technological level, and especially to the semantic. Internet is the public information and Intranet is the propensity of private information.

Networks can be of several types:

- LAN (Local Area Network) - computers are placed inside the same building or campus;
- MAN (Metropolitan Area Network) - a city wide network);
- WAN (Wide Area Network) - national network.

Intranet Benefits derived from:

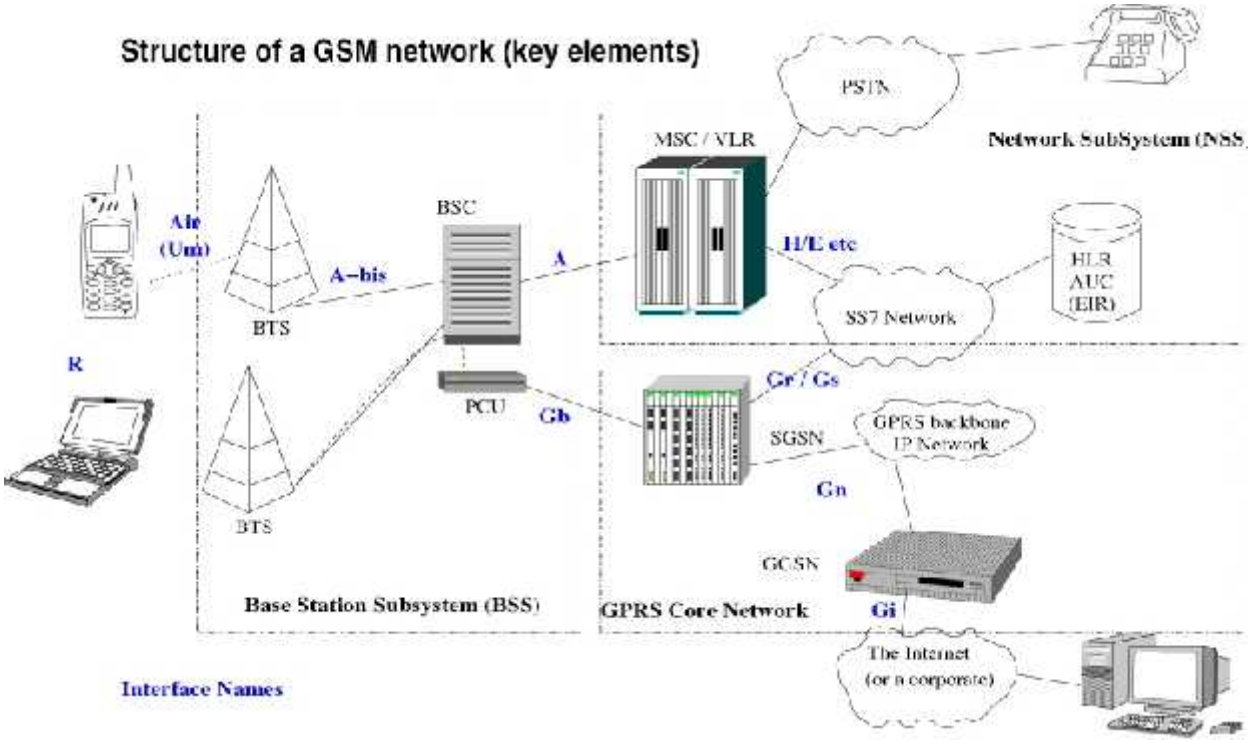
- uses browser;
- "dissolution" geographical distances;
- low maintenance cost and maintenance of an Intranet system;
- available information in an Intranet system is well organized and controlled, it will always have a "master";
- manageding the information security (including security access);
- is easy to learn the user through the learning curve once the specification of an interface (menus, toolbars, dialog boxes, etc..).

III.2.3 GSM Network (Global System for Mobile Communications)

The structure of a GSM network is quite complicated. In principle, there are three main elements: Base Station Subsystem (BSS), Network Switching Subsystem year (NSS) to GPRS Core Network. Base Station Subsystem is the component that can connect mobile phones to the mobile station. It consists of GSM stations that you see everywhere nowadays and are called Base Transceiver Station (BTS) and the station control unit (BSC). GSM stations are usually equipped with directional antennas. Coverage area around a station / GSM cell is divided radially into sectors, each of which is assigned one or two antennas. A common type is the type sectorization clover, with three sectors of 120 ° each.

A control unit stations (BSC) controls typically tens or hundreds of antennas, directing traffic to NSS. In a GSM BSC's several regional connections concentrate in one area and forward them to the MSC, a component of the NSS. BSC is considered the most robust component of a GSM network and is equipped with redundant systems to ensure continuous operation of the network.

Network Switching Subsystem (NSS) is the component of a GSM network PBX similar to a fixed telephone network. It manages the network and provides interconnectivity talks with other mobile or fixed networks. The most important component is the Mobile Switching Center NSS (MSC). This is mainly responsible for directing calls and SMS. Also, through the MSC site, a user can contact a GSM network user fixed. GPRS or General Packet Radio Service is a mobile service for data transmission based on data flow packet truncation. GPRS Core Network, the third component of a GSM network, is responsible for managing the data service.



III.3. Using the computer

III.3.1 Desktop publishing

Typing is "a technical training and graphics manuscript before the print job." This preparation of the manuscript refers to the application of those processing operations to determine, finally obtaining a document:

- superior image quality,
- good readability,
- looks good,
- a presentation appropriate to the content.

Typing can be done either manually, by mechanical processing (see typewriters), and automatic computer, using the computer processing means.

Desktop publishing system implies the existence of a physical process: the computer, and a logical system of processing: computer program that function to achieve the desired processing. This program or set of programs specialized in editing operations is called processor or text editor.[33]

Operates word processor documents.

The document is a combination of:

- texts
- images
- tables
- graphics ...

all belonging to the same work (so the logical connection between the parties). DOCUMENT is actually equivalent in terms of word processing, the work is published (article, book, magazine, letter...).

Computer publishing has several advantages compared to the manual:

- Text from the keyboard can be made by a person without special training;
- Part of routine operations are executed automatically by computer;
- After the document has been placed it can be previewed on the monitor screen, thus achieving a possible correction before printing;
- Can be obtained documents of high quality both technically and artistically.

Microsoft Word for Windows is a powerful word processing program that can be used for:

- creating and editing documents,

[33] Ştefan Prutianu, *Comunicare şi negociere în afaceri.* Ed. Polirom Iaşi, 1998.

- insertion and / or deleting text and graphics,
- create specialized documents (forms, letters formatted ..).

MICROSOFT WORD provides some basic word-processing functions such as:

- automatic alignment of the text
- possibility of different shapes and sizes to choose characters
- text in page layout
- create headers and footnotes
- editing tables
- equation editor[34]

With this processor is very easy to give the letters, envelopes, labels, reports, newspaper articles, price lists, etc.. desired appearance, custom, increasing the impact of different forms of communication within and outside a company.

Modern word processing programs can be used with databases and / or spreadsheet products, enabling the printing of reports based on data contained in a table, and offers design using information contained in various databases.

Literature even claimed that the combined use of word processors to databases can increase the efficiency of a company due to the reduction of search time and retrieval of information necessary for placing their desired business correspondence and accuracy due to this information.[35]

III.3.2 Using E-mail (Electronic mail)

The purpose of communicating in the organization is the transmission and reception of messages in order to achieve pragmatic effects.

For this purpose it's recommended the use of e-mail system - E-mail, which transmit messages in a computer network.

Due to Internet structure and spreading, Internet e-mail enables easy communication between people around the globe.

Conceptually, e-mail is an analogy to the normal. There is a post office named mail server that holds mailboxes of subscribers. When a subscriber wants A post office to send a message to a subscriber B at the post office, not only to write the message and specify the recipient's address (include name and post office mailbox destination). To send and write a electronic letter you must use a mail client. This letter is characterized by the recipient's address (To field), the

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[34] *Microsoft Office 2003 Profesional*, Ed. TEORA, Bucureşti , 2003
[35] *Microsoft Office 2003 Profesional*, Ed. TEORA, Bucureşti , 2003

addresses of others to which we send the letter (CC-field carbon copy) and a few descriptive words (Subject line). After completing these fields and the contents of the letter, it's transmitted effectively after pushing the Send button

Advantages

- It's cheap - usually cheaper than sending a mail message and often cheaper than a phone conversation.
- It's quick. Messages are often sent in seconds.
- It's easy. You can create groups of users, which allows you to write a message and send it by E-mail to all persons group. Also, you can write a message addressed to one person, then the "CC" (Carbon Copy) can be sent to other users of e-mail.

Disadvantages

Two dangers in the E-mail

- nothing special ...
- .... and they do not see your face

Writing for the majority address e-mail is not a problem. To send an e-mail a member of an online service, withheld from the Internet address consists of two parts: the identification number or name to connect to the person (company) and online service domain name separated by the @ sign. INTERNET analyzes domain name, find the number associated with it (against the computer that manages messages by mail) and use that number to send the message to the right place.

When working with e-mail over the Internet, follow these rules to avoid offending people and making your delicate situations.

- Do not write anything you might regret later.
- Careful tone of the message.
- Give addressee the opportunity to explain.
- <CAPS Lock> KEY DISABLE. Messages written in capital letters are hard to read and can be considered as equivalent to written speech with high voice.
- Read the message before sending it.

III.4 Using the mobile phone

The basic communication method of all of them is through the electromagnetic microwaves with a cell base station. The cellular companies have large antennas, which are usually mounted over towers, buildings and poles. The cell phones have low-power transceivers that transmit voice and data to the nearest sites usually within the 5 to 8 miles (8 to 13 kilometers away).

Cell phones have vastly changed the way we communicate today. A cell phone can be all you need for communicating. From a cell phone you can make calls, text message, BBM message, email, send and receive directions, go on the Internet, buy things, do online banking, listen to music and much more. In that one device you can do everything. There is no longer a need for multiple devices and you can be on the move

A cell phone's basic function is to make and receive calls from anywhere you have service. Even though they can do more, calling is their main function. This function enables a person to make or receive a call without having to worry about location. The other basic function is location tracking in case of emergency. By law cell phones are built in with GPS technology that makes them "112 capable." This allows, if the cell phone is powered on, for your location to be tracked.[36]

III.5 Ethics in communication

Tim O'Reilly Has developed a code of conduct for Internet users .. It can not yet (and probably never) imposed a community is so fragmented and blogosphere. But the principles were as follows:

- We take responsibility for own words and those whose comments we allow.
- We declare the level of tolerance in the comments.
- We consider eliminating anonymous comments.
- Ignore the instigators.
- We are polite
- We note for inappropriate behavior.
- Do not write anything online if I say it in person [37]

CONCLUSIONS

In our days many people use the Internet to communication, to find the latest news, latest sports results, such as weather, which is the exchange rate, how exchange works, as is the fee for a fishing lake and many other problems. A fairly large percentage of the population of Romania, for example, to design and desfosoare not work without a computer and free internet. The office computer is not much just a typewriter as he was by the 90. Many people prepare, usually in those leadership positions not only use the pen to sign the documents and activities are in computer agenda. Do not have time to travel to find our with friends, business partners, time has

[36] Retele GSM pe intelesul tuturor – www.go4it.ro

[37] Media and Internet freedom - Recommendations of Amsterdam, 2003, document prepared by the Organization for Security and Cooperation in Europe.

other dimensions, though, and use Messenger, Facebook, Twitter and many other software for communication. Large institutions implement specific software messaging and messaging communications formatted to shorten.

Of course youth is one of the great consumers of social networking sites and through this communication channel could not use non-verbal communication and ability to implement those emotional states unconscious transmission. For many people, perhaps because they have a false identity, a mask behind which believes that everything can honestly say what they think without repercussions, the Internet creates a virtual world that they like most and which is less expensive than real life. You all are considered equal. And appears on deepnet and darknet. WWW inventors have revolutionized the way of communication between people and with mobile phones that support all IT environment is radically changed how the world inreaga communicate, socialize, learn, work, and finally it informs LIVE.

The main benefit of a cell phone is convenience. You have all you need in one device. You no longer need to go out of your way to do something. If you need to make a call in the car you can. If you need to send an email at lunch you can. If you need directions, you can get them, and if you need to get online, it's there for you. It helps you to get more done.

REFERENCES

1. *Microsoft Office 2003 Profesional*, Ed. TEORA, Bucureşti , 2003.
2. Dan Popescu, *Arta de a comunica,* Bucureşti , 1998.
3. Ştefan Prutianu*, Comunicare şi negociere în afaceri.* Ed. Polirom Iaşi, 1998.
4. Rodica Cândea, Dan Cândea, *Comunicarea managerială,* Ed. Expert, Bucureşti,
5. Stanton Nicki – *Comunicarea,* Ed. Societatea Ştiinţă şi Tehnică, Bucureşti, 1995.
6. Mihaela Cârstea, Ion Diamandi, *Calculatorul pe înţelesul tuturor,* Editura AGNI, Bucureşti, 1996
7. Media and Internet freedom - Recommendations of Amsterdam, 2003, document prepared by the Organization for Security and Cooperation in Europe.
8. ewww.go4it.ro – Retele GSM pe intelesul tuturor

PROJECT COST MANAGEMENT

LTC Ion LĂZĂRESCU

INTRODUCTION

Project Cost Management includes the processes required to ensure that the project is completed within the approved budget. Figure 1 provides an overview of the following major processes:

- **Resource Planning**—determining what resources (people, equipment, materials) and what quantities of each should be used to perform project activities.
- **Cost Estimating**—developing an approximation (estimate) of the costs of the resources needed to complete project activities.
- **Cost Budgeting**—allocating the overall cost estimate to individual work items.
- **Cost Control**—controlling changes to the project budget.

These processes interact with each other and with the processes in the other knowledge areas as well. Each process may involve effort from one or more individuals or groups of individuals based on the needs of the project. Each process generally occurs at least once in every project phase.

Although the processes are presented here as discrete elements with well-defined interfaces, in practice they may overlap and interact in ways not detailed here.

Project cost management is primarily concerned with the cost of the resources needed to complete project activities. However, project cost management should also consider the effect of project decisions on the cost of using the project product. For example, limiting the number of design reviews may reduce the cost of the project at the expense of an increase in the customer's operating costs. This broader view of project cost management is often called *life-cycle costing.*

In many application areas predicting and analyzing the prospective financial performance of the project product is done outside the project. In others (e.g., capital facilities projects), project cost management also includes this work. When such predictions and analysis are included, project cost management will include additional processes and numerous general management techniques such as return on investment, discounted cash flow, payback analysis, and others.

Project cost management should consider the information needs of the project stakeholders—different stakeholders may measure project costs in different ways and at different times. For example, the cost of a procurement item may be measured when committed, ordered, delivered, incurred, or recorded for accounting purposes.

When project costs are used as a component of a reward and recognition system, controllable and uncontrollable costs should be estimated and budgeted separately to ensure that rewards reflect actual performance.

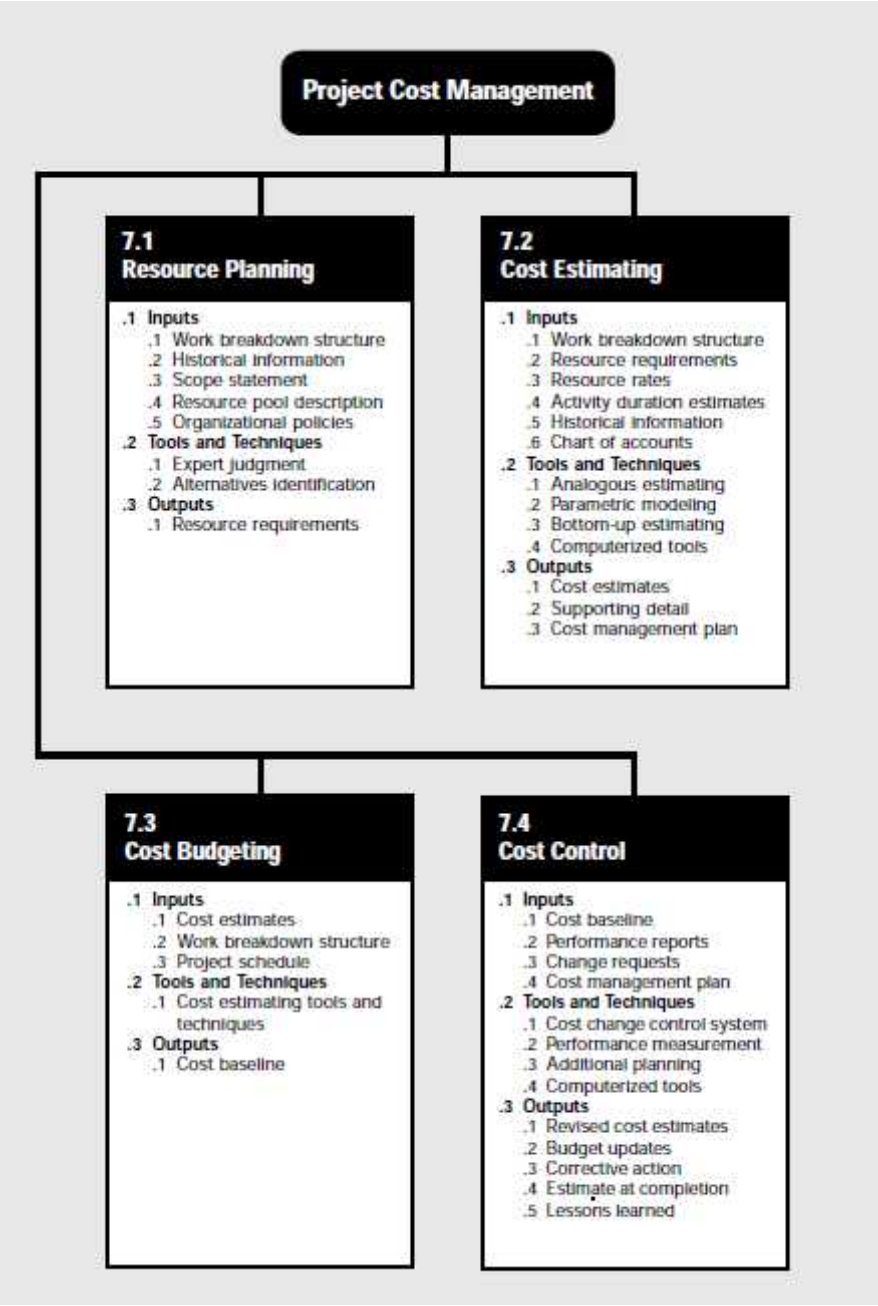


Figure 6

On some projects, especially smaller ones, resource planning, cost estimating, and cost budgeting are so tightly linked that they are viewed as a single process (e.g., they may be performed by a single individual over a relatively short period of time). They are presented here as distinct processes because the tools and techniques for each are different.

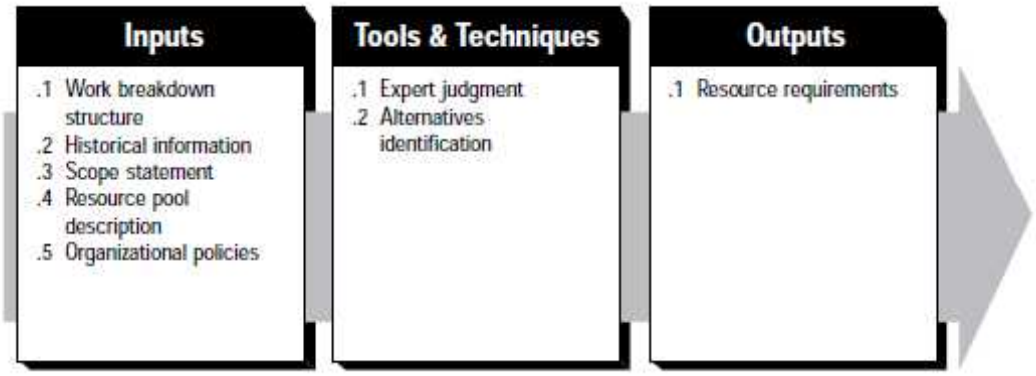
I. RESOURCE PLANNING

Resource planning involves determining what physical resources (people, equipment, materials) and what quantities of each should be used to perform project activities. It must be closely coordinated with cost estimating .

For example:

A construction project team will need to be familiar with local building codes. Such knowledge is often readily available at virtually no cost by using local labor. However, if the local labor pool lacks experience with unusual or specialized construction techniques, the additional cost for a consultant might be the most effective way to secure knowledge of the local building codes.

An automotive design team should be familiar with the latest in automated assembly techniques. The requisite knowledge might be obtained by hiring a consultant, by sending a designer to a seminar on robotics, or by including someone from manufacturing as a member of the team.



I.1 Inputs to Resource Planning

1. ***1 Work breakdown structure.*** The work breakdown structure identifies the project elements that will need resources and thus is the primary input to resource planning. Any relevant outputs from other planning processes should be provided through the WBS to ensure proper control.
2. ***Historical information.*** Historical information regarding what types of resources were required for similar work on previous projects should be used if available.
3. ***Scope statement.*** The scope statement contains the project justification and the project objectives, both of which should be considered explicitly during resource planning.
4. ***Resource pool description.*** Knowledge of what resources (people, equipment, material) are potentially available is necessary for resource planning. The amount of detail and the level of specificity of the resource pool description will vary. For example, during the early phases of an engineering design project, the pool may include "junior and senior engineers" in large numbers. During later phases of the same project, however, the pool may be limited to those individuals who are knowledgeable about the project as a result of having worked on the earlier phases.

5. ***Organizational policies.*** The policies of the performing organization regarding staffing and the rental or purchase of supplies and equipment must be considered during resource planning.

I.2 Tools and Techniques for Resource Planning

Expert judgment. Expert judgment will often be required to assess the inputs to this process. Such expertise may be provided by any group or individual with specialized knowledge or training and is available from many sources including:

- Other units within the performing organization.
- Consultants.
- Professional and technical associations.
- Industry groups.

I.3 Outputs from Resource Planning

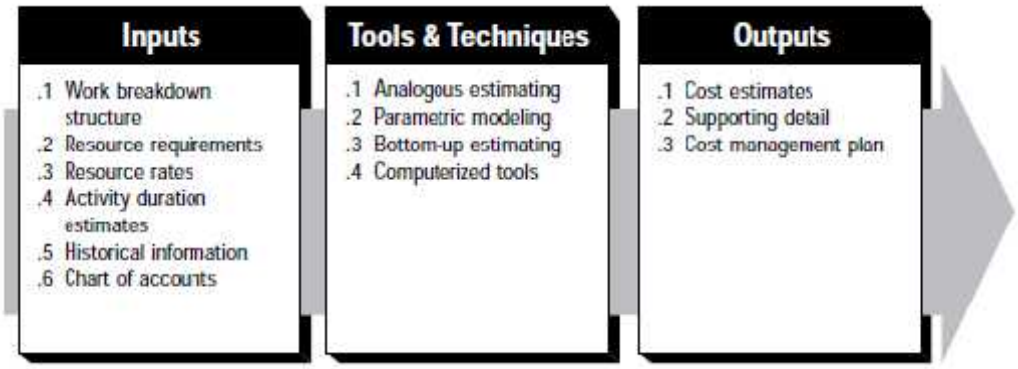
Resource requirements. The output of the resource planning process is a description of what types of resources are required and in what quantities for each element of the work breakdown structure. These resources will be obtained either through staff acquisition or procurement.

II. COST ESTIMATING

Cost estimating involves developing an approximation (estimate) of the costs of the resources needed to complete project activities.

When a project is performed under contract, care should be taken to distinguish cost estimating from pricing. Cost estimating involves developing an assessment of the likely quantitative result—how much will it cost the performing organization to provide the product or service involved. Pricing is a business decision—how much will the performing organization charge for the product or service—that uses the cost estimate as but one consideration of many.

Cost estimating includes identifying and considering various costing alternatives. For example, in most application areas, additional work during a design phase is widely held to have the potential for reducing the cost of the production phase. The cost estimating process must consider whether the cost of the additional design work will offset the expected savings.



II.1 Inputs to Cost Estimating

1 ***Work breakdown structure.*** It will be used to organize the cost estimates and to ensure that all identified work has been estimated.

2 ***Resource requirements.*** Resource requirements was described.

3 ***Resource rates.*** The individual or group preparing the estimates must know the unit rates (e.g., staff cost per hour, bulk material cost per cubic yard) for each resource in order to calculate project costs. If actual rates are not known, the rates themselves may have to be estimated.

4 ***Activity duration estimates.*** Activity duration estimates will affect cost estimates on any project where the project budget includes an allowance for the cost of financing (i.e., interest charges).

5 ***Historical information.*** Information on the cost of many categories of resources is often available from one or more of the following sources:

- Project files—one or more of the organizations involved in the project may maintain records of previous project results that are detailed enough to aid in developing cost estimates. In some application areas, individual team members may maintain such records.
- Commercial cost estimating databases—historical information is often available commercially.
- Project team knowledge—the individual members of the project team may remember previous actuals or estimates. While such recollections may be useful, they are generally far less reliable than documented results.

6 ***Chart of accounts.*** A chart of accounts describes the coding structure used by the performing organization to report financial information in its general ledger. Project cost estimates must be assigned to the correct accounting category.

II.2 Tools and Techniques for Cost Estimating

1 Analogous estimating. Analogous estimating, also called *top-down estimating,* means using the actual cost of a previous, similar project as the basis for estimating the cost of the current project. It is frequently used to estimate total project costs when there is a limited amount of detailed information about the project (e.g., in the early phases). Analogous estimating is a form of expert judgment.

Analogous estimating is generally less costly than other techniques, but it is also generally less accurate. It is most reliable when (a) the previous projects are similar in fact and not just in appearance, and (b) the individuals or groups preparing the estimates have the needed expertise.

2 Parametric modeling. Parametric modeling involves using project characteristics (parameters) in a mathematical model to predict project costs. Models may be simple (residential home construction will cost a certain amount per square foot of living space) or complex (one model of software development costs uses 13 separate adjustment factors each of which has 5-7 points on it).

Both the cost and accuracy of parametric models varies widely. They are most likely to be reliable when (a) the historical information used to develop the model was accurate, (b) the parameters used in the model are readily quantifiable, and (c) the model is scalable (i.e., it works as well for a very large project as for a very small one).

3 Bottom-up estimating. This technique involves estimating the cost of individual work items, then summarizing or rolling-up the individual estimates to get a project total.

The cost and accuracy of bottom-up estimating is driven by the size of the individual work items: smaller work items increase both cost and accuracy. The project management team must weigh the additional accuracy against the additional cost.

4 Computerized tools. Computerized tools such as project management software and spreadsheets are widely used to assist with cost estimating. Such products can simplify the use of the tools described above and thereby facilitate rapid consideration of many costing alternatives.

II.3 Outputs from Cost Estimating

1 Cost estimates. Cost estimates are quantitative assessments of the likely costs of the resources required to complete project activities. They may be presented in summary or in detail. Costs must be estimated for all resources that will be charged to the project. This includes, but is not limited to, labor, materials, supplies, and special categories such as an inflation allowance or cost reserve.

Cost estimates are generally expressed in units of currency (dollars, francs, yen, etc.) in order to facilitate comparisons both within and across projects. Other units such as staff hours or staff days may be used, unless doing so will misstate project costs (e.g., by failing to differentiate

among resources with very different costs). In some cases, estimates will have to be provided using multiple units of measure in order to facilitate appropriate management control.

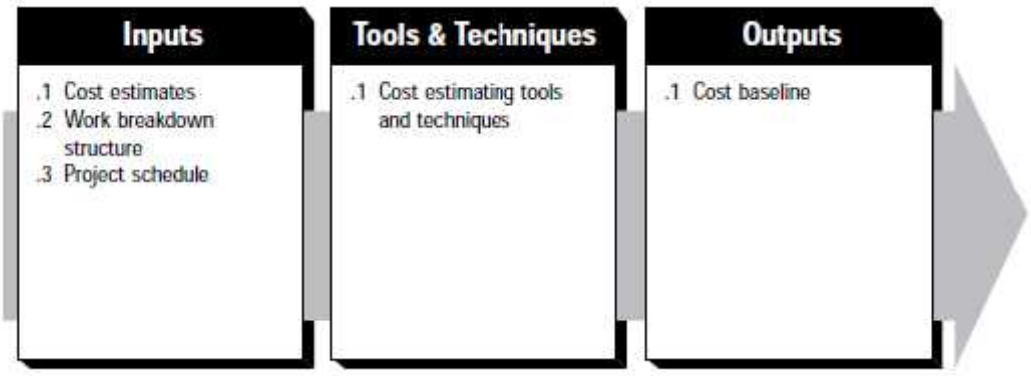
Cost estimates may benefit from being refined during the course of the project to reflect the additional detail available. In some application areas, there are guidelines for when such refinements should be made and what degree of accuracy is expected. For example, AACE International has identified a progression of five types of estimates of construction costs during engineering: order of magnitude, conceptual, preliminary, definitive, and control.

2 Supporting detail. Supporting detail for the cost estimates should include:

- A description of the scope of work estimated. This is often provided by a reference to the WBS.
- Documentation of the basis for the estimate, i.e., how it was developed.
- Documentation of any assumptions made.
- An indication of the range of possible results, for example, $10,000 ± $1,000 to indicate that the item is expected to cost between $9,000 and $11,000.

The amount and type of additional detail varies by application area. Retaining even rough notes may prove valuable by providing a better understanding of how the estimate was developed.

3 Cost management plan. The cost management plan describes how cost variances will be managed (e.g., different responses to major problems than to minor ones). A cost management plan may be formal or informal, highly detailed or broadly framed based on the needs of the project stakeholders. It is a subsidiary element of the overall project plan.



III. COST BUDGETING

Cost budgeting involves allocating the overall cost estimates to individual work items in order to establish a cost baseline for measuring project performance.

III.1 Inputs to Cost Budgeting

1 ***Cost estimates.*** Cost estimates was described.

2 ***Work breakdown structure.*** The work breakdown structure identifies the project elements that costs will be allocated to.

3 ***Project schedule.*** The project schedule includes planned start and expected finish dates for the project elements that costs will be allocated to. This information is needed in order to assign costs to the time period when the cost will be incurred.

III.2 Tools and Techniques for Cost Budgeting

Cost estimating tools and techniques. The tools and techniques described for developing project cost estimates are used to develop budgets for work items as well.

III.3 Outputs from Cost Budgeting

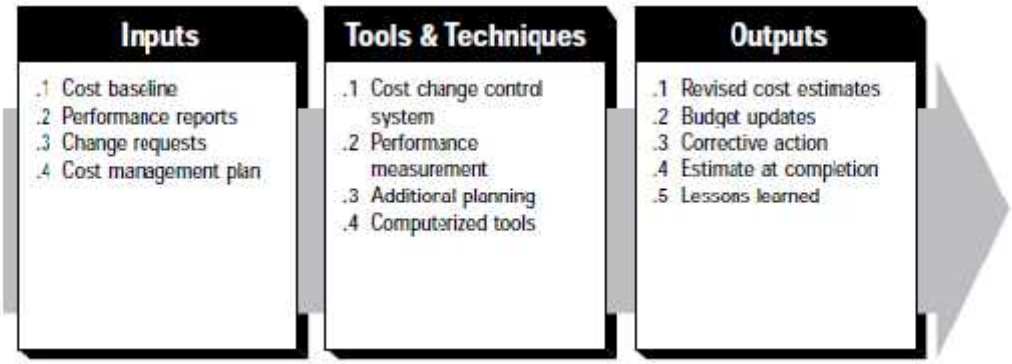
Cost baseline. The cost baseline is a time-phased budget that will be used to measure and monitor cost performance on the project. It is developed by summing estimated costs by period and is usually displayed in the form of an S-curve, as illustrated in Figure 2**.**

Many projects, especially larger ones, may have multiple cost baselines to measure different aspects of cost performance. For example, a spending plan or cash flow forecast is a cost baseline for measuring disbursements.

IV. COST CONTROL

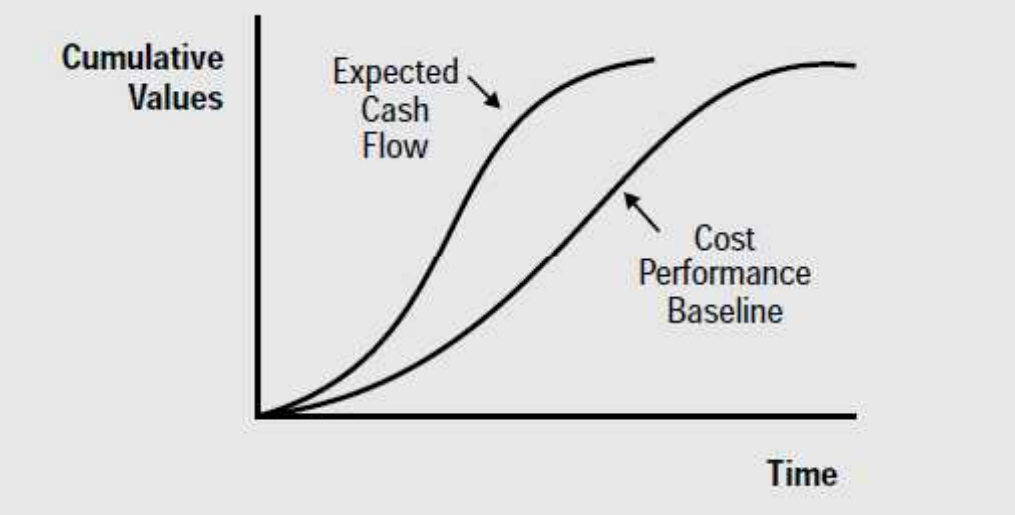
Cost control is concerned with (a) influencing the factors which create changes to the cost baseline to ensure that changes are beneficial, (b) determining that the cost baseline has changed, and (c) managing the actual changes when and as they occur. Cost control includes:

- Monitoring cost performance to detect variances from plan.
- Ensuring that all appropriate changes are recorded accurately in the cost baseline.
- Preventing incorrect, inappropriate, or unauthorized changes from being included in the cost baseline.



・Informing appropriate stakeholders of authorized changes.

Cost control includes searching out the "whys" of both positive and negative variances. It must be thoroughly integrated with the other control processes. For example, inappropriate responses to cost variances can cause quality or schedule problems or produce an unacceptable level of risk later in the project.



IV.1 Inputs to Cost Control

1 ***1 Cost baseline.*** The cost baseline was described.

2 ***Performance reports.*** Performance reports provide information on cost performance such as which budgets have been met and which have not. Performance reports may also alert the project team to issues which may cause problems in the future.

3 ***Change requests.*** Change requests may occur in many forms—oral or written, direct or indirect, externally or internally initiated, and legally mandated or optional. Changes may require increasing the budget or may allow decreasing it.

4 ***Cost management plan.*** The cost management plan was described.

IV.2 Tools and Techniques for Cost Control

1 ***1 Cost change control system.*** A cost change control system defines the procedures by which the cost baseline may be changed. It includes the paperwork, tracking systems, and approval levels necessary for authorizing changes. The cost change control system should be integrated with the overall change control system.

2 ***Performance measurement.*** Performance measurement techniques, help to assess the magnitude of any variations which do occur. Earned value analysis, is especially useful for cost control. An important part of cost control is to determine what is causing the variance and to decide if the variance requires corrective action.

3 ***Additional planning.*** Few projects run exactly according to plan. Prospective changes may require new or revised cost estimates or analysis of alternative approaches.

4 ***Computerized tools.*** Computerized tools such as project management software and spreadsheets are often used to track planned costs vs. actual costs, and to forecast the effects of cost changes.

IV.3 Outputs from Cost Control

1 ***1 Revised cost estimates.*** Revised cost estimates are modifications to the cost information used to manage the project. Appropriate stakeholders must be notified as needed. Revised cost estimates may or may not require adjustments to other aspects of the overall project plan.

2 ***Budget updates.*** Budget updates are a special category of revised cost estimates. Budget updates are changes to an approved cost baseline. These numbers are generally revised only in response to scope changes. In some cases, cost variances may be so severe that "rebaselining" is needed in order to provide a realistic measure of performance.

3 ***Corrective action.*** Corrective action is anything done to bring expected future project performance into line with the project plan.

4 ***Estimate at completion.*** An estimate at completion (EAC) is a forecast of total project costs based on project performance. The most common forecasting techniques are some variation of:

- EAC = Actuals to date plus the remaining project budget modified by a performance factor, often the cost performance index. This approach is most often used when current variances are seen as typical of future variances.
- EAC = Actuals to date plus a new estimate for all remaining work. This approach is most often used when past performance shows that the original estimating assumptions were fundamentally flawed, or that they are no longer relevant due to a change in conditions.
- EAC = Actuals to date plus remaining budget. This approach is most often used when current variances are seen as atypical and the project management team's expectation is that similar variances will not occur in the future.

Each of the above approaches may be the correct approach for any given work item.

5 ***Lessons learned.*** The causes of variances, the reasoning behind the corrective action chosen, and other types of lessons learned from cost control should be documented so that they become part of the historical database for both this project and other projects of the performing organization.

CONCLUSIONS

Project cost management is traditionally a weak area in IT projects, and project managers must work to improve their ability to deliver projects within approved budgets.

Main processes include:

- Cost estimating
- Cost budgeting
- Cost control

Project cost management is a mechanism by the organization can implement a project needs, primarily on the quality – cost.

REFERENCES

1. Project Cost Management - ©1996 *Project Management Institute*, 130 South State Road, Upper Darby, PA 19082 USA;
2. Kathy Schwalbe, Ph.D. - Information Technology Project Management, Fourth Edition – Thomson Course Technology.

PRINCIPLES OF INFORMATION MANAGEMENT

LTC Sergiu- Marian IVAN

INTRODUCTION

> **"…if a commander's service of information is better than that of his adversary he possesses wider knowledge and superior control; he selects with certainty his objective and arrives first; he perceives weaknesses before his own is discovered or strength before his weakness is known; he anticipates movements, alters dispositions, executes plans unknown to his enemy; in short, the successful soldier commands the situation by force of superior knowledge, and never is it more true than in war knowledge is power. The commander inferior to his enemy in character and service of his intelligence communication is like a blind man fighting him who can see. It follows that his information service must be the best, and also that he must use it to his fullest extent."**[38]

„Information management is the way in which an organisation plans, identifies, creates, receives, collects, organises, governs, secures, uses, controls, disseminates, exchanges, maintains, preserves and disposes of its information. It is also the means through which the organisation ensures that the value of that information is identified and exploited."[39]

„A principle is a law or a rule that has to be, or usually is to be followed, or can be desirably followed, or is an inevitable consequence of something, such as the laws observed in nature or the way that a system is constructed. The principles of such a system are understood by its users as the essential characteristics of the system, or reflecting system's designed purpose, and the effective operation or use of would be impossible if any of the principles was to be ignored."[40]

Principles are used to help formulate the initial architecture and governance model and provide a framework for decision making.

Information Management Principles define how information will be managed, modelled, stored, shared and accessed and also define how information issues are resolved, governance processes and information standards.

Principles of Information Management provide a framework for how information is to be shared, captured, stored and modeled and kept reliable across the environment. As organisations need to

[38] George P. Scriven, *Service of Information, United States Army* (Washington DC: Government Printing Office, 1915), 14.
[39] *Queensland Government Information Management Strategic Framework, September 2009;*
[40] Alpa, Guido (1994) „General Principles of Law", Annual Survey of International & Comparative Law: Vol. 1: Iss. 1, Article 2;

be able to clearly enunciate the principles by which it leverages information, Principles of Information Management are particularly important. Implementing solid Information Management these principles will result in an enterprise that excels at leveraging data for the benefit of all of its stakeholders by providing better service and a better financial return.

First at the beginning the reader, can find out what is information management.

Generally, this paper will analyse the principles of information management, and particularly the principles of information management for operational commander.

The vast amount of information available in today's network centric environment has increased the complexity and uncertainty of military operations. Leveraging the information domain to achieve a decisive advantage requires effective information management. In a globally connected world, where unilateral nation-state military operations are becoming less likely, mission success in the operational environment will largely depend on the interoperability of many diverse organizations. Information flow is the critical link that ties these organizations together and achieves unity of effort. However, information management at the operational level is less than optimum. With so much depending on the ability to get the right information to the right people at the right time, an effective information management strategy is a must.

1. WHAT IS INFORMATION MANAGEMENT ?

Information, as we know it today, includes both electronic and physical information. The organizational structure must be capable of managing this information throughout the information lifecycle regardless of source or format (data, paper documents, electronic documents, audio, video, etc.) for delivery through multiple channels that may include cell phones and web interfaces.

According to Wikipedia, **Information management** is ,,the collection and management of information from one or more sources and the distribution of that information to one or more audiences. This sometimes involves those who have a stake in, or a right to that information. Management means the organization of and control over the structure, processing and delivery of information."[41]

Information management is ,,a discipline that governs accountability for the structure and design, storage, movement, security, quality, delivery and usage of information required for management and business intelligence purposes."[42]

[41] Wikipedia

[42] Dan, Bowman - 2009

Information management is application of management techniques to collect information, communicate it within and outside the organization, and process it to enable managers to make quicker and better decisions.

Information management as a discipline has become more prominent in recent times as enterprises seek effective ways to make use of corporate knowledge. It is now understood that this requires more than use of technology. Professionals with responsibilities in such areas as knowledge utilization, strategic planning, records and archives systems, business analysis, libraries and data warehouses, have expressed information management strategies. They normally try to articulate approaches to dealing with organizing and distributing information with attention to quality, or to determining needs of information users, or to analyzing an environment that values the information and knowledge as resources and accordingly builds them into corporate planning. Most works have examined one of these areas without attending to the relationships between them. The principles have been confined to viewpoint of particular disciplines, or to particular levels of exploration. 'Information Management' extends the analysis from several perspectives. It consolidates material into a coherent framework of principles at operational, analytical and strategic levels.

Information management:

- has the potential to contribute to the achievements of organisations;
- has different purposes in different organisations. These purposes will be influenced by the organisation's goals as well as by its culture and its stance on information;
- is practised in a political, social and cultural context which shapes both what information management does and how it does it;
- practice is value laden and so it has an ethical dimension. The ethics of information management practice are most often implicit;
- has the potential to contribute to the effectiveness of managers in their diverse organisational roles;
- should seek to meet the information needs of managers and enhance their information capabilities;
- must recognise informal and formal information sources and flows both internal and external to the organisation;
- needs to enable managers to integrate business strategy and information;
- needs to encompass information as an object and information as a construct as well as interactions between them;

- has a role in enhancing the information capabilities of individuals in organisations;

Information management contributes to the achievement of organisational goals. There is little doubt that information does contribute to the success of organisations. Whether information is regarded as a resource or a force for change and development it is clear that information can contribute to the achievement of organisational goals. The assumptions are made that the goals of an organisation are explicit, thus are known throughout the organisation and there is some way determining the extent to which the goals have been met.

Information management is contextualised by the organisation and is value-laden. The earlier discussion of images of organisations suggests different approaches to information management in organisations. While the objectives of information management will be linked to the effectiveness of organisations, information management practice will vary across organisations. For example, in the organisation which is like a machine, the information management function might be centrally located in a unit established to control internally generated information. This unit would have links to an IT unit. There might also be a library in the organisation which provides an information service based on externally generated information. Depending on the industry sector, the market place, the culture and the nature of work in the organisation, such a structural arrangement for information management might be appropriate. The objectives and priorities for information management will be framed within this context.

If information management is to influence the development of the organisation then it should recognise as many categories of information as possible, as broad a range of sources and media as possible, and as broad a range of uses of information as possible. The information provided by the information expert in work teams should be seamless and all information created by the team which is likely to be of value should be organised and stored by the information expert. The information will no doubt be stored on many different media including discs, maps, photographs, brochures, samples, diagrams, videos, reports, printouts, all of which are part of the organisation's memory and history and have the potential to be reused in later projects. The tacit knowledge of the team becomes explicit knowledge for the next team or task force working on a similar project.

Managers are in a unique position to integrate information and business strategy. Successful implementation of information management presupposes senior management support, expressed most visibly in funding priorities and through information-related activities and projects from training programs to information system enhancements. The integration of information and business strategy presupposes a learning organisation which is team based.

Managers as domain experts are able to use and create information and knowledge so that both information and business strategy are embedded in the innovations, products, processes or services developed by the team.

The effectiveness of information management can be measured by the extent of knowledge creation or innovation in organisations. The evaluation of information management needs to take into account different views on information. Evaluation based solely on information as object or tangible information will be misleading. The focus of evaluation needs to include also information as a construct and information processes. One approach to the evaluation of information management could be based on the processes of information management discussed earlier. Another approach might be based on innovations in the organisation and might include consideration of the information capabilities of managers and their co-workers. In organisations, information management is the key to systematic innovation and to the benefits that innovation brings.

2. A NEW APPROACH ABOUT PRINCIPLES OF INFORMATION MANAGEMENT.

There are many approaches about principles of information management. In my opinion, the best approach was written by James Robertson.

James Robertson is the founder and Managing Director of Step Two Designs, a vendor-neutral consultancy located in Australia.

James is recognised as one of the world-wide thought leaders on the topics of web content management and intranet strategy. He has worked with many organisations in both the public and private sectors, including Fortune 500 companies and Federal Government agencies. In particular, he has helped many organisations to select a suitable content management system, or to develop an effective approach to the design and management of their intranets. James has also mentored a number of intranet teams, providing insight into organisational change issues and leadership approaches.

James' primary focus is on the strategic aspects of information management and on the organisational change required to deliver effective business outcomes. He also has a deep understanding of usability, information architecture and user-centred design.

Improving information management practices is a key focus for many organisations, across both the public and private sectors.

This is being driven by a range of factors, including a need to improve the efficiency of business processes, the demands of compliance regulations and the desire to deliver new services.

In many cases, ,,information management" has meant deploying new technology solutions, such as content or document management systems, data warehousing or portal applications.
These projects have a poor track record of success, and most organisations are still struggling to deliver an integrated information management environment.
Effective information management is not easy. There are many systems to integrate, a huge range of business needs to meet, and complex organisational issues to address.

2.1. EXPLORATING INFORMATION MANAGEMENT.

Information management is not a technology problem. Information management is an umbrella term that encompasses all the systems and processes within an organisation for the creation and use of corporate information.
In terms of technology, information management encompasses systems such as:

- web content management;
- document management;
- records management;
- digital asset management;
- learning management systems;
- learning content management systems;
- collaboration;
- enterprise search.

Information management is, however, much more than just technology. Equally importantly, it is about the business processes and practices that underpin the creation and use of information.
It is also about the information itself, including the structure of information (,,information architecture"), metadata, content quality, and more.
Each of these must be addressed if information management projects are to succeed.

2.2. INFORMATION MANAGEMENT CHALLENGES

Organisations are confronted with many information management problems and issues. In many ways, the growth of electronic information (rather than paper) has only worsened these issues over the last decade or two.
Common information management problems include:

- Large number of disparate information management systems;
- Little integration or coordination between information systems;
- Range of legacy systems requiring upgrading or replacement;
- Direct competition between information management systems;

- No clear strategic direction for the overall technology environment;
- Limited and patchy adoption of existing information systems by staff;
- Poor quality of information, including lack of consistency, duplication, and out-of-date information;
- Little recognition and support of information management by senior management;
- Limited resources for deploying, managing or improving information systems;
- Lack of enterprise-wide definitions for information types and values (no corporate-wide taxonomy);
- Large number of diverse business needs and issues to be addressed;
- Lack of clarity around broader organisational strategies and directions;
- Difficulties in changing working practices and processes of staff;
- Internal politics impacting on the ability to coordinate activities enterprise-wide.

While this can be an overwhelming list, there are practical ways of delivering solutions that work within these limitations and issues. Information management issues can be overwhelming.

2.3. TEN PRINCIPLES OF INFORMATION MANAGEMENT

James Robertson identified ten principles to ensure that information management activities are effective and successful:

1. Recognise and manage complexity;
2. Focus on adoption;
3. Deliver tangible and visible benefits;
4. Prioritise according to business needs;
5. Take a journey of a thousand steps;
6. Provide strong leadership;
7. Mitigate risks;
8. Communicate extensively;
9. Aim to deliver a seamless user experience;
10. Choose the first project very carefully.

Each of these is analysed in the sections below.

2.4. PRINCIPLE 1 – RECOGNISE AND MANAGE COMPLEXITY

There are no simple answers to complex issues and needs.

Organisations are very complex environments in which to deliver concrete solutions. As outlined above, there are many challenges that need to be overcome when planning and implementing information management projects.

When confronted with this complexity, project teams often fall back upon approaches such as:

- Focusing on deploying just one technology in isolation;
- Purchasing a very large suite of applications from a single vendor, in the hope that this can be used to solve all information management problems at once;
- Rolling out rigid, standardised solutions across a whole organisation, even though individual business areas may have different needs;
- Forcing the use of a single technology system in all cases, regardless of whether it is an appropriate solution;
- Purchasing a product „for life", even though business requirements will change over time;.
- Fully centralising information management activities, to ensure that every activity is tightly controlled.

All of these approaches will fail, as they are attempting to convert a complex set of needs and problems into simple solutions. The hope is that the complexity can be limited or avoided when planning and deploying solutions.

In practice, however, there is no way of avoiding the inherent complexities within organisations. New approaches to information management must therefore be found that recognise and manage this complexity.

Organisations must stop looking for simple approaches, and must stop believing vendors when they offer „silver bullet" technology solutions.

Instead, successful information management is underpinned by strong leadership that defines a clear direction (principle 6 – provide strong leadership). Many small activities should then be planned to address in parallel the many needs and issues (principle 5 – take a journey of a thousand steps).

Risks must then be identified and mitigated throughout the project (principle 7 – mitigate risks), to ensure that organisational complexities do not prevent the delivery of effective solutions.

2.5. PRINCIPLE 2 – FOCUS ON ADOPTION

Information systems are only successful if they are used.

Information management systems are only successful if they are actually used by staff, and it is not sufficient to simply focus on installing the software centrally.

In practice, most information management systems need the *active participation* of staff throughout the organisation.

For example:

- Staff must save all key files into the document/records management system;
- Decentralised authors must use the content management system to regularly update the intranet;
- Lecturers must use the learning content management system to deliver e-learning packages to their students;
- Front-line staff must capture call details in the customer relationship management system.

In all these cases, the challenge is to gain sufficient adoption to ensure that required information is captured in the system. Without a critical mass of usage, corporate repositories will not contain enough information to be useful.

This presents a considerable change management challenge for information management projects. In practice, it means that projects must be carefully designed from the outset to ensure that sufficient adoption is gained.

This may include:

- Identifying the „what's in it for me" factors for end users of the system;
- Communicating clearly to all staff the purpose and benefits of the project;
- Carefully targeting initial projects to build momentum for the project (see principle 10 – choose the first project very carefully);
- Conducting extensive change management and cultural change activities throughout the project;
- Ensuring that the systems that are deployed are useful and usable for staff.

These are just a few of the possible approaches, and they demonstrate the wide implications of needing to gain adoption by staff.

2.6. PRINCIPLE 3 – DELIVER TANGIBLE AND VISIBLE BENEFITS

It is not enough to deliver „behind the scenes" fixes.

It is not enough to simply improve the management of information „behind the scenes". While this will deliver real benefits, it will not drive the required cultural changes, or assist with gaining adoption by staff (principle 2 – focus on adoption).

In many cases, information management projects initially focus on improving the productivity of publishers or information managers.

While these are valuable projects, they are invisible to the rest of the organisation. When challenged, it can be hard to demonstrate the return on investment of these projects, and they do little to assist project teams to gain further funding.

Instead, information management projects must always be designed so that they deliver tangible and visible benefits.

Delivering tangible benefits involves identifying concrete business needs that must be met (principle 4 – prioritise according to business needs). This allows meaningful measurement of the impact of the projects on the operation of the organisation.

The projects should also target issues or needs that are very visible within the organisation. When solutions are delivered, the improvement should be obvious, and widely promoted throughout the organisation.

For example, improving the information available to call centre staff can have a very visible and tangible impact on customer service.

In contrast, creating a standard taxonomy for classifying information across systems is hard to quantify and rarely visible to general staff.

This is not to say that ,,behind the scenes" improvements are not required, but rather that they should always be partnered with changes that deliver more visible benefits.

This also has a major impact on the choice of the initial activities conducted (principle 10 – choose the first project very carefully).

2.7. PRINCIPLE 4 – PRIORITISE ACCORDING TO BUSINESS NEEDS

Tackle the most urgent business needs first.

It can be difficult to know where to start when planning information management projects.

While some organisations attempt to prioritise projects according to the ,,simplicity" of the technology to be deployed, this is not a meaningful approach. In particular, this often doesn't deliver short-term benefits that are tangible and visible (principle 3 – deliver tangible and visible benefits).

Instead of this technology-driven approach, the planning process should be turned around entirely, to drive projects based on their ability to address business needs.

In this way, information management projects are targeted at the most urgent business needs or issues. These in turn are derived from the overall business strategy and direction for the organisation as a whole.

For example, the rate of errors in home loan applications might be identified as a strategic issue for the organisation. A new system might therefore be put in place (along with other activities) to better manage the information that supports the processing of these applications.

Alternatively, a new call centre might be in the process of being planned. Information management activities can be put in place to support the establishment of the new call centre, and the training of new staff.

2.8. PRINCIPLE 5 – TAKE A JOURNEY OF A THOUSAND STEPS

Avoid „silver bullet" solutions that promise to fix everything.

There is no single application or project that will address and resolve all the information management problems of an organisation.

Where organisations look for such solutions, large and costly strategic plans are developed.

Assuming the results of this strategic planning are actually delivered (which they often aren't), they usually describe a long-term vision but give few clear directions for immediate actions.

In practice, anyone looking to design the *complete* information management solution will be trapped by „analysis paralysis": the inability to escape the planning process.

Organisations are simply too complex to consider all the factors when developing strategies or planning activities.

The answer is to let go of the desire for a perfectly planned approach. Instead, project teams should take a „journey of a thousand steps".

This approach recognises that there are hundreds or thousands of often small changes that are needed to improve the information management practices across an organisation. These changes will often be implemented in parallel.

While some of these changes are organisation-wide, most are actually implemented at business unit level. When added up over time, these numerous small changes have a major impact on the organisation.

This is a very different approach to that typically taken in organisations, and it replaces a single large project with many individual initiatives conducted by multiple teams.

While this can be challenging to coordinate and manage, this „thousand steps" approach recognises the inherent complexity of organisations (principle 1 – recognise and manage complexity) and is a very effective way of mitigating risks (principle 7 – mitigate risks).

It also ensures that „quick wins" can be delivered early on (principle 3 – deliver tangible and visible benefits), and allows solutions to be targeted to individual business needs (principle 4 – prioritise according to business needs).

2.9. PRINCIPLE 6 – PROVIDE STRONG LEADERSHIP

Successful projects require strong leadership.

Successful information management is about organisational and cultural change, and this can only be achieved through strong leadership.

The starting point is to create a clear vision of the desired outcomes of the information management strategy. This will describe how the organisation will operate, more than just describing how the information systems themselves will work.

Effort must then be put into generating a sufficient sense of urgency to drive the deployment and adoption of new systems and processes.

Stakeholders must also be engaged and involved in the project, to ensure that there is support at all levels in the organisation.

This focus on leadership then underpins a range of communications activities (principle 8 – Communicate extensively) that ensure that the organisation has a clear understanding of the projects and the benefits they will deliver.

When projects are solely driven by the acquisition and deployment of new technology solutions, this leadership is often lacking. Without the engagement and support of key stakeholder outside the IT area, these projects often have little impact.

2.10. PRINCIPLE 7 – MITIGATE RISKS

Apply good risk management to ensure success.

Due to the inherent complexity of the environment within organisations (principle 1 – recognise and manage complexity), there are many risks in implementing information management solutions. These risks include:

- selecting an inappropriate technology solution;
- time and budget overruns;
- changing business requirements;
- technical issues, particularly relating to integrating systems;
- failure to gain adoption by staff.

At the outset of planning an information management strategy, the risks should be clearly identified. An approach must then be identified for each risk, either avoiding or mitigating the risk.

Risk management approaches should then be used to plan all aspects of the project, including the activities conducted and the budget spent.

For example, a simple but effective way of mitigating risks is to spend less money. This might involve conducting pilot projects to identifying issues and potential solutions, rather than starting with enterprise-wide deployments.

2.11. PRINCIPLE 8 – COMMUNICATE EXTENSIVELY

Extensive communication from the project team and project sponsors is critical for a successful information management initiative.

This communication ensures that staff have a clear understanding of the project, and the benefits it will deliver. This is a pre-requisite for achieving the required level of adoption.

With many projects happening simultaneously (principle 5 – take a journey of a thousand steps), coordination becomes paramount. All project teams should devote time to work closely with each other, to ensure that activities and outcomes are aligned.

In a complex environment, it is not possible to enforce a strict command-and-control approach to management (principle 1 – recognise and manage complexity).

Instead, a clear end point („vision") must be created for the information management project, and communicated widely. This allows each project team to align themselves to the eventual goal, and to make informed decisions about the best approaches.

For all these reasons, the first step in an information management project should be to develop a clear communications „message". This should then be supported by a communications plan that describes target audiences, and methods of communication.

Project teams should also consider establishing a „project site" on the intranet as the outset, to provide a location for planning documents, news releases, and other updates.

2.12. PRINCIPLE 9 – AIM TO DELIVER A SEAMLESS USER EXPERIENCE

Staff do not understand the distinction between systems.

Users don't understand systems. When presented with six different information systems, each containing one-sixth of what they want, they generally rely on a piece of paper instead.

Educating staff in the purpose and use of a disparate set of information systems is difficult, and generally fruitless. The underlying goal should therefore be to deliver a seamless user experience, one that hides the systems that the information is coming from.

This is not to say that there should be one enterprise-wide system that contains all information.

There will always be a need to have multiple information systems, but the information contained within them should be presented in a human-friendly way.

In practice, this means:

- Delivering a single intranet (or equivalent) that gives access to all information and tools;
- Ensuring a consistent look-and-feel across all applications, including standard navigation and page layouts;
- Providing „single sign-on" to all applications.

Ultimately, it also means breaking down the distinctions between applications, and delivering tools and information along task and subject lines.

For example, many organisations store Human Resources procedures on the intranet, but require staff to log a separate „Human Resources self-service" application that provides a completely different menu structure and appearance.

Improving on this, leave details should be located alongside the leave form itself. In this model, the Human Resources application becomes a background system, invisible to the user.

Care should also be taken, however, when looking to a silver-bullet solution for providing a seamless user experience. Despite the promises, portal applications do not automatically deliver this.

Instead, a better approach may be to leverage the inherent benefits of the web platform. As long as the applications all look the same, the user will be unaware that they are accessing multiple systems and servers behind the scenes.

Of course, achieving a truly seamless user experience is not a short-term goal. Plan to incrementally move towards this goal, delivering one improvement at a time.

2.13. PRINCIPLE 10 – CHOOSE THE FIRST PROJECT VERY CAREFULLY

The first project must build momentum for further work.

The choice of the first project conducted as part of a broader information management strategy is critical. This project must be selected carefully, to ensure that it:

- demonstrates the value of the information management strategy;
- builds momentum for future activities;
- generates interest and enthusiasm from both end-users and stakeholders;
- delivers tangible and visible benefits (principle 3 – deliver tangible and visible benefits);
- addresses an important or urgent business need (principle 4 – prioritise according to business needs);
- can be clearly communicated to staff and stakeholders (principle 8 – communicate extensively);
- assists the project team in gaining further resources and support.

Actions speak louder than words. The first project is the single best opportunity to set the organisation on the right path towards better information management practices and technologies.

The first project must therefore be chosen according to its ability to act as a 'catalyst' for further organisational and cultural changes.

In practice, this often involves starting with one problem or one area of the business that the organisation as a whole would be interested in, and cares about.

For example, starting by restructuring the corporate policies and procedures will generate little interest or enthusiasm. In contrast, delivering a system that greatly assists salespeople in the field would be something that could be widely promoted throughout the organisation.

3. PRINCIPLES OF INFORMATION MANAGEMENT FOR THE OPERATIONAL COMMANDER

„Information has always been a source of power, but the information age is making it increasingly a source of confusion."[43]

There is no denying the vital role of the information domain in military operations or the continuous flow of information it provides. The challenge of handling the vast quantities of information available in today's network centric environment can be overwhelming in any business. But add the high operational tempo and uncertainties of military operations, along with the requirement of speedy decisions to stay ahead of the enemy and the challenges grow exponentially. Providing the right information - accurate and relevant - at the right time can prove to be extremely complicated.

In complex environments, guiding principles are often used to steer the actions of organizations toward a desired objective. Generally based on tough lessons learned, these principles are basic underlying assumptions meant to prevent or at least diminish the likelihood of repeating past mistakes. Often devised for complicated processes, principles are not meant to direct action but provide key points of consideration in planning for execution. In the military, if a subject matter is deemed important, it is given legitimacy through strategies or principles. The granddaddy of them all, the principles of war are considered to be „capsules of wisdom"[44] which „represent fundamental truths in the practice of military art that have stood the test of time."[45] Others include the principles of logistics[46], principles of military operations other than war[47], principles of ethical conduct[48] and of course, the principles of information operations.[49] All of which are critical processes in achieving military objectives - Information Management is no less significant. The knowledge that is shared through Information Management underlies all military operations.

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[43] Milan N. Vego, *Operational Warfare* (Rhode Island: Naval War College, 2000), 97.
[44] C.R. Brown, "The Principles of War," *U.S. Naval Institute Proceedings* 75, no.6 (June 1949): 621-633.
[45] National Defense University, Joint Forces Staff College Publication 1 (Norfolk, VA: NDU, 2000), D-1.
[46] Chairman, U.S. Joint Chiefs of Staff, Joint Publication 4-0 (Washington, DC: CJCS, 6 April 2000), II-1.
[47] Chairman, U.S. Joint Chiefs of Staff, Joint Publication 3-07.3 (Washington, DC: CJCS, 12 Feb 1999), I-7.
[48] U.S. President, Executive Order no. 12674 of April 12, 1989 (as modified by E.O. 12731), "Principles of Ethical Conduct for Government Officers and Employees," (17 October 1990).
[49] Chairman, U.S. Joint Chiefs of Staff, Joint Publication 3-13 (Washington, DC: CJCS, 13 February 2006), I-6.

Information Management at the operational level is less than optimum. Are there basic Information Management principles that can be derived from lessons of past and current operations? Principles that can guide the commander and operational staff in developing an effective Information Management strategy to increase the likelihood of having the right information at the right time? This paper will show that there are fundamental tenets that can effectively guide Information Management in the operational environment.

With so much emphasis in getting the right information to the right people, at the right time, guiding principles are a must. In a constantly changing global environment, effectiveness of an organization is dependent on the willingness to assess how it operates and the ability to effect necessary changes in order to meet new demands. The military is no different. While it will always be the force relied upon to protect the interests of the nation it serves, the nature of the threat it faces can and will change.

Information and its importance in achieving an objective have always existed. What has changed is the speed at which vast amounts of information can be delivered to the consumer. Consequently, information overload has and will continue to lead to confusion unless proper guidance can be derived to focus the actions of future endeavors.

The military has acknowledged the monumental significance of the net-centric environment in achieving information superiority. Information superiority can only be achieved by harnessing the power of the net-centric environment through effective Information Management. After all, the value added is not in the connectivity of the networks, but in the information it provides; information that must be accurate, relevant, and timely. The following is a list of recommended Information Management principles, not intended to be all-inclusive, but a good starting point for further study.

Each of these is analysed in the sections below.

3.1. PRINCIPLE 1 - OPERATIONALLY FOCUSED – INTELLECTUALLY POWERED (FACILITATED BY IT)

„Success in information management is 5% technology and 95% psychology."[50]

The most difficult hurdle to overcome in Information Management is the perception that Information Management equates to IT. Information Management is less a function of information technology and more a dynamic process of the interaction of people and technology, which requires constant analysis and refinement to meet the commander's information

[50] Thomas H. Davenport, *Information Ecology: Mastering the Information and Knowledge Environment*. (New York, New York: Oxford University Press, 1997), 175.

requirements and ultimately achieve information superiority. Often it is stated that Information Management is about getting "the right information, to the right people, at the right time."

However, it must be remembered that technology provides the means for speedy information flow, but is no substitute for the brainpower that is required to ensure the information delivered is operationally aligned with the needs of the end user. After all, delivering a properly packaged product that the consumer can put to immediate use to „reduce uncertainty"[51] in a given situation is the ultimate objective of Information Management.

This requires the human ability to think - the information producer must understand the information requirements as it relates to the operation, collect input from multiple sources, interpret information provided, and package in a usable format that will meet the user's needs; a lofty objective that will not be met by an IT solution alone. Unfortunately, with the emphasis clearly on the systems, personnel "are ….not …. learning how to reason within the … networked environment"[52] Organizations must see IT for what it is, a facilitator of Information Management and place the focus of Information Management back where it belongs – alignment with operational requirements and the capabilities of its personnel.

3.2.PRINCIPLE 2 - DYNAMIC PROCESS IN NEED OF CONSTANT REVIEW

„The magic of command and control occurs when skilled and talented personnel interact with the system to make it really work – to turn ideas into action" [53]

Information Management is defined in joint terminology as „the function of managing an organization's information resources by the handling of knowledge acquired by one or many different individuals and organizations in a way that optimizes access by all who have a share in that knowledge or a right to that knowledge."[54] But is Information Management truly a function or more a process that needs to be continually evaluated and reevaluated in order to achieve its objective? Function "implies a definite end or purpose that…a particular kind of work is intended to perform."[55] On the other hand, a process is „a continuing activity"[56] which has a systematic approach that „emphasizes both measurability and improvement."[57]

Inherent in a process is feedback – a necessary attribute of any systematic process focused on improvement. It is easy to measure Information Management in terms of IT…time to deliver a

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[51] Davenport, *Information Ecology*, 116.

[52] David C Gompert, Lachow Irving, and Justin Perkins. *Battle-Wise*. (Washington D.C.: National Defense University Press, 2006), p 4.

[53] Darren Knight. "The Fourth Wish: Operational Information Management and Situational Awareness." *Canadian Military Journal*. (Winter 2001-2002), 33 – 40.

[54] Chairman, U.S. Joint Chiefs of Staff, Joint Publication 1-02 (Washington, DC: CJCS, 12 April 2001 as amended through 22 March 2007), 259.

[55] *Merriam-Webster's Collegiate Dictionary*, 10th ed. (Springfield, MA: Merriam-Webster, 1998), 472.

[56] *Merriam-Webster's Collegiate Dictionary*, 10th ed. (Springfield, MA: Merriam-Webster, 1998), 929.

[57] Davenport, *Information Ecology*, 134-5.

message, authorized access, bandwidth requirements, number of times accessed, etc., all of which are critical measurements in Information Management. However, what about the not so easy to retrieve statistics…usability, interpretation, confidence in source, best information retrieval methods, etc? How does one evaluate those metrics?

The Information Management process must include feedback links between consumer and producer to inject necessary corrections into the system. It is important to identify the right metrics early on in the process, as they will serve as the triggers for corrections. If Information Management is to be leveraged to achieve information superiority, it must be viewed as a process and structured to quickly adapt to changes in the operational environment.

3.3.PRINCIPLE 3 - USER CENTERED THROUGH CLEARLY-DEFINED, PRIORITIZED INFORMATION REQUIREMENTS

„The foundation of any command and control system is actually the operational information being fed into it."[58]

Identifying information requirements is the first and likely the most important step in the Information Management process. The importance of clearly identified and prioritized information requirements cannot be overstated. One cannot deliver what one does not quite understand; nor can one cipher through the mounds of information to determine what is more important to the user without priorities. Identifying information requirements, is likely to be the most time-consuming part of the process but if this part is right, the return on investment will equate to reduced complexity in follow-on steps.

Often so much focus is placed on the medium - the IT infrastructure - that the efforts required to attain the "right information" does not quite receive the attention it needs. In order to develop an effective Information Management strategy, the producers of information must first and foremost understand who the consumers are and how they operate.

It is through that common understanding that the operational-minded producers will be able to assist the user in identifying and prioritizing the operational needs and seek out methods that most efficiently deliver the user's information requirements.

While it is not the producer's role to identify information requirements, there is much to be gained through cross-functional collaboration between consumer and producer in this very important step. It will enable the early identification of potential gaps in information and with proper planning, provide time to minimize risks through both operational processes and technological solutions.

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[58] Knight, The Fourth Wish, 36.

3.4.PRINCIPLE 4 - INTEROPERABLE – SYSTEMS AND PROCESSES

„The teams and staff through which the modern commander absorbs information and exercises his authority must be a beautifully interlocked, smooth-working mechanism. Ideally the whole should be practically a single mind."[59]

The requirement for interoperability should come as no surprise. In the current global environment, the military operations of one nation impact the diplomacy and economics of many other nations, and it is almost expected that such operations will be executed in coordination with other nations that share the same interest.

However, this is another attribute that focuses mainly on IT systems. The perception seems to be that open architecture networks and open source programs will solve this issue. While extremely critical to interoperability, systems must not be the only concern.

Challenges, such as lack of standardized terminology or common processes, which are in the way of achieving interoperability, can be addressed by the operational staff. Personnel must be trained to know and understand the capabilities and limitations of the diverse organizations participating in the joint or coalition environment if seamless operations are to be achieved. Upon deployment is not the best time to figure out what is not understood; the organization must plan ahead so personnel can be prepared to engage in coalition operations.

„Working to build a standard foundation before operations commence enables personnel to spend less time acclimating to a joint environment and more time planning and executing. Efforts should also be focused on eliminating barriers to horizontal flow of information."[60]

Command structure ensures that information flows from subordinate to superior and vice versa, but operational processes must also facilitate the exchange of information between the horizontal elements within the operation in an effort to create a shared understanding.

3.5.PRINCIPLE 5 OPTIMUM SECURITY BALANCED WITH INFORMATION AVAILABILITY

„The mission of security it to give … freedom of action."[61]

Protection of critical information should be of the utmost priority; but it must be balanced with ensuring information is available to coalition partners and others requiring access to that information in order to meet the operational objective. „Security should not be so stringent that it becomes an obstacle for participating forces."[62]

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[59] Dwight D. Eisenhower, General, U.S. Army, quoted in Russell W Glenn and Gina Kingston, *Urban Battle Command in the 21st Century*. (Santa Monica, CA: RAND, 2005), 9.

[60] Davenport, *Information Ecology*, 88.

[61] Brown, Principles of War, 630.

[62] Chairman, U.S. Joint Chiefs of Staff, Joint Military Operations Historical Collection. (Washington, DC: CJCS, 15 July 1997), III-10

If operational partners are to be added value to the operation, they must have access to the information they need to effectively contribute. Security cannot be just about denying access to the enemy but must also consider the importance of information availability.

A much more effective process is taking the time to classify documents at the appropriate level, so only the information that absolutely cannot be shared is held back. Security in Information Management only provides freedom of action if it protects classified information while still providing access to information required to accomplish the tasks at hand. Any thing less is not optimum security. Unity of effort is built on the ability to share information, and security, if not properly implemented, will obstruct that effort.

CONCLUSIONS

- Implementing information technology solutions in a complex and ever-changing organisational environment is never easy;
- The challenges inherent in information management projects mean that new approaches need to be taken, if they are to succeed;
- These focus on the organisational and cultural changes required to drive forward improvements;
- There is no denying that the globally connected environment, with all its good attributes, has created an information quandary – so much information, often times it is difficult to distinguish the relevant from the irrelevant;
- In complex operational environment, information overload can quickly lead to confusion. To diminish this risk, an effective Information Management strategy must be adopted to focus efforts in the collecting, processing, and distributing of information. Review of past and current military operations strongly suggests that IM is not optimum in the operational environment;
- While some challenges in this paper must be addressed at a higher level of command, there are some issues that can be improved at the operational level. A well thought out, operationally aligned Information Management strategy based on solid guiding principles would facilitate a better shared understanding of what truly defines effective Information Management for the operational environment;
- Information Management is not Information Technology Management. Effective Information Management in the operational environment must be operationally focused and championed from the top down, as it is a determining factor in mission success.

REFERENCES

[1] George P. Scriven, Service of Information, United States Army (Washington DC: Government Printing Office, 1915), 14.

[2] Queensland Government Information Management Strategic Framework, September 2009;

[3] Alpa, Guido (1994) „General Principles of Law", Annual Survey of International & Comparative Law: Vol. 1: Iss. 1, Article 2;

[4] Wikipedia

[5] Dan, Bowman - 2009

[6] Milan N. Vego, Operational Warfare (Rhode Island: Naval War College, 2000), 97.

[7] C.R. Brown, "The Principles of War," U.S. Naval Institute Proceedings 75, no.6 (June 1949): 621-633.

[8] National Defense University, Joint Forces Staff College Publication 1 (Norfolk, VA: NDU, 2000), D-1.

[9] Chairman, U.S. Joint Chiefs of Staff, Joint Publication 4-0 (Washington, DC: CJCS, 6 April 2000), II-1.

[10] Chairman, U.S. Joint Chiefs of Staff, Joint Publication 3-07.3 (Washington, DC: CJCS, 12 Feb 1999), I-7.

[11] U.S. President, Executive Order no. 12674 of April 12, 1989 (as modified by E.O. 12731), "Principles of Ethical Conduct for Government Officers and Employees," (17 October 1990).

[12] Chairman, U.S. Joint Chiefs of Staff, Joint Publication 3-13 (Washington, DC: CJCS, 13 February 2006), I-6.

[13] Thomas H. Davenport, Information Ecology: Mastering the Information and Knowledge Environment. (New York, New York: Oxford University Press, 1997), 175.

[14] Davenport, Information Ecology, 116.

[15] David C Gompert, Lachow Irving, and Justin Perkins. Battle-Wise. (Washington D.C.: National Defense University Press, 2006), p 4.

[16] Darren Knight. "The Fourth Wish: Operational Information Management and Situational Awareness." Canadian Military Journal. (Winter 2001-2002), 33 – 40.

[17] Chairman, U.S. Joint Chiefs of Staff, Joint Publication 1-02 (Washington, DC: CJCS, 12 April 2001 as amended through 22 March 2007), 259.

[18] Merriam-Webster's Collegiate Dictionary, 10th ed. (Springfield, MA: Merriam-Webster, 1998), 472.

[19] Merriam-Webster's Collegiate Dictionary, 10th ed. (Springfield, MA: Merriam-Webster, 1998), 929.

[20] Davenport, Information Ecology, 134-5.

[21] Knight, The Fourth Wish, 36.

[22] Dwight D. Eisenhower, General, U.S. Army, quoted in Russell W Glenn and Gina Kingston, Urban Battle Command in the 21st Century. (Santa Monica, CA: RAND, 2005), 9.

[23] Davenport, Information Ecology, 88.

[24] Brown, Principles of War, 630.

[25] Chairman, U.S. Joint Chiefs of Staff, Joint Military Operations Historical Collection. (Washington, DC: CJCS, 15 July 1997), III-10.

INTERNET SOURCES

1. http://www.steptwo.com.au/papers/kmc_effectiveim/index.html (November 2, 2011);
2. http://www.tfl.gov.uk/assets/downloads/corporate/Data-management-principles.pdf (November 2, 2011);
3. http://www.monash.edu.au/staff/information-management/principles/ (November 2, 2011);
4. http://mike2.openmethodology.org/wiki/Information_Management_Guiding_Principles_Deliverable_Template (November 3, 2011);
5. http://www.unimelb.edu.au/infostrategy/policies/info_principles.html (November 3, 2011);
6. http://www.st-andrews.ac.uk/bi/datamanagement/ (November 4, 2011);
7. http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA470765 (November 4, 2011);
8. http://infosmart4.wordpress.com/2010/10/25/what-is-information-management/ (November 7, 2011).

ORGANIZATION SYSTEM MANAGEMENT

LTC Adrian Ioan DOROBANȚ

INTRODUCTION

Exercise of functions and relations management at the level of each organization is carried out by the management system.

The management system of the organization can be defined as all the components.

the decision-making, organizational, informational, motivational, etc. of the Organization, through which it exercises all the processes and management relations, with a view to achieving efficiency and effectiveness as large.

Management system of modern organization, competitive nationally and internationally, is a complex of principles, rules, requirements that ensure adequate modeling his precepts of science management. Note that, in the design and realization of management system, must be taken into account the specificities of each organization, in particular the profile, size and structure of human resources, financial, material and potential staff, location and company mentality in the context of national economic and-where appropriate-international etc. You have a decisive role, often owners or their representatives, whether acting as executives or managers as components of participatory management bodies.

Regardless of the characteristics of the organization, management system several components which differ depending on the nature of the characteristics of the instruments used, namely:

- organizational subsystem;
- subsystem information;
- decision-making subsystem;
- the management methods and techniques;
- other management elements.

Component business management system is the most concrete organizational subsystem, which explains why it have been raised most of the first surveys of science management. The organization is the collector resistance organization, through its constructive and functional characteristics by sensitive content and effectiveness of activities within the organization.

Among the components of business management system, the information may only by strong dynamism and flexibility, resulting in the spectacular progress of application of computer science. The information, through its functions within the Organization, has the same role as the

circulatory system in the human body. Providing necessary information to all parts of the organization is as vital as blood perfusion of each human body.

Being wholly specific management subsystem will constitute a true decisional command system, which adjusts the range of activities involved. Through the system is exercised all the functions of management decision, a higher percentage recording a forecast devoid of any act or decision-making process. Strongly conditioned by the quality of the other components of management, decision-making subsystem is the most active management system, and ultimately decisive for getting a high profit. Within the organization decision-making subsystem fulfills a role similar to the nervous system in the human body. As the nervous system without a well developed man dies or is ill, and may exercise the functions specific to rest, work, fun, etc., all equally and without an appropriate decision-making system cannot work efficiently.

Methodological-management subsystem is characterized by complexity and formalize, participating in the exercise of each of the five functions of management.

Having a strong character methodological-instrumental, the methodological rationality contributes significantly to the improvement and efficiency of each process management at the level of his most poignant visible trend of professionalization of management. Methodological-managerial subsystem in your organization is analogous to the system of knowledge possessed by every human being. As knowledge significantly enhances the human capacity to decide and act like and methodological-managerial subsystem significantly enhances the functionality and performance of the organization. Each of the four management subsystems have an essential role, with a pronounced specificity under the management of the organization.

Suggestive results of each subsystem decisive contribution to the functioning and performance management organization by analogy with human beings. Between the four management subsystems are highly interdependent which shall ensure the normal functioning of the organization's management system. The quality of each subsystem and functional management and constructive relationship that connects with other management subsystems functionality give cohesion and capacity management system and therefore competitive organization.

1. THE COMPANY'S DECISION-MAKING

1.1. DEFINITION AND STRUCTURE OF THE DECISION-MAKING SYSTEM

Decision subsystem, component management system is the most prominent specific managerial quality which marks the crucial functionality and performance to any organization.

In essence, through the decision of an organization assign all decisions taken and applied in its properly structured system of objectives pursued and configuration management hierarchy.

The number, nature and characteristics of decisions incorporated into the system presents a wide variety. In order to facilitate their knowledge and their rationalization by means of a suitable instrumentation is particularly useful to group them according to certain criteria, which are an important managerial theoretical and pragmatic significance.

Next, we present the quickness typology according to six criteria, which expresses, in fact, variables or major managerial positions with great impact on the rationality of managerial processes within companies-both public and private — and national or local.

The decision-making structure of the subsystem **Table No. 1**

No.	Criteria classificatio	Types of decision	Highlights	Examples
0	1	2	3	4
1	Horizon and implication s	strategic	refers to a period exceeding one year, usually 3-5 years; - Contribute directly to achieving the fundamental objectives or derivatives; - Aims to be all business activities or its main components; - Often taken at senior management group;	Approval to carry out an investment of 50 million to build polling will be mechanizing the product "x", ensuring an improvement in the production structure and an annual turnover of 100 million.
		tactical	- Usually refers to periods ranging from 2 to 0.5 years; - Contribute to the achievement of objectives directly derived; aims to be the set of activities, or some activities considerable implications on other areas; - Shall be taken at senior management level, group or individual; - Be integrated into policies, programs and annual plans, and half	Establishing the technical director, with the Board, the introduction of new technologies in Section X, in the first half of next year, leading to a decrease in product costs by 20%
		Current	Usually refers to a maximum period of several months; - Contribute directly to achieving individual and less specific, derived; - Predominate exclusively at the management level and lower	Distribution of daily production tasks to be performed by team members "y" by the team leader and "z".

No. crt.	Criteria classificatio	Types of decisions	Highlights	Examples
0	1	2	3	4
2.	Echelon managerial	higher	- To adopt the echelon senior management (Participatory management bodies, the general manager); - A considerable part are strategic and tactical decision;	Approval by contracting commercial director of the quantity "X", the raw material "y" to satisfy an order of a novel partner of US.
		medium	- Adopting the medium echelon Heads of management services, polling and workshops; - Most are current and tactical;	Complete their passage "x", dis to engineer "y" to the technician "z", the head of A in order to accelerate completion of the task "u" the engineer "y".
		lower	- Are adopted by the lower echelon of management Heads of offices and teams; - Are the current decisions;	Reference to bank economist "x" by the head office "y" to obtain information on new methodology for obtaining current credit
3.	Frequency	periodic	- Shall be adopted in certain intervals, reflecting cyclical management and production processes; - Most relates to production activities; - It is possible the widespread use of models and algorithms in their foundation;	Development by economist "x" the need the raw material supplied to "Y" to project design annual program of technical supply - the material of the company.
		random	shall be taken at intervals irregular, it is difficult to predict; - Their effectiveness depends mainly on the potential decision maker's	Approval of the norms consumer new product X by technical director.
		unique	- Of an exceptional nature, not repeated in the foreseeable future; Approval by the Board of Directors of the Foundation building department does not	Approval by the Board of Directors of the Foundation building department "H" does not resist

No.. crt.	Criteria classification	Types of decisions	Highlights	Examples
0	1	2	3	4
4.	Possibility anticipation	anticipated	- The adoption and main elements involved are known well in advance; - Prevalent in firms run scientific; - Are almost entirely regular.	Same with the current decision
		unpredictable	- The adoption and main elements involved are known only shortly before; - Depends mainly on intuition and decision-making of managers involved	Approval by the Board to strengthen the foundation section H vibrations not resists the new machine "x" in the process of installation.
5.	The extent of the scope of decision-makers	integral	- To take the initiative decision maker, without the need for the higher echelon opinion; - Usually are current and anticipated periodic	Changing the general manager of the company "X" personnel record keeping system used the personal service
		approved	- Their application is conditional approval at the higher echelon; - Are often strategic and tactical; - Are adopted more frequently and in small companies and powerful kings centralized and authoritarian management style,	Release from the office of chief engineer by the general manager in the opinion of the Directors of the Company.
6.	Scope coverage decision maker	participatory	- Are adopted by organizations management participatory - Most of them are strategic and tactical decisions; - Consumption of time, reflected generally higher	Same with the strategic decision
		individual	- Is a framework adopted by management; - Are often based solely on experience and decision-making that manager; - "Cost" cheaper than participatory decisions;	Same with the random decisions

Each of the six types contained in the above table corresponds to a specific structure of the decision-making system, whose knowledge is essential in the design of effective management system of the organization. Also, thorough knowledge of the structure of decisions by managers facilitate the appointment of decision-making tools and concepts and their effective use.

Structuring of decision-making system based on the six criteria, though essential, do not reflect the whole organizational structure and functionality of modern management systems. In the last decade have outlined some approaches to management, management, and virtual holons,

containing major decision, indicating appreciably different configurations and functionality compared with the decision of the organization.

Concluding, the decision-making system of contemporary organizations presents a particular complexity, incorporating a variety of decisions and allowing a significant diversity of approaches. In recent years emphasized a trend of increasing its functionality based on the novel approaches, with a pronounced character of innovation, in which priority is to ensure the competitive performance of organizations.

1.2. THE MANAGERIAL DECISION-THE MAIN COMPONENT OF THE DECISION-MAKING SYSTEM

The decision, the primary component of the decision-making system, constitutes an essential element of the management, being, as many authors, its specific tool of expression most important. The quality level, the management of an organization is best developed and applied through decisions.

The decision is part of management's resistance, its most active and dynamic, by exercising their functions fully exploit.

In the literature there are lots of definitions for the decision, both by local specialists and some foreigners. Based on information provided by the practice of decision-making, the analysis of the various views of specialists, we formulated the following definition of the decision.

The decision is the course of action chosen to implement one or more objectives.

The assessment of this definition it follows that the decision necessarily involves many elements. The above definition is valid for any decision, regardless of their field or the level at which you take. Obviously, of concern for organizations to give priority to managerial decision.

Decision management can be defined as that decision has direct track on decisions and actions of at least one other persons.

To reveal more poignant present specific managerial decision, the main elements that set it apart from the daily personal decision to be taken by each of us countless times each day. A decision takes the form of a decisional act, for the purposes of deployment of its in a very short period, typically a few seconds or minutes.

Decision making process specific decisions more complex, involving a notable time consuming, which may be of the order of hours, days or even weeks, during which it collects and analyzes a certain amount of information, establish human contact and consult more people decision to contouring situation.

In essence, the entire decision-making process consists of the phases through which the prepares, enact, implement and assess managerial decision and whose progress requires a relatively long period.

Given the variety of situations of decision-making and decision-making processes involved are very heterogeneous in terms of constructive and work together and managers parameters. Precisely why it is necessary a more analytical approach of the main elements involved.

Investigations carried out have revealed that the key constituents of decision-making are factors are the primary situation of managerial decision- decision-maker and environment decision-making.

Decision-maker is represented by a manager or a management body, pursuant to the objectives, tasks, powers and responsibilities, adopted decision related to your situation.

The dominant trend among decision-makers, both in Romanian and organizations from other countries, to enhance their decision-making capacity is due to the increase in the level of large portfolio management.

The decision-making environment consists of all the components of endogenous and exogenous organization, which make up the decisional situation, characterized by the expression of the direct and indirect influences on the content and results of managerial decision.

In the environmental decision-making shows an evolution in contradictory matters.

In the decision-making process of the primary factors in decision interdependence, which is reflected in the characteristics of the decision-making situations it generates.

Mainly there are three situations may, as follows:

- **certainty**
- **uncertainty**
- **risk**

In companies and national and local, overhead, both situations occur decision-making of certainty and uncertainty and risk. The emergence of situations of risk and uncertainty and their completion in decision is inevitable and to a large extent, even necessary.

In conclusion, the decision of the primary factors are complex and accelerated developments, generating a multitude of situations, decision-making in specific shapes within each autonomous companies, that are reflected in the variety of decisions to be adopted. As a result, it is necessary to know and study specific decision-makers each decision-making situations, so as to ensure the premises of adopting decisions effectively, in consonance with the strategic objectives of the organization.

1.3. THE RISKS AND ORGANIZATIONAL DECISION

By its nature, the decision refers to the future, being predominantly forward. In any decision-making process of the organizations are involved at the same time numerous variables such as economic, technical, managerial, legal, human, etc. As a result, the decision in general and especially the managerial decision-due to its complexity and growing contextual determination-often associated with numerous risks. Specific act or decision making process is the **inevitability of the risks**. Potential risks of decision-makers shall as a rule an inhibitory effect.

To overcome this reaction-given that, as i pointed out, the survival and functioning of any organization requires the adoption and implementation of decisions of risk and uncertainty is necessary to know the risks involved in order to reduce their . The difficulty of this process consists of the many possible risks and of the number and complexity of the variables that are involved. Genuine help on this plane is the knowledge of the main forms of risk that companies are being confronted.

Without going into further details, we refer only briefly to the most important categories of risks which professional managers shall evaluate them and they are considering and implementing the decisions.

Depending on the nature of their risks can be grouped into seven categories:

- Economic risks
- Financial risk
- Commercial risk
- Production risks
- Political risks
- Social risks
- Legal risks
- Natural risks

In the present period there is a tendency of increasing risk due to amplification, diversification, encouraging higher intensities and innovation to all tasks, and the factors that influence directly and indirectly to the company and its context. To counter this trend has outlined the so-called risk management with a pronounced decision-making content. Essentially, this is a decrease of the risk, regardless of their nature, related to the attainment of the company, implying changes in optics and design decisions

1.4. DECISION-MAKER – THE DECISION-MAKING FACTOR IN YOUR ORGANIZATION

Decision to influence most of all points of view one has **decision-maker.**

Decision-maker is represented by the person or group of persons who by virtue of the tasks, powers and responsibilities assigned managerial decisions.

Dominant influence or decision-making body manager who decides on the quality of the decision, the intervention was decisive at all stages of the decision-making process, beginning with the establishment of objective decision-making and decision-making, shifting the demarcation of the situation with the identification, collection, processing, analysis of information, decision-making, with elaborate alternatives considering itself and ending with the preparation of the implementation of its decision and the application itself.

In the present period, the dominant trend, thanks to professionalization of management, enhance their decision-making capacity is the result of the increase in the level of large portfolio management.

Increasingly more frequently, the decisions drafted by professional managers, in order to be able to successfully simulate complex economic activities have received, in addition to a band type and special training in the field of management.

In situations involving deep knowledge in some areas, calling on specialists in your organization or outside it.

To increase the decision-making capacity of decision makers in your organization contribute substantially and consultants in management working in specialized companies. On the basis of know-how, managerial possessed experience obtained by repeated interventions in solving the same types of decision-making situations, consultants are typically an important plus for quality decisions adopted and applied.

A trend characteristic of contemporary management firms is the proliferation of group decisions, in particular at the level of strategic decisions. In Romania this trend was reflected in the institutionalization of participatory management (shareholders ' meeting, the Board of Directors, etc.). Advantages of drawing up the most important decisions in the group are multiple: substantiation to facilitate more rigorous, deployments, and others.

Obviously, all these elements express the increasing potential of personnel management's decision-making, with beneficial results on the results. Relationship managers ' performance capacity-essence of the Organization, is increasingly being considered at its true value.

Concluding, we can affirm that in organizations, managers, decision makers, through the preparation of the qualities and efforts are asking a decisive impact on decisions.

1.5. DECISIONAL SYSTEM FUNCTIONS

The firm represented, decision-making subsystem has a priority position, which stems from the fact that the decision is the main tool used by managers. The main functions of the organization-specific decision-making system are:

a) Directs the development of the whole organization and its components.

b) Harmonizing staff organization is another major function of the decision-making system.

c) Triggering actions in the company's staff and their components

Naturally, these functions shall not be exercised individually, but together. Separation was based on the rationale for individualized educational opportunities, as such are more easily perceived and used by managers and thus make themselves or even discarding the lives of some of them, which also has a negative on the evolution and performance of your organization.

2. THE ORGANIZATION'S METHODOLOGICAL-MANAGERIAL

2.1. DEFINITION OF THE MAIN COMPONENTS OF THE SYSTEM AND METHODOLOGICAL-MANAGERIAL

Without any doubt, as a whole becoming more complex, sophisticated and efficient managerial elements, characterizing organizations competitive at the beginning of the Millennium III, systems, methods and management techniques has a growing role. Amplification functionality and competitiveness of firms in the context of internationalization contradictory current plan is the result of advances in instrumentation design and operational management of the organization.

Hence, the need for further knowledge of how these elements to their operational a plus of speed and efficiency.

Methodological-management system or system management techniques and methods can be defined as the combination of (complex) systems, methods and techniques used in the design and performance of functions and managerial relationships across the organization.

Regarding to the content and wording in the definition above are two details to avoid any confusion or misunderstanding.

For all methodological management in your organization to use two names: **methodological-management system**, which, according to our opinion, expresses faithfully and fully its contents; **the managerial methods and techniques**, easier to remember and widely used, but “stricto sensu ", does not reflect only part of its contents. Whereas, in the works, both are used frequently, and doing something new in a similar way, with the words: the logic of the argument above that the first forms-methodology management system-consider it as being more rigorous.

Methodological-management system mainly comprises three categories of factors: complex systems or methods of management, methods and techniques. Calling the term advanced management method for a specific management system in your organization, in order to avoid confusion with the management system of the organization as a whole. The term rigorously, as we will demonstrate in this subparagraph which are recommended to use it is, of course, the quality management system.

For a more complete and rigorous building on the content management system, we should deep typology components which essentially consists of two categories:

a) Typical management methodological elements, which were designed specifically to exercise managerial functions and relationships in your organization. In this category include:

- Management system or complex managerial method;
- Management method;
- Management technique.

Management system (management complex) is a managerial - construction coherent rigorous and complex components, phases, etc. precisely contoured rules, through which it carries out all managerial processes and relationships in an organization or a significant part of them.

Construction **management method** is a consistent and rigorous management, incorporating components, phases, etc. precisely contoured rules, through which it carries a small segment of managerial processes or relationships in an organization, usually with localized effects at the level of a small number of managers and bins in your organization. Managerial methods have a long history, some of them still being used in the primitive.

Management systems as distinct from the methods of management, in particular as regards the scope and complexity.

Managerial technique is a relatively simple construction management, through its exercising is a specific task, its impact by limiting the level of a manager.

b) Methodological elements similar managerial, represented by the management methods and techniques specific to other sciences (mathematics, statistics, economics, law, computer science, sociology), which is used by managers, but without affecting directly the contents and form of manifestation of managerial processes and relationships.

2.2. THE SYSTEMS MANAGEMENT TECHNIQUES AND METHODS

As a result in part from the evidence presented above, intensive development in recent decades, the science and practice management was reflected in the shaping of many systems, methods and management techniques. In table 2 present, selective, a list of the most famous managerial and methodological elements used, indicating for each:

-functions of management in the pursuit of which is used in particular;

-company management subsystems within which are used as a priority;

By indication of these elements is primarily to facilitate the use of the instrumentation system of management by managers and-secondly-the knowledge of nature and its usefulness by those studying, working or are involved in managerial processes and relationships.

The main synoptic systems, management methods and techniques

Table 2

No. crt	Name the method	Management functions in the exercise of which are used mainly	Subsystems of management organization in which priority is used
0	1	2	3
A	Strategic alliance	Planning and organization	Decisional and organizational
2	Organization mark (Organization print)	Forecasting and Control	Decisional
3	Audit of managerial culture	Control-evaluation	Ensemble management system
4	Morphological analysis	Planning and organization	Ensemble management system
5	Job analysis	Organization and training	Organizationally
6	Job analysis	Organization	Organizationally
7	Analysis of organizational	Organization	Organizationally
8	Assessment (Rating)	Management process as a whole	Organizationally
9	Functional appreciation	Organization and training	Organizationally
10	Benchmarking	Control Evaluation	Decision and information
11	Brainstorming	Whole management process	Ensemble management system
12	Brain writing	Whole management process	Ensemble management system
13	The global assessment	Organization and training	Organizationally

2.3. CHARACTERISTICS OF THE SUBSYSTEM METHODOLOGICAL-MANAGERIAL

Methodological-management system provides, in terms of constructive and functional, several characteristics that confer specificity and effectiveness. Of these, the most important are:

- The multitude of instruments
- Emphasized the formal character
- Specific strong organizational management system

- Fast pace of obsolescence management methods and techniques
- Integrated the organizational level character
- Heterogeneity of system components

Between the six characteristics mentioned are complementary relationships, sometimes overlapping partial consideration of which is subject to point and use of methodological and managerial systems and functional performance.

2.4. METHODOLOGICAL MANAGERIAL SYSTEM FUNCTIONS

The evidence presented in the preceding paragraphs represent the background necessary for understanding and valuing spotting, specific system functions methodological-management organization:

• Providing methodological support for the exercise of managerial processes and relations;

• Enhance the functionality and the competitiveness of the organization;

• Standardization management activities;

• Development of staff potential and managerial performance;

3. INFORMATIONAL SUBSYSTEM

3.1. DEFINITION OF THE ORGANIZATION'S INFORMATION SYSTEM

Information system may be defined as all information, data, and flows routing information, procedures and means of treating information designed to contribute to setting and achieving the objectives of the organization.

Information system-IT system relationships.

Note that such a definition of the information system is comprehensive, in that it includes, as opposed to the definitions given by other specialists and information flows, information and means of processing the data. According to our opinion, the definition of information system based on its role in the whole of the undertaking is a condition sine-qua-non for correct understanding of the problem, not only information but also the whole question in general management.

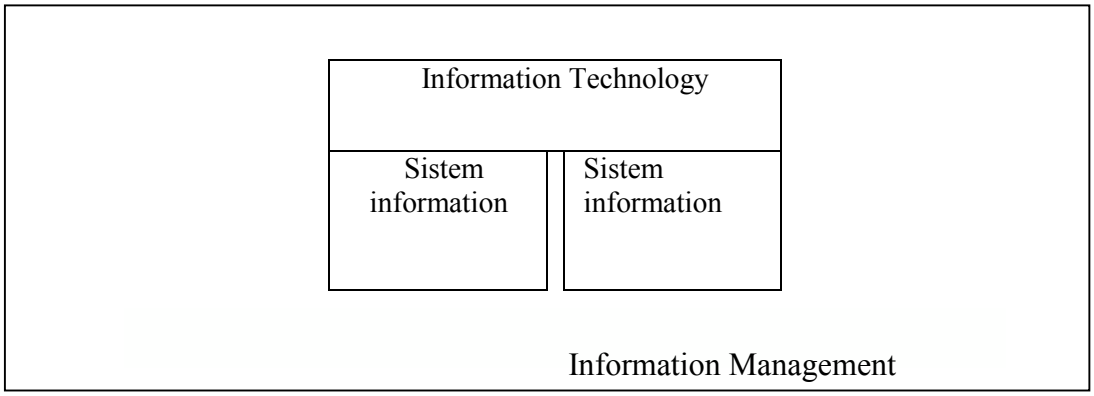
Stress on this aspect because, not infrequently, especially some IT experts, equate IT system, which essentially summarizes the collection, transmission and processing by automatic means of information and information system which, as defined above is significantly larger. The relationship between information system and the computer are whole-part.

The current trend, which manifests itself with strong progressive, is to amplify the use of automated information processing systems, while reducing the manual and mechanized. The

above definition of the information system has a realistic character, in that it does not represent that all incorporated are rigorously organized and integrated.

Increasing the size, complexity and importance of the information system of the past two decades was reflected and in shaping the so-called information management.

This includes three major components-resources management, information management processes and information technology management, as evidenced in the following figure:



The relationship between information technology, information management and information system

The basis of the information system design and operation of the organization - as well as information management - is a new theory. The theory used until a few years ago related to information system focusing on the identification and classification of information as a basis for ensuring access to them.

The new theory of information system refers to a focus on identifying information needs and ways of meeting them, while addressing the use of information in a strategic and economic vision while centered on efficiently.

This theory is a prediction of the evolution towards a knowledge-based company, which emphasizes the same author, is the type of organization that is growing the fastest in a significant part of the world. Approach to define, design, operation and improvement of organization's information system from the new theory, is the base functionality and efficiency.

3.2. INFORMATION SYSTEM COMPONENTS

Information system of the firm is composed of several elements closely inter-linked:

1. Data and information
2. Circuits and information flows
3. Information procedure
4. Means of information processing systems

3.2.1. DATA AND INFORMATION

Data and information are the primary components of the information system, organic interdependent, so that must be addressed together. Data is

Data represents the numerical or letters description of actions, processes, facts, phenomena, relating to the organization or processes outside of which affects its management.

Some data are information that is most important in terms of management.

Through **information**, in terms of management, which denote that data recipient a spore of knowledge relating to the organization directly and indirectly, to provide new information to be used in carrying out the tasks to perform his side within that organization. By virtue of such qualities, the information is the basis of actual decisions and actions within the organization.

Information from the organizations are particularly complex. In order to facilitate their characterization classify them according to several criteria, allowing for the identification of significant facets of managing organization:

- Method of speech
- Degree of processing
- Direction of the handling
- Sources
- Destination
- Nature of reflected processes

In examining the many and various features on the various types of information, we can draw certain elements is particularly important in terms of organizational and managerial. Thus, the information is a raw material involved in all activities of the organization. Any process, regardless of its nature, is based on the information. At the same time, the information is inevitable and a product of any process-manufacturing, commercial, technical, financial or personal.

By virtue of all these elements, the information confer power which he possesses.

A final aspect that we wish to highlight concerns the fact that the information is a valuable one, the market value. There are three different theories that deal with sensitive content and determine the market value of information without being in their content, to underline the conclusion reached by experts – information has value and generates efficiency at a level that depends on the complexity and the competitive nature of the environment involved. In the context of development organizations based on knowledge, value and power of information-the foundation of the construction and utilization of workforce,-continue unabated.

3.2.2 INFORMATION FLOWS AND CIRCUITS

Use of information in decision-making processes and performance in your organization involves finding their date or the recipient of information, information is necessary in a **circuit**.

Assign information inserted in the circuit that you browse through the information or set of information between the transmitter and recipient.

Note that information through circuits and length, makes the information flow between a significant proportion of the corporate information system functionality. **Information flow** represents the amount of information exchange between the transmitter and beneficiary information circuit, characterized by certain features-length of travel, speed, reliability, cost, etc.

Regardless of type, it is necessary that information circuits to be as direct in the sense of avoiding more than intermediate crossing points, which entails both increasing the vehicular speed information and reduce the occurrence of deficiencies. Also, it is recommended that information be circuits as short, avoiding extended downstream and upstream of the beneficiaries of the informational target.

Characteristic is the use of modern organizations in a proportion of increasingly large information electronic circuits based on computers and telecommunications.

3.2.3. PROCEDURES INFORMATION

A component of the information system which tends to acquire a predominant role in modern organizations is the **information procedures**.

In essence, information procedures assign all the elements that establish procedures for collecting, recording, transmission, processing and archiving of a category of information, stating operations performed and their sequence, support, formulas, models and methods of treatment information used. At the level of which is reflected in a manner give meaningful progress in the design and functioning of the Organization's information system. Procedures in modern organizations present a set of features, which gives them a decisive importance in the utility and its system information.

3.2.4. THE MEANS OF HANDLING INFORMATION

Means of treating information entirety technical-material used for the collection, recording, transmission, processing, interpretation and storage of data and information represents the means for handling the information (from the simplest (pen), the most complex (computer).

Means for information system for collecting, recording, transmission and processing of information is its technical support. Number, structure and performance of technical and functional means of handling information packed in an appreciable performance information

system and organization performance by default. Characteristic of contemporary organizations is the use of a wide range of facilities for the treatment of information, which, depending on the technical performance and the degree of human intervention, are divided into three categories: manual, automated machinery.

Coverage concerning categories of means of information processing systems, noted that the mechanized are endangered. The formidable progress registered by automated means, in terms of reducing substantial costs has been mechanized means obsolete.

On the management of the organization, use of electronic computer involves the integration of its organic management system, taking into account the specific needs of each organization. Another major concern in the use the computer management is keeping the secrecy and protection of the financial and economic assets of the company.

For managers of organizations, one of the most difficult problems in the information plan is to ensure at all times by means of treating information with technical and economic level of the last of the electronic technology products. The pace of renewal in this area is particularly alert, the emergence of new products concurrently sometimes every few months, raising serious questions of cognition, decision and organization costs for hiring managers.

To an extent, increasing the ability of managers to ensure access to the latest products and performance of hard and soft makes your organization's competitive ability.

4. ORGANIZATIONAL SUBSYSTEM

4.1. DEFINITION OF SUBSYSTEM AND MAJOR COMPONENTS OF THE ORGANIZATIONAL

The Organization's management system is the most concrete organizational subsystem, which explains why most studies have been devoted in the early decades of the development of management science.

The organizational system of the firm consists of all such organizational division, which provides the framework and functionality, combining the work processes in order to achieve the objectives of the predicted.

Under the company's organizational meeting are, in fact, the two main categories of existing in any business organization: organization of formal and informal.

By organizing **formal organizational** define all the components within your company, established by regulation by the management of the organization and functioning, organization chart, descriptions of functions and posts etc.

From a procedural point of view, the organization has as its main content, formal functions, tasks, responsibilities and tasks. Considers that specialists within the companies there are usually five functions: research and development, production, trade, financial accounts and staff.

Structural organization of its contents, is modeled in its organizational structure, the collector resistance. Always formal organization is associated informal organization, which is interconditioning relationships.

Informal organization is the totality of the elements and human interactions with organizational character, which is manifested spontaneously and naturally between the constituents of the organization.

4.2. DEFINITION AND COMPONENTS OF PROCEDURAL ORGANISATION

As shown in the preceding paragraph, the organization is directly subordinated to the objectives projected circumscribed firm, constituting an essential means to achieve them. Consequently, content organization and its mode of expression is subject to the characteristics of long term objectives, medium and short. Because of this, the very name implies references to the content organization system objectives within the organization.

As a result of the forecast is for a **system of objective**, which refers both to all company activities and its components.

The objectives are qualitative characterization and / or quantitative goals pursued by the organization.

They may share it, depending on the scope and importance, in several categories:

- Fundamental objectives
- Objectives derived first degree
- Objectives derived second degree
- Specific objectives
- Individual objectives

To achieve them is initiates and integrates a set of processes and actions, so the overall organization is of the firm. Depending on the content, organization of the company in two main forms: organization of process and organization structure.

Organization process consists essentially in the establishment of the main categories of work, the processes necessary to achieve the full range of corporate objectives.

The result is the organization primarily functions, activities, tasks and duties.

Function is homogeneous all work processes, similar or complementary that contribute to same objectives degree derivative I. In the context of modern large companies and medium-sized

enterprises there are 5 main **functions**: research and development, production, trade, financial-accounting and personnel.

In turn, each operation is divided into several **activities.**

In essence, the **activity** assign all or homogeneous processes that contribute directly related to achieving the same objectives derived second degree. In the activities of particular **tasks**.

The task assign specific work outlined a process that runs periodically and sometimes continuously, involving specialized knowledge and compete to achieve a specific objective.

A task can be divided into several duties.

Duty is a basic component of a complex work process or a simple work process contributes to an individual object, which is usually attributed to the achievement of one person.

4.3. STRUCTURAL ORGANIZATION

Structural organization consists in grouping the functions, tasks, competences and tasks, depending on certain criteria, and the distribution thereof, in furtherance of their organizational subdivisions by groups and individuals to ensure the best possible conditions for the attainment of the company. The result of structural organization represents the organizational structure.

4.3.1. DEFINITION AND IMPORTANCE OF ORGANIZATIONAL STRUCTURE

Although the concept of organizational structure has been addressed in a number of works on him did not come to a rigorously scientific definition, able to meet the consensus of specialists. Most of the approaches devoted to define a rather general way, leaving, especially when organizations move to practical analysis, a wide open door confusion. The proposed definition is as follows:

Organizational structure of the company means the combination of people and organizational subdivisions so constituted as to ensure the organizational prerequisites for the establishment and objectives of predicted.

Within the organizational structure of the organization there are two main components:

-management structure

-structure of production

Management structure can be defined as all top-level managers and organizational subdivisions by whose decisions and actions shall ensure conditions for economic, technical, managerial and staff necessary to conduct business compartments.

Management structure is made up mainly of participatory management, general manager and his deputies, functional compartments and constructive and technological design. The structure of production, concerns all the firm's organizational subdivisions, within which operational

activities are carried out mainly in production. Specifies the size of firms is increasing and modern role of managerial structure at the same time enhance the integration of production structure in the organizational structure of the whole, through organizational, informational and economical elements.

4.3.2 COMPONENTS OF ORGANIZATIONAL STRUCTURE

The main components of organizational structure, which is found in any organization, whether or not an industrial character, are: post, position, share hierarchical, compartment, hierarchical level and organizational relationships.

The post is the simplest organizational subdivision of the organization that can be defined as all the objectives, tasks, powers and responsibilities on a regular basis, to exercise an employee arising out of the company or overhead.

Objectives item called individual targets, is, as you know, defining qualitative and, wherever possible, quantitative goals envisaged by its creation. The individual objectives are synthetic characterization of the utility job expressing the reason of its creation and job evaluation criteria which the employee is assigned. The objectives are carried through the tasks.

Tasks are the most dynamic components of the job, their level of priority manifesting qualitative changes that require changes in organizational structure.

Decision and action limits within which holders of posts can act to achieve individual objectives are linked to job competence or formal authority. In other words, the formal power to determine the means that can be used by job holders to fulfill their tasks.

The last component of the post is the **responsibility of the organization**, namely the obligation for the holder of the post on the individual objectives and carry out related tasks. The organizational responsibility also means responsibility for the use of formal powers associated with a post, which is reflected in the provisions of all the rewards and penalties for each post.

All posts with the same main characteristics form a function. Depending on the nature and scale of the objectives, tasks, competences and responsibilities are two main types of functions: the management and execution.

Hierarchical dimensions are influenced by nature share the work of subordinates, level of education and their degree of motivation, frequency and extent of links between them, experience, ability and reputation manager. Many experts share the view that the optimum size for a hierarchical higher and medium enterprise manager is 4-8 subordinates, increasing the proximity measure organizational pyramid up to 20 to 30 workers for a team leader. The weights should be adapted features hierarchical situation of each organization, especially avoiding

common trend under dimension, generating serious drawbacks to increased costs for device management, the manager derating.

Compartment means all persons performing work uniform and / or complementary, usually on the same site, that contribute to same objectives and are derived directly subordinated to the same manager**.**

Are operational and functional compartments, depending on the objectives assigned to the tasks performed, the components and responsibilities and how circumscribed their performance.

Hierarchical level-another major component of the organizational structure is composed of all organizational units located at the same distance hierarchical general meeting of shareholders or of the owner of the company's unique.

The number of hierarchical levels are of special importance for the proper conduct of managerial activity, whereas the reduction of their means to shorten the information circuits, increasing efficiency, reducing the possibilities for distortion of information.

The last component of the formal organizational structure is the relationship with the major role in ensuring the functioning of the organization.

Formal organizational relationships can be defined as ratios of other organizational subdivisions (posts compartments, etc.) official organization established by regulations.

Depending on their particular characteristics, the nature and mode of manifestation of the powers and responsibilities, organizational relationships within the organization can be divided into three categories: authority relations, cooperation and control.

4.3.3. WAYS OF PRESENTING THE COMPANY'S ORGANIZATIONAL STRUCTURE

Knowledge and organizational structure analysis involves the use of appropriate ways to describe it. **Organization chart** is the most commonly used for this purpose. Synthetic organization chart can be defined as the graphical representation of organizational structure with certain symbols and the specific rules.

Organization chart consists usually of rectangular boxes representing management positions or departments and lines of various forms, which render hierarchical relations, functional, etc., which are established between all other components of organizational structure. In cases where organization chart plays the organizational structure of the entire organization is called general or overall organization.

A more detailed organizational structure is achieved by using the **rules of organization and operation** or manual organization.

In the first part of the regulation shall be inserted the legal basis of data on establishment and operation of the company (status, contract company, etc..) and a brief presentation of the object or activity. Further, it includes general organization chart of the organization, whether a commercial level of complexity, organizational part of the main components of structural organization, is made also a detailed overview of the main organizational features - specific objectives, tasks, powers and responsibilities of management level. Special attention should be presented participatory management bodies. The second part of the regulation of organization and is dedicated to presenting in detail the organization's compartments, posts functions and incorporated each of them.

Rules of organization and functioning as the organization chart is actually developed by the compartment or organizational management with the participation of senior management of the company.

CONCLUSIONS

The decisions adopted by the managers on different hierarchical levels aims the establishing and laying out the objectives, specifying the ways of achieving, dimensioning of the necessary resources, stipulating the intermediary and final terms, delimiting and dimensioning of the structural and processual components involved in achieving the objectives, coordinating and directing the active personnel to establishing and achieving the objectives, evaluating the results, casual seizing of disfunctionalities and strengths, correcting and/or updating the objectives. Its modernization implies carrying on of complex measures which would allow obtaining of an increased efficiency and effectiveness and implicitly, of corresponding performances.

REFERENCES

1. I. Verboncu, O. Nicolescu Fundamentele mnagementului organizației, Editura Tribuna Economică, Bucureşti, 2002, capitolul IV.

2. Maria Barrulas, The Role of External Sources of Information as a Dynamic Factor of Competitiveness and Performance for SME's, în FID News Bulletin, nr. 47, 1997.

3. D. Birchall, L. Lyons, Creating Tomorrow's Organization: Unlocking the Benefits of Future Work, Pitman Publishing House, 1997.

4. R. Boaden, G. Lockett, Information Technology, Information Systems and Information Management: Definition and Development, Information Systems, vol. 1, nr. 1, 1991.

5. De Breson, X. Hu, I. Dreyer, B. A. Lundvall, Innovative Activity in the Learning Economy, OCDE, Paris, 1997

6. M. Catinat, Entrer dans la Societé de l'Information, in Futurables, nr. 5, 1999

7. Cheshrough. H. & Teece, D.,When is Virtual virtous, in Business Review, nr. 1, 1996
8. Th. Copeland, D. Friedman, The Market Value of Information: Some Experimental Results, in The Journal of Business, vol. 65, nr. 2, 1992.
9. R. L. Daft, D. Parks, Chief Executive Scanning, Environmental Characteristics and Company Performance: an Empirical Study, în Strategic Management Journal, nr. 9, 1988.
10. B. Dewan, P. Bhakta, Quality Through Information Management, in IT Vision, nr. 2, 1999.
11. P. Drucker, The Future that Has already Happened, in Harvard Business Review, nr. 5, 1997
12. L. English, Turning Information Management Into an Effective Business Enabler, in Information Strategy, vol. 12, nr. 6, 1996.
13. Hambrick D., Mason P., Upper Echelons, The Organization as a Reflection of its Top Managers, in Academy of Management Review, nr. 1, 1994

METHODS FOR STIMULATING CREATIVITY IN A MILITARY ORGANIZATION

LTC Florentin POSEA

"Imagination is more important than knowledge"

Albert Einstein

INTRODUCTION

Among others, the important role of human resources in society and into an organization is due to *creativity* that is a characteristic belonging only to human beings.

Creativity is an idea as old as the human being who has created in his entire life: objects, vehicles, cities, poems, systems etc. "A person's life is a mixture of routine and creativity" said the well-known American sociologist Abraham Maslow but human societies historically are rather conservatory than innovatory. Changes were made when spontaneous creators' ideas and innovations production started to be insufficient related to economic requirements of society. That was the period of time when creativity started to be studied, society asking for an enough number of flexible and innovative individuals.

All publications that we read today include statements or analysis on this subject: "Past solutions don't work anymore; it's time to come with new ideas. So, let's innovate!"

I. CREATIVITY – THE STRENGTH OF HUMAN RESOURCES

I.1. CONCEPT OF CREATIVITY

Having Latin origins, the concept of creativity has many sophisticated and tautological definitions.

The commonly accepted definition of creativity has three parts:

- Creativity is a complex process, subject to studies by Behavioral Psychology, Social Psychology, Psychometrics, Cognitive Science, Artificial Intelligence, Philosophy, Economics, Business and Management, etc.
- Creativity is an interpretation of past knowledge and experience in a new way.
- Creativity contributes to the enrichment of the existing knowledge base.

George Keller expressed this definition[63] as "Creativity, it has been said, consists largely of re-arranging what we know in order to find out what we do not know".

[63] http://wikipedia.org/wiki/Creativity

The simplest definitions of creativity are these: "Creativity is capability to create" and "To create means to produce original and useful ideas combining existing elements".

The definite element of creativity is the process of generating new ideas whereas the innovation implies in addition changes based on these ideas.

The word "creativity" is relative new but the interest for it started from antiquity. The French mathematician Jacques Hadamard described for the first time the invention process as a four-step one: preparation, incubation, illumination and verification.

Some researchers of creativity consider the creative process as a five-step one[64]:

- Fact-finding
- Problem-finding
- Idea-finding
- Solution-finding
- Acceptance-finding.

Certain cognitive characteristics contribute to the one's creative behavior[65]:

- Fluency
- Flexibility
- Visualization
- Imagination
- Expressiveness
- Openness.

Such skills could be learned or they may be situational. Fluency is related to the number of meaningful responses to a challenge, while flexibility reflects the diversity of the responses provided. These features are involved in the psychometric study of creativity too[66].

I.2. CREATIVITY - ROLE AND APPLICABILITY

Creativity is necessary when it's need to innovate or make an original change in a situation. Need of creativity could be determined by a dysfunction (a real problem) but, moreover, it could be determined by the will of progress, without existing real dysfunctions, in order to strength a position and to gain on.

There are three big families of applications of creativity:

- creation, invention, innovation
- solving problems

[64] Van Gundy, A.B. (1987), Creative Problem Solving, New York : Quorum
[65] DIP Concept (2007), http://tip.psychology.org/create.html/
[66] Guilford, G.P. (1967), the Nature of Human Intelligence

- optimization of what exists

Creativity is necessary for all people who want or have to accomplish at least one of these three missions, and for all people who want to keep their selves the power of their own existence, too.

Depending on circumstances, creativity is different: artistic or technical, intellectual or applied, amelioration or pure creation, generalization or new creation, discover/research, new idea or association of two known ideas, modest or grand.

Gradually, stimulating of creativity has become a solution to solve crisis, to implement changes, to explain backwardness of some countries or organizations towards other ones.

To launch a new product before others, to find the best ingenious way to highlight its advantages, to make more dynamic the research and development teams, to mobilize sales forces are the objectives which enabled to demonstrate the investments capitalization in the creativity field and allowed practitioners to dedicate their energy in methodological research.

The human resources function was reticent for a long time but now, situation considerably evolved and creative approach get a nobly distinction.

Till the end, the general directions started breaking away and accepting necessity: after the informatics glory had distributed on centralized systems it succeed a development of an organization founded on intelligence and creativity.

It simply could say that the model of heads who think and of members who execute shows its limits: all the organizations and present society need all talents, without exceptions. It remains the problem of their coordination.

II. PREMISES AND CONDITIONS TO PERFORM A CREATIVE ACTIVITY

Around 1954, John Paul Guilford, the president of the American Psychological Association, received a capital mission from federal government and consequently a budget to define precisely nature of creativity and concrete means of education and development. His research was supported on scientific approach of Claude Bernard experimental method. He started by forming a two samples, each of them having one million people. First sample consisted of well known creators belonging to different kind of disciplines such as technical, scientific, artistic and literal. The second one consisted of simple representatives of USA population.

After a lot of tests, the factorial analysis has outlined some conclusions which could bring serious changes within industrial civilization:

- everybody, without exception, has an great creative potential but only few people use this potential, most of them having no idea about it.
- potential is not dependable of gender, age, race and social origin.

- potential could be aroused and developed at any age by an appropriate pedagogy.

In 1954, started from the last conclusion, Americans created the Creative Education Foundation. This foundation organizes an international meeting every year and gathers together a lot of people like in a pilgrimage. Researchers, students, high officials, priests, rabbis, social assistants, doctors, architects, artists, businessmen, pensioners, Americans and other nationality are present at this meeting.

Starting from this western Mecca, creativity migrates to all five corners of the planet, in most of cases, models from here being taken by Germany, United Kingdom, India, and France and so on.

II.1. INFLUENTIAL FACTORS ON INDIVIDUAL CREATIVITY

Being undependable of gender, age or social origin, creativity is influenced by these factors. Influential factors on an individual creativity are represented in figure no 1.

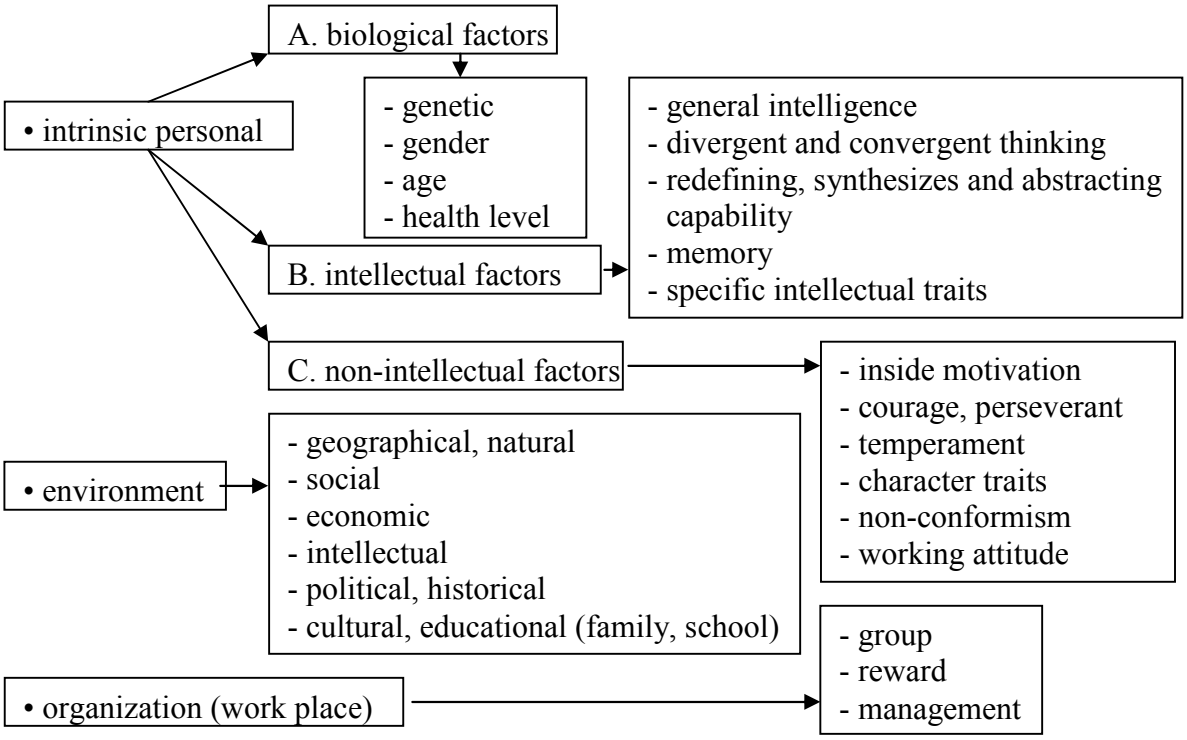


Figure no 1. Influential factors on an individual creativity

Biological factors (gender, age, health, relax level, stress) influence creativity in different ways. Referring the *gender*, "Men are more creative than women" said analysts. They discovered that girls waste a lot of time in their childhood doing many useful but routine things. Women could be a rich source of creativity in the future giving up such kind of activities. Even though men seem to be superior to women, there are many traits such as oral communication, numbers calculating, perception capability or memory in which women are superior to men[67].

[67] Feier, Vasile Virgil, Creativitatea şi creativitatea managerială, Ed. Expert, Bucureşti, 1995

Having no relation between person's age and creativity specialists concluded that people are more creative from 25 to 45 years old. The maximum of creativity could be found among people who are from 25 to 35 years old where imagination is required and among people who are from 35 to 45 years old where experience is required.

Health, level of relaxes and stresses are factors which influence especially managerial creativity.

Intellectual factors (general intelligence, fluency, flexibility, originality, sensibility, redefining aptitudes, memory, specific intellectual trait, so on) have a big influence on creativity. Intelligence is not only native; it could be educated and trained. A human being brain could be learned but forming a mechanical memory has to be avoided because of a negative influence on creativity. Unfortunately, such kind of memory is developed sometimes in schools. "Memory doesn't keep anything that is not understood or is without child's deep interest and judgment" wrote our great national poetry Mihai Eminescu into newspaper named "Timpul" in 27 October 1878.

Non-intellectual factors (inside motivation, working attitude, perseverance, temperament, character) are analyzed more than others ones. Without a strong inside motivation an individual could lose gradually his will and pleasure to investigate or search in his working field so his courage and creativity will be decreased. Working attitude is necessary and the routine tasks have to be avoided. Perseverance or capability to not give up easily could be educated during the time without isolation from collective group or illness. Temperament is expressed by behavior and it has a genetic base. Usually, some activity fields ask for adequate temperaments. Depending on the environmental conditions, the same kind of temperament could deter different characters. The creators' character is represented by responsibility, honesty, honor, abnegation, optimism. It frequently is formed in a social relationship system. In some cases, a creator's success depended on his defective character.

Environmental factors (culture, family, school, working place, reward, appreciation, competitions) have an important contribution for stimulating creativity. All experts in this field agree with idea that to produce new ideas means to be in a creative environment.

II.2. PREMISES OF CREATIVITY IN AN ORGANIZATION

Results from the theoretical researchers' analyze and practice divide premises of creativity in an organization in three parts:

A. Quality of human resources selection
B. Social and economic premises
C. Organizational premises

Quality of human resources selection is a premise to obtain desired level of creativity in an organization. A candidate has to satisfy four criteria of creative potential (fluidity/flexibility – originality/elaboration) and the other personal traits[68] such as:

- scientific, artistic and general cultivation, curiosity
- open wide to world and to the others
- sense of observation
- psycho somatic equilibrium
- relationship aptitudes
- respect and valuation of variety
- tolerance for ambiguity and inconsistency
- sense of humor and self irony
- judgment, independence
- relative sensibility to established powers
- use of all senses, included the sixth one

Taking care of most of those mentioned criteria within a selection process the right person will be appointed on the right position and in terms of creativity chances to accomplish the objectives increase.

Social and economic premises are reflected by advanced technology, pressure of competition, competitive products and improved employees' training. Need of creativity results from power of change. Collective creativity is more efficient than individual one in an organization.

Organizational premises are in close conjunctions with the type of used management. A human group couldn't survey without leadership. On the other side, total democracy is a utopia. Proposed by the experts, the model of participatory management is appropriate only to leadership. The contributory management[69] could be a new solution, not a universal one but surely not a utopia. The condition of implementing of this management is that all problems firstly have to be analyzed and solved by the person who is responsible for doing that, then, in case of abortiveness he could send them to the next superior level or to the experts.

II.3. CONDITIONS TO PERFORM A CREATIVE ACTIVITY

Creativity is good only if is put in practice. Adequate environment for creativity is there where a feeling of an unsatisfactory situation exists and an improvement is necessary. All factors which contribute for changing have to be used and objectives have to be realistic.

[68] Hubert Jaoui, La créativité, Morisset, Paris, 1995, p.28
[69] Hubert Jaoui, La créativité, Morisset, Paris, 1995, p.54

Communication between personnel and leadership is a very important condition to perform a creative activity. An innovator has to be a good communicator. Communication couldn't be reduced to a simple information change. To obtain maximum of everybody' implication and a harmonized efforts communication has to act to human behaviors. If personnel are limited as executors it will obtain mediocrity and abortiveness. A communication strategy and a communication plan implying leadership have to perform. Creative sessions are necessary to transmit conclusions of explorations (expectations, aspirations and mental lists of personnel and leadership) and to establish clearly objectives and means.

Motivations in creativity are the fallowing:

- need – "necessity is the mother of invention"
- will: everything is ok because nobody ask me something. I create because I want to, because if I don't express "the force of arch keeping tense"[70] I will assume the risk of an implosion
- contract: I search, and sometime I find, because I am paid to do that

Obviously, two of these motivations or all together could be combined. There are many controversial opinions related to motivations. Most of inventions are the result of "need to know" or because the opportunity to gain a big prize meaning a lot of money? In fact, the question is "Recognition or reward?"[71] The experts started analyzing inconvenient of financial reward and whom and how express recognition. The inconvenient of financial recompenses seem to be multiple. A system named "kaizen" was issued to eliminate them. The word "kaizen" comes to Japanese meaning small continuing ameliorations that create an environment of continuing amelioration and encourage ideas and all employees' involvement.

Education and forming are necessary conditions in performing creativity. There is no creation without competence and accumulation of experience. There is no invention without science and ''savoir-faire" conditioned by duplication of competence with courage. Forming and education have to be urgently taken into consideration as some essential engines of economical development. Peter Druker said that innovation could be represented as a discipline, it could be learned and it could be practiced.

Organizational conditions have an important influence in performing creativity. All creators have a method that they trusty follow it, consciously or unconsciously. This method is based on a principle that recourses to different logics and to sequence of three main moments (before, during and after creation). The technology of creation is general but methods for stimulating

[70] Genius' definition given by Nietzsche

[71] R. McDermoff, R. Mikulak, M. Beauregard, Développer l'initiative et la créativité du personnel, Dunod, Paris, 1996

creativity are diverted and they will be selected by each creator or creators' group depending on subject and their objectives. Creator's qualities could be schematic represented like in figure 2.

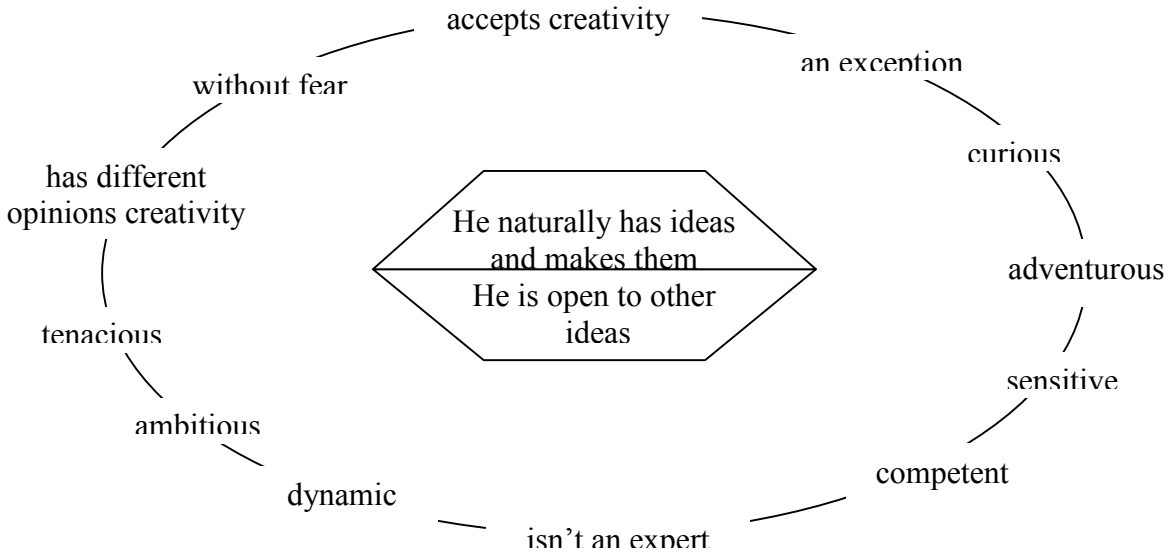


Figure no 2. Creator's characteristics

III. METHODS FOR STIMULATING CREATIVITY

Creativity is not a wild, impulsive or improvised method. Creativity belongs to objectives of amelioration and it is practiced as a method. There are two conditions to benefit of methods of creativity: to be naturally creative and to know and apply the methods.

General scheme of process of creativity is shown in figure no. 3.

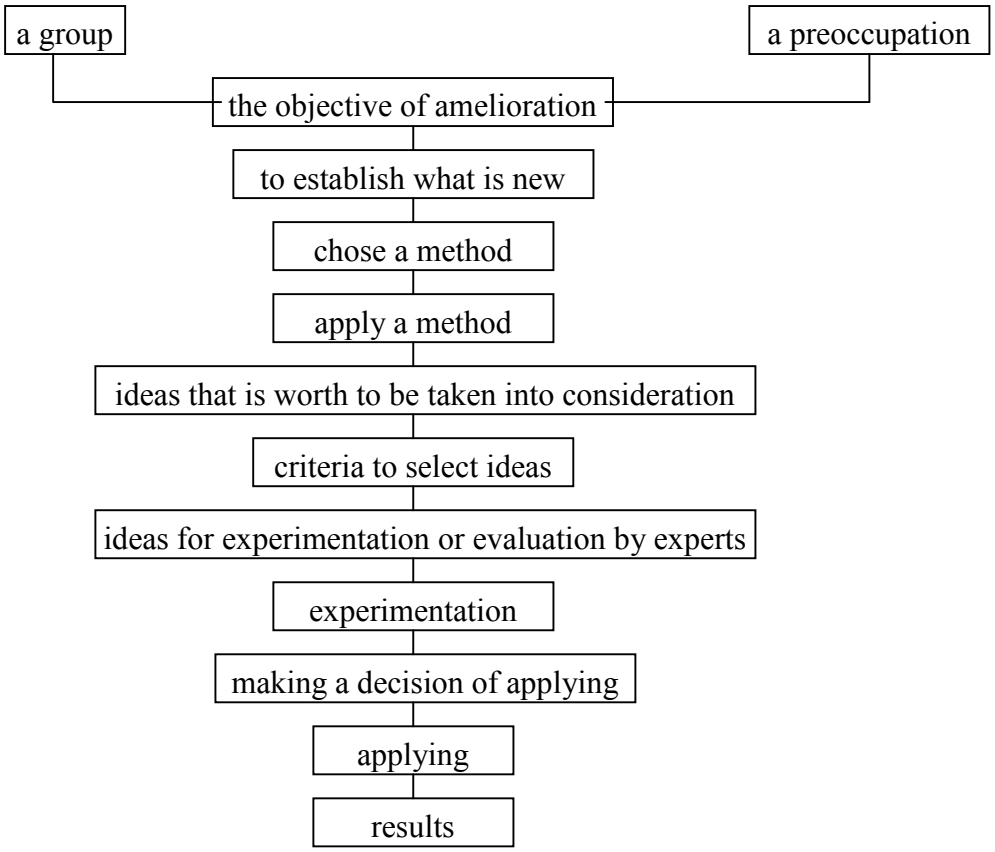


Figure no 3. General scheme of process of creativity

Choosing a method depends on types of problem and group and obviously of characteristics of that method as it could be seen in figure no. 4.

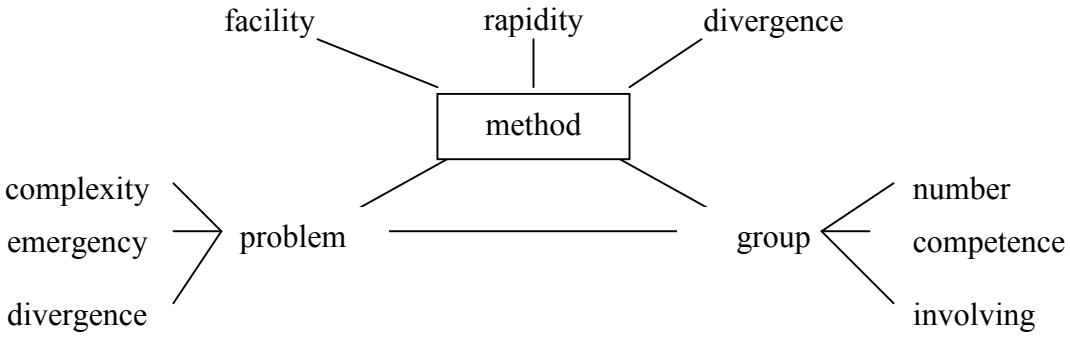


Figure no 4. Elements which influence the choose of a creative method

Probability to discover something in terms of creativity will be increased if it's found a big number of ways using different logics. That is way the creative method is defined as a multi-logical one.

III.1 GENERAL METHODS

Associative logics are the most interesting methods for stimulating creativity. There is no haphazard into association indicated Freud[72]. One of the simple mechanisms of an invention is free association. An invention is made when spirit could be free of educational conditions and ideas could be born into an uncensored process. There are four mandatory rules of free inspiration. These rules were instituted by Alex Osborne who created the brainstorming (the storm of ideas).

The brainstorming is an old associative technique. There are four mandatory rules in the first part of the method, where is involved a group consisted of six or seven persons:

1. It is forbidden to forbid. Negative and positive evaluation of ideas is forbidden. Self censure is suppressed.
2. The strangest ideas are received with enthusiasm.
3. Quantity is better than quality.
4. Association of ideas will be systematically practiced without limits: each someone' proposal is a locomotive thereupon all the others could attach their carriages.

In the second part of the method, the group will be reduced keeping in it only direct involved persons and the most original ideas.

[72] Hubert Jaoui, La créativité, Morisset, Paris, 1995, p.38

Actually, there are many difficulties in applying of this method but the brainstorming has developed a lot in the world, especially in finding new ideas for organizational management, commercial activities, restructuring activities etc. Moreover, many other derivate techniques of brainstorming such as the Gordon' "Little" technique, "fresh eye" or "organized research" were developed.

Associative techniques are used especially in performing products and in working organizing.

Analogical logics are very old and essential in understanding and learning. The human natural tendency is to relate new reality to known reality. The Gordon and Prince' proposal to invent was that "everything is known before has to be seen as a new one". This is "sinectic" method which name has Greek roots meaning "to put together heterogeneous things". This method includes direct, symbolist, functional, fantastic and personal analogies. Analogical methods could be used standoffishly to avoid exaggerates in all human knowledge fields included economy.

Combined (matrix) logics are especially used in performing existing products and in human resources management.

Logics based on dreams are very interesting methods for stimulating creativity. One of these methods is named "Dream - Wake up – Guided" and belongs to the Swiss psychoanalyst Robert Desoilles. Putting away the logical thinking and having direct access to subliminal could be discovered by analogies new ideas.

A synthetic method tries to describe the itinerary fallowing within stimulation framework of creativity. The method has five stages: creative perceptions, creative analyze creative production, creative selection and creative application.

There are more than fifty methods for stimulating creativity (Philips 66 technique, Panel reunion, Delphi technique, experiment and stimulation, brain writing and so on). What is more important than to know them is to try to apply them.

III.2. MILITARY ORGANIZATION AND CREATIVITY

The military organization is a bureaucratic one. There are some principles which emphases the bureaucratic character of it:

1. military activities are conducted on a continuous basis
2. military activities are conducted with strict accordance to the following rules:
   - the duty of each military people to do certain types of work is delimited in terms of impersonal criteria
   - the formal is given the authority necessary to carry out his assigned functions

- the means of coercion at his disposal are strictly limited and conditions of their use strictly defined

3. every military's responsibilities and authority are part of a vertical hierarchy of authority, with respective rights of supervision and appeal
4. military people do not own the resources necessary for the performance of their assigned functions but are accountable for their use of these resources
5. military and personal activities and income are strictly separated
6. offices cannot be appropriated by their incumbents (inherited, sold, etc.)
7. military activities are conducted on the basis of written documents

Consequently, a military person could be described as a bureaucratic person as following:

- A military people is personally free and appointed to his position on the basis of conduct
- A military people exercises the authority delegated to him in accordance with impersonal rules, and his or her loyalty is enlisted on behalf of the faithful execution of his official duties
- Appointment and job placement are dependent upon his or her technical qualifications
- Administrative work is a most full-time occupation
- Work is rewarded by a regular salary and prospects of advancement in a lifetime career

Certainly, there is a lot of bureaucracy in a military organization. There are a lot of rules, a lot of standard procedures which have to be rigurously respected. Obviously, the excesive bureaucracy has consequency on creativity. Concerning of maintaining and respectnees of existing systems and procedures managers forget to be creative. Standard procedures don’t generate inovation. The result is a blockage of sense of criticism, spirit of inovation and a surrender of routine.

The Armed Forces is a total institution. The schedule of military activities, especially those from the operational units, requires maximum individual capabilities and, stressing them psychical and physical many times. This military normality absorbs space, time and human resources.

Creativity is important for the military organization because it is especially essential to leadership. The Armed Force, like all institutions, is dependent on strategic leadership, but like most institutions distrusts creativity. A large degree of that distrust is caused by viewing creativity as artistic inspiration outside the field of science and management, a view that is widely accepted in modern society. Scientific research into creativity, however, indicates that this romantic view of creativity is a myth. Although creativity can not be delivered on demand or even predicted with accuracy, it is subject to explanation and understanding by scientific methods. The knowledge gained by scientific research offers ways for the military to come to

terms with creativity and take steps to ensure it has creative leadership in the future. Matching what is known about creativity with the characteristic of the Armed Force's processes, procedures, and culture shows that the Armed Force is doing very well in certain areas required to produce creative leaders; however, there are also areas where the Army is either missing opportunities to stimulate the development of creative leaders or is actually inhibiting creativity. These different results are caused by the Armed Force's tendency to leave the development of creativity to chance. A systematic approach is needed.

III.3. METHODS FOR STIMULATING CREATIVITY IN A MILITARY ORGANIZATION

Keeping in mind all presented about creativity, even though in an military organization there isn't an adequate environment for innovation and creativity, so long there are human beings in there, creativity exists. For sure, in that mixture of routine and creativity of each military people we have to increase enough the weight of creativity.

For tactical objectives we can success alone but for strategic ones we need for a group, for a team. At the level of military organization work is made especially in groups, so using a collective creative than an individual one is more appropriate. The main idea is to focus our energy in optimizing and stimulating creativity of groups of people such as section, platoon, company, crew so on.

Stimulating creativity doesn't suppose denial of routine activities but guided all efforts of a military organization for conceiving new ways of thinking and acting. It is not necessary to provide new ideas from time to time. We need permanently new constructive ideas to choose the best of them from their confrontations.

From the beginning we have to start trying to optimize existing creativity by:

- knowing military people's involvement and their aptitudes in creation added to their competences
- knowing ameliorations (improvements) which are required to be set up be innovation and to establish précis objectives
- keeping realism in innovation without be enthusiastic more than is necessary
- ensuring that the product of creativity will be exploit
- creating opportunely, without remaining in the wake of requirements, without exceeding them

To the best of my knowledge, a military people could be an innovator if he has the following capabilities:

- easiness to solve difficult matters which he is confronted

- capability to assume a calculate risk accomplishing a task or a mission
- easiness to communicate with civilian or military people around
- capability to command his military structure
- desire to success in his carrier
- optimism
- a good military experience
- sense of humor and a lot of fantasy

In my opinion, in the military field the main enemies of creativity are fear, bureaucracy, hierarchy and making a wrong decision. These enemies have to be defeat by two kinds of people: methodical and creators. Methodical military's people are those who could express their working future by quotation "Let's do things better!". On the other side, military's people who are creative said "Let's do everything otherwise!". What is important to mention about these different ways to see in the future is that both of them could be innovators but they will innovate in different manners.

All methods of creativity allow by their appliance on common people to obtain results in terms of creativity. For a military organization collective methods are adequate and they could be applied or to find new ideas (brainstorming, suggesting box, question list) either to solve problems (SWOT analyze, why-why diagram, mind mapping).

In fact, in the military life, all the time we have a lot of problems to solve and we solve them using our traits, fallowing some general steps:

- identifying the problem
- creating an working team
- analyzing an diagnosing existent situation
- arranging causes in a hierarchy
- finding solutions by generating new ideas
- selecting the best solution keeping mind of criteria
- making a final decision

To increase creativity it is mandatory to ensure appropriate conditions:

- no censure or self censure on any kind of idea
- eliminating any negative or negativist attitude
- trying to improve together each issued idea

During the exercises, training, real military operations, workshops, conferences or working sessions creativity has to be stimulated. Studying all existing administrative or operational

process we will discover there is creativity in there. In most of military activities even are tough a sequence of steps of a general creative method as is shown in figure no 5 could be applied.

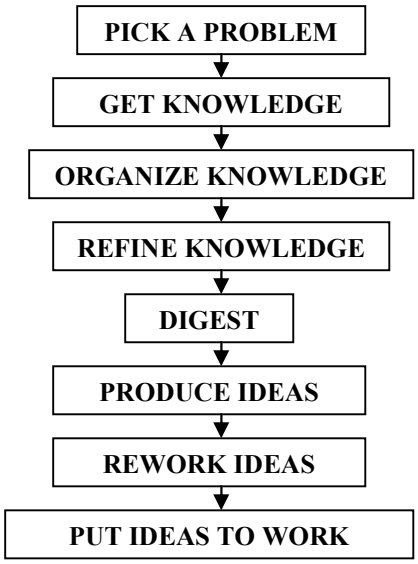


Figure no 5. Steps of a general creative method

From my point of view, to stimulate creativity in an military organization the leadership has to implement some measures such as:

- to create an adequate internal and external communication climate based on the principle "every military people has a creative potential"
- to create a good system of motivation
- to discover and select people who correspond to creativity requirements
- to ensure permanently personnel' forming and performing
- to ensure conditions for a better performance of working group by an adequate management
- to create an favorable organizational framework of creativity and permanent or temporary creativity teams
- to ensure that the best methods for stimulating creativity are used

CONCLUSIONS

In a military organization it is very difficult to perform creativity but is no impossible. There are many obstacles in performing creativity especially because of the bureaucracy, a lot of rules, procedures and instructions. The special methods for stimulating creativity in the military are difficult to identify today in the military. Even though in last time there have been a lot of changes in our Armed Forces, the relationship between creativity and military transformation is problematic.

In the military organization that is a classic system of organization the real barriers to creativity are these:

- nobody has time to be concern about ideas
- every time superior is busy and he has to do accomplish an urgent task
- all military people could have ideas but one of them is that “no money from you, no idea from me”

I think is a challenge for the military leadership, especially for the commander and his stuff to develop an adequate environment for creativity. Positive thinking and creative energy are two faces on the same side of reality.

Creativity could be performed in training and education. Presented all informational materiel clearly, understandable and with low level of accessibility we can change military people’s visions. Trying to avoid monotony, to give recent information in your lectures without sophisticated terms, to be flexible, adaptable and pragmatic you will manage to be more efficient. Military people have to be involved in creative activity and they have to know recognition, encouragement and motivation.

Lesson learned process could provide us some challenges in doing changes in order to improve our activities. Understanding the role of this process and using learned lessons efficiently we can improve substantially our military activities.

Military leaders as key leaders have an important role in performing creativity during exercises. They could obtain that necessary environment for creativity among their subordinates

It seems to me that, creativity is the prime source of innovation and we need to use it as a key to improve our combat power. Creativity is, and will continue to be, a core attribute for the thinkers and doers who must build and sustain combat power if victory is to be certain.

We need to transform our Armed forces by encouraging a culture of creativity and sensible risk taking, and this could be a real challenge in the military human resources management.

REFERENCES

1. Radu EMILIAN, Gabriela ȚIGU, Olimpia STATE, Claudia ȚUCLEA, Cătălina BRÎNDUȘOIU, *Managementul resurselor umane*, Editura ASE, Bucureşti, 2003
2. Robert Harris, *Introduction to Creative Thinking*, Version Date: July 1, 1998, http://www.virtualsalt.com/crebook1.htm
3. Harman, Larry D., Creativity: *The Sustainer's Field of Dreams*, available at
4. http://www.almc.army.mil/alog/issues/MarApr03/MS864.htm
5. Micewski, Edwin R., *The Education of (Military) Leadership Personnel in a Postmodern World*, *Connections Quarterly Journal*, Volume 3, Number 1, March 2004 (available at www.ciaonet.org/olj/co/co_mar04f.pdf).
6. Dr.P.Chakalisa, Dr.D.Mapolelo and D.M.Totev, *Modern Methods for Stimulating Creativity in Education,* University of Botswana, Gaborone, Botswana Ir. E.D.Totev, Delft University of Technology, Delft, Holland, July 24, 2006
7. http://en.wikipedia.org/wiki/Creativity
8. VanGundy, A.B. (1987). Creative Problem Solving. New York: Quorum.
9. DIP Concepts (2005); http://tip.psychology.org/create.html.
10. Creativity: The Sustainer's Field of Dreams by Colonel Larry D. Harman, www.almc.army.mil/alog/issues/MarApr03/MS864.htm
11. Brian Martin, The military, *Uprooting War* (London: Freedom Press, 1984); this is the revised 1990 version
12. Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning (OJ L 394 / 30.12.2006).
13. http://en.wikipedia.org/wiki/Bureaucracy
14. Radu Vodă, Bureaucracy and military bureaucracy, Graduation paper, DRESMARA, Braşov, 2007

ROLE OF INFORMATION PORTAL IN ORGANIZATION'S MANAGEMENT

LTC. Gigi TILIȚĂ

INTRODUCTION

The term portal was used, initially, to refer search and navigation solutions in sites that provided a starting point for web consumers to explore and access information on the World Wide Web.

Compared to the original Internet search engines, portals offer a more structured, navigable interface. Browsing in an organized hierarchy of categories developed by people on the Internet for relevant and useful websites is more effective than issuing a keyword search against the entire Web.

The market for portal technology is increasingly focused on the better delivery of corporate information. Portal technology has matured since the public search sites were first built, and has been used to build a diverse range of portal types such as enterprise portals, workspace portals, marketplace portals, knowledge portals etc.

Managing knowledge isn't reserved for mega corporations anymore. All the employees in any company need to access information instantaneously in order to enhance their functionality and efficacy. Using content management features the content on the portal always stayed fresh at any point of time.

1. ARCHITECTURE

1.1. Major functions of portals

The portal is a collect of information's from diverse sources that are accessed on an single point and in a unified way. It is very much the idea of a personalized filter into the web a library of categorized and personalized content.

Traditionally, a portal denotes a gate, a door, or entrance. In the context of the World Wide Web, it is the next logical step in the evolution to a digital culture. Web pages are not completely self-referential anymore, but allow for personalization, workflow, notification, knowledge management and groupware, infrastructure functionality, and integration of information and applications.

Portals are often the first page the company's site that loads when users get connected to the Web and they offer users a surplus value of service based on the features of classic search engines:

- a well trained concierge who knows where to search and find;
- a well-assorted newspaper kiosk that keeps the latest market information about the surfer's personal stocks ready;
- communications possibilities like email or discussion boards.
- collaboration between teams improved as documents, knowledge and plans were shared.

Web portal services often include a search engine or directory, news, email, stock quotes, maps, forums, chat, shopping, and options for customization. These are only some of the most frequently offered services; large portals often include dozens or hundreds of bundled services. Portals are one-stop destinations for advertisers and marketers, too, offering a endless variety of choices.

The system architecture of the Web Portal is based on Database server, Web server and Web interfaces created with specialized programming languages (like asp, php). When accessed, the web paged displayed to users are constructed by extracting data from the database tables in terms of forms and reports. The majority of the application comprises web pages containing dynamic content. The design of the Web Portal allows the content to be dynamically updated from the underlying database.

Four possible action items when designs web portals are:

1. Designing for remote collaboration and communication
2. Using ambient displays to support awareness of remote colleagues
3. Using convincing design/technology
4. Replacing physical objects with virtual (digital) ones

1.2. The benefits of a portal

The benefits of a portal:

- A portal offers a structured approach to navigating information, that may improve a user's contextual understanding of the subject area. The structure of information hierarchy it is more likely to relate to the user's query than a search engine keyword search.
- A portal offers a consistent information structure, that users once familiar with the portal are able to easily locate information and services.

The function of search and navigation forms the basis the web portals meaning that a successful portal should support its users in an efficient search for contents:

- display to portal's users the information appropriate to the user's role
- suggest additional information to the user
- allow the user to search for information based on location.

A portal should warrant the integration of information from disparate sources using several mechanisms. One such technique of innovative interfaces is the Unified Content API (Application Programming Interface) which speeds up the development of portal applications.

1.3. Types of portals

Portals are not a "all in one" solution. Although the term portal is often treated as synonymous with enterprise information portals there are actually many, different types of portals; each one tailored to meet a specific business need.

- **Web searching portals**

Portals started out on the web. These early web portals, such as Yahoo, provided aggregated content, usually as a series of predefined links along with a search engine. As their survival is dependent on advertising they must drive large numbers to their site.

- **E-commerce portals**

E-commerce or e-business portals facilitate the sharing of information to external partners, customers and suppliers. They usually have a transactional processing component, provide information on products and services and often include supply chain management features. Ecommerce portals aim to increase the value of the relationship whilst lowering the cost.

- **Self-service portals**

Self-service portals allow employees, customers or suppliers to access information about themselves and to carry out certain business processes in a way that is suited to their own needs. Portals are usually justified in terms of removing hard cost from the business through self-service options. The employee self-service (ESS) portal in relation to human resources, IS or financial services, is an obvious starting point for many.

- **Business intelligence portals**

Business intelligence portals or decision portals empower users in their decision-making process. More than just allowing users to query and report across multiple data stores, business intelligence portals have built-in tools that provide targeted reports to end-user groups and individuals.

Business intelligence portals are likely to cater to the needs of executives looking for top level information relating to company performance; general employees requiring ad-hoc reports as well as those within the organization whose specific role is to mine and analyse data.

- **Collaboration portals**

Collaboration portals enable a geographically dispersed workforce to interact around projects and business-as-usual tasks through a common access or rallying point. Collaboration portals ensure that non-technical staff can administer the collaboration session, workgroup or site, including user set-up and creating online webpage's, presentations etc. Collaboration portals offer generic tools such as chat, white boards and threaded discussion streams along with ways to share objects such as maps, documents.

- **Enterprise information portal**

Of all the various portal types, the enterprise information portal is the most complex. The objective is a highly tailored, unique experience for every user. This is achieved by tying the various disparate legacy systems together and joining these to the business process. In this scenario multi-step processes are underpinned by complex workflows and business rules.

- **e-learning portals**

No longer the domain of academic institutions alone, e-Learning portals focus on guiding students in the broadest sense through a structured learning experience. E-learning portals test abilities and provide feedback to the student in a personalized and confidential manner. They may also interact with other systems and business processes to provide in-context training and help.

- **Communication portals**

Communication portals aggregate various forms of messaging into a single place. Bringing together email, voice, mobile, web feeds etc in a way that allows access and control from multiple interfaces and locations at any time. The individual can then tailor this, choosing for example, to received and manage critical communications regardless of where they are or what type of device they have with them.

2. THE WEB PORTALS AND THE ORGANIZATION'S MANAGEMENT

By using a single web portal to improve a business process is no requirement to utilizing a number of organizational information systems. In a web portal as each software upgrade is completed, a copy is made, the file compressed and saved into a central location. From here it is uploaded to the site. There is no need to pull information from, or go into any of the organization's information systems.

Customer information is accessed from the customer report. Any other information is tailored for the site by the sales and marketing team.

2.1. Management features of web portals

Notification

Notification using push technology is referred to as a computer in which a user receives information automatically, based on subscriptions, from a network server. Push technologies are designed to send information and software directly to a user's desktop without the user actively requesting it.

Task Management and Workflow

Portals providing task management services can help users take part in and/or manage formally defined business processes. The workflow functionality allows the automation of business processes and a portal should be able to prompt its users when they have tasks to perform.

Collaboration and Groupware

Knowledge management and groupware ensure that the required information is stored in the right place and in the right mode. By this means the right persons are brought together with the right information. As with workflow automation, groupware increases the value delivered by many types of specialized portals.

The runtime infrastructure associated with the portal will have a primary effect on manageability, scalability, security and availability.

2.2. Information Portals

These types of portal can be essentially seen as consolidating many different types of information from a multitude of sources onto a single screen. Users who use an Information Portal typically are not or do not publish to it - or put another way - they are the consumers of the information prepared and published by others.

A typical Information Portal being used within a company might contain some of the following:

- Local Weather, News, Share Price information taken from content feeds such as RSS, XML.
- Access to email client, calendars, meeting room bookings, centrally stored documents and assets - or any type of central business application where viewing of items is required.
- Corporate information such as human resources, events, programs, or any other cross company information..

- Reports - or forms that allow information to be requested - to assist with business choices.
- Access to smaller information portals that are not maintained centrally but have an access point via the primary information portal.

This type of information portals can be a starting point to all users - or they can be and are frequently personalized. In essence personalization allows a portal gateway or window to be modified so that the information presented to a user is tailored to their profile, chosen interests or clicking behavior.

2.3. Content Management Portals

These types of portal are designed to improve the access to and sharing of information stored within an organization. In a content management portal, self-service publishing features allow end users to post and share any kind of document, record or Web content with other users, even those geographically dispersed. Content Management is essentially process that managing any type of digital information such as text, images, graphics, video, sound, documents, records etc

A global organization like a national software company consisting of developers, product managers, marketing, sales access the web portal from many locations across the country. In a Content Management Portal, most users will have the ability to add information to the portal and some users will have rights or authorizations to modify, delete, expire information produced by others.

Whereas an Information Portal is essentially a 'read only' experience - with a Content Management Portal users are able to publish, read, retrieve, modify, archive and delete content or information within the portal 'window'.

A typical Content Management Portal being used within a corporation or company might contain some of the following:

- ***The ability to check-in and check-out information which is 'in progress', so that users cannot overwrite each other's changes***
- ***Version control and Audit trail, so that successive versions of a particular item can be retained or overwritten and a track of who did what can be reported***
- ***A security mechanism, so that content can be protected from unauthorized view or***
- ***Workflow, which establishes a process through which a document or request flows among users.***

A Content Management Portal can be seen as an Application Centric Portals. In this type of portal users could be viewing the information as read only or able to create, modify, delete, expire information based on rights and permissions - but they are essentially using the portal to

explore together a number of applications into one view - so that rather than having to open a number of different applications to drive their business processes they are able to access them all from one point.

CONCLUSIONS

A web portal solution can provide real business advantage. The web portal is the most expensive website or intranet that an organization can build.

When organizations implement a web portal it must take a look at:

- the difference between 'portal as a concept' and 'portal as a technology'
- the types of business initiatives that are well-suited to a portal
- the importance of aligning business users' thinking with that of those working in the information technology (IT) or information systems (IS) departments
- working out whether the business requirement is for a portal or a content-managed site

Gaining an understanding of what exactly an enterprise information portal is can be difficult; in part because portals are completely invisible to the end user and in part because there is little agreement as to what exactly constitutes a portal. Portals as a concept are very different from portals as a technology.

Understandably, 'portal as a concept' is driven by end-user needs and end-user experience. On the whole, user goals relate to the user experience of staff, and are about making it easier for staff to access information and to complete tasks.

This concept has been around for a long time, and quite a few technologies have had a positive impact. For example, web content management systems have done much to improve both the delivery and management of information.

'Portal as a technology' on the other hand is driven by technology vendors, who have focused on delivering products that do the following:

- simplify integration issues
- provide single sign-on to targeted applications
- provide personalization and customization
- offer a development environment and integration standards
- allow more dynamic delivery

Under the right circumstances a portal can certainly deliver value to any organization that has a compelling reason to implement a portal over other technologies.

'Portal as a concept' will certainly be better served with the implementation of a content management or other similar system over portal technology.

The first step after defining the need for a portal is to interrogate portal understanding and thinking across the business.

The understanding of portals is likely to be especially variable between IT departments and general business stakeholders. It is important to give particular attention to these two specific areas of the business.

Organizations that have successfully implemented portals have done so by focusing on one particular business problem at a time. For a portal to be successful it must address a business need.

Portals continue to tempt organizations. Solving a real-world business problem is certainly a good place to start.

BIBLIOGRAPHY

http://www.contentmanager.eu.com

http://www.steptwo.com.au

http://webtrends.about.com

http://www.sapdesignguild.org

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