

Exercises – Planning and Execution

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The lecture will refer to the following subjects.

1. M&S support to CAX - Organisation and Functions

2. M&S support to CAX - Phases

3. CAX – Application Alternatives

- (1) Real-Time exercises for commanders and their staffs
- (2) Branches- / Functional Areas – related exercises
- (3) Class room exercises

4. Coupling CI – systems ¹⁾ with simulation systems

- (1) Coupling for CAX purposes
- (2) Differentiate coupling for Decision-Support purposes

5. Role – Oriented Graphical Workplaces

- (1) Adaptable workplaces
- (2) Role-oriented operational pictures
- (3) Planning tools

6. Analysis of Tactical Information

7. Civil Environments: “Dual use” – capabilities in SimSys

8. Further – Development of DEU GUPPIS System

9. Multi-National distributed CAX Environments

¹ CI: Communication & Information

1. M&S SUPPORT TO CAX - ORGANISATION

Forces to be controlled by a training audience are substituted by simulation models. This is the main characteristic of Computer –Assisted Exercises (CAX). The models are used in simulations by using computers to generate those forces, their behaviours and their actions over time. Generally the simulation generates a synthetic environment which is the basis for planning and decision-making activities in the staff to be trained .

The organisation of a CAX comprises four different parts:

- The training audience
- The response forces
- The simulation system
- The directing staff (DiStaff).

The training audience works in its real world environment. It has to use those operational tools which are available in real world missions. This staff communicates with its subordinated staffs via its operational available communication means.

The subordinated staffs are represented in the CAX organisation by the so-called response forces. They do not work in their real staff environment but they must use the operational available communication means. The response forces are manned by a restricted number of members of the real subordinated staffs. The aim is to reduce the necessary amount of personnel in the response cells to a minimal number.

The response cells act as an interface between the trained staff and the simulation system. The trained staff should not realize that simulation models are substituting real forces.

The response cells receive the orders given by the trained staff and translate those orders into orders for the simulated forces. These orders are given via the interactive graphical workplaces of the simulation system.

The simulation models process the given orders and provide the data and information generated over time to the response cells.

The response cells translate the dynamically generated simulation results into messages for the trained staff and inform the trained staff about the operational situation in their area of responsibility.

The directing staff controls the exercise. The components within the DiStaff are:

- The higher control staff controlling the trained staff
- The neighbouring staffs flanking with their forces the forces controlled by the trained staff
- The White Cells taking care of those things not represented in the simulation system
- The OPFOR representing the opposite forces
- The analysis team supporting the DiStaff activities.

A CAX might be conducted as a single level CAX. This is a CAX where the trained staffs are allocated to the same echelon. A CAX might also be conducted as a multi-level CAX. This is a CAX where the trained staffs are allocated to different echelons.

2. M&S SUPPORT TO CAX – PHASES

The different CAX phases are:

- Planning
- Preparation

- Execution
- Analysis

Activities in the planning phase cover the definitions for the objectives of the CAX, for the preconditions to be taken care of, for the participants necessary and finally the definition of the CAX concept.

Activities in the preparation phase are the definition of the total operational situation for the CAX scenario as it should be valid at the start time of the exercise (startex). This includes the definition of necessary data collections, the preparation of the simulation data base at startex time as well as necessary adaptations, modifications or extensions of the simulation models involved.

The dynamic development of the scenario as it might be expected during the later execution phase of the CAX can be produced by using the M&S tools available in the simulation system to be used in the CAX. That way it is possible to test in the preparation phase whether the defined CAX objectives can be achieved via the chosen startex scenario.

Activities in the execution phase are the installation of the simulation system (if this is not permanently available in a simulation center), train-the-trainer education courses (that is training the members of the response cells), execute the training of the training audience (as described above in chapter 1) and collect data for the analysis phase.

Activities in the analysis phase are the review of achieved results and the replay of important situations in the scenario development related to planning and decision-making activities in the staff.

Furthermore “if – then” questions could be analysed and answered by using the tools of the simulation system as described for the “class room” activities in chapter 3.3.

The results of the analysis phase should be documented in a report which summarizes the “lessons learned” of the CAX. These lessons learned should be described in such a way that they can be used for the planning of future CAX.

The lessons learned of single CAX should be made available to an overarching common evaluation of the different lessons learned of a larger set of CAX. This is necessary for the further-development of CAX.

3. CAX – APPLICATION ALTERNATIVES

3.1 Real-Time exercises for commanders and their staffs

In real-time exercises orders and messages as well as information requests can be sent to the simulated forces continuously at any time.

The update of the operational pictures within the response cells occur periodically in fixed time steps for efficiency reasons. The time steps to be chosen depend on the echelon level of the training audience.

3.2 Branches- / Functional Areas – related exercises

The simulation systems should not only support the training of higher echelon staffs but also the training of the staffs of forces of single branches or functional areas. In those exercises also all the relations to other branches and functional areas not being part of the training audience should be taken into account. The challenge for those exercises is to keep the required amount of personnel minimal.

This can only be achieved when personnel and its tasks are substituted by models. This is mainly done by two different types of models. The one type is generating the behaviour of forces components, the other type is generating orders of commanding components. Both types are available e.g. in the German simulation system GUPPIS used in the German Army Simulation Center Wildflecken.

3.3 Class room exercises

In class room exercises the use of simulation systems might be used in a mixed mode. In this mode real-time simulation and faster-than-real-time simulation are used alternately.

The students of the class are involved during the real-time simulation. Only teachers of the class are involved during the faster-than-real-time simulation. During this simulation phase the teachers are looking for upcoming important situations. After identification of those situations the students are involved again in the following simulation phase which occurs in real-time due to the training objectives of the class.

This type of faster-than-real-time simulation is called trend-simulation.

4. COUPLING CI – SYSTEMS ²⁾ WITH SIMULATION SYSTEMS

4.1 Coupling for CAX purposes

For CAX it is required that beside the response cells and the opposite forces also the training audience as well as the components of the DiStaff (HiCON, Neighbours, White Cells) should be enabled to exchange information with the simulated forces via their operational communication and information systems.

4.2 Differentiate coupling for Decision-Support purposes

There is a main difference between the coupling of CI – systems and simulation systems for CAX purposes and their coupling for decision support purposes.

The application of simulation systems during the CAX execution phase requires the coupling of CI – systems and simulation systems *during* the runtime of the simulation. This is the so -called “*on-line*” coupling.

The application of simulation systems to support planning and decision-making does not require an “on-line” coupling.

The information exchange between a command post component requiring M&S –based analysis and evaluation support and an organisational component providing such support will occur outside the running time of simulations. This is the so – called “*off-line*” coupling.

The technologies used for information exchange in the case of “off - line” coupling are quite different to those used in the case of “on – line” coupling.

5. ROLE – ORIENTED GRAPHICAL WORKPLACES

5.1 Adaptable workplaces

The interactive graphical workplaces of simulation systems support its users during CAX in the following activities:

- Generating forces and scenarios
- Requesting information, presenting operational pictures and ordering
- Planning and decision – finding
- Analysis and evaluation of simulation results.

Planning refers mainly to the definition of courses-of-actions (CoA).

Decision-finding refers to the comparative evaluation of the expected consequences of CoA if those would be implemented.

² CI: Communication & Information

Analysis and evaluation of simulation results has two aspects. The one is the analysis and evaluation by response cell members during the running simulation in the CAX execution phase. The other is the analysis and evaluation during the CAX analysis phase after the end of the execution phase.

5.2 Role-oriented operational pictures

The different acteurs in the different CAX phases CAX and in the different activities of the CAX phases must perform quite different roles and tasks. Therefore, the usage of the interactive graphical work places of the simulation systems must be very flexible and adaptable.

It must be assured that the different response cell members have only access to those information to which they would have access via those information sources available to them during real operations. This type of flexibility and adaptability supports the system operateur to organize the simulation system in such a way as it is especially required by each single CAX.

Given its role and tasks and within the restrictions related to them, the response cell member must have the flexibility to choose the content of its graphical display situation dependent. This requirement relates mainly to the content of operational pictures.

Examples are given using the simulation system KORA. KORA is the software of the German CAX system GUPPIS.

6. ANALYSIS OF TACTICAL INFORMATION

For CAX at the operational echelons exists a gap in the collection, analysis and evaluation of the tactical information which is exchanged between the different acteurs during a CAX.

This refers to information concerning:

- Orders given to the training audience prior to startex time (pre-orders, reconnaissance orders, orders for the first missions, subsequent orders)
- Messages exchanged within training audience, between response cells, between training audience and response cells etc. (situation messages, event lists, statistical data)
- Measures taken by the DiStaff (orders to HiCON, Neighbours, OPFOR; own activities taken; impact taken on simulated natural environment).

The means used for this information exchanges comprise the operational pictures within the training audience, radio, phone, video and e-mail.

The concept for realization includes document management, exchange of operational pictures, control of radio- and video- recording, e-mail handling, control of replays as well as time synchronization of all these information exchanges.

7. CIVIL ENVIRONMENTS: “DUAL USE” – CAPABILITIES IN SimSys

In CAX more and more non – military aspects have to be taken care of.

Here it is of advantage that a lot of military systems and platforms have a corresponding counterpart in the civilian environment.

Examples will be given based on the simulation system KORA.

Civilian structures as well as their equipment can be represented by using already available functionalities of simulation systems, at least partially.

Further-development of the simulation systems is enforced, at least in Germany, to enlarge non – military functionalities.

8. FURTHER – DEVELOPMENT OF DEU GUPPIS SYSTEM

The German CAX System GUPPIS will be further-developed by a broad band of new functionalities as well as by an extension of already available ones.

This further-development includes the following items:

- Air forces capabilities (extended)
- Navy capabilities
- Joint services
- Joint fire support
- Joint health support
- Special Forces, special operations
- Military police

- NA5CRO capabilities (extended)
- Non-government, irregular and government organisations
- Civil – military cooperation
- Natural and civilisational environments and their impact
- Catastrophic events, missions

- Asymmetric operations and missions
- Collateral damages

- Analysis of tactical communication

- Coupling with communication and information systems
- Coupling with other simulation systems
(see lecture: Analysis & Evaluation, Federation Building)

9. MULTI-NATIONAL DISTRIBUTED CAX ENVIRONMENTS

No NATO partner will go for military missions alone. Therefore the partners will be a component within a NATO mission or within a multi-national mission.

All the partners will train their military staffs at the different echelons using CAX. This training activities will be activities conducted under national, multi-national or NATO responsibilities.

The NATO partners agreed in the NATO Modelling & Simulation Masterplan that each partner nation should have the possibility to use in NATO exercises those simulation systems which he uses also during national CAX.

This agreement yields, among other activities, to the so-called Pathfinder activities aiming at the building of NATO and / or multi-national simulation system federations to support NATO and / or multi-national CAX.

National investments as well as NATO investments should be used economically and efficiently. This requires not only that multi-national federations of simulation systems should be build. It would also be necessary to couple the national simulation centers as well as the national simulation centers with the NATO simulation centers.

A first step in that direction should be to test distributed simulation system federations by using distributed coupled simulation centers.

