Comparing the "Adaptive Control Methodology" (ACM) to the financial planning practice of a large international group

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Abstract:

The present paper is a contribution to the validation of the newly developed methodological framework, called "Adaptive Control Methodology" (ACM) introduced in a previous paper. ACM is a tool for planning and on-line control of complex socio-economic processes. It combines the techniques of adaptive control theory with System Dynamics and Group Multicriteria Decision Aid. In the following the usefulness and practical use of this framework is set in perspective by comparing it with recurrent planning and control of financial processes in the BSN/DANONE group. As a result of this comparison, some lessons are drawn on the way the practical implementation of the theoretical framework can be eased. As a by-product recommendations are made on how to influence in a constructive way common planning processes in the real world.

Keywords: Control, System Dynamics, Multicriteria analysis, Financial Planning

1. Aim of the paper

The authors of the present paper have recently developed a methodological framework blending System Dynamics (SD) modelling with Group Multicriteria Decision Aid (GMCDA) (Brans et al., 1998). In the following we refer to this approach as to “Adaptive Control Methodology” (ACM). ACM provides a technique to design and to implement policies of long-term benefit to complex socio-economic systems.

In recent times, the authors have spent many efforts to validate the approach in specific examples, mainly from industrial practice and environmental management. An example in sustainable development has been described in Kunsch et al. (1999). Nevertheless some more practical applications of this approach are needed to demonstrate its applicability in the real world, particularly in reengineering of organisations. It is why the authors propose today a contribution stemming from the existing financial planning in a large group of the food industry, i.e. BSN/DANONE. This case is useful as it provides points of comparison with a real-world approach. The first aim is to validate ACM, however. It is not the intention to influence the financial process of

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BSN/DANONE, although in principle the confrontation between theory and practice would presumably be beneficial for both parts. The authors are preparing additional papers on reengineering in industrial groups for the same validating purpose and to strengthen the credibility of their approach in real-world applications.

2. The control framework and the flowchart of ACM

For the sake of a self-contained presentation it is necessary to provide an overview of the approach though it has been extensively described elsewhere (Brans et al., 1998).

According to the specifications exposed in this reference paper the policies developed within the framework of ACM are supposed to achieve the three following characteristics:

1. They are determined by the use of SD simulations and implemented in the real world system during the controlling steps;
2. They are adaptive, i.e. their performances are verified in real time, and corrective actions are taken, if necessary.
3. Their choice and possible adaptation in the course of time are the result of collective decision-making using Group Multicriteria Decision Aid (GMCDA). The PROMETHEE-GAIA methodology, based on outranking techniques, developed by Brans et al. (1994, 1996) has been used to that aim.

We now briefly comment on the characteristics.

In mechanical engineering control is applied on-line by direct action on the controlled system. The model ("controller") and the real system ("plant") are both part of a combined system. The latter behaves in a prescribed way as feedback loops are made active by the use of a controller. This almost never happens in the perspective of simulations on complex systems with System Dynamics (SD) (see e.g. Coyle, 1996; Wolstenholme, 1996). In this approach the model and the actual system are kept apart during the planning phase in which policies are designed through simulations. In addition, the monitoring of further on-line behaviour of the real system does not provide any feedback from the controller to the system. This means that the SD planning as applied to human systems is exclusively ex-ante, without envisioning any policy change at later times. ACM is striving for giving to the control of complex socio-economic systems the same on-line characteristics as for technological systems.

In addition to the on-line use, the state-of-the-art technique in applied engineering calls for adaptive control. This implies not only that the controller permanently corrects the system’s behaviour according to defined goals, but also that this controller can change its structure in the course of time. These changes are induced by external events disturbing the system and the conditions of control. Brans et al. (1998) have called "control of structure" this advanced control procedure as transposed to human systems. In this case, adaptive
behaviour often has the primary objective of keeping the system structurally stable, i.e. viable. There are here obvious similarities to the concepts of viability developed by Beer in a qualitative manner some time ago (see e.g. Beer, 1975; Espejo and Harnden (Eds), 1989). The principal aim is to design an operational frame for this viability concept, as has been already be done on a similar basis in a previous paper on the control of companies (Kunsch and Chevalier, 1998).

Finally, multiple goals in the search of control policies are often conflicting and subject to compromises within the decision-maker group. Therefore ACM is blending both SD and Group Multicriteria Decision-Aid (GMCDa). The latter approach available to the authors is based on the MCDA outranking methodology PROMETHEE-GAIA (Brans, et al., 1994). Particularly user-friendly tools and pieces of software assembled in the user interface PROMCALC are available for GMCDa as requested by ACM (Macharis et al., 1998).

The basic steps of the on-line control in ACM are described in the simplified flowchart (Figure 1). We now briefly describe its main features.

The approach has three stages, subdivided into 11 elementary steps. Elementary means that these steps may be executed many times as the procedure unfolds dynamically. It is an adaptive approach in the sense that at each point in the flowchart backtracking to any upstream step is possible. This occurs when improvements in modelling, strategy revisions or on-line control operations are required. The full three-stage sequence without backtracking in an elementary time interval is the following:

- **Stage I: elaboration and System Dynamics modelling** (steps 1 to 5);
- **Stage II: generation and selection of reengineering strategies by simulation** (steps 6 to 8);
- **Stage III: implementation, monitoring and on-line control** (step 9 and 10).

Normal move to the next time interval with backtracking takes place at completion of stage III. Branching is always possible before the time interval is over when immediate control action requires it.

The first stage of system modelling is particularly important. It does not mean yet quantitative simulation, but identification of the possible ways the problem will develop. It is mainly a development phase producing a shared mental model (analysts and decision-makers) in steps 1 and 2. It emphasises anticipation, vision of the future and coherence. In most general socio-economic systems we have in mind, two main dimensions are identified: the economic and financial dimensions on the one hand, and the social, environmental and ethical ones on the other hand. In developing the shared mental model to a working vehicle, using e.g. simulation software, important milestones are set in steps 3 to 5, as control and critical variables and feedback loops are identified. This includes the analysis of dominant virtuous or vicious circles in the dynamics of the problem and the earmarking of some variables as “watchdogs” delivering warning signals by threats on the viability or sustainability. This very extensive and time-consuming modelling process delivers a first validated model.
In the second stage the interactions between SD (step 6 and 7) and GMCDA techniques (step 8) display its full synergy. It is by no means an obvious task and it is time-consuming as well, as the preference of the decision-makers and the skills of the analysts in generating representative sets of useful and believable control strategies of the complex system must meet at ends. The quality of the modelling done in the previous stage is subject to multiple robustness tests, as required in the industrial practice. Revisiting is possible at any time.

The third stage is where real-time control sets in. The selected strategy is implemented (step 9), and variables being part of a socio-economic core representing a minimum set of essential variables for describing the system basic behaviours are monitored on-line (step 10). Finally, the deviations with respect to predefined benchmarks in the control variables are established in each elementary time interval or earlier if "watchdogs" signal necessary interventions. Actions for the next iterations are taken accordingly (step 11).

Steps 9 and 11 are classical and are the straightforward translation of business practice in usual management implementation and control (Anthony et al., 1984). Step (10) is less usual and perhaps new in the systems we have in mind, as it directly stems from adaptive engineering control.

In the second and third part of this paper, we now verify the usefulness of this approach by setting it in perspective in a practical case of financial planning as practised in the group BSN/DANONE. We call this case recurrent, as the yearly preparation of the budget defines an elementary time period of one year. It spans the full cycle of the implementation and control processes of strategies at the division level.

3. The recurrent case of BSN/DANONE

The BSN/DANONE group has been using a well-defined procedure for strategic and operational management at the level of each individual subsidiary company, e.g. dairy products or mineral water etc., called "division" in the following.

Therefore, in the following description the elementary time period is one year, and the scope is limited to one division.

To follow the description of steps in ACM (figure 1: step 1 to 4) a shared mental model is an important issue, but the latter must comply with the key principles imposed by the group, i.e. the holding. There are three such normative principles used as guidelines prior to each reflection. The are respectively the (1) management, (2) the financial, and (3) the human resource principles.

(1) The management principle implies that the responsibility of every decision should belong to the operational management level where it can be best decided and realised. The division is fully responsible for operations, while the group, i.e.
the holding, bears the responsibility of strategic management. This can be cast in a different format as follows:

- **Strategic management:** Group decides; Divisions advise
- **Operational management:** Group advises; Divisions decide.

(2) The *financial principle* stresses the importance of pooling resources in order to finance internal and external growth. Note that the BSN/DANONE group has realised two thirds of its past growth since the origin thanks to external growth. This implies a maximising of the free cash flow and of the debt financing capability on the one hand, and satisfactory bank relationships, on the other hand. In practice this principle requires a loss of autonomy of the divisions for what regards their cash flows and the structure of their balance sheets.

(3) The *principle of human capital* relates to the importance of external growth. Its consequence is important management mobility. While employees are directly hired and employed by operational divisions, managers may have to change their activity or their location following a decision of the group.

In correspondence with step 4 in ACM, the group has validated its strategic planning framework to the world evolution in the last ten years, i.e. the changes observed in the economic, social and political environment of large industrial and commercial entities.

- In the years 1960 to about 1975, economic growth was large and more or less constant, so that the future was quite predictable. Typical dynamic models were based on simple linear approximations under certainty. As the internal structures of the groups were becoming more complicated, teams of specialised strategic planners were set at work to design long-term policies for the commercial and industrial companies. Quantitative management techniques based on rational economic efficiency were the instruments used in these days.

- In the years 1975 to 1990 growing complexity and the development of non-linearity causing unpredictable behaviour characterised the market place and its socio-political environment. Qualitative management techniques came more and more in the forefront. Common sense, cost reduction and priority given to the core business became the keywords. Normative values like business spirit and missions grew in importance, as strategic planning saw its role reduced to co-ordinating activities. In these days the planning and control work was being taken over by operational people.

- In the years since 1990 to 1995, qualitative techniques have largely eliminated quantitative forecasts. The onset of a global economy does not change the priorities of cost reduction and of core business, but new values are added such as emerging markets, shareholder value and intercultural problems between divisions around the world.

The planning cycle from concepts to operations includes three stages as in ACM. An overview is given in the basic flowchart in Figure 2. It starts from the long-term “vision” of the mission statement. The latter sounds “to be number 1
or 2 in one’s market, with strong brands and big market shares, within the framework of an economic and social project”. The three stages span about one complete year, more precisely eleven months.

- **Stage I.** Strategic orientation is embodied in the so-called “Preliminary Objectives”, called P.O. in the following. It is entirely qualitative. It starts in January and it is completed by about mid-year.

- **Stage II.** Strategic schedules, i.e. the actual planning phase, extend from mid-June to end of August. By this time a plan is made available. Quantitative assessments of economic and financial variables are asked for. Final meetings between the division and the group take place in September.

- **Stage III.** Operation budgeting is prepared for the next accounting year between end of September and end of November.

The links with the three ACM stages are obvious. We describe now each stage in turn.

The *first stage*, called P.O., is in fact the elaboration of mental representation of the system. It takes the form of multiple brainstorming meetings between the group and the managers of the division assembled in the Executive Committee. All members are the decision-makers in charge to elaborate a plan. Everyone has a different perception of the environment and of the structures. It is the purpose of several P.O. meetings during about six months to aggregate the preferences into one single mental representation. At completion, a final meeting is organised with all top executives of the branch, i.e. all divisions or companies working in the same field of activity. The guidelines to conduct the meetings are strained creativity, priority given to qualitative over quantitative, i.e. concepts come before figures, and professionalism being preferred to sophisticated calculation tools. P.O. is in fact decentralised strategic analysis. It is asked to participants not to limit their time horizon and to avoid mere review of brands. They should disregard quantified trial plans or recommendations in terms of investment. P.O. can only be built as a dialogue in spontaneity, given the priority to realism and anticipation. Asking the right questions, as a proof of strategic awareness, is the first aim. For the whole Executive Committee it is a rich experience:

For the group, here is a chance to:

⇒ Gain a detailed picture of markets, products, technologies and issues, which allows to the group to seize opportunities later on.
⇒ Meet the top staff of all divisions, and gain a better grasp on how Executive Committees function.
⇒ Set main strategic objectives directly and spell out the major policy guidelines.

For the division, here is a chance to:

⇒ Assess discrepancies between results and forecasts.
⇒ Confront points of view with the Executive Committee members (Group/Branch/Division) in order to reach shared and consistent conclusions.
⇒ Enhance understanding of work by addressing current issues.
⇒ Meet the group general management in charge of global strategy.
⇒ Place division’s objectives in the perspective of global strategy.

Past P.O. meetings are systematically analysed over a period of typically five years. It is the opinion of the group, as a member of the board states it, that “facts cannot be dismissed, […] operational or strategic issues one chooses to ignore have a way of resurfacing ever more pressingly […] P.O. meetings must be forums in which one may express thoughts freely. Thus, every effort must be made to prevent and avoid self-censorship”.

The second stage after completion of P.O. is planning. It is entirely in the hands of the division and it is actually the first attempt to work quantitatively. However, the top staff of the branch to which the division belongs is also attending the meetings in June and July. The instruments used for that are not as sophisticated as in ACM in which the full apparatus of SD is used. Spreadsheets are here the typical simulation tools. While the P.O.’s time horizon was in principle unlimited, a three-year planning period is considered. It is in fact a rolling time-horizon, moving ahead from one budget year to the next.

The sequence of planning decisions is as follows.

1. All possible operational alternatives are analysed before an “optimal” solution is worked out.
2. A programme of top priority issues, called P.A.P (Priority Action Program), i.e. the core of the planning process is defined.
3. The P.A.P. is quantified over a period of three years in terms of objectives, precise operation schedule, necessary means and costs, and expected impact on key figures (turnover, profit etc.). The quantifying of the P.A.P takes into account macro-economic data (GIP, inflation, costs etc.) and internal assumptions (markets, new products etc.).

The brochure of the plan points out what needs to be underlined:

a) the links between P.O./P.A.P./Quantified plan;
b) the changes from prior plans

By the end of August the three-year plan file is forwarded to all participants. For the division, the plan is an opportunity to think about the optimal allocation of resources in order to meet the medium and long-term objectives of the global production, as defined by the group. These resources are:

⇒ Industrial investment (new plants).
⇒ Marketing investment (advertising and promotion).
⇒ Investment in human resources (training).
⇒ Technological investment (Research and Development).
⇒ Financial investment (equity financing).
For the group and the branches (the latter have supervised the elaboration of the plans in their divisions), this allows to:

⇒ define medium-term perspectives of the group;
⇒ assess the leeway on the market;
⇒ picture the risks and opportunities;
⇒ start the control of divisions;
⇒ check the validity of financial data

The third and last step consists in the preparation of a monthly budget for the coming accounting year. The division is entirely committed to the objectives negotiated with the branch during the plan preparation. The budgeting establishes the major link between the planning cycle and the ensuing reporting stage. Monthly reporting is requested for the sake of the financial communication of the group.

The reporting will record the discrepancies between the plan and the reality, as in classical budget control (see e.g. Anthony et al., 1984). This establishes the link with the next stage P.O. in the accounting year following the budgeted year, in which the whole cycle starts again.

This completes the second part of the paper dedicated to the case study. It illustrates the general principle stressed by the BSN/DANONE group: “The future cannot be forecast; it must be prepared”.

In the third part we now establish the links with ACM to gain some insight on possible improvements in striving for harmonising theory and current industrial practice. We then draw some general conclusions in the form of recommendations for improving both the ACM procedure and possibly some common practices.

4. Main differences between the two schemes

The mere visual comparison of the figures 1 and 2 evidences the many similarities in the operating stages in the theoretical ACM and in the recurrent financial planning of BSN/DANONE, “the case study”. Indeed, both approaches are part of a process characterised by a logical sequence of elaboration, selection, implementation and subsequent control of management decisions.

Basic differences between the two schemes do exist, however. An overview of the comparison is given in figure 3. ACM gives more importance to the development of the model, long-term horizons and the use of simulations with SD; the case study underlines qualitative concepts, the core priorities on a shorter term horizon and the links with the budgeting and reporting processes. In addition, the concept of Collective Decision-Makers (CDM) is different and changing according to the stages in the case study, being e.g. group/branch/division during P.O. and only the division during the budgeting stage. By contrast, CDM are unspecified in ACM. Although this can be explained
by the generic nature of the methodology, it might also require some refinements
to be discussed below.

Going more into details in each of the three stages evidences the following
differences (please compare Figure 1 for ACM and Figure 2 for the case study).

*In the elaboration stage the main differences are the following:*

♦ In the ACM, mainly analysts are acting as experts in qualitative modelling and
SD; in the case study, the CDM, i.e. the members of the Executive
Management Committee, are directly involved in the development of a shared
mental model during the P.O. meetings.

♦ In the ACM, the mental model is rational as being elaborated by scientifically
oriented analysts trying to understand some behaviour patterns of reality, i.e.
growth periods, cycles etc. (see e.g. Randers, 1980; Coyle, 1996). The model
is translated into a quite technical dynamic influence diagram displaying
feedback loops, stocks and flows etc. CDM are in general not yet involved at
this point, except as information providers. In the case study, the shared
mental model is non-technical and it is the result of the consensus between all
members of Executive Management Committee acting as CDM.

♦ In the ACM, historical time series are used to understand the past behaviour of
the real-world system and herewith to validate the model. In the case study,
the main input is the vision of shared objectives in agreement with the
 corporate mission and the culture of the group.

*In the planning stage the main differences are the following:*

♦ In the ACM, quantitative simulations are the output given by specific SD
  techniques and software packages. In the case studies, though quantitative
  results are also provided as a result, the main output is given by economic and
  financial variables obtained by using conventional spreadsheet software.

♦ In the ACM, a sufficiently large set of simulations must be created in order to
  be able to select one in the set as representing the consensus of the CDM
  (obtained by GMCDA). The exploration of alternatives to be included in this
  set is quite technical and can only be performed with the assistance of analysts
  in SD and with the use of GMCDA. In the case study, convergence towards
  the optimal solution is efficient and fast. This is because a consensus has been
  obtained before during the P.O. meetings, during which the group has given
  its agreement to the division in charge of planning.

♦ As a consequence of the previous remark, ACM only starts selecting a policy
  in this stage, while in the case study first elements of the control are set in
  place.
Among the outputs viability aspects are given much importance in the non-linear modelling of ACM. Extensive tests are made to avoid risk-fraught long-term evolution towards non-viable attractor basins (see also Kunsch and Chevalier, 1998). In the case study, because planning is on shorter term, this threat is less present. Long-term evolution is less important than achieving the pre-set goals.

In the implementation stage and in the backtracking step the main differences are the following:

- In ACM, the implementation of the chosen strategy and its subsequent control are tasks taken over by all CDM. In the case study, the budget preparation and the management control are in the sole responsibility of the division, i.e. at decentralised level.
- In ACM, the main part is given to the implementation of the chosen strategy and the follow-up of the core, i.e. the set of important variables to be monitored. It is an on-line process. The case study is busy with budget preparation for the coming year and the preparation of all necessary measures for the reporting and control during the budgeted year. The establishment of a core has taken place at the planning level in the form of a P.A.P. (Priority Action Planning). It is an off-line process.
- In ACM, the backtracking is performed after the analysis of deviations from the objectives, either at the end of the elementary time period, or as selected “watchdogs” are giving warnings. The process is fully adaptive. In the case study the analysis of discrepancies between the plan and reality is part of a routine budget control. The move to the next budgeted year is natural. The process is only partly adaptive in the sense that three reviews are scheduled during the realisation years. However, the reporting is part of the next preparation stage (P.O.) in the following cycles.

5. Learning from the comparison

The lessons to be learnt from this comparison are important for the ACM. The latter is a generic approach and, therefore, details about its actual implementation in concrete cases are not discussed. This is not to say that these considerations must be ignored or that some variants in the theoretical framework are excluded, as it is supposed to be adaptive as well. Two examples follow with respect to the notions of CDM and core as developed in ACM by contrast with the case study.

1. The notion of CDM (collective decision-makers) is intentionally vague in a generic framework. Therefore, the approach must be sufficiently flexible to allow different levels of more or less centralised decision-making, like in the case study. Also the role of the analysts or experts may have to be made more precise as they are intimately associated with the whole process. Therefore, it may be desirable to associate the CDM to the first elaboration phase. While this is not considered in ACM in its present settings, group model building has been the object of an important literature in SD (see for references e.g. Vennix, 1996).
2. The notion of core and its positioning in the decision cycle of ACM may not be unique. In the original approach it takes place in step 10 (see Figure 1) in the implementation phase as it is a direct instrument of control. In the case study it is an important vehicle of the planning stage as represented by the priority actions (P.A.P.). Trying to reconcile these two points of view, the possibility is there to have both a planning core (P.A.P.) and a control core.

To be complete it has to be remarked that the learning process initiated by the present comparison is in principle also beneficial for BSN/DANONE. So far it is excluded, as no information regarding ACM has yet been made available to responsible managers of BSN/DANONE. Therefore in the mean time only conceptual changes in the approach of this company can be discussed. In the following the authors give three examples of the possible input of ACM in order to improve the current existing process by BSN/DANONE:

1. The comparison shows that the three years planning is rather short, although one recommendation on P.O. is not to limit the time horizon. Perhaps the planning could be performed over more extended time horizons. Only the first year of the rolling horizon gives birth to a quantitatively detailed monthly budget. In the following years, at least preliminary quantitative output can be provided.

2. In relation with the previous suggestion, long-term viability considerations are also important while little importance is given to them in the short-term planning. In the planning stage, therefore, more attention could be given to unsustainable dynamic evolution. This is equivalent to say that the system evaluation in the plan is too “static”. The use of influence diagrams as in SD would then be encouraged, as it would evidence the full dynamics of virtuous and vicious loops.

3. Regarding the previous discussion about the core, the P.A.P. could be supplemented at the level of budget by a control core. The traditional budget control would then become more “active” and herewith come closer to adaptive on-line control as suggested by ACM.

6. Conclusions

A first satisfactory result of the comparison between the theoretical ACM and the recurrent financial planning of BSN/DANONE is to globally confirm the adequacy of sequences in the proposed approach. In particular it appears that the ACM has features that are indispensable in practice, though they are rarely present in theoretical models. The required specifications of the ACM described in section 2, i.e. awareness of the planning system complexity, need for adaptive capabilities and recognition of multiple objective decision-making are prerequisites in each real-world planning processes.

Though no apparent contradictions are visible, the comparison also stresses the need for continued conceptual work for achieving the proposed validation of
ACM through practice. In section 5 we have evidenced two aspects worth investigating. First the concept of "Collective Decision-Makers" has to be made more precise and capable of evolution in the course of the planning process. Second the notion and positioning of the core as being the set of important decision variables has to be revisited as a useful instrument of process control.

Beyond the first objective of validating the ACM methodology, the comparison delivers some by-products in stressing the benefits of adaptive control in real-world planning. For the special case of recurrent financial planning by BSN/DANONE, several potential improvements of the existing process have also been indicated in section 5. Their possible implementation is totally out of the authors' reach, however.

Additional material will be provided in forthcoming papers from the practice of BSN/DANONE, in particular the non-recurrent case of the merger and acquisition policy, and a case on the interactions between several divisions of the same group. This will enlarge the discussion to more detailed conclusions and recommendations on the practical use of the Adaptive Control Methodology in an industrial and commercial environment.
References


**Figure 1.** Flowchart of the Adaptive Control Methodology (ACM)

**STAGE I: Elaboration; System Dynamics Modelling**

- Step 1: Mental Model
- Step 2: System variables; influence diagram
- Step 3: Positive and negative feedback loops
- Step 4: System Dynamics Modelling and validation
- Step 5: definition of “watchdogs” and control variables

**STAGE II: planning; definition of strategies by simulation; GMCDA**

- Step 6: Generation of alternative strategies
- Step 7: Simulation of strategies and long-term test
- Step 8: ranking and selection of a strategy with GMCDA (PROMETHEE-GAIA)

**STAGE III: implementation; monitoring; on-line control**

- Step 9: realisation of the selected strategy
- Step 10: definition of the core; short-term control

**BACKTRACKING**

- Step 11: Analysis of the deviations between evolution and prediction
Figure 2. Flowchart of the decision cycle in the case study BSN/DANONE

STAGE I: Elaboration

- Shared Mental Model: Vision of group
- Acquire shared/consistent strategic concepts
- “PRELIMINARY OBJECTIVES P.O.”
  - Meetings of Executive Committee
  - (Representatives of group/branch/division)

STAGE II: planning; definition of strategy

- Quantifying the alternatives
- Selecting the optimal solution
- Defining the core of plan =
  - “PRIORITY ACTION PLAN (P.A.P.)”
  - Assessing economic and financial variables over 3 years

STAGE III: operation budgeting; reporting

- Starting the preparation of next year operations
- “BUDGETING”
  - Reporting procedure for budget control

MOVING TO NEXT CYCLE

- Three reviews during accounting year to record differences between plan and reality.
- Taken into account for stage I (P.O.) of next cycles.
**Figure 3.** Main differences between ACM and the case study

<table>
<thead>
<tr>
<th>ACM</th>
<th>BSN-DANONE case study</th>
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<tbody>
<tr>
<td><em>CDM</em> = “Decision-makers” not specified</td>
<td>CDM set depends on stage full set = Group/branch/division</td>
</tr>
<tr>
<td>CDM intervene in stage II,III Analysts perform modelling</td>
<td>full CDM-set intervenes in phase I Division is responsible for II, III</td>
</tr>
<tr>
<td>Simulation with specialized SD software of full trajectories</td>
<td>Simulation of economic/financial variables with plain spreadsheets</td>
</tr>
<tr>
<td>Maintaining viability; long-term horizons</td>
<td>Achieving goals; short-term horizons</td>
</tr>
<tr>
<td>No core during planning; core only in control stage III</td>
<td>Core (P.A.P.) already during planning in stage II</td>
</tr>
<tr>
<td>Implementation of strategy on-line</td>
<td>Budget preparation off-line</td>
</tr>
<tr>
<td>Fully adaptive backtracking during control</td>
<td>Routine budget control; partially adaptive in next decision cycle</td>
</tr>
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