TO STIMULATE THOUGHT

If people are asked, "What is the Pythagoras theorem?" 95% or more will answer:

"**A** squared plus **B** squared equals **C** squared."

This of course is outright wrong or even utter nonsense. The answer given is a meaningless formula, not a theorem. But even worse: the people are not aware of this nonsense they just made public. They do not understand what this theorem is all about. They do not WANT to understand what it means.

Why is that so? What is lurking below this admitted ignorance?

INTRODUCTION

> **"The Games of Chess is not merely an idle amusement; several very valuable qualities of the mind, useful in the course of human life, are to be acquired and strengthened by it, so as to become habits ready on all occasions; for life is a kind of Chess, in which we have often points to gain, and competitors or adversaries to contend with, and in which there is a vast variety of good and ill events, that are, in some degree, the effect of prudence, or the want of it. Chess teaches foresight, by having to plan ahead; vigilance, by having to keep watch over the whole chess board; caution, by having to restrain ourselves from making hasty moves; and finally, we learn from chess the greatest maxim in life - that even when everything seems to be going badly for us we should not lose heart, but always hoping for a change for the better, steadfastly continue searching for the solutions to our problems.**
>
> [Benjamin Franklin]

As the small but dedicated group of colonists pondered the foundation of a republic founded on the concept of a "government of the people, by the people, for the people,"[1] they were all aware of the decisive prerequisite required for such a political and social construct to function perpetually: only the well-educated will preserve their sovereignty.

Benjamin Franklin clearly did not want people to learn and play chess simply for the sake of it, but rather he used this appeal to make a point about education. Nobody in the 18th century needed to play chess to survive, nor could anybody hope to survive just by knowing how to play chess. This is true also for today and the future. His request carried with it the underlying concealed advice to engage and occupy oneself with subjects and issues which challenge the mind, i.e. deliberately involve one's own thinking without suspending such efforts due to a perceived lack of providing any direct or immediate positive influence on one's own life. This insight might appear obviously positive today, however it remained elusive for a long period of time before it turned into practical measures. The complex history of establishing compulsory schooling in the Western world provides some evidence about this protracted process.
Frederick the Great established such a system in 1763 within the kingdom of Prussia. Even this monarch, who espoused absolutism, was aware of the role and importance of education. The following three quotes may illuminate this dichotomy:

[1] Quoted from Abraham Lincoln's Gettysburg address, 19 November 1863. In this context, the American Civil War can be seen as the final phase or chapter of the American Revolution as it settled for once and forever the one question left deliberately open in the declaration of 1776: the existence of slavery contradicting the statement "… that all men are created equal …"

> "We have to invest in education, not in the import of pineapples. The human being is worth more than all pineapples of this world."
>
> "An educated people can be easily governed."
>
> "If my soldiers were to begin to think, not one of them would remain in the army."[2]

It would take nearly all the 19th century to expand this basic system within Prussia and later the second German Empire. Compulsory school attendance based on the Prussian model made its entrance into the United States in 1852 via the State of Massachusetts. Remarkably, England and Wales were the last in Western Europe to install this idea, via the Elementary Education Act of 1870.

Since then, the endeavour to keep and improve education in Western societies continued its arduous path. Consider this concluding example: in 1972, the secretary of defence of Germany, Helmut Schmidt, established two universities for the German Armed Forces. The motivation for this was not simply to increase the attractiveness of the Bundeswehr Offizier career, but mainly to foster the value of education within the officer corps. All members of the armed forces of a Western country are part of its nation's people, and therefore they form part of the sovereign.

As stated above, education is inextricably linked to sovereignity. This leads to the question: What exactly is "education"?

[2] This might sound as if the "thinking" soldiers might decide to leave the armed forces; the king indeed aimed at just the opposite: he would never tolerate such a quality in the ranks of his army. According to the tactics and applied warfare of his time, this actually makes sense.

PART 1 – THE IDEA

1.1 EDUCATION

> **"Thinking is the hardest work there is, which is probably the reason why so few engage in it."**
>
> [Henry Ford]

Education resounds throughout the land. Everyone asked, supports it vividly and affirms its importance and categorical necessity. But for most, this is where it ends. However, a universal understanding of what education really is seems to be quite a different story; "Knowledge," "general knowledge," "schools and learning," "reading books," "crucial," meaningful," "the responsibility of parents and teachers," but also "I don't care," "hmmm, I don't really know", are just a few examples of possible replies. Of course, there are official, i.e. available definitions and elaborations on "education."[3] Interesting enough, even the simple process of looking up a word actually automatically forms part of exactly that: education.

Education is inherently self-referential, i.e. delving into education inevitably builds one's own education. But is all this really catching the root of the matter? Perhaps the better approach is to consider whether there is a way to measure education and/or compare education between two or more entities who self proclaim, "I am educated!" For example, does the amount of books a person has read provide a measurement or index of her/his education? If one person read twice as many books as another, is she/he then twice as educated as the other?[4] Is an officer reading a NATO document like the Allied Command Operations Comprehensive Operations Planning Directive (COPD) turned into a well-educated asset when it comes to executing effective command & control of NATO operations? The answer to all those questions is a simple "No."

Let's examine some of the other replies which in fact avoid the original intent of the question, "what is education?" Isn't it somewhat strange that people provide an assessment like "crucial" about something they do not want to, or not capable of, explaining as such? This phenomenon is not limited to "education." Take "energy" for example. Everyone is convinced about its significance and value. But, who can tell what energy is? Who has grasped the models/schemes[5] for energy that have been established and are under continuous

[3] Here is an example of a bundle of definitions (from the Free Dictionary; by FARLEX)
1. the act or process of imparting or acquiring general knowledge and of developing the powers of reasoning and judgment.
2. the act or process of imparting or acquiring particular knowledge or skills, as for a profession.
3. a degree, level, or kind of schooling: a college education.
4. the result produced by instruction, training, or study.
5. the science or art of teaching; pedagogics.

[4] Provided that those sets of books could be compared somehow …

[5] $E = m * c^2$ is just one (maybe the most popular; but what does this formula really tell us?)

advancement by scientists? Terms like "energy consumption," "renewable energy," "wind energy," reveal a less vague understanding of it all.[6]

An even more "honest" reply is something like "why should I know?" "what's the gain (for me, personally) to know about education (or whatever)?" This attitude towards knowing something or neglecting knowledge about something is the key for and of education. Allow an example to highlight this point: why are manhole covers circular?[7] Does it make sense to know a tiny fact like this, or is all this unnecessary lore or trivial information?
The extreme position resulting from the continuous balancing between useful and useless knowledge is often influenced by the concept that "ignorance is bliss."[8] The driving factor behind this mental development actually is located within each individual. Henry Ford was right.

Now we are left with the final category of replies to the original question: "I don't know." This puts the responding individual at a crossroad. She/he can now either: enter (or continue on) the path of "it's much more comfortable to walk without baggage," or follow Robert Frost.[9] Taking all this together, the following understanding, conception, or notion of "education" is conveyed and applied for the ideas, sketches, and schemes unfurled below.

> **Education is the individual's obtained insight by self-awareness that knowledge and learning have the decisive significance regarding the own competence, skill, proficiency and prowess.[10]**

This perception elucidates the motivation of quite a few education and training institutions to offer, and in some cases force, students to attend to a so-called "must-read" book list.
But simply accepting and literally digesting this "advice," does not by itself stimulate, encourage, or foster an individual's education.

> **"Not I – not anyone else, can travel that road for you. You must travel it for yourself."**
>
> [Walt Whitman]

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[6] Interesting enough, a conversation with a fighter pilot about his business of intercept and dogfight offers a fascinating approach to "energy" the moment he addresses the doctrine of "you always have to trade altitude for speed and vice-versa".

[7] Any polygon shaped cover could fall down the manhole, circular shaped covers cannot. To prove this, the Pythagoras' theorem comes in handy, by the way.

[8] This age-old composure was also addressed in the Matrix movie. The statement was uttered by Lew Cypher in a conversation with agent Smith. Pronouncing the former protagonist's name will indicate that this person is not one of the good guys of this story. If all this remains incomprehensible, the level of education of the Matrix storytellers failed to link with yours.

[9] American poet, 1874 to 1963; "Two roads diverged in a wood and I – I took the one less traveled by, and that has made all the difference."

[10] In this context, "training" is defined as: "Purposeful and deliberate activities demanded from individuals aiming at the improvement of their competence, skill, proficiency and prowess."
Taking this into account, the training of individuals lacking education is useless for the trainee, as the latter will only act when triggered from the outside.

Concluding this chapter, the following oxymorons might offer some more thought-provoking impulses:

1. Knowledge is the only resource which grows when used.
2. The more the individual knows, the more aware they become of their own ignorance.

All of these elaborations are not just self-referred they also provide the basis of an effective education & training model which aims to cultivate a sustained improvement of competence.

1.2 COMPETENCE

"You don't have to hold a position in order to be a leader."

[Henry Ford]

Defining "competence" requires the competence to do so. Like education, this word or term is self-referential which does not alleviate any preoccupation with it.
Researching definitions for competence results in a plethora of suggestions and propositions. Although, the word is rather young: it appeared first in 1959 and addressed a concept for performance motivation.

Another big issue is to assign competence to positions, roles, or allocated tasks. This "branch" of competence actually reflects authority, jurisdiction, responsibility, rights and obligations. As this category of competence has no link to an individual and his/her personal determinants, it will not be further dealt with here.

A single person's competence comprises his/her set or sum of abilities and capabilities which find their expression in applied skills, and the handling of his/her knowledge, all based on that individual's education.[11] Accepting this, each of us has a competence for everything (e.g. cook, aircraft pilot, race car driver, astronaut). The big question: what happens if such a competence is called for? Apparently, in nearly all cases, the people concerned are well aware of their insufficient competence and they would deny acting (e.g. no one without a proper license would take command of an aircraft risking the life of others and his/her own under less then extreme dire circumstances). But there are exceptions … politics and politicians (sometimes one cannot but ascertain that expert knowledge actually is deemed counter-productive), and competence in the realm of command & control and leadership (C2/LS).
Systems that require well-defined structures and hierarchies are always prone to entangle competence with position or assign levels of competence according to the hierarchical levels within the organization. It took a long time and countless blunders to recognize this wrong

[11] The Business Dictionary: „Competence is a cluster of related abilities, commitments, knowledge, and skills that enable a person to act effectively in a job or situation. Competence indicates sufficiency of knowledge and skills that enable someone to act in a wide variety of situations. Because each level of responsibility has its own requirements, competence can occur in any period of a person's life or at any stage of his or her career."

approach. This does not imply the latter has been given up. Military thinkers as well as practitioners like Nelson, Moltke the Elder, struggled a lifetime to change/improve the systems they formed a part of. This quest never comes to an end[12].

The German Armed Forces of today pursue a specific C2/LS concept, or better: mentality, called "Führen mit Auftrag." Calling it "Mission Command" misses a lot due to the 'lost in translation' effect. The idea of this "mind set for military leaders at ALL levels" originates mainly from the Prussian military as it entered the world stage during the 18th century. Führen mit Auftrag is driven by the idea and proven perception that effective military activities require competent leaders at all levels of operations. The operational factors (time, space, forces, information, and law) require effective C2/LS at all times everywhere.

This ideal – never to be really fully achieved – nevertheless calls for the education and training (E&T) of personnel to provide a sufficient host to conduct successful operations.
The C2/LS competence – as with any other competence – makes an appearance only when asked for. But if so, competence inevitably is put to the test (as good or bad as it is). The C2/LS competence influences ALL phases of the Observe-Orient-Decide-Act (OODA) loop[13]. The core elements of this process are decisions (from the development of options to the final selection, or decision-making).

The objective of any E&T effort therefore, must be the improvement of this C2/LS competence. As competence rests upon education, the former cannot be initiated, built, changed or improved solely from the exterior. The individual must be willing to walk this path. Consequentially, the E&T facility must provide an environment and a set-up which invites the trainees to build and maintain their own motivation to approach "competence,"[14] tackle it, and finally achieve its sustained improvement.

The E&T model described in this document accommodates all those issues. Using non-computer based simulation systems is the trigger and the tool to spur and foster motivation. Additonally, there are two more topics to be addressed before contemplating this model in detail. This will complete the survey of the idea that sparked this model; and this will of course, provide some further key rationales for the model itself.

[12] Just three examples of scientific efforts proving this point: Norman Dixon, "On the Psychology of Military Incompetence", 1976; Andrew Gordon, "The Rules of the Game", 1996; Barbara Tuchman, "The March of Folly", 1984.

[13] Instead of loop it is more adequate to think about a coil spring, as the operational factor time drags the process into that construct rather than permitting a perpetual circle.

[14] Regarding some competence models, see part II.

1.3 DECISION MAKING

> **„The tactical result of an engagement forms the base for new strategic decisions because victory or defeat in a battle changes the situation to such a degree that no human acumen is able to see beyond the first battle. Therefore no plan of operations extends with any certainty beyond the first contact with the main hostile force. "**
>
> [Moltke the Elder]

Essentially, decisions are nothing but selections, or deliberate exclusions. The moment the decision is made and declared to move exactly in one specific direction, all other directions are EXCLUDED and dismissed. Furthermore, decisions are not just transacted exclusions, they are also inevitable. Decisions are rarely discrete. There are interdependencies as well as hierarchies. A meta decision, for example, provides the overall exclusion binding all decisions beneath it. A classic expression of this case: "Before I make that decision, I need more details."[15] There is one operational factor, mercilessly forcing leaders to make decisions: time[16].

Decisions are one thing, their results, or consequences, the other. Both are intrinsically tied to each other. Sounds simple and obvious, doesn't it? But why then is exactly this connection artificially separated or neglected in so many E&T efforts? In other words, the OODA coil spring is not completely represented or applied. All too often, the focus is placed on the Orient phase. The trainees have to develop most elaborate plans and options to be briefed and assessed as such. Turning this into action after the decision was made, witnesses a comparatively low level of interest, if at all. See also the next chapter.

Another important field of interest in the realm of decisions and decision-making lies in the "delay effect", the "cascading effect" and the combination of both. As simple as many decisions can be formulated and uttered, in many cases, the consequence does not show up at the same speed or immediacy. Ordering a large ship to change bearing is easily done, but it can take a small eternity until it happens. Tasking a motorized division to move from A to B takes a huge effort touching all operational factors. A simple change on a map displayed at a headquarters triggers a lot of activity over a long period of time. The other, much less spectacular, but all the more dramatic effect stems from the "system of systems" reality. Especially in military operations, a single set of exclusions will release a multi-dimensional, never fully controllable, not even foreseeable chain of events. Now add an adversary who is

[15] The often heard phrase "You better make a wrong decision than no decision" is nonsense, of course. To delay a decision at level x is a decision made at level x-1.

[16] As Niall Ferguson puts it in his book "Civilization – The West and the Rest": "There is in fact no such thing as the future, singular; only futures, plural. There are multiple interpretations of history, to be sure, none definitive – but there is only one past. And although the past is over, for two reasons it is indispensable to our understanding of what we experience today and what lies ahead of us tomorrow and thereafter. First, the current world population makes up approximately 7 per cent of all the human beings who have ever lived. The dead outnumber the living, in other words, fourteen to one, and we ignore the accumulated experience of such a huge majority of mankind at our peril. Second, the past is really our only reliable source of knowledge about the fleeting present and to the multiple futures that lie before us, only one of which will actually happen. History is not just how we study the past; it is how we study time itself."
Is there a better way to address the value and importance of history?

mainly interested in disrupting the opponent's plans to secure his objectives whilst denying the opponent to achieve exactly that for himself. By the way, the worst case, i.e. the combination of both effects, is the normal case. Any E&T for C2/LS has to cover exactly this fact.

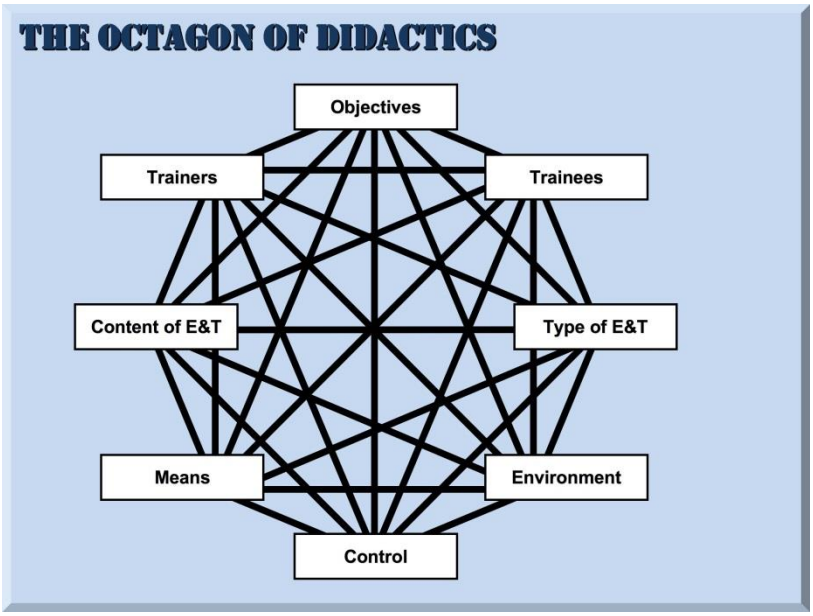
1.4 TRAINING

A human being turns into his/her real being only when playing a game.

[based on Friedrich Schiller]

Training is always a contention between the trainers and the trainees. Both sides have expectations, both sides request quite a lot from their counterparts. In order to avoid any unnecessary conflict, transparency is key. There must not be a hidden agenda by the trainers. On the other hand, any training dealing with the C2/LS Competence is based on adult education. The trainees must have a mindset open to the idea of training and to the specific theme (here: C2/LS Competence Improvement). For those who can't, or refuse to, participate, save time and send them home. In other words: both parties must be willing and able to fully participate in the training.
The preparation and execution of any kind of training always profits from a thorough and comprehensive course of action not to be mixed up with the content of the training!

An example for a proven tool supporting this effort is the so-called Octagon of Didactics.



It simply provides a checklist of eight topics defining and covering the major elements involved in training and making it possible as such.

The challenge of training is to achieve a lasting progress for the trainees. Thus, how to ensure a sustained, actually self-perpetuating C2/LS Competence Improvement once initiated by applying the E&T model?

The peculiarities of competence and education forbid the one-way approach (as provided by Behaviourism, for example). They also exclude the method of drill, as effective competence relies on individual insights about one's own abilities and capabilities brought forward through the personal education. If the latter accepts the value and raison d'etre of drill, there is no problem for the affected trainee to learn and act accordingly. Forcing "drill" (or

"military bullshit" as Norman Dixon names it) as such upon trainees ensures nothing but failure regarding the intended competence improvement. Nobody becomes an effective air warfare warrior due to his/her ability to recite the COPD like a parrot, for example. Reducing operational art to replicating lines of text is fatal for the own cause. The other big trap of training is the dualism of "avoidance of mistakes" and "searching to meet the sample solution".

The E&T model presented in this document turns its back to both those miserable guidances. There is no "true" or "false" in the realm of C2/LS. What was right in one situation could be horribly wrong in the next one. The model does not support the still common idea that "the next military operation will be a huge success as we will avoid the mistakes from the previous one". As NATO doctrine correctly states: "Operations are operations." No one will be repeated, and they are all different.

When conducting this type of E&T, the trainees cannot make any mistakes. But, they will blunder and fail achieving success in the challenge they were offered and accepted. They will taste victory when they master the challenge. All this is based on their own verdict, ensuring the objective of the training: competence improvement.

Experience shows that trainees initially distrust the fact that this E&T model has NO sample solution/s. There is no comparison between what the trainees do and what was put somewhere listing the "best practice". Once this presumption has been removed, the creative power of the trainees enters the playing ground to full effect.

PART 2 – THE TOOL

2.1 CHAOS – OR – THE FUNCTION OF COMPLEXITY AND DYNAMICS

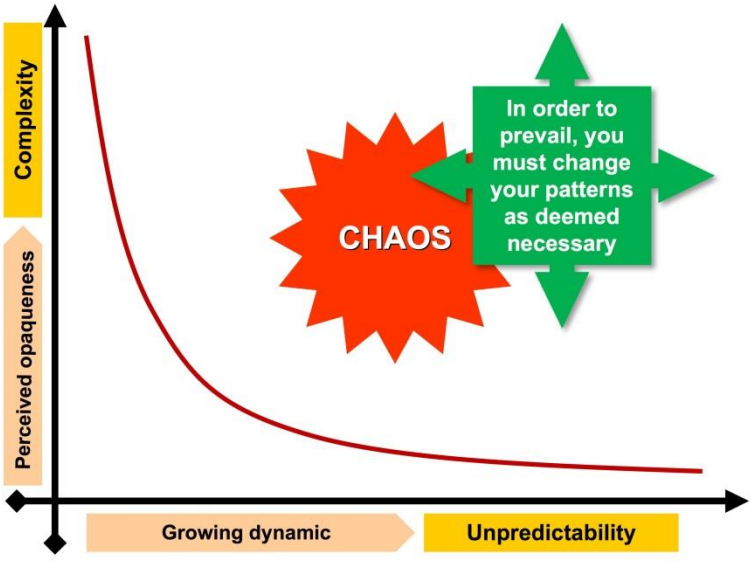
"The battlefield is the scene of constant chaos. The winner will be the one who controls that chaos, both his own and the enemy's."

[Napoleon Bonaparte]

Situations calling for C2/LS can be determined or described via two criteria: the degree of complexity and the degree of dynamics. Complexity represents the perceived opaqueness. The awareness and the knowledge of the individual about the components dictating the shape and the developments of events result in her/his assumed level of intricacy of the overall situation at each point in time[17].

Dynamics stands for the degree of unpredictability of any developments or changes of a situation, or the flow of events, respectively. The more abundant this dynamics, the more C2/LS must accept uncertainty.

Knowledge and experience surely provide some support in the face of such a challenge where things are hard to understand and surprises are lurking around each corner of a dark alley. But knowledge and experience could also be detrimental as they might lead to inappropriate conclusions discharging disastrous decisions. Each individual generates his/her own borderline of pairs of variates (unpredictability; complexity). Anywhere beyond[18] this borderline is "chaos".



[17] Compare the perceived opaqueness of two men watching a game of baseball, one knows the rules, the other has no idea.

[18] "Beyond" from the perspective of the zero-point of this coordinate system.

There is no way to avoid this chaos. Each non-trivial tasking resulting in military operations encounters and sooner or later contributes significantly to a highly opaque and dynamic situation and the sequence of activities occurring within it. Just think about an army unit entering an urban territory to sweep it free of enemy forces.

C2/LS personnel therefore cannot be thrown into such situations early enough. "Chaos" must turn into the "standard" overall situation, the environment where C2/LS competence has to take effect. The idea of "moving out of the area of chaos back into well-ordered circumstances" is a dangerous illusion and inevitably leads to defeat. The abstract directive (or doctrine) therefore contains just two points:
1 – Stay in the area assumed as chaos (accept uncertainty, lack of knowledge, absence of total control, etc.).
2 – Maintain and apply a high degree of flexibility when it comes to conducting operations.

Patterns of activities are inevitable (and also helpful). But we must not apply a pattern to change a pattern. What has been most successful at time point x at location y could be a total disaster somewhere else.

The E&T of C2/LS personnel has to deal with exactly this subject. In a practical way! A purely theoretical contemplation will definitely not achieve success, i.e. competence improvement. The trainees have to experience the situations that were, for example, presented to them as a short historical excursion. This experience is brought to the trainees as a C2/LS challenge they have to "solve", i.e. try to achieve victory.

As no one seriously wants to execute a real operation, much less fight a war (or fight a historical military confrontation again), to bring this challenge to life, one must use simulation systems.

2.2 SIMULATION

> **"The war with Japan had been enacted in the game rooms at the War College by so many people and in so many different ways that nothing that happened during the war was a surprise – absolutely nothing except the kamikaze tactics toward the end of the war. We had not visualized these."**
>
> [Chester W. Nimitz]

Simulation systems have been in use since the existence of civilizations. The capability to run simulations is not linked to the availability of computers. The military branch of simulations, also called war gaming, experienced its first heyday during the 19th century as a stunned world witnessed an unprecedented swift sequence of successful military campaigns turning Prussia and its patchwork of allies into a European power. Moltke the Elder, his Kriegsakademie and the "Kriegsspiel" brought forward an age-old idea to a new level of effectiveness.

At that time, simulation systems served to prepare for war. The capacity, especially the inherent potential for E&T purposes, was fully exploited and influenced both the set-up of military forces as well as their conduct in operations. The E&T model described in this document does not share those aims, of course. But it is fully aware of the usefulness of simulation systems, especially those NOT based on computers. There are three main reasons for that.
1 – Non-computer based simulation systems are completely transparent to all their users (players, umpires, observers, etc.).
2 – There is an incredibly extensive amount of commercial war games, also called Conflict Simulation Systems (CoSim), available. Those games, or systems, cover nearly everything from the Stone Age to contemporary conflicts and beyond. There are CoSims for every C2 level, all military domains (from ground war to space), and the scope of conflict ranges from duels, skirmishes, battles, campaigns, wars to whole historical eras.
3 – The monetary effort to procure and modify those simulation systems into effective tools for the C2/LS Competence Improvement E&T effort is ridiculously low.

A simulation system (or war game) always contains a conflict situation that, once started, is continuously carried forward within the system driven by the decisions made by the players. Any and all interim results as well as the final outcome are not predetermined. War games are not "scripted exercises". Each simulation system provides a comprehensive micro cosmos containing all selected/desired/requested parameters and factors. The whole thing is set into motion once the first game turn has started. Whatever the system, within a few turns (deliberate segments of time slices), if not already even before the very first turn, the players (i.e. the trainees of the E&T model) find themselves deep within the chaos surrounding the C2 of military operations[19].

[19] This is the perception of the trainees. Compared to the real world, the complexity generated by a CoSim is self-evidently harmless.

2.3 PLAYING

> **"You can discover more about a person in an hour of play than in a year of conversation."**
>
> [Platon]

> **"We don't stop playing because we grow old; we grow old because we stop playing."**
>
> [George Bernard Shaw; Benjamin Franklin]

> **"By playing games you can artificially speed up your learning curve to develop the right kind of thought processes."**
>
> [Nate Silver]

Using words like game and playing in the context of military matters runs the high risk for a document like this of being discharged as being "frivolous".[20] Nevertheless, the E&T model described here leans heavily on "games" and "playing" in general and "playing CoSims" in particular.

What makes playing, and playing games so important and profitable regarding C2/LS Competence improvement?[21]

Step 1 examines games in general. The topic, the particular mechanisms and rules are not under consideration at this point.

Games are structured frameworks established by the rules and the game composition allowing the reflection on the consequences of interconnected decisions. There is nothing fuzzy or hidden in the static component of games. The dynamic solely exists in the processes occurring during game play. This is where the chain of decision-consequence pairs is generated.

Games provide situationally adapted parameters for orientation. There is always a discrete objective (which itself could consist of a set of subordinate objectives and so on) defined for the game. This allows a permanent aim-oriented assessment. A spin-off: games spark the mental discipline to seek the best solution. Games transform complex circumstances into much more simple notional structures. This way the tool to be used for the E&T can easily be focused and any and all elements deemed irrelevant can be excluded from the beginning.
Games provide rules and clear facts, but also offer room for chance and spontaneity. The combination of rules and chance turns games into platforms for creativity and imagination. The players are the protagonists. Their combined behaviour determines the course of the game. As said earlier, this E&T model does not pursue the concept of scripted exercises.

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[20] For a thorough analysis of this phenomenon, see the presentations of MG Andrew Sharpe (The Problems with Wargaming in the Military) and Professor Phil Sabin (Addressing the Stigma and Scepticism Wargaming Attracts) on the occasion of CONNECTIONS UK 2013 (King's College, London); http://www.professionalwargaming.co.uk/2013.html

[21] The main source for the examinations conducted here was Dietrich Dörner's book "The Logic of Failure: Recognizing and Avoiding Error in Complex Situations", 1989

Games are a holistic supervision of both the systematisation and alternative interpretation of data in parallel. All players have access to the game situation (looking at the game board, reading game tables, etc.) but this rather static shared situational awareness competes with the players' subjective situational understandings. One challenge would be to turn those into a shared situational understanding.

The perceived opaqueness of game rules (due to the fact that rules are not a familiar construct of communication) impedes the reader from discovering the provided well-ordered structures. So it requires a tremendous effort of thinking by the individual to reveal those structures; thus, positively affecting his/her education.

Step 2 opens the game box and takes a look at the effects of playing a game.

The fascinating effect of playing a game is the parallel occurrence of the following activities applied by the protagonists: Holistic, systematic thinking unites with linear and functional thinking. Logic, imagination, purpose, flexibility, and capabilities are brought together.
Games operate solely with quantifiable factors, but they make intangibles transparent at the same time. For example, in a CoSim dealing with air warfare, the players enjoy a comprehensive overview about all parameters defining a mission. But none of the players can predict the outcome of a mission, as the flow of events will entail too many variations.

Game playing demonstrates the effect of simplifying decisions by reducing situations to their core elements. It is also a kind of fitness program for thinking: only reasoned thinking and valid action are rewarded. Everything outside that frame is simply ignored by the game system and made crystal clear to the players. This inherent condition also automatically exposes the true thinking templates of the players.

Success in a game requires the combination of an effective perception of the game together with a thorough understanding of strategy and tactics (detached from any game). A game therefore provides a platform to have the individual „play"with his/her grasp of getting things done. Playing a game forces all players to take a risk. Not just once but throughout the duration of the game[22].

Step 3 addresses the effect on the players of games.

Human thinking is influenced by the way this thinking is organized. Playing games affect exactly this. It offers the individual to apply a substitution of the OODA coil spring and to recognize its universality. Thinking is also a slave of applied routines or patterns. Switching between patterns requires a person to enter new positions or to apply different perspectives towards the same object. The occupied perspective strongly influences one's actions. Playing games reveals the true patterns of thinking followed by the players. A change of thinking cannot be ordered, only accepted and internalized by the individual. Games provide invitations to exactly do this[23].

[22] Games provide an organized frame work compelling the trainees to accept and actually exploit uncertainty.

[23] Do not underestimate the inertia brought forward by the individual. Change, or: voluntarily leaving one's own convenience corner is anything but easy.

Playing games trains the individual's perception. He/she could recognize:
1 – The Perception trap. As perception is always subjective, all conclusions solely based upon it (including decisions) are inevitably flawed as they cannot overcome the conflict between the one-dimensional view and the existing multi-dimensional structures and processes[24].
2 – Perception and language are inseparable buddies. The subjective reality is reflected via the words used to describe it. Language also determines our thinking and thought process (and vice-versa). This way the Perception trap also contains a semantic trap.
3 – Both the egocentric and allocentric views upon things are valid and best applied in combination (i.e. deliberately switching between them). All this fosters the effects of changing perspectives and operational patterns.
4 – The Complexity trap. There is always a difference between the assumed degree of difficulty to achieve the solution and the level of entanglement affecting the situational elements of concern. A further conflict results from the concurrence of static and dynamic elements. Finally, there is the requirement to maintain observance of processes of plurality and linearity existing and influencing each other in parallel.
5 – A critical approach to deal with complexity is to deny complexity.

Last, but not least, there is the observer's perspective of the events happening within the game and, for the purpose of this E&T model are more important, occurring and affecting the players (trainees) as well as their contributions to the events. There is communication at game level but definitely far more on the meta level as the trainees attempt to find an effective way to master the challenge. Team work, either based on pre-determined teams or left to the trainees own design, reveal a lot about the subliminal and open processes of individual thinking, applied C2/LS, knowledge sharing, and conflict handling.

Everything addressed here provides plenty of opportunity for the trainee to cogitate about his/her C2/LS competence. This is of course in line with the overall idea of the E&T model, but this cogitation should not be left to chance.

[24] This insight brought to life the concept of the Staff of Officers supporting the single Military in Command.

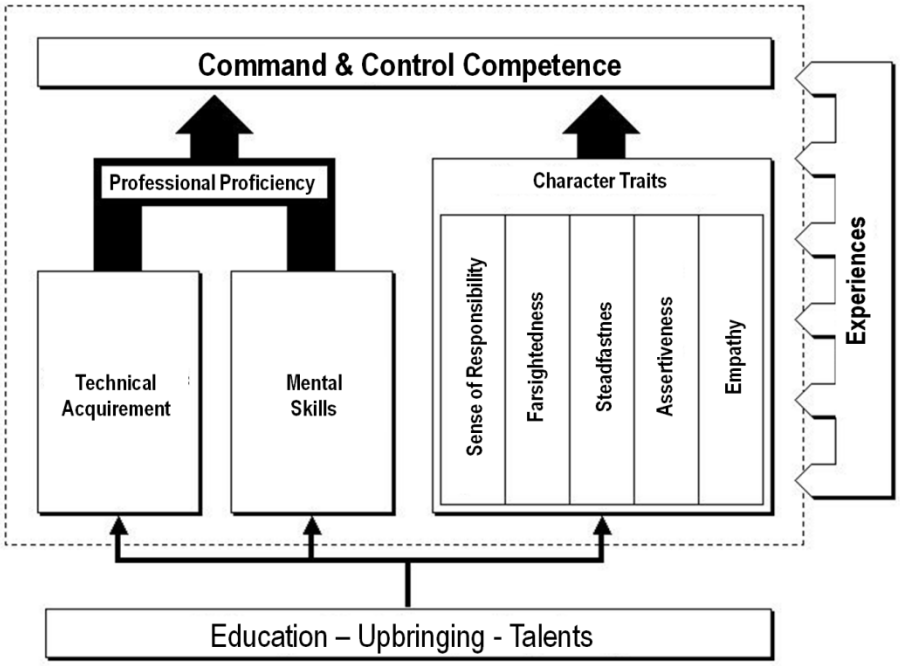
2.4 THE TOPIC

> **"Give me six hours to chop down a tree and I will spend the first four hours sharpening the axe."**
>
> [Abraham Lincoln]

The E&T model aims to improve competence; and applies CoSims as a tool to establish the environment for the trainees to start and run the required process. This is the starting point, as abstract as required, as simple as possible. The execution of a concrete E&T event, e.g. a seminar, also needs concrete content. Both for the competence as well as the CoSim.

There are many theories/models for competence, of course. The two selected here fit into the E&T model easily as they substantiate the seminar set-up (in accordance with the Octagon of Didactics, for example).

The first competence model shown here is derived from the German Armed Forces Doctrine Capstone document (ZDv 1/01 (draft)).



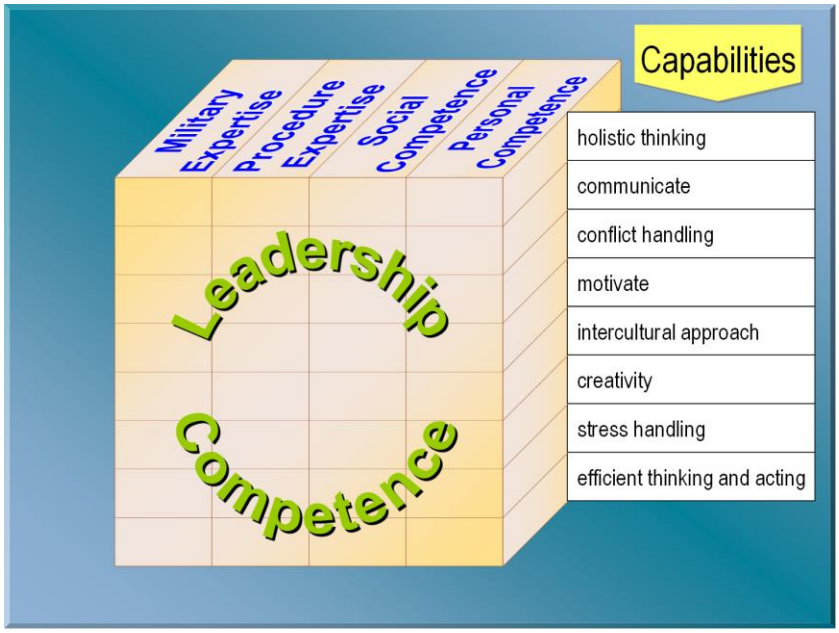
It provides two competence sub-areas (with a total of seven fields of interest), and it includes the key factors of education, upbringing, talents, and experience.

This allows the trainers to focus on a selected subset for each specific seminar run[25].

The second one is a copy from the competence model used at the German Armed Forces General Staff College, called the Competence Cube. This approach understands the C2/LS competence as a composition of actually four competences/expertises. Each of those areas can be assigned an identical set of eight capabilities. This creates a "cube" containing 32 "drawers".

[25] Note that experience can neither be learned nor taught, only made and told about.

This is a nearly perfect construct for the E&T model presented here. The teachers/trainers can select whatever combination of those drawers to define the focus of the planned seminar or E&T event. Experience tells that such a set should consist of about two to four drawers; otherwise the intended focus might not materialize during the course of the event.



Military Expertise
In this context the military expertise is a blessing and a curse. On one hand, it could support the execution of the simulation system used as the trainees interpret the abstract rules to support their rationale. On the other hand, exactly the opposite could happen if the trainees start to compare the simulation system with their perception of the simulated reality ending in complaints about "lacking realism" and/or endless discussion about what has to be changed in the simulation system.

All this can be avoided if a historical topic covered by the simulation system is ostensibly far off any military expertise that could be expected from the trainees[26]. Experience shows that any conflict selected as the topic for a CoSim that took place before the 20th century will not run the risk as described above. When following that path, part of the E&T event should contain a kind of "history" presentation to introduce the trainees to the time and events they will be confronted with in the simulation.

Procedural Expertise
It provides a lot of tools from the trainees' side. But, not surprisingly (see also Part 3), this knowledge slumbers in the minds of most and often requires an external stimulus to awaken this competence.[27]

Social Competence
It mainly deals with the individual's capacity for teamwork (regarding any position within a team).

Personal Competence
It might be the toughest challenge for the trainee. The disposition of an individual to reflect on him-/herself cannot be taken for granted. A key question: "How do I face and handle chaos?"

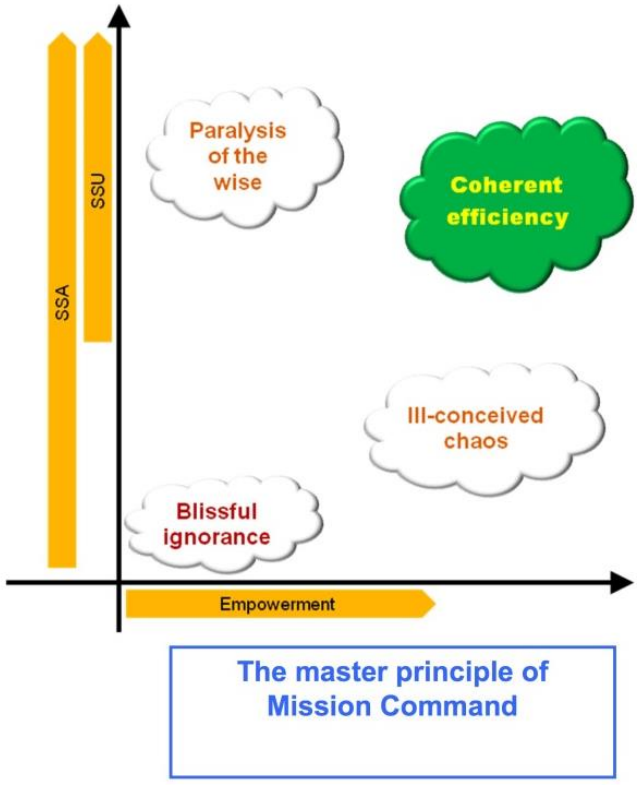
[26] Yes, it is for example possible to train Air Force officers to improve their C2/LS competence espcially in the realm of Air Warfare using a simulation system not addressing aircraft at all.

[27] Key elements of NATO E&T efforts are topics like the OODA loop, the CoG, the LOO, a lot of checklist, etc. But are those things applied outside the environment they were introduced into? Rarely, if at all.

The eight capabilities add “spice” to the competence oriented set-up and allow a further sophistication of the competence profile. Here is just one example for such an approach.

The diagram shown here was taken from a JAPCC project paper dealing with “Mission Command in a NATO Network Enabled Capability”.

This theoretical construct could be used as the starting point for the whole E&T event set-up. What will be provided for the trainees? What should they experience? Should they be aware of all of this from beginning? Will they be tasked to move through all four areas deliberately? And so on. The options are limitless.
The selection of which CoSim to be used is determined by the teachers/trainers. They should consider things like: the C2 levels the trainees should be placed at; the scope of the conflict; the military forces involved; JOINTness; COMBINED-ness; the involvement of non-military factors and elements.



The master principle of Mission Command

Finally, the teachers/trainers must consider the time span available for the E&T event. This directly impacts the limit of complexity of the CoSim (this has nothing to do with the complexity of the simulation).

Based on parameters and requirements, the teachers/trainers can then select the concrete CoSim to be used for the upcoming E&T event. There is always at least one existing and available simulation system fitting this profile.

PART 3 – THE KEY

3.1 MOTIVATION

> **"Tell me and I'll forget. Show me and I may remember. Involve me and I will understand."**
>
> [Benjamin Franklin]

This chapter mainly deals with the motivation of the teacher/trainer team. This team is comprised of two types of teachers: the umpires and the observers. They have to be more than convinced about this E&T model. They must also be enthusiastic about it. Otherwise, it will not work as the empathy of the trainees (in any kind of E&T effort) towards their instructors, DISTAFF, teachers, coaches, etc. kicks in when they sense a negative attitude from those tasked with their education.

The team's motivation must touch all aspects and components of the E&T model. The objective, the content, the use of a simulation system, the understanding of key terms like education and competence and the value and role of history all must be actively fed in, applied and promoted throughout the E&T event.

To dispel any misunderstandings, this does not require the team members to recite from a fixed catalogue (or this document); absolutely the opposite is true! Each member has to act and decide individually what to contribute to each event. Exactly this attitude indeed forms the key component of the whole endeavour. You can hardly hope for success when appealing to the individual for his/her own way to education and competence (as described here) using a method violating precisely those "values".

The team has to avoid routine (using a tool like the Octagon of Didactics time and again does not contradict this approach) in setting up each E&T event and adding flesh to the bones of it. For example, the repeated use of the same simulation system will degrade the quality of all efforts and risks turning passionate action into bloodless routine. Yes, dealing each time with another system adds extra work and preparation and requires changes of patterns. There is the main argument for doing exactly this.

Apart from the E&T model inherent claims, there is support (via documented ideas, proven strategies, experience turned into reproducible action, etc.) from the outside. There is no need to reinvent the wheel in the realm of education and competence. Again, such an approach is perfectly in line with the model's values. A key position within this external support is the scientific idea called Constructivism.

3.2 CONSTRUCTIVISM

> **"Only the blockhead recognizing by himself that he is a blockhead, no longer a blockhead is."**
>
> [based on Voltaire]

The sciences engaged with the subjects of learning and teaching have identified three major categories or "schools": Behaviourism, Cognitivism, and Constructivism. This E&T model does not exclude any one of them and leaves it to the team to apply any mixture as deemed applicable. There is of course a kind of unbalance in this, as such an approach definitely does not find acceptance in the world of behaviourism.

Behaviourism was established at the end of the 19th century. At the centre of this theory rests the attraction-reaction scheme. Based on the assumption that the human brain acts like a black box (input produces output), always waiting for external attractions, only to react rather passively. This leaves teachers with the task to feed the brains of the scholars with sequences of specific attractions to trigger predefined reactions confirming the intended results (the scholar has learned what he/she should have learned).

What actually happened "inside" the scholar during this learning process is of only small interest, if any, for the teacher. The teacher enjoys finding confirmation of the principles of attractions and assigned reactions. A much less scientific but drastic illustration of behaviourism is the Nuremberg cone.

Cognitivism does not neglect the capabilities and potential of the human brain; it does not accept the black box theory. This approach aims at the processes right there. Evolving about the same time as behaviourism, the scientists gave attention to the subjects of perception, problem solving via insights, decision processes, the processes that turn data into information, and understanding (what makes the brain comprehend things).

This way cognitivism focuses on the conscious or cognisant processes taking place in the human brain. This makes the individual an active part of learning as the scholar no longer follows context free procedures of input-output but has a chance to build structures that can be assigned to problems in order to increase the chance of solving them.

The theory of constructivism pursues the idea that knowledge about things is the result of a deliberate and active effort of the individual. Insights gained by a person trigger the process to gain knowledge for him-/herself. This implies that all the results achieved according to the theory of cognitivism must first be activated by the individual. The decision to do so is made based on the perception about the encountered events, happenings and experiences made, suffered, or enjoyed by the same individual.

Constructivism understands knowledge is the result of an individual's on-going sequence of insight processes as described above. Knowledge therefore is inherently subjective and not a

convertible copy of an assumed consistent reality. Furthermore, knowledge is generated due to a dynamic, subjective and individual process. "Handing over" or transferring knowledge only works if such a process is initiated and executed. Learning becomes an individual and active process, always situative and strongly influenced by the presence or absence of a community of scholars.

Learning has turned into a way of construction. This dispels the illusion that learning is a matter of digesting input data and copying data. Each individual constructs his/her own knowledge (this also affects his/her education, of course). The main threat to this approach is found in any restrictions forced upon the scholars regarding their self-reliance. The trainees must have sufficient free space allowing them to self-organize their learning/constructing of knowledge. In this context, the application of personal competence increases its importance as it allows the individual to check him-/herself regarding the own strategy of learning. Bottom line: constructivism conceives that knowledge cannot be transported "into" the individual from outside, but the knowledge is the result of an active construction effort undertaken by the individual due to insights gained by the individual motivating him-/herself to do exactly that.

Back to the team running the E&T model. All its members must conduct an orchestra comprised of all three theories of learning and teaching. If they achieve that, some of the individuals involved in the E&T event may grasp that the E&T is self-referential, then the overall objective has been achieved and nothing will prevent competence improvement of those individuals.

3.3 ROLES

"Everything in war is very simple. But the simplest thing is difficult."

[Carl von Clausewitz]

This E&T model only works if the team provides continuous feedback to the trainees. There is spontaneous feedback driven by singular events and occurrences, as well as pre-declared, more formal feedback sessions. Elaborations about the theory of constructivism provide the rationale for that task.

There are countless domains of observation. This E&T model does not include any fixed master list (or check list) for the observers, as this would contradict everything this model is all about. The following 21 domains include examples of questions that may initiate possible feedback directions. This includes a two perspective approach, one is more interested in the "operations", i.e. what is done in order to win the challenge, the second focusses on the "processes", i.e. what strategies are pursued to support the "operations" effort[28].

[28] See also footnote 21.

1- The Operational Perspective

1-1 The compliance with the given objectives, the missions and the tasks.

Is there an overview? Who is responsible for any achievement control?

This domain is, of course, directly linked to the applied C2/LS related behaviour of the trainees as they tackle with the OODA coil spring. Most of the time they are not aware of this, at least in the beginning; and experience tells that situational assessment is the first subphase to become a victim of neglect. The impact on the chance to achieve shared situational assessment and shared situational understanding is then easy to measure. This also leads to blind actionism.

1-2 Holistic/Comprehensive C2 of the operations.

Is there a plan? How is it linked to the activities that are set in motion?

This is a very ambitious task requiring a very disciplined and effective leader and staff. All of them are permanently forced to adapt to an ever-changing environment … chaos.

1-3 Undivided responsibility and unity of command.

What about the effectiveness of the current C2-structure? What are the experiences with centralized planning and decentralized execution?

Success always has many fathers; failure is blamed to a single person. Running a simulation allows making mistakes, suffering losses and generating disastrous results. Nothing and nobody is harmed, except for the … ego.

Did the team of trainees independently establish an effective C2/LS structure? All too often, trainees perceive this granted freedom as a lack of preparation from the side of the umpires/observers team[29]. In practice, this provides an opportunity for the trainees to cultivate their own creativity.

1-4 Flexibility of thinking and acting.

How did you digest the difference between your own situational awareness and the things that actual happened?

The plan is nothing, planning is everything.

1-5 Precise and clear tasking and delivery of orders.

You have your orders in front of you. Why do you hesitate to act accordingly?

I am sorry, the text became so long but I didn't have enough time.

1-6 Gaining and preserving the initiative.

Is all this derived from one's own plan? Who is currently winning?

Are staff and leader considering tendencies and the development towards the "critical point of battle"? Are there deliberate switch points between each phase of the OODA coil spring?

A key element in the handling of a contest lies in the overall posture of enjoying the initiative or being condemned to the reaction role. The point is: are the trainees even aware which posture they currently occupy?

[29] This reveals a lot about the self-reliance of the trainees after many years of being forced to accept a rather passive attitude when it comes to C2/LS.

1-7 Aim-orientied adjustment of effects.
What is the gain of this success? Could you please identify your own and the enemy's centres of gravity?
One of the first things the trainees lose sight of once they get involved into the game are the "victory conditions" which soberly determine victory or defeat within the simulation's micro cosmos. Following that, the achieved successes and suffered losses develop a kind of life of their own.

1-8 Influencing the adversary's volition.
What is the most threatening option of the enemy? What is the most probable option of the enemy?
At the start of a conflict, operational planners quickly view the enemy as an immobile, rather stupid monolith, doing nothing but wanting to be punched by the planner's forces. Once things get going, both sides will not only be surprised about their adversary's agility, but will often incorrectly conclude that influencing enemy future activities is nearly impossible.

1-9 Handling information and data.
Which battle rhythm is applied? Who disseminates intel data?
Depending on the set-up of the E&T event, the flow of data can be channeled to a certain degree (e.g. by dispersing the trainees into separated locations linked with strict specifications for any data transfer), but the information flow is always determined and executed by the trainees. A crucial point is the visualition of facts and figures influencing the flow of events, the planning and operations, or the lack of it. Surprisingly often, objectives (the commander's intent) are neither communicated in a prominent way, much less visualized.

1-10 Force protection
Please show the effective fire range of the enemy. Who assessed the own OOB for strengths and weaknesses?
The "attack" seems to dominate operational thinking. To put it on a level with "initiative" reveals a fatal simplification of operational matters.

2 – The Procedural Perspective
2-1 Formulation/Phrasing of objectives.
Could you explain the rationale for that military activity you are tasked to conduct?
Effective Shared Situational Awareness (SSA) and Shared Situational Understanding (SSU) are prerequisites for any operations providing enough flexibility to change patterns at will.

2-2 Chains/Sequences of objectives and compromises.
What will you do if the intended action does not succeed? What is the impact of the event that just happened?
The achievement of objectives requires a deliberate strategy including a sequence of measurable achievements. Depending solely on chance and coincidence will not suffice. A rigid adherence to a once written plan will also ensure failure.

2-3 Focussed planning and acting.
Where is your plan B? How do you cover the recent drawback?
Everybody is aware of the inevitable deviation from original plans due to events simply happening. But the reaction to such circumstances is far from equanimity.

2-4 Handling of problems.
Who is currently assigned to solve this problem? Who applies time management to synchronize actions and changes of plans?
Problem handling might bring about a whole set of escape strategies. The categorization of problems and/or tasks is rarely applied, e.g. what is urgent, what is important? There are five areas of difficulties or causes for errors regarding the solving of complex problems: the slowness of thinking; the small amount of data that can be processed at the same time; the tendency to protect one's own perception of competence; the small capacity of adding data to memory; the fixation of the attention on the most current problem (last in comes first).

2-5 Information management.
How do you support the idea of SSA and SSU? Who attributes data allowing efficient information dissemination?
Everything outside the human brain is data. Information can be transferred between individuals but only by changing them back to data.

2-6 The mental skills of abstraction, reduction and substitution.
Those three mental skills cannot be trained often enough.
For example: "You have 10 minutes to brief your superior commander. 3 minutes briefing time."

2-7 The balance between knowledge and ignorance.
What keeps you from making the decision to move left or right? Why do you accept the lack of data about the enemy you are going to attack next?
Stupidity collects data, intelligence dispels data.

2-8 Horizontal and vertical escapes.
You as COM JFAC gave direct orders to a single fighterbomber. May I ask why?
There is always a tendency to turn to solving problems that one believes could be solved instead of tackling with problems that ought to be solved.

2-9 Doing things for the sake of doing things.
Why did you execute this action?
This easily recognizable phenomenon results from a rather complex process that started with unsureness what to do, which triggered a detailed planning, which in turn led to even more uncertainty, starting an even more thorough planning process mainly increasing the nagging feeling that all this might not help at all. This is then coupled with an excuse that one is actually confronted with an unsolvable situation[30]. The final step is a liberating act … just to do something.

2-10 Unconsidered methodism.
You just witnessed the failure to achieve the intended objective. Why did you repeat exactly the same maneuver?
The curse of the early victory. Why should one change a pattern that led to success once? This effect could lead to even worse courses of action: the successful patterns turn into rituals, and fulfilling such a ritual overrides everything else.

[30] A conspiracy theory that the CoSim offers no chance for winning.

2-11 Reflection and analysis.
How do you feel right now after your suggestion for the next attack operation was denied by the commander?
The trainees should always be encouraged to reflect on their own thinking and acting, and the consequences of such doing. Learning actually has a better chance to evolve due to recognized and accepted mistakes. Successes rather lull the own ego. Thinking is a resource.

As all this primarily aims at weaknesses and flaws (removing them could serve to improve competence), there is also always quite a few occasions where the observers can confirm more than adequate, up to brilliant actions and activities of the trainees. Such cases also deserve feedback and provide a solid basis for competence improvement too.

The interaction between the trainees coping with the CoSim forcing them to apply their C2/LS competence and the observers injecting feedback provides the decisive environment bringing forward the mechanism of contructivism to a maximum degree of effectiveness: each individual can exploit the chance for sustained learning resulting in his/her C2/LS competence improvement.