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Crisis management decision making

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Within the framework of crisis containment, crisis decision-making has got its particularities: stress and time-pressure. Factors like uncertainty, risk perception, subjective resolution of uncertainty, values, conflicting goals, reality principle versus set expectation are discussed under the Cognitive Paradigm.

Decision rule systems, decision strategies and switches between decision strategies are treated as Grand Strategy Level Decision Styles and The Military Estimates Process on the operational/tactical levels. Recent research on speeding up by means of either corporate planning tools, or a hybrid continuum model, or naturalistic decisionmaking is tackled.

Crisis manager's essential information requirements

Magnitude, severity of the situation

What makes a difference in the course of the management of an emergency is the severity of the crisis. "Organization and coordination requirements increase dramatically as the incident grows in size, scope and complexity".¹

SA (Situation Assessment)

- 1. Determine the area and magnitude of the damage
- 2. Availability and readiness of the resources, manpower
- Need for critical resources: General: water, food, shelter, Specialized: medical, environmental, communication, etc. Communications (C2): local, regional, adjacent regions (expanded SA).

Small calamities can be handled with local resources. A disaster cannot be handled by local general forces, but require outside specialized assistance. Catastrophes, i.e. disasters of great magnitude, might need a spectrum of specialized military skills and resources.

The speed of situation development can be too great for conscious analysis. When the event is a surprise, or a serious imminent threat to be responded to quickly, then the decision-maker can perceive this as a crisis. Perceived importance of the problem area

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Address for correspondence: GYULA MEZEY Miklós Zrínyi National Defence University, P.O. Box 15, H-1581 Budapest, Hungary E-mail: mezey@zmne.hu is key in classifying the situation. If it is perceived that the case is serious, and there is only a very short response time to manage it – this can be felt as a crisis. Crisis is a matter of perception, and there is not an internationally agreed definition of a crisis (disaster, catastrophe) situation. There is a relationship between the perceived seriousness of the situation and the decision process.

A perceived crisis

Perception of a crisis can produce stress and in turn stress may create a crisis perspective. There are three relevant simple stressors:² threat of loss, short of time to decide, pressure to innovate in problem solving. Human performance is influenced by stress and by information load. Performance of a decision-maker can be measured by erroneous decisions. Psychologists³ showed that the quality of human decisions plummets due to overstress, information overload (noise), fatigue, etc.

A crisis situation is perceived by the decision-maker in a combination of at least the following three of the above perceived characteristics:

- High probability of loss: hazard (H)
- Great value of loss: elements (E) at specific risk and vulnerability (V)
- Short reaction time.

The combination of the first two of the above variables (namely hazard and vulnerability) is defined as specific risk. Risk assessment is closely linked to SA.

The response SA (situation awareness) of the CMG is based on three major pillars:

- Damage Assessment Reports
- The CMG (Crisis-Management Group)/crisis manager information requirements
- Generating CoAs (Courses of Actions available).⁴ At this point it may be a pressure to innovate in problem solving.

Crisis containment

The CoAs to be generated based on SA and to be selected by the CMG can be produced by different decision paths (decision strategies, rules set). These paths can be under either the Analytic, or the Cybernetic, or the Cognitive Paradigms, or a combination of them, for example the Poliheuristic Paradigm. Switches between decision paths during crisis management are usual. Specific sorts of CoAs are demanded according to the task of crisis response and the steps in the interactive process of fulfilling the subtasks.

The task of response management can be split into these major subtasks:

- 1. Redeployment of resources
- 2. Request assistance from adjacent regions

- 3. Request next higher level national assistance
- 4. Request international assistance

Preceded by stress, defensive avoidance is a symptom of 'decisional conflicts' with its forms: procrastination, buck passing, bolstering.⁵ In order to successfully handle crisis and manage response, improve decision quality and passing by decision avoidance, it seems to be helpful and necessary to ensure the:

- Explicit setting of (hierarchy of) objectives,
- Explicit setting of preferences of CoAs (options for action),
- Explicit setting of decision criteria.

The problem of explicit setting of the three above elements of a decision model leads us to the investigation of the Cognitive Paradigm as follows.

The Cognitive Paradigm

A core assumption of the Cognitive Paradigm is that due to various cognitive distortions (biases) the decision process leads to sub-optimal choice.⁶ Complexity, interactivity, inter-relatedness are typical issues in responding to problems of a crisis.

For example, decisions in foreign or defence policy may be by-products of domestic or economic concerns and vice-versa. Economic and functional criteria control adaptation and optimisation of performance.

These criteria depend on subjective values and cultural differences. In making complex decisions three main issues should be handled:

- Resolution of uncertainty in the decision process
- Revealing values
- Power structure over a number of individuals.

Uncertainty

Uncertainty stems from the "curious failure of perception to agree with the outer world."⁷ Merkhofer presents a 4-level analytic taxonomy of risk-decision⁸ problems. However, according to practical experience, uncertainty of a decision-maker – in most cases – is not resolved by means of presentation of a range of options with related probabilities what the Analytic Paradigm can offer.

According to cognitive theory, uncertainty usually is rather resolved under a governing set of belief-structure in practice.⁹ Human mind seems to be successful in value integration and outcome calculation. Uncertainty is mostly resolved by cognitive processes many of them unconscious.

No common risk definition

There is no commonly agreed definition of risk not only between the social and technological sciences; there are also differences among individual researchers within those disciplines.

Utilisation of social judgements and perceived political demands (and threats) from friends and foes channelled into information can be treated as an uncertainty-reducing mechanism. It is also a useful way of uncertainty-reduction when one party's decision-maker knows whether his adversary is an analytic risk-assessor, or whether he perceives risk.

Risk perception

Even when being informed about the real situation, the risk is higher if the complexity of the situation is not adequately understood by the CMG (Crisis-Management Group) owing either to a lack of relevant expertise in the team (a planning error), or due to the suppression of that expertise either by an authoritative decision of the leader of the team, or by "groupthink". Groupthink sometimes can be seen as social control, as a complement to formal bureaucratic control, to replace the mechanical application of rules. The burden of information processing for risk-based analytic decision-making far exceeds the capacity of the human mind, so selectivity is a must. Perception and attention cannot help being selective enough. The fundamental cognitive principles: reality and economy are considered to support efficient selection.

Subjective resolution of uncertainty

Cognitive processes and mechanisms function according to fundamental principles:

- Inferential memory
- Consistency
- Reality
- Economy, which is split into: = simplicity and

= stability (of the internal belief relationships).

For the subjective resolution of uncertainty, certain different important cognitive processes have been revealed:¹⁰

- Reinforcement
- Small-group interaction
- Inconsistency management, with some major cognitive mechanisms:
 - 1. Images and arguments from analogy
 - 2. Inferences of transformation (wishful thinking)

3. Inferences of impossibility

4. Negative images.

Values

Values are not constancies, but are dynamically evolving, which can either be ignored (i.e. CBA /Cost-Benefit Analysis/ of the Analytic Paradigm assumes static value functions), forecasted, accommodated by a flexible plan, or planning only for a near-term. Sometimes neither benefits (values, utilities) nor costs are easy to measure.

The decision-maker's private values are not only added to that of the public values he represents, but the outcome for the public values is overwhelmingly dominated by his private values.¹¹ The confrontation of powers is greatly affected by the personal political stakes of the decision-makers. Risk-taking in politics should not be seen as an always cool analytic calculation of strategic interests of countries.

Government behaviour is 'deliberate choices', and action is the result not of maximizing some social objective, but of political bargaining.¹² Government is an arena where members choose and legitimise some of their values.

In politics the actors are frequently in disagreement because of general competition over a range of issues. Because of the dispersion of power amongst the actors, outcomes are consequences of a continuous bargaining game. This can be branded 'decisionprocess'. Although narrow consideration of personal motives of the actors dominate their behaviour, what happens is not always intended or preferred by any of the actors individually.

Separation of values

Much of the human information-processing system operates outside of consciousness. But there is evidence, that – at least in some situations – the information-processing operations of the mind construct and weight values in order to establish consistency¹³ and later explicitly reinforce it by conscious trade-off. For instance this is the way to handle conflicting goals – very important in politics. Either a psychologically based implicit decomposition (value-separation), or an additional conscious ranking, or explicit hierarchical arrangement of a set of goals, are practical options.

Simply integrating social values as variables as analytic social DA (Decision Analysis) tries to do, does not eliminate its problem, that it does not accommodate risk perception, although the political decision maker is responsible to people's risk perceptions. Allocation of resources (benefits) and costs follows the distributive patterns of either law and public administration procedure regulations, or private rules, which lay no claim for rationality.

Assumption of a 'single outcome' calculation

According to cognitive theory, in solving a complex problem the human mind tends to split it into single-valued problems and solve them separately.¹⁴ Decompositions of different individuals differ, and may to lead to different judgements of the same issue. Instead of pondering alternative outcomes of a decision, human mind rather tends to impose his image and tries to maintain that image. Cognitive inferential structures are considered simple and coherently organised in order to present a single preferred outcome and related course of action to which the decision-maker is committed.

Preferences and values differ: the first reflects what an individual wants, whereas values explain what kind of person one aspires to be. Market prices do not necessarily reflect social values. Separation of information from preference using the analytic paradigm would be a basic decomposition, but facts shape values, and values filter facts. Validation, analysis, interpretation are always necessary.

Conflicting goals

In handling problem-complexity, value-separation helps the separate consideration and solution of the sub-problems by the mind of the decision-maker/group,¹⁵ but clearly hurts the fundamental principles of reality, cognitive consistency and stability. We feel this. Trade-off relationships are usually "painful", might become harmful, creating benefit on the one side, whilst possible threat on the other side. Establishing goal-consistency, – and explicitly maintaining it – generally can create a strain, a stress of the decision-maker/group. Trade-offs in politics may be followed by "agonizing" over a particular trade-off, or alternations, even oscillations of more trade-offs (for instance different policies to the same foreign country pursued by our subsequent governments). Under certain circumstances it can be found to be smart ways of avoiding, rather than creating explicit trade-offs in foreign policy.¹⁶

Reality principle versus set expectation

According to Steinbruner¹⁷ decision makers can be representatives of cognitive syndromes (these cannot be assumed to refer to personality types):

- Grooved thinking (inflexible pattern of quick response on narrow grounds)
- Theoretical thinking (quick response even in a chaotic situation, based on coherent beliefs. Ready to use false arguments of impossibility to block off other options.)
- Uncommitted thinking (oscillating between competing belief patters and interests of groups, rather than responding quickly).

(Analytic Paradigm)

Non-rational escalation of commitment, anchoring and insufficient adjustment, bias, cognitive inertia and conservatism all mean that, even if evidence for another outcome already exists, it is typically ignored, refused, or manipulated only to preserve one's own set of expectation, favoured hypothesis and assumption. Evidences threatening an individual's established belief pattern are not supposed to be processed, – so reality principle is hurt. What is 'a fair amount of evidence' for him/her? It is very subjective.

Decision rule systems

Decision strategies

According to Jarman and Kouzmin there are four paths of decision-making:

- Algorithmic/technocratic heuristic
- Opportunity-cost/economist heuristic
 (Analytic Paradigm)
- Satisficing/muddling through/interest group bargaining (Cognitive Paradigm)
- Crisis decision-making (Cognitive Paradigm)

The first two paths are dominated by the Analytic Paradigm while the latter two paths are dominated by the Cognitive Paradigm. There are other classifications of decision strategies into a continuum from analytic to intuitive.¹⁸ What is important is, that decision strategies of the same person can shift many times within a single problem.

- Task factors of a novice can require a more analytic decision strategy, – but with an expert in charge, this does not apply. Situation assessment can be based on the Bayesian model. Then every possible implication of every observation must be identified and quantified at the beginning of the decision analysis.

- In situations with a sufficiently developed knowledge base and up-to-date information any decision strategy could be used, - but without them, it cannot. In the case of a rapidly evolving crisis situation when stakes are high and information is sparse and unreliable, meta-recognition process and the 'default values' of an expert can help to fill the information gaps.

- In situations without time pressure any decision strategy could be used, - but with time pressure, it cannot. There is a rapidly increasing cost and risk when hesitating in choosing a decision strategy, or in refusing and changing basic assumptions in a crisis situation.

Command levels and decision paths

The level of command, and the time available for a decision tend to be related. A US military command example is used to as an illustration:

At NC (national command) level, a 'strategic' behaviour can be supposed. The decisions could be based on rational analytic approaches and represented by, for instance decision trees, influence diagrams.

At OP (operational) level 'management' behaviour can be expected. For example the CCC (Crisis Command Centre) follows a prescribed plan, although with adaptations, using plan-block procedures.

At TC (tactical) level 'service' behaviour can be assumed. The tactical level manages on a routine basis using a combination of SOPs (Standard Operation Procedures) and heuristics.

Grand strategy level decision styles

The following types of threat/risk analyses are applied in COBR (Cabinet Office Briefing Room)/UK:¹⁹

- Political & security risk analysis
- Political threat assessment
- Intelligence & security briefs
- Military threat analysis
- Military estimate
- Economic risk analysis
- Commercial risk analysis.

In the US, the foreign and security policy decision making at the highest level has been analysed.²⁰ In the following, both taxonomies on decision strategies of Mintz et al., and Goodwin and Wright were combined²¹ and extended as follows:

- Non-compensatory (or cognitive) strategies

It is an assumption (the non-compensatory principle), that it is difficult psychologically to make compensation trade-offs between many attributes and scores. Instead approaches under the Cybernetic Paradigm are used. The essence of these ordersensitive, non-open, decision-matrix strategies is to purposefully ignore any decision alternative with an unacceptable return on a critical decision dimension. Ordersensitivity means framing the effects of both the order of invoked attributes and/or the order of the differently described alternatives to the same decision. Modifiability of the decision-matrix is necessary, since for instance a new Course of Action can be inserted into the matrix.

- 1. EBA (Elimination by Aspects): Filtering out alternatives is based on the selection (ignoring) of a few attributes and their cut-off points.
- 2. Sequential Search for alternatives: Satisficing,
- 3. Some Simultaneous Search of Alternatives:
 - The Lexicographic Strategy: The most important attribute, and the best performing alternative is to be selected.

During crisis (under time-stress) cognitively simpler (some non-compensatory) strategy is likely to be applied. The most important factors, short-of-time and stress, further limit the cognitive performance, so only a reasonable amount of calculations using incomplete information can be expected from humans.

The decision-maker has an important role in determining the few most important attributes (and ignoring others) and their cut-off values in the case of the EBA in order to reduce the complexity of the decision problem to the level of limited human cognitive performance.

Sequential search terminates with the first alternative exceeding the 'aspiration level' of the decision-maker. The choice depends on the order on which the alternatives present themselves. With the familiarity of the problem to the decision-maker (experts) there are likely to be better alternatives already at the beginning of the queue.

However, non-compensatory strategies can lead to poor decisions because they cannot ensure that eliminated or omitted alternatives are inferior to those, which remained.

- Compensatory (or rational, or analytic, or normative) strategies

Compensatory strategies may lead to better decisions because they can ensure that weakness on one attribute can be compensated by good performance on others. These approaches are basically order-insensitive.

- 4. Approaches of the Analytic Paradigm
- 5. Certain Simultaneous Search of Alternatives:
 - The Conjunctive Strategy: similar to EBA without weights of attributes Compensatory decision strategy is based on a systematic comparison of the set of all simultaneously available courses of options and the search for an optimum. That is why this takes more time than a non-compensatory strategy.
- Miscellaneous Strategies
- 6. Other Simultaneous Search of alternatives
 - The Semi-lexicographic Strategy: inherent contradictions, intransitive, and although on the surface it looks rational, basically it is irrational;
- Poliheuristic Strategy

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The capacity for processing information by humans is limited. Even if there is enough time, the alternatives can be so numerous, that it is impossible to consider them all in detail. A way of overcoming this problem is to reduce the complexity of the problem by eliminating any alternative without an acceptable return on a key attribute;²² the rest of the problem with the remaining set of alternatives is less complex. In order to reduce the complexity of a problem, different ('poli') heuristics (cognitive shortcuts) are used. "Heuristics compensate for incomplete information...by organizing the information"²³ However, the poliheuristic model is a non-compensatory, non-additive, order-sensitive model.²⁴

7. The basic assumption of the poliheuristic model is that, in solving a complex problem, a decision maker uses a mixture of decision strategies. Decision procedures and rules are not fixed, and are dependent on intervening variables such as goals, domain, situation.²⁵ A two-stage decision process is applied with a shift from a non-compensatory path (for instance EBA) in the first stage to a compensatory one (for example SWT (Social Welfare Theory) expected utility based conjunctive strategy) in the second step.

Non-compensatory strategies deal better with uncertainty and complexity, and political leaders tend to have a risk-averse behaviour. It was found²⁶ that the input by the political advisor is often non-compensatory. So prior to making a detailed evaluation of alternatives, the politically unacceptable ones are refused.

Compensatory strategies deal better with structured problems. "The surviving alternatives ... can be subjected to game-theoretic analysis".²⁷ Either conventional (Analytic Paradigm), or extended (Cybernetic Paradigm) game theories can be applied. Although most compensatory paths are under the Analytic Paradigm, cybernetic decision models can also develop a composite index, which is compensatory and additive.²⁸

"The poliheuristic strategy accounts not only for simple decision situations but also for cognitively demanding and complicated N-person, N-alternative, and Nattribute settings that characterize many foreign policy decisions."²⁹ 'Computational modelling'³⁰ can be used for dynamic simulation of decisions.³¹

Switches between decision strategies on the operational/tactical levels

Instead of applying the SRK (Skill based /SB/, Rule based /RB/, Knowledge based /KB/) model of Rasmussen, or the GEMS (Generic Error Model) model of Reason, Flin³² uses overlapping though somewhat different categories to that of Rasmussen which depend on the time available for decision making and the risk involved.

Command decision making can choose and implement one of the following decision making strategies:

• Analytical (comparison of course of action options, Rasmussen's RB)

The crisis manager cannot help bridging the gap between static regulations, rules and the dynamic situation. Himself has not got all the necessary ability, that is why specialists in a team: the crisis management group (CMG) is required to support him. They ought to adapt at the KB (Knowledge Based) level to the unforeseeable specific situations for which no rules are available by improvisation. This requires both maxims of behaviour and a timely risk assessment of the possible actions based on an adequate understanding of the complex interactive processes of the system.

Research on high reliability organisations has shown that handling rare but hazardous conditions depends on "invisible functional depth" features and requires functional, theoretical knowledge about those features. The usual reinforcement of "normative" operating procedures will lead to systemic degradation of safety when agents optimise local performance during adaptation.³³

• Creative (broadly similar to the KB category of Rasmussen - without rules),

During a crisis management decision process, there are switches in using this or another decision path (and there are also great overlappings between the above categories), depending on perceived changes in the evolving crisis situation.

Creative decision-making equals the knowledge-based (KB) category of Rasmussen (KB)

SOP-based (standard operating procedures {written or memorised} is in RB category)

Organizations responding recurrent events are highly procedural.³⁴ In crisis situations short of time, routine standard operating procedures (SOP) take too long so necessary to change the rules (RDCR = Rules During Crisis), and shorten procedures into EOPs (Emergency Operation Procedures), or even more shorten to an NDM (Naturalistic Decision-Making).

Some applied psychologists classify that situation, where there are high stakes, uncertainty, ambiguity, lack of information, dynamic rapidly changing conditions, time pressure because real time reaction (rapid decision) is required to respond to the changes, where the organisational goals and norms themselves can be shifting and competing (sometimes with individual goals), when goals and the structure of tasks are ill-defined, and the decision-makers are experienced, as naturalistic decision-making.³⁵

These psychologists usually refuse analytic decision models seeking to find an optimal solution, in favour of finding a satisfactory solution by means of quick NDM. So NDM avoids traditional analytic decision-aiding approaches or the SOPs. RPD

(Recognition-Primed Decision Making) is the dominant NDM theory and is based on Rasmussen's SRK-model. An SB (Skill-Based) behaviour a la Rasmussen seems to might have been far linked to RPD.

• RPD (recognition-primed decision) – according to Flin,³⁶ relies on experience, requires "little conscious effort" [sic],

SOP-based decision-making requires a somewhat more cognitive processing and takes longer than RPD.³⁷ SOP/EOP is useful and appropriate in routine situations, but not in unforeseen, extreme situations. If rules or plans are out-of-date or superseded by practice (seems to be near to Rasmussen's SB {skill-based} behaviour), or they are irrelevant to the unique situation, than over-reliance in plans represses flexible decision-making.

On the NATO orders

- The standard structure of a NATO order³⁸ is the following:
- Situation (enemy and friendly forces),
- Mission,
- Execution (concept of operations, missions/tasks for subordinates, coordinating instructions, resources given).³⁹ Subordinates are told what effect they are to achieve and why.

Mission command is a military version of MbO (Management by Objectives) focusing the responsibility of every subordinate to support his/her commander's intent. Lower level tasks to high-level objectives are linked with the commander's intent in the 'friendly forces' paragraph and passed down two levels. Extraction of orders relies upon a standard methodology of interpretation.⁴⁰

• Command and control are taken as complementary functions, although under certain circumstances the mix of the two may not be capable of achieving its task. For instance, attempts to command rather than control from the rear have proved unsuccessful so far.⁴¹ In a local crisis there is a shift in the level of decision-making from strategic down to tactical level in responding. Schmitt⁴² suggests that C2 should be seen as an adaptive rather than a hierarchical control. The senior commander is unable to control the battlefield and cannot help therefore to rely on timely and accurate feedback in order to adapt and adjust his plan. The senior commander provides direction, initiates and sustains action whilst subordinate local commanders are in local direct control.

• According to McCann and Pigeau (1999) there are conceptual inconsistencies⁴³ in the NATO, USA, UK and Canadian military doctrines, and in C2 (Command and Control). In combat – which is seen as a highly interactive, complex (near-chaotic) system⁴⁴ – decision-making must be robust against rogue results, based on mental, physical abilities and provision of reserves. McCann and Pigeau are of the opinion, that C2 is a coping mechanism to reduce uncertainty and risk in dangerous situations.

C2 - A coping mechanism

C2 can be seen as a coping mechanism to reduce uncertainty and risk in a crisis.

In Western doctrines, military decision-making is usually seen as an event embedded into OODA control-loop (Observation, Orientation, Decision, Action), so the basic process of C2 (Command and Control) is fed back and is therefore an iterative process. It is an advantageous capability to react faster than the opponent ("getting inside the enemy's decision cycle"). However, the OODA-loop does not adequately describe the process; Indeed, in some cases no OODA-loop can be identified.⁴⁵ It takes at least a whole 24 hours to execute a new division-level operation. In addition, planning takes an additional 12 hours, and even more time needs to be added for preparing for action at tactical level. But in the meantime decisions at tactical level proceed in real-time, so C2 from the level of individual soldiers does not seem to be a circular model.

In reality Observation, Orientation, Decision and Action occurs almost in parallel, in real-time, while an OODA-loop at division-level exists with about 48 hours propagation delay. It is a hierarchically controlled system with 48 hours propagation and overhead delay at operational level or with even more delay at strategic level. At the HQ CoS (Head Quarter Commander of the Staff) there may be enough time to be iterative during strategic decisions, when trying optimally to allocate forces, or in peacetime when new equipment is to be acquired. However, the senior commander will never have an accurate and current picture of the battle situation, therefore the decisions concerning how the goals should be achieved cannot help but be left to a junior commander on the scene. In a rapidly changing situation, life-or-death decisions (by acting) sometimes have to be made at the lowest level in the hierarchy, and it is unlikely, that during modern air-fight combat OODA can be seen as the most adequate model of C2.

Mission command

If the decision-making authority is temporarily slipping down to the lowest level in the hierarchy, and crawling back after a delay to the top level, then it might mean that control of the events from time-to-time is going to slip out of the senior commander's hands. This is a 'graceful loss-of-control'.

To maintain control when feedback is slow between levels in the command hierarchy can be handled by 'feed-forward' control, with focusing on mission goals by the junior officer rather than details of a plan. Co-ordination under mission command is partly substituted by a mix of preliminary planning, education and doctrine which tells what the appropriate SOP (standard operating procedures) responses are for a given condition, 'auftragstaktik', exercises, training, culture, loyalty, military expertise and intuition. But plans should generally only be executed when there is a reasonable chance of them succeeding. Rapid changes in the situation make finely detailed plans useless.

The Military Estimates Process

According to a comparative international analysis,⁴⁶ the Army's decision-making process is broadly the same in the US, UK, Germany and indeed, throughout the NATO. There are however, small differences in the cycle even in the same Army (UK), where the resolution or the sequence of the phases in case of a Joint Estimate can be slightly different. However, the process starts with externally set goals and the next step is mission analysis; the process is different at COBR level.⁴⁷ Compared to the German and UK practices this phase is very deep, but lengthy in the US version where the commander is more involved, so he has less time to deal with other problems of his command. In the German version a precise common unambiguous vocabulary is used for communication.

The following is a SWOT-like phase, identifying relevant factors of the situation with a focus initially into three of them: end-state, CoGs (centers of gravity), decisive points. This is followed by an evaluation of factors: environment, enemy, friendly forces, time, space, security and surprise. A 3-column format is used: factor, deduction and task.

Compared to the German and UK practices, which focus on key factors early on, this phase is very systematic, though lengthier in the case of the US. Novice decision-makers use structured methodologies – but experienced commanders, or expert staffs do that seldom.⁴⁸

Option generation (CoA=course of action) is a more systematic and formalised (beneficial for novice decision-makers) but non-mandatory method of the US,

compared to the German and UK versions. It is not information-intensive, but information-sensitive, because the information required depends largely on the situation.

For a comparison of options a formalised war-gaming (simulation) is performed for each CoA by the G3 in the US, but not in the German and UK Armies. However, some analytical comparison of the components of each option is undertaken, either by the staff or the commander (in the German situation by the CoS). During the simulation (it is an extra task for G3 in the US Army) 3–4 factors and 5–6 changes of state are used, and human mind rarely handles more.⁴⁹

Speeding up with corporate planning tools

Producing a comprehensive decision tool that can be visualised rather than ticking a checklist, would greatly assist understanding and serve as a useful rapid operational planning and training aid. But military estimates are very much command led processes. Strategic level decision-making is tackled in the literature of the corporate Strategic Management schools. In his comparative analysis of major schools of corporate strategic decision-making, Vallings⁵⁰ concluded, that Mintzberg's Configuration School is most close to the top-down fundamentally sequential process of the Estimates. But neither of these schools provides recommendations as to how the process of decision-making can be improved, for example, in terms of shortening time requirement.

Corporate tools are becoming increasingly central to security decision-making. For risk-management the following corporate tools are in use, for instance at Kraft Inc.:

- Internal threats: SWOT (strength, weakness, opportunity, threat),
- External threats: PESTLESS (political, economic, social/cultural, technological, legal, environmental, security, safety) factor analysis.

There is a research proposal in the UK to combine military decision-making with the corporate tools that are available. At the operational level, where military strategic objectives are translated into operational and tactical events, campaigns are planned using the Joint Estimate process. The Estimate is an "immensely powerful aid to logical thought under pressure".⁵¹ However, it is a disadvantage of the Joint Estimate its inability to meet very short time constraints.⁵²

However, it was found that the following corporate planning tools: the Stakeholder Matrix,⁵³ the PESTEL analyses have high value; the CSF (Critical Success Factors), the SWOT and Porter's analyses, and GE-matrix have moderate added value. When incorporated as decision-aids into the decision process of the Joint Estimate.⁵⁴ According to Vallings' recommendations based on his research, the Stakeholder Matrix is most useful in an early stage of the Joint Estimate and ought to be updated. The

PESTEL analysis with an added new Media component could be applied in the Situational Review Stage for collating key issues from a macro position or identify future trends in the influencing factors (political, economic, social/cultural, technological, environmental, legal).

Rather than using 'enemy vulnerabilities', 'joint objectives' and 'decisive points', CSFs can be applied to determine directly critical enemy vulnerabilities, thought of as "the events that have to be achieved in order to be successful".⁵⁵

Porter's five forces replaced by the six functions in combat (Manoeuvre, Firepower, Protection, Information, Combat and CSS/countersurprise-surprise) could be used in assessing the relative strengths at the end of the Evaluation of Factors Stage, and also in determining the best means to attack a Decisive Point.

In case of short of time, SWOT analysis is simply applicable (in a 3-column format) for enemy, friendly forces, and environment assessment. It can be either as a precursor to the Evaluation of Factors Stage of the Joint Estimate or as a briefing tool because of its visualising properties is seen to be useful. For Evaluation of Factors an utterly new tool should be developed.

Rouse's Hybrid Continuum Model

The 'Estimate Process'⁵⁶ prescribed for battlefield decision-making could be shortened. This analytical decision process can produce a solid plan, which is both rigorous and auditable back to the original analysis from which it was derived. The US military estimate is like an industrial managerial decision-making of a control process – and this can be too lengthy under stress and time-pressure. Control is more feasible in a slowly changing environment and command seems to be more appropriate in a rapidly changing critical situation. An enemy's surprise attack – together with our tactical responses – condition time-lagged changes in our strategy.

However, many analytic decision-processes can be a straight jacket to a decisionmaker if applied rigorously. If the analytic procedure does not produce a decision until the end, it is difficult to shorten the process if the external time-pressure suddenly demands an earlier-than-expected decision.

Rouse's 'Hybrid Continuum Model' is a 'shortened' battlefield decision-method,⁵⁷ allowing experienced commanders to follow their own military intuition, because it was revealed that in the UK practice, the commander makes an early implicit decision and then uses the rest of the estimate process to support that decision. The 'hybrid continuum' model of Rouse either allows the early intuitive decision based on the commander's expertise and experience, or allows him to proceed with the longer full analytic decision-process.

Rouse tries to find a trade-off in applying either NDM, or - if the timeframe available allows it - analytic decision-making, as a hybrid model. Requirements for the hybrid decision models are:

- Accommodation of a shortened version (NDM) decision process
- When it is an analytic method, it allows for the synthesis of factors once analysed
- Flexibility to allow interfaces for different management styles
- A union of rationality and intuition (irrationality)

Naturalistic Decision Making

In a combat information centre a team of computer operator officers are watching the screens for signs of threat. When they consider, that the target on the screen may be hostile, there is only a short timeframe to decide whether to shoot. The officers are under personal threat and take a high risk in case the approaching target attacks earlier. They have severe stress because the consequence of error is catastrophic, the time pressure and the workload is enormous, there is fatigue, the uncertainty is high and because the information on the screen is very ambiguous.

It should be emphasized here, that the decision-maker behaves as a manager, and almost simultaneously behaves as if he were a subordinate actor, a member of the team, primus inter pares. This may be seen as an aspect of leadership. Because of the shortage of time, in NDM, thinking and acting are sometimes interleaved and cannot be separated.

NDM seems to be a set of 'situation and successful response pattern' identification and matching techniques by heart, by means of expert leaders' memory – or that of his staff. The goal is to find the first, satisfactory rather than optimal, response and at once implement it. Generally no different options are compared; a single option is identified by cognitive association. As if it were a 'condition – action' rule stored in the expert's memory. Many decisions of us seem to be RPD-, or RB (rule-based).⁵⁸

It is a disadvantage, that this sort of 'shortened' decision process has a trial-anderror character with inherent risk. In those unclear problems, where the decision-maker has perceived a 'higher than a threshold' risk, s/he usually chooses an option, which starts with a standard precautionary measure (a sort of SOP).

Only if the implementation is unsuccessful, will the decision-maker search for another single feasible response. In a stressful situation adherence to a previously successful strategy frequently can lead to desperate pattern-matching human behaviour. It is a dilemma, if the crisis situation is beyond the previous experience of the decision maker and he does not have any 'earlier patterns' in mind. "There is no escape here. No panacea..."⁵⁹ – except for 'Auftragstaktik'.

Crew Resource Management/Staff Management

When the decision-maker behaves as a subordinate actor who implements a decision, and simultaneously behaves as a manager, this might be seen as an aspect of leadership. There are frequent teamwork problems under NDM:

- 1. Lack of orders
- 2. Unclear roles

3. Miscommunication.

There are some remedies to these:

Ad 1) 'Change gear' – change your management style to a leadership style. When the situation is serious, there is a need to send this message to the rest of the team to sharpen their performance, and there is a need for a change in management style as well, to clearly show there is a 'change gear' now. In a fast moving emergency only a directive, more authoritarian, commando-like leadership style leads to success, anything else is likely to lead to a disaster.

Ad 2) In war the goal is to achieve victory; becoming the most effective in combat is all-important. Effectiveness and efficiency are opposed – in order to win (becoming effective), the military force must be reliable, robust, with redundant reserves and supplies. Co-ordination by directives and redundancy support reliability, because co-ordination is liable to disruption. Relatively robust co-ordination in distributed decision-making systems is achieved by the use of command hierarchy (setting non-conflicting mission goals).⁶⁰

Ad 3) We refer here to the German staffwork of tactical decision-making,⁶¹ where a precise common unambiguous vocabulary is used for communication. Here 'blind passes', body-language, non-explicit expressions are not only counterproductive and a waste of time, but they are dangerous. It was found during controlled⁶² (simulation) experiments, that the most effective communication was one which involved central emergency decision-making ("all eyes swivel to the captain").

Combating surprise – Getting in control at once

A sudden change of the perceived risk in a situation, upsets the enemy's will and cohesion, and can lead to victory. Collapse of will is an effective indicator of combat outcome.⁶³ The effect of surprise may be as great as if the force ratio were 10:1.⁶⁴

In distributed decision-making the aim is to achieve co-ordination towards a common goal among members (of a management-group). Security depends on high performance and co-ordination seems to be efficient by the use of a hierarchical management structure.

It was found in the framework of the TADMUS⁶⁵ (Tactical Decision-Making within the US Armed Forces), researching for the causes of disastrous errors, that compared to both other teams and individuals, 'dream' teams had far more resources to cope with an increase in stress (i.e., growing time pressure), and could adapt to the more demanding situation – by changing their normal RPD mode of decision-making to a more rapid one.

Instead of waiting for explicit information requests from the commander, they anticipated what information he may need. This is due to shared mental models,⁶⁶ as if they were focusing on a shared problem model in an emergency situation. The team's response is better, if during normal conditions between two emergencies, they are working on contingency planning, discussing each others needs and self-monitoring performance. It is true, that the emergency you prepare for is never the one that happens. However, the leader's role is to develop not only a team-spirit, but a team's ability to change to an even more rapid than the normal pace RPD, non-synchronised, proactive decision-making mode, if there is only a very narrow time frame.

But this is a double-edged sword for use only as a last resort. Many errors occur, when individuals performing a task are interrupted by demands from other crew members or are overloaded with a variety of tasks requiring immediate action. The pace of human work cannot be increased over a threshold otherwise this may lead to chaos.

Incident command system

Flin makes a difference between military and incident command (IC). Incident command is emergency management in a non-military setting.

A multi-tier incident command (IC or IM=Incident Management) system can be applied in the Continuity Services.

IM (or IC) enables a business function to sustain a major interruption by timely coordination, management, activation, and execution of various business continuity plans. A business continuity process is divided into three phases: assessment, planning/preparation, event management.

IM assessment identifies, classifies critical business processes based on an evaluation by BIA (Business Impact Analysis). Risk assessment of key areas and risk mitigation define actions in order to reduce risk. Related to each site recovery of the relevant processes IM planning/preparation create, maintain, approve, document and exercise strategies and plans.

IM event management provides the infrastructure and communication processes in response to a potential or actual threat, activates, coordinates and is tracking from an operations center the activities and interfaces among Response, Recovery, Relief, and Restoration stages in case of a disaster.

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