DESIGNING AND MEASURING CAPABILITY. A NEW PERSPECTIVE

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The concept of capability has long been a topic for debate among planners. The main benefit brought by it is that of ensuring the connection between objectives and necessary financial resources. Thus, capability is a median element within the process of integrated planning. In this context, there are sceptics who consider that capability cannot be measured. However, this article aims at presenting a pattern and a formula for measuring and interpreting the level of capability.

Key words: *capability, integrated planning, objectives, financial resources, resources allocation.*

1. INTRODUCTION

Capability is a neologism and is often confused by people with ability, flexibility, adaptability, etc. Withholding the flexibility of the notion, it should be mentioned that capability is a feature that essentially belongs to people and, despite its flexibility, is measurable. Thus, Romanian military systems are not exempted from this "confusion", the notion being relatively new for the Romanian military vocabulary. Hence, it is understood differently and perceived as a "useless neologism" with reference to capability. In reality there are essential differences between the two concepts, which do not only separate them but present the features of each and the connections between them. Defining them is of utmost importance since capability is an essential element of integrated planning since it is the one that links objectives to necessary financial resources.

1.1 Defining capabilities

The concept of *capability* (1) is generally, defined by the dimensions of knowledge and acquired skills. Thus, it includes the capacity to generate, design and elaborate, which in turn requires a stage of thinking and developing a project, depending on goals and objectives, as well as of possibilities and availability. In this respect, capability means both the ability to design, prospect, plan and execute, but also the availability of means, methodologies, expertise and procedures necessary to put into practice a plan, an idea or a concept.

The noun capability is derived from the adjective capable (2). The noun is defined by the same dictionary as the feature of being capable. Although both notions come from French "capable" and, "capabilité", respectively, they actually merge two

words – capacity and ability – which could be interpreted as skill, ability to use the skills you possess. Often, about someone who has not properly fulfilled a task, although he/she had all means necessary, it is said that the person had the capacity (the means), but lacked capability.

A country's military capability is an integrated system consisting of defensive ability (3), which represents all forces, means and resources for ensuring the defense of the country, coupled with the existence of a coherent system of skills, knowledge, competencies and roles, trained and developed over time. It should be emphasized, that at the level of this integrated system, a large amount of knowledge, experience, lessons learned and values that are part of the organizational culture of the respective institution, of the national culture and even of the universal one are cumulated and accumulated.

Thus, depending on the perspective, capability means:

- USA view: ability to achieve a specific objective during war (win a war or battle, destroy targets [1];
- NATO view: ability to perform a particular action or to obtain a specific effect (NATO) [2];
- ability to provide an operational effect required by specific standards in a nominated environment within a specified period of time and to sustain that effect for a specified period of time; is provided by a system or a system of systems (EU);
- ability to execute a specified course of action or to obtain a fixed operational effect – start-up / recovery capacity (ROU).

With a view to all this, for a better use of the concept of capability, especially in the planning phase, we propose the following definition: *CAPABILITY represents the assurance coefficient of fulfilling assigned tasks.*

The value of capability (CP) will be calculated using the following equation:

$$CPT = CCT \bullet CABT \quad (1)$$

where:

$$CCT_T = \frac{CT_T}{CT_F} \cdot 100 \quad (2)$$

CCT_T = capacity coefficient, [%]
CT_T = level of capacity, at *T* moment [acc. to capacity measurement unit];
CT_F = level of capacity, necessary [acc. to capacity measurement unit].

$$CAB_T = \frac{AB_T}{AB_F} \cdot 100 \quad (3)$$

CAB_T = *ability coefficient,* [%]
AB_T = level of ability, at T moment [acc. to ability measurement unit];
AB_F = level of ability, necessary [acc. to ability measurement unit].

1.2 Capability components

Capacity and capability are in relations of mutual conditioning. Graphically, this could be represented as follows:

Figure 1. Capability components and parameters

Capability consists in an extension of capacity and results in an effect. In other words, the existing capacities can be linked to some skills which can in turn transform them into actions from which effects appear. In this case, capacity (CP) united with ability (AB) creates the effect EF.

$$CP \cup AB \Rightarrow EF \quad (4)$$

Thus, the capability components (capacity CP, ability AB) represent level 1 capability parameters. Furthermore, the capability component is made up of level 2 capability parameters, respectively:

- ***Capacity***: organization/ structure; human resources; material resources; cooperation/interoperability.
- ***Ability***: training/education, experience, level of regulation, institutional culture etc.

Depending on the objectives/tasks in responsibility, capabilities are based, developed, approved and then implemented over a period of time at a specified level. This situation is as follows:

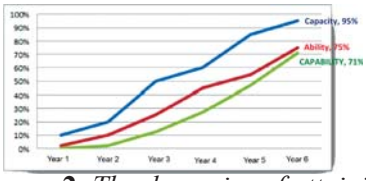

Figure 2. *The dynamics of attaining a capability*

It can be observed that, generally, capability is lower than capacity because it is more flexible, more dynamic and more difficult to accomplish. Capability means thorough training, skills, creative ability, knowledge as well as various moral qualities. They belong to people and the limit of human capacity can never be truly known. Therefore, the trend of optimizing systems and processes is to bring capability closer to capacity and even to identify them.

Only when the capacity and capability of an entity overlap, one can say that we are dealing with unitary coefficient completeness, that the respective system has reached its maximum performance. In practice, this is very difficult, if not impossible to accomplish.

In the planning period, a capability can be found in one of the 4 stages, namely: initiation, growth, constant maintaining/stagnation, and demolition.

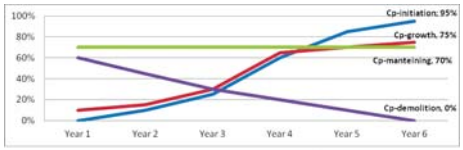

Figure 3. Capability stages

Figure interpretation (colour significance):
Blue *= the initial capability in the planning period;* ***Red*** *= existing capability at the beginning of the planning period, with an increase within the reference period;* ***Green*** *= existing capability at the beginning of the planning period, with a stagnation within the reference period;* ***Purple*** *= existing capability at the beginning of the planning period, at the end of the reference period will be zero (dissolved).*

1.3 Capability levels

The Capability Maturity Model [henceforth CMM] [3] is an interdisciplinary approach to engineering systems developed by Software Engineering Institute at Carnegie-Mellon University to describe the five stages of

development and levels of capability and maturity of the processes within an organization [4]. CMM describes the way of improvement from immature ad hoc processes to mature, disciplined and optimized ones. This capability and maturity model is applied to the development of new products, including software development. The levels of capability and maturity of the processes of product development are:

1. Initial level (ad-hoc, immature)

At baseline, the organization does not provide a stable environment for development. Thus, development processes are unstable and unpredictable because they are constantly modified as (development) work progresses or varies from one project to another. Processes are not documented, but they are driven in an ad-hoc manner by users and events.

2. Repeatable level

At a repeatable level, the policies for the management of development projects and the procedures for implementing such policies are established. Some processes developed in previous projects are repeatable, possibly with consistent results.

3. Defined level

At the defined level, the standardized processes for new products development are defined; these processes are integrated into a coherent whole. A well-defined process can be characterized as including readiness/availability criteria, inputs, standards and procedures for carrying out the process, check-up mechanisms (e.g. team analysis), outputs and criteria for terminating the development process.

4. Managed level

At a managed level, the organization establishes metrics for products and processes and measures results. Projects carry out verifications of products and their processes by reducing variation in their performance in order to fit within acceptable limits. The process capability is established from this level.

5. Optimized level

At the optimized level, the entire organization is focused on the continuous improvement of process through incremental and innovative technological changes/ improvements. The organization has the means to identify "weak points" and to proactively strengthen the process in order to prevent flaws. Data regarding the efficiency of the development process are used to perform cost/benefit analysis of developing new technologies and the proposed changes in the development processes of the organization.

2. RESOURCES

Resources represent one of the central elements of integrated planning since the whole mechanism was designed in order to improve their allocation, irrespective of the type of resource.

As presented above, all resources, besides financial ones, are related to capability. As stated earlier, integrated planning, based on the requirements to achieve the objectives, establishes in the first stage the required financial resources (necessary budget). Upon receipt of budgetary ceilings, during the second stage, (fit in between budgetary constraints) the optimal variants of allocation of approved financial resources are analysed with the purpose of attaining a higher

degree of the planned objectives. During the process of fitting between budgetary constraints, the other types of resources are analysed.

2.1 Types of resources

The available resources during the integrated planning activity are:

a. human resources;
b. material resources;
c. technological resources;
d. information;
e. financial resources;
f. time.

a. Human resources

It is the most important resource because it enhances and retains the entire activity of the institution. The resource planning should be very precisely assessed because the impact on the activity is of utmost importance (at all levels of interaction: none, medium, exceptional etc.).

Furthermore, financial resources are also very important to be ensured for staff members (it represents over 70% from the institutional budget), as well as the entire career management process, plus ensuring the logistics and equipment necessary for performing their activity. These resources can be: military, civil, collaborators, etc.

b. Material resources

This category comprises the materials necessary for performing the activity and the ones associated with the functioning and ensuring equipment maintenance.

The major requirements for ensuring such type of resource are: ensuring a "just in time" process; addressing specific supply problems, like ensuring centralized / storage / transport contracts at the site.

c. Technological resources

This category comprises technologies, equipment and the infrastructure for them.

The main features of this type of resource are: procurement program, product life cycle, complex procurement (requires participation in research and development programmes), etc.

d. Information

This category comprises: open sources of information, regulated sources of information and classified sources of information.

Besides the strategic usefulness of this type of resource, the access to them should also be considered, as well as the related counterintelligence insurance since it requires considerable financial resources.

e. Financial resources

Integrated planning by categories of expenditure/costs is used in relation with financial resources (4): manpower costs; operation, maintenance and support costs; procurement costs; research and development costs; infrastructure costs.

All activities related to integrated planning are correlated with deadlines for drafting the state and social security budget established by Law no. 500/2002 regarding public finances.

Due to the fact that directors of major program have well defined responsibilities in the integrated planning process, as well as institutional responsibilities under national law, it is not necessary for them to act as main credit release authority, since they are supported in this respect by the Department of Finance and Accounting.

f. Time

This type of resource, depending on the type of objective it "accompanies", can be as follows: working time; spare time; period of time; deadline; free time.

In terms of period, the time resource can be classified as follows: immediate; short-run; annual; medium-run (1-4 years); long-run (1-10 years); very long-run (over 10 years).

2.2 Resource allocation

The basic elements to take into account when allocating resources are the following:

1. *Rules of priority and restrictions* – they are established within the planning period and are completed during the budgetary period. Depending on the development of the security environment they can be revised.

2. *Establishing resources* – establishing the necessary resources for each category.

3. *Establishing the resources level of efficiency* – this item is very useful for the time resource (e.g. an efficiency of 80-85% in teams composed of more than one person is reasonable). Thus, for a good planning, an increase of 15-20% in the number of hours estimated for an activity is necessary.

4. *Multi-annual planning* – when designing resource allocation, the estimation of impact on insurance during the following years is also made.

3.CONCLUSIONS

Given the interpretation of capabilities and 'the coefficient of fulfilling assigned tasks' as well as a definition of their structure and capability parameters, the proposed formulas can provide an initial and a final value (optimal / the steps involved), which can be used as a management tool. The proposed format used on the basis of (future) data established within strategic planning, best achieved through integrated planning - capabilities planning, provides a picture regarding the starting point (where we are) and the steps involved for reaching assigned tasks (where we want to go. Furthermore, the capability format as well as its applicability offers an easy way of bringing IT&C solutions into the management process (ERP IT system - Enterprise Resource Planning). Finally, capability provides a support for substantiating the allocation of all resources (human, informational, material and financial).

REFERENCES

[1] Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (As Amended Through 9 May 2005).

[2] http://www.nato.int/docu/review/2008/03/ART7/RO/index.htm (15.10.2012).

[3] http://en.wikipedia.org/wiki/Capability_Maturity_Model, (15.05.2012).

[4] http://www.npd-solutions.com/cmm.html, (15.05.2012).

ENDNOTES

(1) Capability is a notion which usually designates the notion of competency, as well as the one of opportunity, ability, and competence.

(2) Capabil, -ă, capabili, -e adj. Who is capable, who has the possibility to accomplish smth., gifted, valuable, worthy and who is capable of doing smth. [fr. capable, lat. capabilis], http://www.military-dictionary.org/capability (15.10.2012).

(3) Capacity - ability to achieve something in a field of activity, skill, work capacity, ownership of penetrating into the essence of things; competence, http://www.military-dictionary.org/capacity. (15.10.2012). Capacity is generally given by quantity, by a quantitative dimension of power, means and resources.

(4) These types of expenses should be linked with related categories form the national legislation (Law no. 500/2002).