

WHAT'S NEW ON CLUB MURAT CBA SOFTWARE?

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ABSTRACT

The manufacturers members of Club Murat, convinced of the IM / Murat interest, have been developing for a ten years, a set of arguments intended for the different stakeholders, to convince them to choose ammunitions complying the best as possible the Stanag 4439 requirements.

The Club Murat software ACB, already presented, is a simulation tool allowing to assess the difference of the global costs between a so-called "reference munition" and a projected munition all along its life cycle.

The workshops organised by NIMIC on June 2001, were the opportunity to come to a positive judgement on the version of then (2.7 version), particularly through an application made by the DGA (French Procurement Agency) on the case of 250 kg bombs.

Since then, the Club Murat maintained its effort to answer the remarks and suggestions of its prime users and presented in June 2002, during the salon « Eurosatory », a 3.0 version called «multi scenarios ».

The difficulty always stays however for the user, to assess the just value of some parameters, especially due to the absence of credible and accessible data bases to all of us.

A new approach, called «New ACB », with a statistical character is here proposed: to introduce the borders framing the most likely values of the parameters (minimum and maximum borders).

A statistical calculation based on several thousands of unpredictable runs (Monte-Carlo) allows then to estimate the probability to have a favourable global balance with the projected IM version.

WHAT'S NEW ON CLUB MURAT CBA SOFTWARE?

March 10-13, 2003

Orlando, FL

1 PRESENTATION OF CBA SOFTWARE (FROM THE 3.0 VERSION)

Club-Murat developed a software allowing to compare the cost of replacement of a batch of reference munitions by a batch of planned munitions. The reference Munition is generally a classical one, and the planned munition is the IM version of it. However, the inverse case can also appear : the reference munition is for example a "2 stars MURAT" labelled item (according the French policy) and the studied or replacement one can be a more sensitive product. More generally, Club Murat CBA soft allows to compare the costs of ownership of a certain munition with two different IM/MURAT signatures.

Studied for all people who wish to have an assistant tool, a help in the economical analysis, this software is simple of use and facilitates the thinking in a context of costs reducing. All along the munition's whole life, CBA software (Cost Benefit Analysis) makes calculations and simulations by identifying the difference between the costs of purchase and the benefits with the planned munition use. The benefits are those connected to the least constraints allowed by the MURATs (logistic benefits). The benefits result also from the least probability of occurrence of the gravest disasters (potential benefits in case of disaster).

ACB contains 3 phases of analysis :

- 1/ construction of the munition's cycle of life ;
- 2/ research and input of technical and economical parameters;
- 3/ analysis of the results and validation of the input data.

The cycle of life is directly captured on the screen under the shape of a modifiable and stretchable arborescence at will.

At every step of this arborescence, a window allows to input the corresponding data. Every input datum is the subject of an accurate definition. These definitions are readable on-line, at any time of the analysis. A note pad is available on-line to register the comments that the user wishes to bring to the chosen value with the selected parameter.

When all the data are put in, CBA software calculates the cost-benefit result.

CBA 3.0 puts at the user's service a "parametric sensibility analysis test" allowing to identify which are the most influential parameters. It is then possible to refine the scenarios and to focus on the estimation on these parameters.

CBA 3.0 also contains a test of statistical sensibility where all the parameters vary at random between two boundaries, independently each from the others. This test gives an idea of the credibility of the Cost Benefit Analysis result...

Finally, CBA allows to edit a paper report of either everything or a part of the cost-benefit analysis

2 THE COST-BENEFIT MODELISATION BY CLUB MURAT CBA SOFTWARE

2.1 THE MUNITION CYCLE OF LIFE

The main CBA's graphic interface is a kind of a browser, with an arborescence on the left and

WHAT'S NEW ON CLUB MURAT CBA SOFTWARE?

March 10-13, 2003

Orlando, FL

a list on the right.

The Arborescence allows to show the various phases of the munition's life and the dreaded disasters which are associated to them. This arborescence can be created ex-nihilo, but can also be obtained from either an arborescence - type or an already existing one. It is modifiable at will and boundlessly expandable by the user.

The Arborescence is subdivided into four levels :

The treated case

It's question of the reference munition and its more or less planned IM/ Murat version in a given life cycle. It's possible to deal in parallel with several cases, generally close, which differ, for example by the degree of IMness from the planned version or by the assumptions of the life cycle.

The sequence

The munition life cycle is divided in separated operational phases which can be preceded or followed by storage periods on the national territory. Every sequence is characterized by a geographic zone of deployment, associated to a military status (peace, crisis or combat). The bringing into service and the disposal at the munition end of life are not taken into account in this arborescence as a sequence of the life cycle, but as compulsory inputs of the treated case (put into and withdraw from service points).

The elementary situation

Every sequence is defined by a succession of storages, transportations and missions, which are theoretically unlimited numbered (on identical or different platforms). Such a situation of storage, transportation or mission constitutes what an elementary situation is agreed to call, because it's not quite possible to subdivide it more.

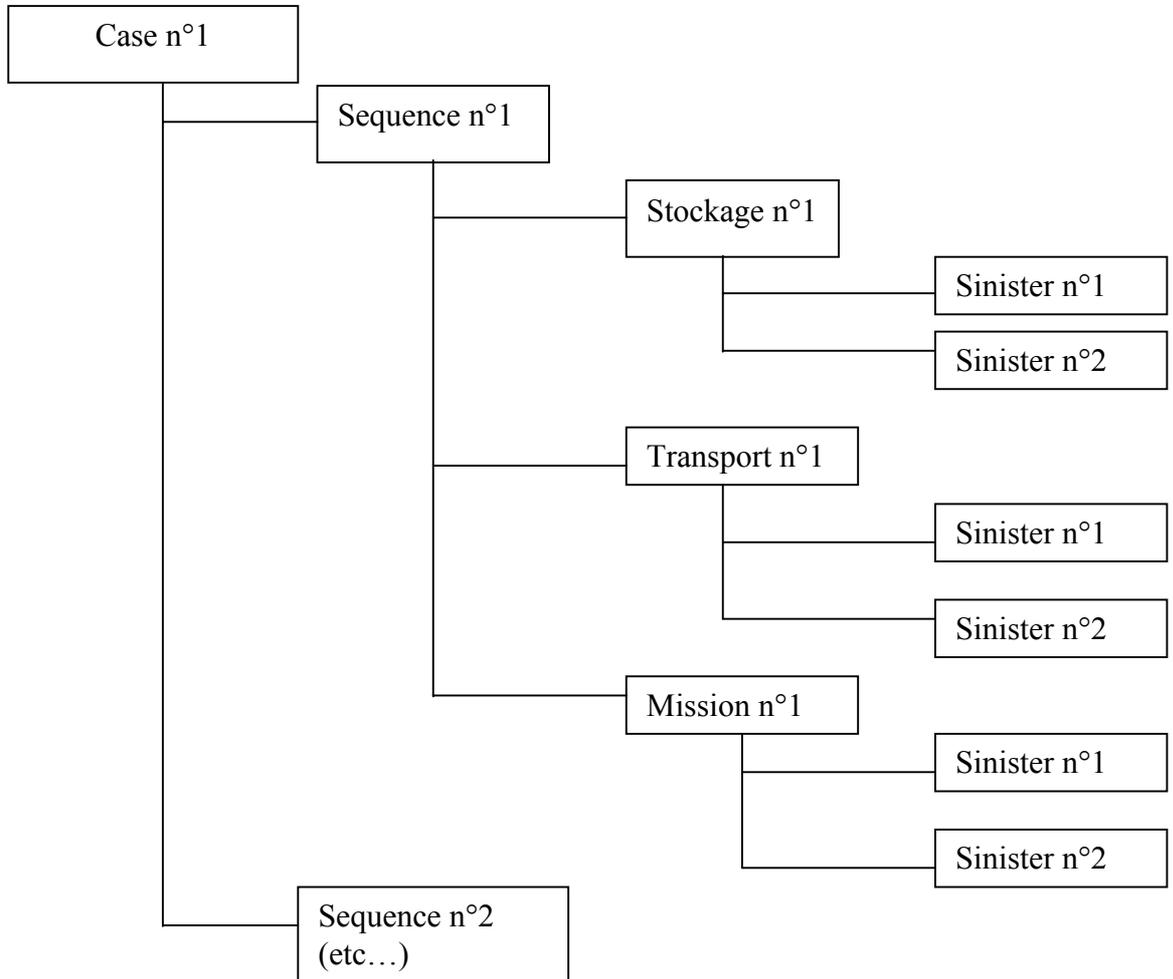
The disaster

Every elementary situation can be the subject of one or several accidental or voluntary threats, generating a typical disaster or even various types of specific disasters (for example, fire and then detonation during handling, explosion after bombing).

In Club Murat CBA software, every element of the arborescence, that's means every treated case, every sequence, every elementary situation and every disaster, are also called a "knot".

WHAT'S NEW ON CLUB MURAT CBA SOFTWARE?
March 10-13, 2003
Orlando, FL

A typical Arborescence :



The list makes to show the direct relationships of a selected “knot” in the arborescence, with more or less details, according to the willing of the user. That allows, in particular, to see immediately, the impact of the chosen value of one parameter, on the cost-benefit result.

2.2 THE “MÖLLER'S FORMULA” IMPROVED BY CLUB MURAT

What we call “Möller's formula” allows to apply the Cost Benefit Analysis to IM/Murat munition case.

It determines benefits, earnings differences and costs differences, between referenced and planned munitions.

2.2.1 Cost Benefit

WHAT'S NEW ON CLUB MURAT CBA SOFTWARE?

March 10-13, 2003

Orlando, FL

The balance of the cost-benefit, given under the form of a table, represents the sum the logistic and potential earnings, minus the extra-costs of putting into service and disposal, between the reference and planned versions.

2.2.2 Logistic benefits

The statutory or logistic earnings are connected to the variation of the constraints (statutory or not) compulsory in the conditions of storage, transportation, even during the missions.

They result from accumulated variations of the costs of storage, transportation and missions, between the reference and the planned versions.

2.2.3 Potential benefits

The potential earnings are connected to the variation of the risk led by every elementary situation (the probability of occurrence and gravity of the disaster), and for every conceivable threats.

They result from accumulated cost differences of disasters between the reference and the planned version.

2.3 DISCOUNTING

Two types of Cost Benefit results are distinguished : without discounting (SD) and with discounting (AD).

Discounting allows to evaluate the financial streams in the time, in their value at initial time T0.

Without discounting : the effect of the time is not taken into account, we assume that we are in constant currency.

With discounting : we assume that the inflation rate is 2 % by default and that the rate of the long-term money is 6 % by default. These two rates are constant during the whole duration of the munition life.

Discounting has not an effect in the initial costs .So, the variation of the fixed expenses (dues to the Murats) and the variation of the recurrent cost are the same with or without discounting.

2.4 THE "MÖLLER'S FORMULAS"

$$\text{Cost Benefit (SD)} = \text{Total statutory Earning (SD)} + \text{Total potential Earning (SD)} - \text{Cost (SD)}$$

And

$$\text{Cost Benefit (AD)} = \text{Total Statutory Earning (AD)} + \text{Total potential Earning (AD)} - \text{Cost (AD)}$$

WHAT'S NEW ON CLUB MURAT CBA SOFTWARE?

March 10-13, 2003

Orlando, FL

3 WHAT'S NEW IN CBA 4.0 VERSION ?

CBA 4.0 is an improved version of CBA 3.0 giving to the user a type of calculation only and totally statistical of the Cost-Benefit balance, according to the Monté- Carlo method.

The used calculation method in CBA 3.0 requires to know as exactly as possible the value of the chosen parameters. This knowledge is not always well-to-do, and the uncertainty is often difficult to appreciate. The method of Monté- Carlo was then applied at the end of the analysis, with a fixed and sometimes unsuitable variation, of 50 % for the parameters following an "equal- occurrence" distribution law, and of - 50 % to + 500 % for the parameters following a "log – normal" distribution law.

The method proposed by CBA 4.0 requires only the sufficient knowledge of the minimal and maximal values taken by each chosen parameter. The law of distribution followed by all the parameters is an "equal occurrence distribution " one.

CBA 4.0 is directly developed in English language.

3.1 CBA'S 4.0 INPUTS

The architecture of this subroutine is identical to that of the CBA 3.0. The difference holds to value each of the parameters. Instead of allocating a unique value (nominal or average) to each chosen parameters, the user brings :

A minimal value ;

A maximal value.

The law of distribution is an "equal occurrence" one, including for the frequencies of disaster. The choice of a calculation with or without discounting, and corresponding financial rates, is made in the options box.

3.2 OUTPUTS OF CBA 4.0

3.2.1 Cost-Benefit balance

The cost-benefit balance is the average of all the Monté- Carlo runs.

The break down of the cost-benefit balance between Murat cost, logistic and potential benefits is kept. Each of these items is himself calculated by application of the Monté- Carlo method to the set of the parameters which constitute it.

The result of the statistical calculation of the cost-benefit balance appears then under the form of the following table :

WHAT'S NEW ON CLUB MURAT CBA SOFTWARE?

March 10-13, 2003

Orlando, FL

Number of runs : 5000 (example)	Minimal value	Mean value	Maximal value	Percentage of negative values
The variation of IMness cost				
Variation of the logistic earnings				
Variation of the potential earnings				
Cost-profit result				

3.2.2 Sensibility analysis

This analysis does not exist any more in this method of statistical Cost Benefit calculation. The reason is there that the compulsory variation alternately to each parameters, for example 10 %, leads a variation of the Cost-Benefit generally weaker than the dispersion of the resultant Cost-Benefit from random runs.

3.2.3 Monté- Carlo Histogram

As in CBA version 3.0, the results are presented under form of a histogram from average -3 Standard-deviations to average +3 standard-deviations, Every histogram band is 6/100 standard deviation wide. A trace of the zero value of the cost-benefit is spotted on (under reserve that it is included between $M-3\sigma$ and $M+3\sigma$).

The « arithmetic » value of the Cost-benefit does not appear there any more.

3.2.3 The final report

As in CBA version 3.0, the report consists, as will, of an endpaper and / or of a one, of some or of the totality of the following sections :

- A. The parameters involved
- B. The Cost-Benefit balance
- C. Monté Carlo Histogram

In the section « parameters », the value of each parameter is given with its unit, during its printing.

CBA (Cost Benefit Analysis)

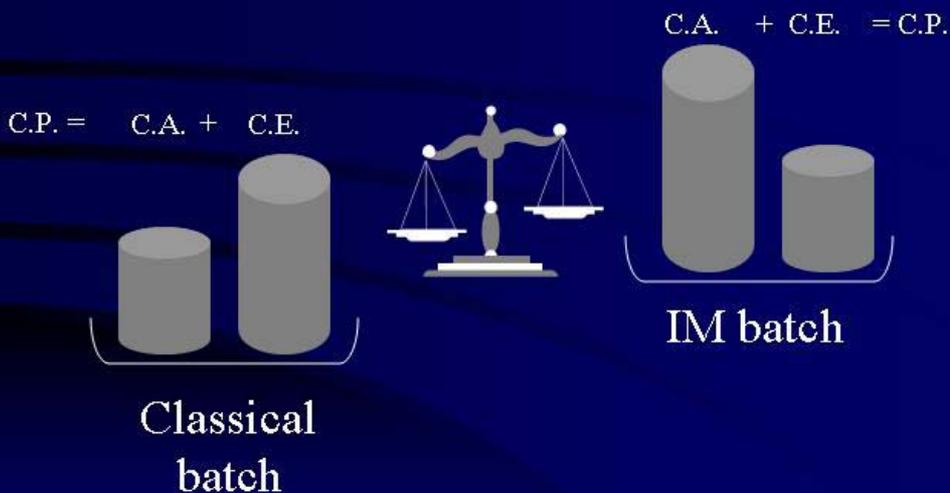
- to assess the difference of the global cost between a so-called "reference munition" and a projected munition all along its life cycle



March 2003

1

CBA (Cost Benefit Analysis)

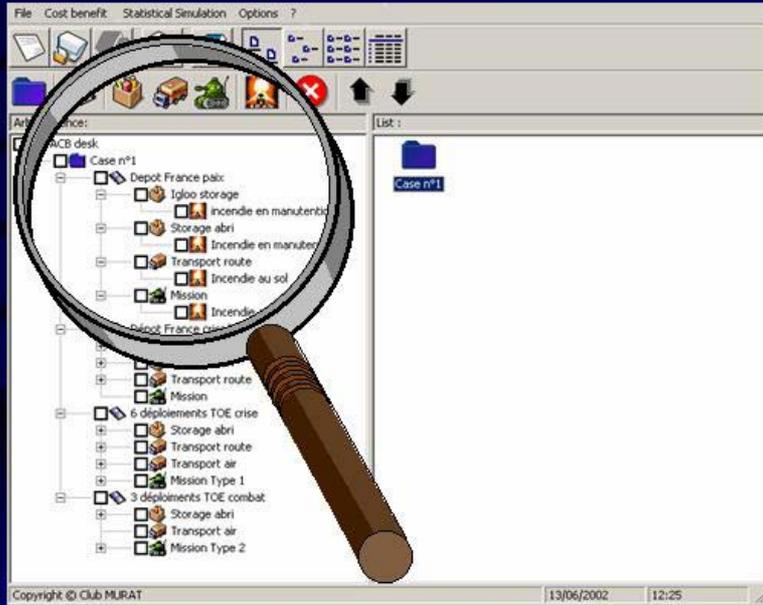


March 2003

2

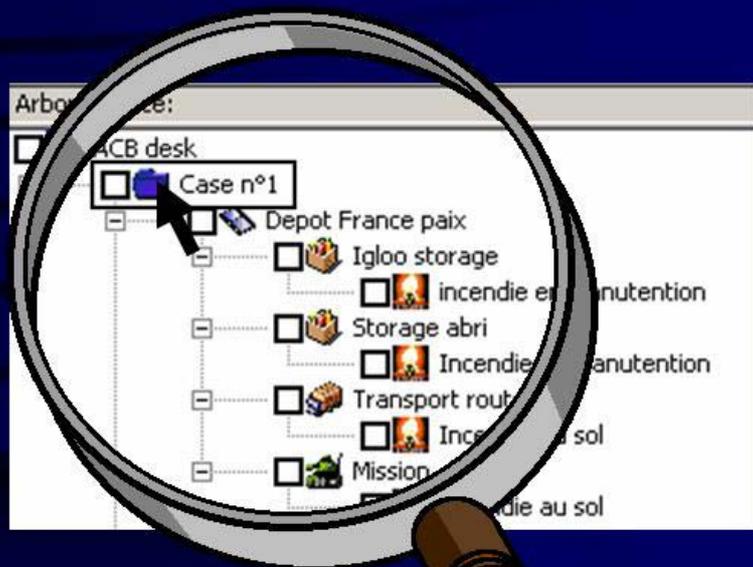
WHAT'S NEW ON CLUB MURAT CBA SOFTWARE?
March 10-13, 2003
Orlando, FL

Graphic Interface



March 2003

3



March 2003

4

WHAT'S NEW ON CLUB MURAT CBA SOFTWARE?
March 10-13, 2003
Orlando, FL

Case Parameters

Inventory description | Muratisation cost variation | Neutralisation cost variation | Discounting

Title: New Case

Munition's name: MK82

Short munition description:

Reference munition cost: [24000 ; 26 000] €

Number of reference munitions: [1 400 ; 1 600]

Life cycle of munition

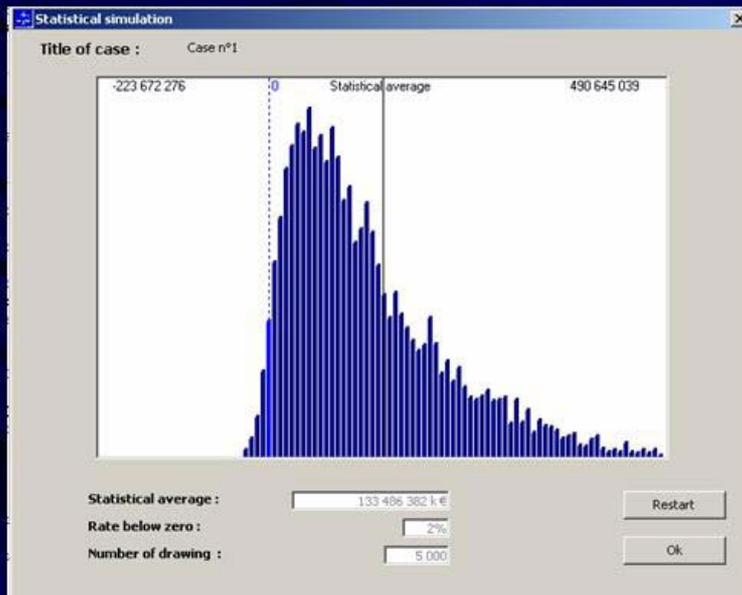
Life duration: [23 ; 27] years

F1 = Help

OK

March 2003

5



March 2003

1