THE CZECH ARMY C2 AND SIMULATION SYSTEMS AND DECISION MAKING SUPPORT ARCHITECTURE

BURITA Ladislav, HOPJAN Miroslav

Military Academy in Brno

65, Kounicova Street, K-303,
612 00 Brno, Czech Republic

Phone: +420 973 44 2172

Fax: +420 973 44 2987

E-mail: bur@vabo.cz, miroslav.hopjan@vabo.cz

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
JUN 2004		**00-00-2004 to 00-00-2004**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
The Czech Army C2 and Simulation Systems and Decision Making Support Architecture	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Military Academy in Brno,65, Kounicova Street, K-303,612 00 Brno Czech Republic, ,**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**		**33**	

Abstract

The paper consists of three parts. The first part characterizes the Command and Control (C2) system of the Army of the Czech Republic (ACR) that was developed by the Czech contractor DELINFO. The second part describes the simulation technology and simulation systems (SIM), used in the ACR. The most important is the tactical simulator ModSAF in simulation center of Military Academy (MA) in Brno. The third chapter deals with current ways of C2 and SIM systems cooperation, also possible future solutions and new ideas are discussed.

Introduction

The ACR is in the period of generally transformation. The main goal of this process is to make ACR small, young, modern, mobile, and more effective. The ACR should be fully professional and very well trained. There is important task to develop and implement complex Command and Control Systems and effective systems of training. The paper illustrates state and some trends in C2 and combat simulation systems.

1. The Czech Army C2 System

The new Czech Army C2 System history (after revolution in 1989) started in 1997 by General Staff/J6 requirements. Main players in C2 project was Military Technical Institute of Electronic - system integrator and DELINFO, company contractor. The project has started in 1998 and there is on that project continuing working.

The basic characteristics of the project are: the NATO architecture approach (operational, system, and technical architecture), COTS component using, prototype and incremental development, project management, common operation picture, interoperability.

The most of C2 system application software is of proprietary character, the same situation is in the data and database structure. Developers are in contact with MIP (Multilateral Interoperability Programme) community, but C2IEDM (core of C2 NATO interoperability) is not implemented. The C2 system is partly in military use for brigade and battalion level, but the solution is a prototype and is still not complex.

The C2 system is designed modular and the hierarchic subsystems are shown in Figure 1 and explained in Table 1. The C2 modules are linked by Tactical Area Communications System and by the Combat Net Radio System. Combat forces, weapon systems and battlefield automated systems will be supported by the Integrated Management and Control System that will provide management of tactical communications.

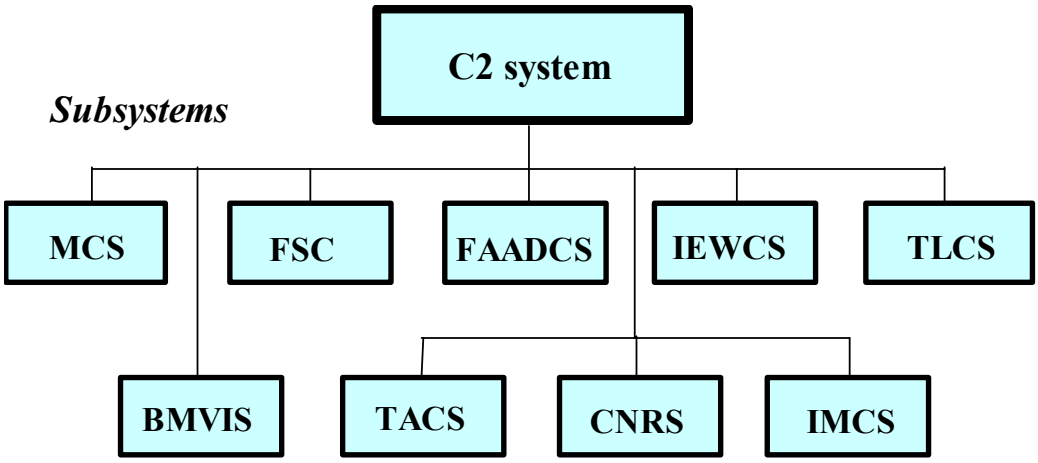


Figure 1 The subsystems of C2 system

There are some original parts in ACR C2 system:

- TAGIS – Tactical Geographic Information System
- ELMET – Electronic Methodology – Steps of Decision Making Process
- OTS – Operational-Tactical Solutions
- FBD – Formalized Battle Documentation

MCS	Maneuver Control System
FSCS	Fire Support Control System
FAADCS	Forward Area Air Defense Control System
IEWCS	Intelligence and Electronic Warfare Control System
TLCS	Tactical Logistics Control System
BMVIS	Battle Management Vehicular Information System
TACS	Tactical Area Communications System
CNRS	Combat Net Radio System
IMCS	Integrated Management and Control System

Table 1 Subsystems of C2 system

1.1 TAGIS – The Tactical Geographic Information System

The TAGIS is a proprietary solution of the geographic information system (GIS) designed for the operational and tactical use. It enables the all-round use of the drawing and editing possibilities over the electronic map, which is based on standard graphic data formats and common used ESRI formats. The TAGIS was developed especially for the military environment (see Figure 2) and was designed like a multi-purpose system, which can be used both separately and in the computer network operation. In addition to the standard properties of the commercial GIS TAGIS enables:

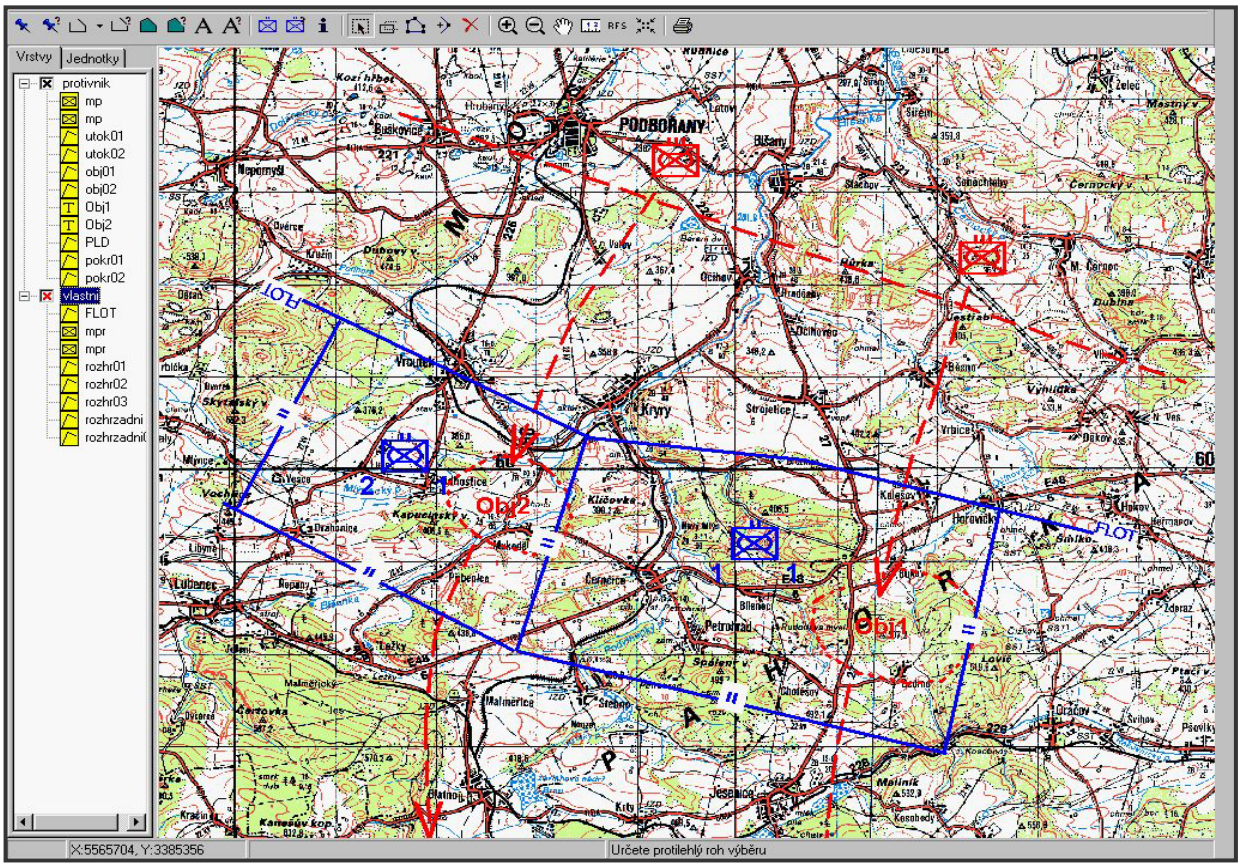


Figure 2 The GIS interface and the ELMET

- The full-value entry of the operational and tactical situations with the use of all objects in accordance to ACR and NATO standards
- Creating and editing the new operational and tactical signs including their text description
- Interconnecting the plotting of the operational and tactical situation and the database with the combat documents
- The work with the raster and vector data respecting common used data interfaces - the raster map, the digital model of the terrain and the relief of the terrain, the electronic products of the terrain analysis, the digitized aerial pictures etc.

1.2 ELMET – Electronic Methodology of Decision Making Process

The ELMET is an author's solution of the applied software system which is designed for the control and co-ordination of the decision making process steps. It is designed as a multi-purpose system and when loaded with the appropriate data it can be used not only by land forces, by the Air Force, by the Territory Defense Force, or by the Logistics Headquarters and by the crisis management. It is fully compatible with the other applications of C2 system. Main properties of ELMET:

- ELMET is a groupware solution for the LAN (Local Area Network). The synchronization of the work under ELMET is carried out at the task time
- Each phase of ELMET has the navigation screens with the standard structure and specific contents defined for the specific staff officer (Figure 2). The navigation screen contains three basic fields:
  - Field of activities – it defines the activities for the individual officers of the staff
  - Field of aids – it contains the software applications to support the standard activities listed in the field of activities
  - Field of documents – it contains the list of the formalized documents available for the user during the operations defined in the field of activities
- The authorized officer can distribute, in case of need, various kinds of signals in the LAN by means of ELMET

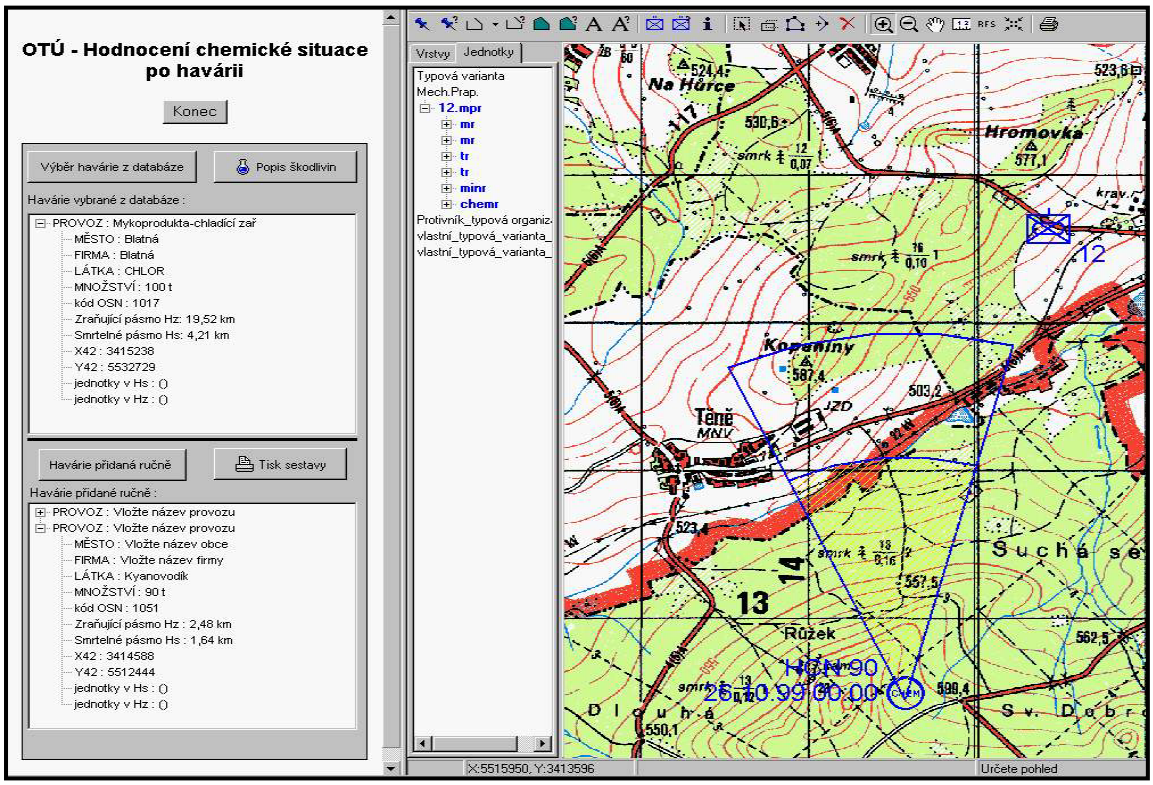


Figure 3 The chemical situation assessment

1.3 OTS – Operational-Tactical Solutions

This group of applications supports all commanders and staff officer tasks. In actual solution there are 10 specific applications for supporting typical commander and staff activities. Some of interesting solutions:

- Rough Time and Transport calculations
- Ratio of power, Optimum variant selection
- Electronic methodology of the Topographic data (electronic maps) demand
- Chemical situation assessment (Figure 3)

1.4 FBD – Formalized Battle Documentation

The FBD is an application designed for the co-operation of the formalized combat documents. It is a base of the formalized messaging according to STANAG 2014, STANAG 2434 (APP-9), STANAG 5500 (Formets-AdatP3). The formalized document can be prepared in Czech and English languages. It ensures the operational interoperability with NATO with respect to the formalized structure (Figure 4). The full procedure interoperability with NATO in accordance with the AdatP3 standard will be ensured after completing the coding tables of message items. The application has the following basic features:

- It enables the distributed processing of the documents by the authorized officers
- It has the direct data relationship to ELMET
- It receives the data from the centralized database of TCCS
- It is using the HTML technology, but it complies with the requirements of the XML

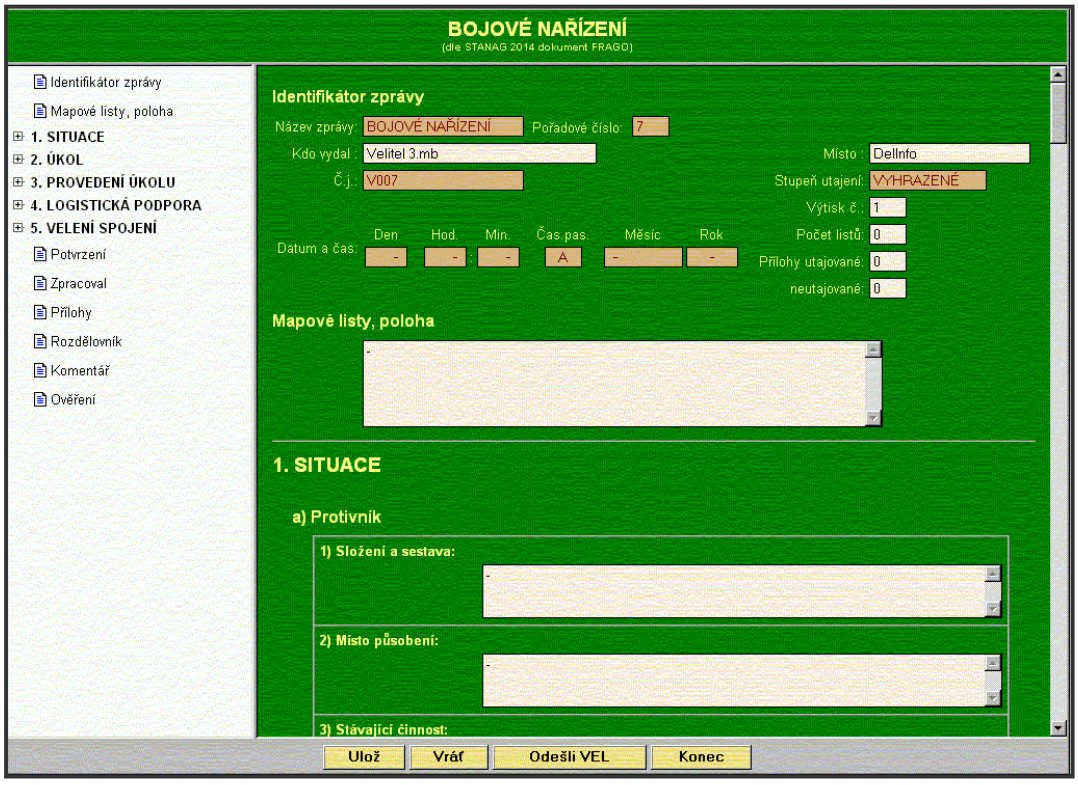


Figure 4 The Formalized Battle Documentation

2. Simulation Systems in the Army of the Czech Republic

The development in M&S field was affected in a similar way like the C2 systems. There was looking for ways to implement NATO procedures and standards in 90th, when our military aimed at full NATO membership joining the Partnership for Peace program. To enable future seamless cooperation of military units we were to train together at all military levels. There was also a big technology gap to bridge that we would not be able to reduce in sufficiently short time without help of our partners. In 1999, the ACR received in the Foreign Military Financing (FMF) contract frame first constructive simulation systems – Janus and ModSAF 5.0 International. In the same year, our first national simulation centre started to prepare Computer Assisted Exercises (CAX), and, with our MoD chosen coordinator, VR Group ltd. company, started to customize simulation databases, build our own terrain databases, and customize individual modules to include system behavior according to our doctrine and equipment. Another contract with US government, represented by US Army STRICOM (today PEO STRI), guaranteed delivery of basic set of live simulation system – MILES. In following text, we will take a closer look at our current simulation systems.

2.1 Tactical simulator ModSAF

The original ModSAF 5.0 International was chosen as the main tool to support CAXes for many reasons. First, the ACR organization is undergoing changes coming to significantly reduced numbers, and force structure changes. That means brigade level will be the highest non-reserve echelon to train the staff.

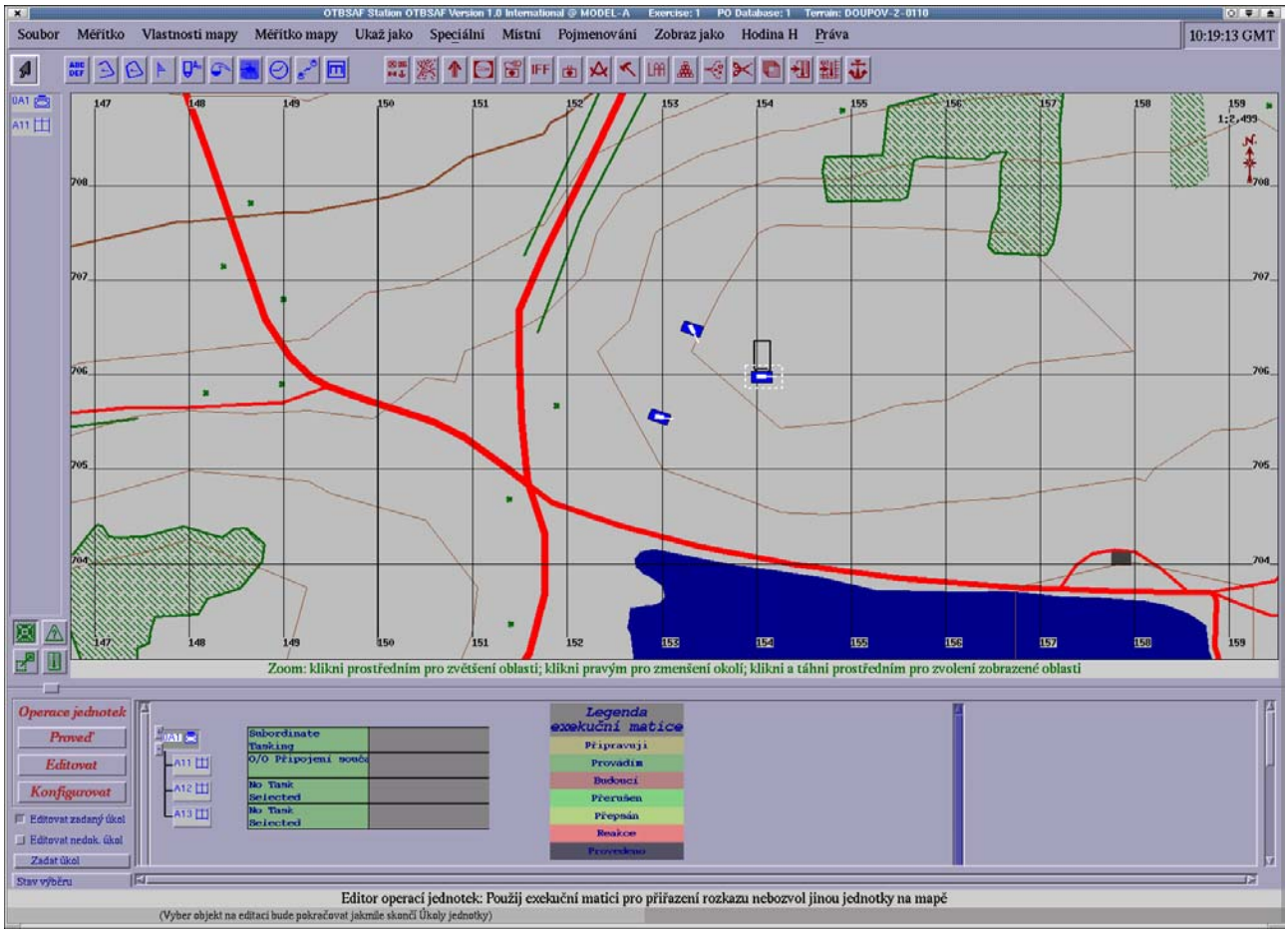


Figure 5 OTBSAF screen

Second reason is that the future development of ModSAF supports its leading position. This system successor, OneSAF, is likely to answer future constructive simulation needs of our military. It

should resolve ModSAF (OTB) limitations, for example better suitability for brigade level exercises, compatibility with current and emerging standards (HLA, SEDRIS). And, because current version, called OneSAF Testbed Baseline (OTBSAF), see Figure 5, is being developed and customized also in Czech Republic, the future system functionality can profit from already developed modules and features.
ModSAF and his successor, OTBSAF, have undergone a series of modifications. Starting with our terrain databases, interface customizing, physical models, and behavior model changes (our weapon systems are based on OPFOR models, that were lower fidelity than US models), we have implemented a tank deep water crossing capability, improved the wheeled vehicles maneuverability, changed building boundaries to make for vehicles route planning, and urban area crossing easier. The Air-to-air and air-to-ground missiles behavior that was prone to allow friendly fire was changed.

2.2 Artillery simulator

Current artillery simulator used at Military Academy is in fact a Fire Direction Control simulator. It uses flat screen where terrain is projected, units positions are marked by red and blue lights behind the screen, these lights are fully controlled, both their position and movement. Trainees must locate coordinates according to light and sound effects. After adjust fire new coordinates are estimated.
Disregarding the missing 3rd dimension complicating distance estimate the system visual and sound cues are quite good. But, this simulator cannot be connected to another system, no today used laser rangefinders or night vision devices can be involved, scene change is comfortless. New system is under development.

2.3 Air traffic control simulator ISVLET

Pilots and air traffic control staff use this constructive simulation tool developed for civilian use but capable of military aircraft simulation, too. This system can be connected to territory network (this feature is obviously limited by air traffic safety concerns), as well as to another constructive simulation tools. AAR capability is included. Primary focus on civilian use means that this system is not suitable for fighter control.

2.4 Virtual simulators

Virtual simulators used in the ACR are fielded in low numbers. They are used for individual/crew training, and they allow broad spectrum of missions to be practiced. They do have interface modules necessary for DIS network interconnection to constructive simulators (OTBSAF). Main benefit of this is more fidelity and model enhancement in constructive system enabling, rather than routine virtual players in tactical level (Battalion) CAX. Virtual Tank T72, APC, or combat aircraft L 159 ALCA (Advanced Light Combat Aircraft) simulators type 1 are in this group.
Virtual simulator type 2, up to mechanized or tank company size, is a suitable tool for small unit training, as well as for higher-level constructive CAX.

2.5 Live simulator MILES

The Multiple Integrated Laser Engagement System (MILES) has been customized for our direct-fire weapon systems, but its full use will be possible only after building fully equipped training range, on-line communicating with individual combatants and vehicles. Current off-line set is limiting not only from AAR prospective but also prevents from building live-constructive simulation network.

2.6 Simulator BVIS

BVIS stands for Combat Vehicle Information System, currently fielded ACR C2 system. It is in fact a training-centre instance of real system allowing conducting CAXes in contemporary way. Another goal is to train commanders for transition to routine use of this new system, there is still little experience from its field employment.

BVIS is, as follows from its deployment level, message-based system, using tactical radio links to bring to lowest commanders the Common Operational Picture.

2.7 Embedded simulation implications

The future of computer based training and simulation will without doubt cover more of today's training time, because the potential of Computer Based Training (CBT) is still growing. The original military simulation systems classification – live, virtual, and constructive, is increasingly insufficient as individual independent systems linked together contribute to more complex one, and, hopefully such a system that resembles more the real war fighting. Combat units tend to be more and more mobile; the same is requirement for their logistics tail. Simulation systems leave exclusively training centre utilization and approach the Mission Rehearsal Training (MRT) pattern, simulators have smaller footprint. They need less space, less additional hardware, less energy, they need fewer personnel to operate and maintain. Like personal computers and consumer electronics products, the trend is to miniaturize these devices, and embed them within weapon systems and platforms.

How difficult it will be to allow increased price for new or modernized combat vehicle with embedded gunnery simulator? It is very clear that in our days when financial constraints drive considerable downsizing of our military higher single price would lower total number of vehicles procured. There are many factors:

- In-theatre training capability is necessary for relatively small portion of our military, the rest stay in their garrisons for most time
- How will the new training capability affect total life cycle cost of such weapon system, there will be higher wear-and-tear expenses
- Development of simulation system, and its own life cycle will be coupled more with a weapon system, will there be more pros or cons (tighter connection could be economic, too – for example using the vehicle software, ant thus simplifying development of simulator as well as future upgrades is a real benefit)?

Even if today's technology and economy constraints do not allow to embed simulation systems into weapon platforms future development, miniaturization, and computer hardware falling prices mark clear trend. The best solution is to be prepared.

At Military Academy, several projects aimed towards improving training (continuous development of OTBSAF constructive simulator, virtual small-unit-tactics simulator, see [Fra-2004]), education (distributed learning), and decision support tools are solved.

3. Future integrated C2-SIM environment

This chapter brings current solution [Sna-2003] of C2-SIM integration and its positive and negative issues. This solution is only as a research project, not implemented yet. More general points of view, knowledge from international co-operation and new ideas – more decision support oriented solution are mentioned in the rest of this part.

3.1 Strategy of integration

In December 2003 was concluded the first phase of the project – the analysis part of future C2-SIM integrated system of the ACR. Figure 6 shows suggested simulation centre extension.

The blue part is the current SIM centre staff, in green boxes are the players – battalion commander, his staff, and company commanders at simulator workstations.
Red parts depict the C2 system which consists of higher-level ASVVR, and the field part, combat vehicle installed BVIS. Battalion commander can use his Forward Observation Post (dashed green box), equipped with virtual simulators type 2.

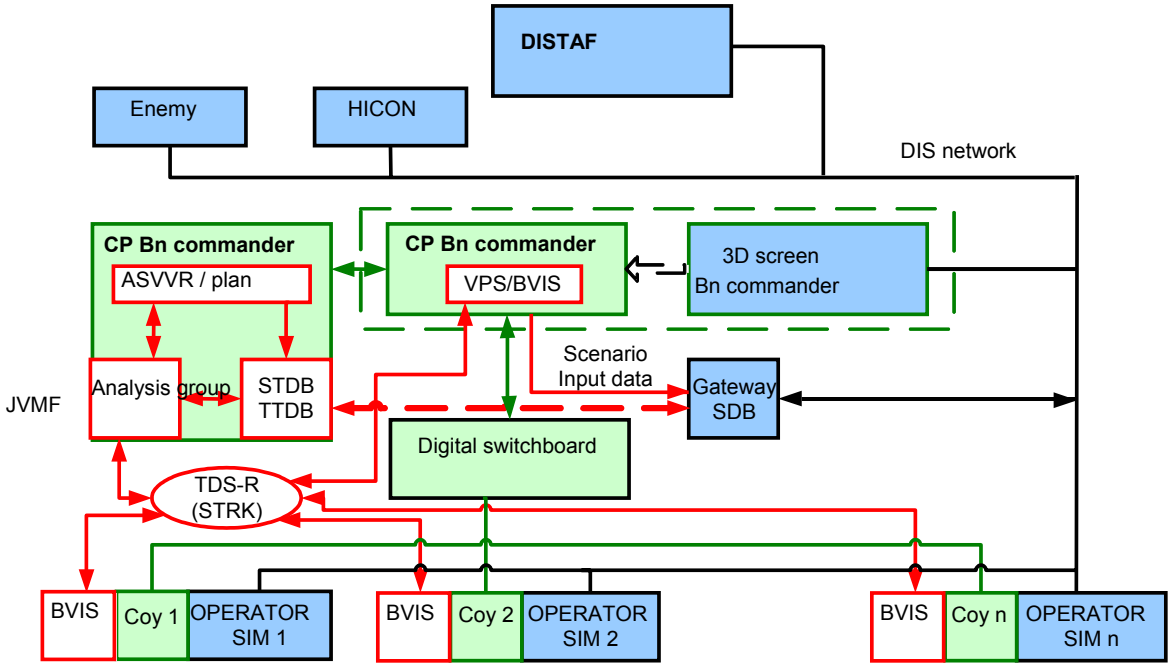


Figure 6 The C2-SIM connection

As we can see this is typical configuration of Human-In-The-Loop (or Swivel-Chair) type when only formatted messages translation can be automated and directly transmitted. The C2 systems are fielded for short time, the cooperation is yet to be tuned up.
Another information, not directly flowing from the chart, is that both systems are located at the simulation centre. The reason is that no satisfactory data security solution is available now.
Important thing is, start using the integrated system soon to get experience and new requirements for developers
The basic task for C2-SIM integration is to improve both part of connection. There are some reasons for this integration:

- The same system is used for training, testing and operational use
- The military know-how, decision support and training are embedded (individual and group)
- It is possible to analyze military activity, to plan missions and to repeat all tasks
- It is easy to realize supervision of training staff

The C2-SIM connection is complicated, because there are different architectures: Technical Reference Model (TRM) for C2 systems and High-Level Architecture (HLA) / Distributed Interactive Simulation (DIS) for SIM system.
Another situation is by General Unified Model (GUM) that is starting point by producing C2-SIM systems of the new generation, but this is not our case.
The integration idea begins by the specification of the common functions:

- User interface
- Management and realization

- Data and algorithm

There are more points of view to integration; for example C2-SIM warfare, communication, data model, etc. C2 system can support staff training SIM system, C2 system can organize its activity against SIM system or C2-SIM communication may be message or data-replication oriented.
All above mentioned SIM variants are detachable in extra context by validation of simulation model in positioning to even state (adversary), to superiority state (staff exercise, simulation of subordinate units). This ideas look to different designed simulators and it is perhaps a very expensive and complex direction of C2-SIM integration. Another point of the same view is an incremental project than can step by step improve the previous solution.
C2 system can be supported by staff training SIM system, which means: Simulator delivers to commander and staff data from subordinate units (CGF, generally complex of constructive, live, and virtual simulators), and it also verifies consequences of commanding process receiving orders and performing appropriate activities. This is the most common view of C2-SIM compound system.
C2 system can organize its activity against SIM system, this topology is based on "equal" position of both systems. This would be feasible especially when we would be able to separate both systems physically. Such a configuration would be beneficial for simulator validating process when different data sensibly interpreted can point to unaligned counterparts of both systems. Another question arises when will simulation system be mature enough to be nontrivial counterpart to commander and staff. Such a configuration would be possible after successful integration of simulators, simulation of communication channels must be seamless part, too. So, this is correlated to near/far goal questions.
C2-SIM communication may be message-based or database-replication oriented. These issues are basic for decision whether Message-Exchange-Mechanism or Data-Exchange-Mechanism is applied. Current situation, legacy systems support message-based solution, when C2 system is the base (there always will be message flow among combat vehicles, these messages should be transmitted in the most efficient way, the same attitude applies for system maintaining COP, simulation, terrain, etc. databases).
If we step back, and say that all information is stored in central databases that have robust maintenance and replication infrastructure then demand-based, periodic, or change-raised updates sent to appropriate recipients can assure the common interface.

3.2 The model C2-SIM interface

The interface model structure is a large and complex task. The exchanged data should have the same representation, but it is unrealistic requirement, so that most of data elements must be transformed in the interface. There are 3 categories of interchanged data:

- Persistent
- Variant
- Control simulation

The persistent data is prepared before the simulation and than stay most time stabile. The variant data respect only small changes in data elements on both sides of C2-SIM. The growing problem is bulk data presence. Intelligent sensors, UAVs supply graphic or video data crucial for taking appropriate measures by commander. It is possible to build a repository of such data in advance to stimulate C2 system. But it is impossible to get a reflection to bulk data from simulated echelons without human-in-the-loop interface.
The C2-SIM integration is possible due to common part of both systems: GIS (terrain database), coordinate-system, tactical and situational signs (marks), military units organizational structure and equipment database, command and control system, and the other data of military significant purpose (NBC, fire support, engineering, logistic…).
Interface should be hardware – software block that will transform all data into C2-SIM understandable formats / protocols. After that we will have C2 automated system fielded the time and data synchronization might be challenged in case of operational leaps. Simulation systems can support virtually any synchronization scheme while C2 systems using GPS must follow real-time

only. A leap can be connected with significant database changes, there must be no data loses, holes, or improper data.
C2 systems have built-in information filters to higher echelons and all data from intelligence and sensors are present in the system. In case of aggregated simulation the fine granularity data is missing. We might need to see details of small task unit also from e.g. brigade level. This, so called zoom capability is very challenging requirement to simulation system.

Groups of messages communicating via the interface:

- Operation orders, operation plans, directives, warnings and other command and control document
- Situational and state reports that are used by all types of military units by informing own units (equipment, activity, targets, position) to superior command post, neighbor's or co-operation units.
- Reconnaissance/surveillance information reports about enemy.
- Fire and anti-aircraft supporting data used by artillery, for air-assault support, by corridor definition or by electronic warfare.
- The engineering support data of minefields, barricades, new built, damaged or constructed bridges
- The NBC data as a source of NBC reconnaissance or analysis, radioactive contamination
- The logistic support data used by material, water and food supplement, health care

3.3 The Enterprise data warehouse position in the model

The Enterprise data warehouse (EDW) is rather new technology that enables effective decision support. We can compare EDW with information system (IS) technology. The main differences between EDW and IS are:

- Subject oriented data (EDW queried more IS sources and external sources)
- Data integration (ETL processes prepared data from variety sources)
- Historical data and summary data are included
- Data in EDW are not edited but are relative stabile (repeated batch inclusion)

Above named features should be applied by C2-SIM integration. Some typical subjects are recognized: GIS, exercise, communication, data model etc. These subjects can support activities of both systems.
The MIP/C2IEDM (Multilateral Interoperability Programme / Command and Control Information Exchange Data Model) can be an integration tool of data and in another point of view can C2-SIM complex be useful for C2IEDM verification. C2-SIM should transform its data to the C2IEDM structure that should be a structure of EDW.

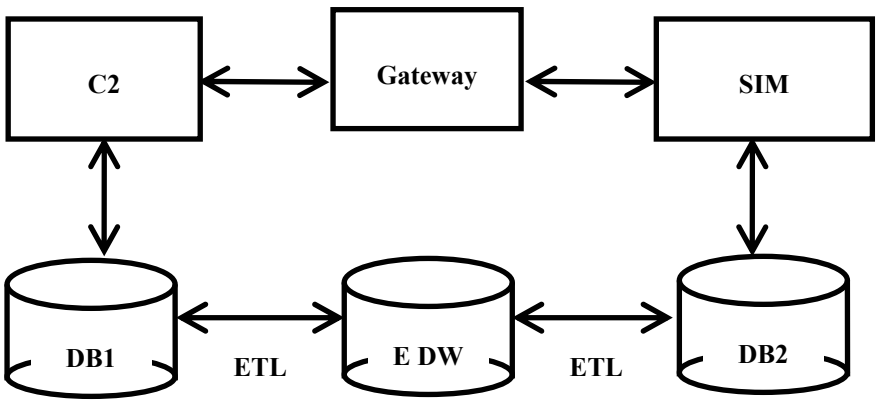


Figure 7 The EDW in an isolated position

The ETL processes (Extract-Transform-Load) are prepared for supporting C2-SIM complex. There are continually checked activities C2 and SIM systems and completed decision support data in EDW. The EDW in isolated position is in the Figure 6, and can support both databases.

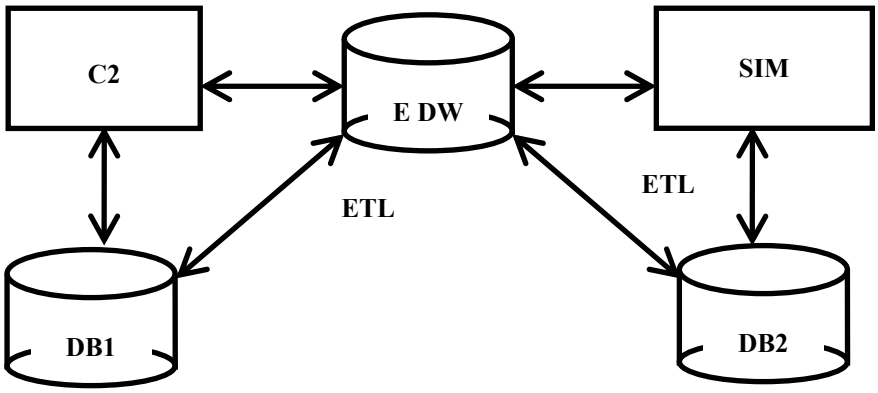


Figure 8 The EDW in a gateway position

The EDW in gateway position is in the Figure 7, and can support directly both systems.
There is a problem in synchronization of both systems. It must be a task of EDW management part, special offers for C2-SIM integration, because no such module is in commercial EDW SW tools.

Conclusion

The two first parts of the paper inform about situation in C2 and SIM in the ACR. The last part of the paper partly originates from the research project [Sna-2003] and partly brings new ideas in designing C2-SIM complex.

References

[Bur-2003] BURITA Ladislav, ONDRYHAL Vojtech, TRUNDA Michal. *Data Warehousing for the Czech Army.* In: Conference Proceedings 5th NATO RCMCIS 2003, Zegrze, Poland, 4 pp.

[Fra-2004] FRANTIS, Petr, HODICKY, Jan. *Design of Distributed Visualization Systems for Small Units Training and Mission Planning*. In: Conference Proceedings ITEC 2004, London, GB, 8 pp.

[Sna-2003] SNAJDER Milan. *Conception of the connection C2 and CSTT systems in the Czech Army*. Prague: Military Technical Institute of Electronic, 2003, 64 pp.

List of Abbreviations

ACR	Army of the Czech Republic
APP	Allied Procedures Publication
BMVIS	Battle Management Vehicular Information System
BVIS	Battle Vehicular Information System
C2	Command and Control
C2IEDM	Command and Control Information Exchange Data Model
CAX	Computer Assisted Exercise
CBT	Computer Based Training
CGF	Computer Generated Forces
CNRS	Combat Net Radio System
COTS	Commercial, Off-The-Shelf
CP	Command Post
CSTT	Centrum of Simulation and Trainer Technologies
DB	Database

DIS	Distributed Interactive Simulation
EDW	Enterprise Data Warehouse
ELMET	Electronic Methodology – Steps of Decision Making Process
ESRI	Environmental Sciences Research Institute
ETL	Extract-Transform-Load
FAADCS	Forward Area Air Defense Control System
FBD	Formalized Battle Documentation
FMF	Foreign Military Financing
FSCS	Fire Support Control System
GIS	Geographic Information System
GUM	General Unified Model
HLA	High-Level Architecture
HTML	Hyper Text Markup Language
IEWCS	Intelligence and Electronic Warfare Control System
IMCS	Integrated Management and Control System
IS	Information System
LAN	Local Area Network
M&S	Modeling and Simulation
MCS	Maneuver Control System
MIP	Multilateral Interoperability Programme
MoD	Ministry of Defense
MRT	Mission Rehearsal Training
NATO	North Atlantic Treaty Organization
NBC	Nuclear-Biological-Chemical
OTB	OneSAF Testbed Baseline
OTS	Operational-Tactical Solutions
SIM	Simulation System
STANAG	Standard NATO Agreement
SW	Software
TACS	Tactical Area Communications System
TAGIS	Tactical Geographical Information System
TLCS	Tactical Logistics Control System
TRM	Technical Reference Model
US	United States
XML	eXtensible Markup Language

THE CZECH ARMY C2 AND SIMULATION SYSTEMS AND DECISION MAKING SUPPORT ARCHITECTURE

2004 Command and Control Research and Technology Symposium

The Power of Information Age Concepts and Technologies

Ladislav BURITA, LTC Miroslav HOPJAN

Military Academy in Brno, CZECH REPUBLIC

Outline

1. Introduction
2. The Czech Army C2 System
3. Simulation Systems (SIM) in the Czech Armed Forces
4. Future integrated C2-SIM environment
5. Interoperability challenges

1. Introduction

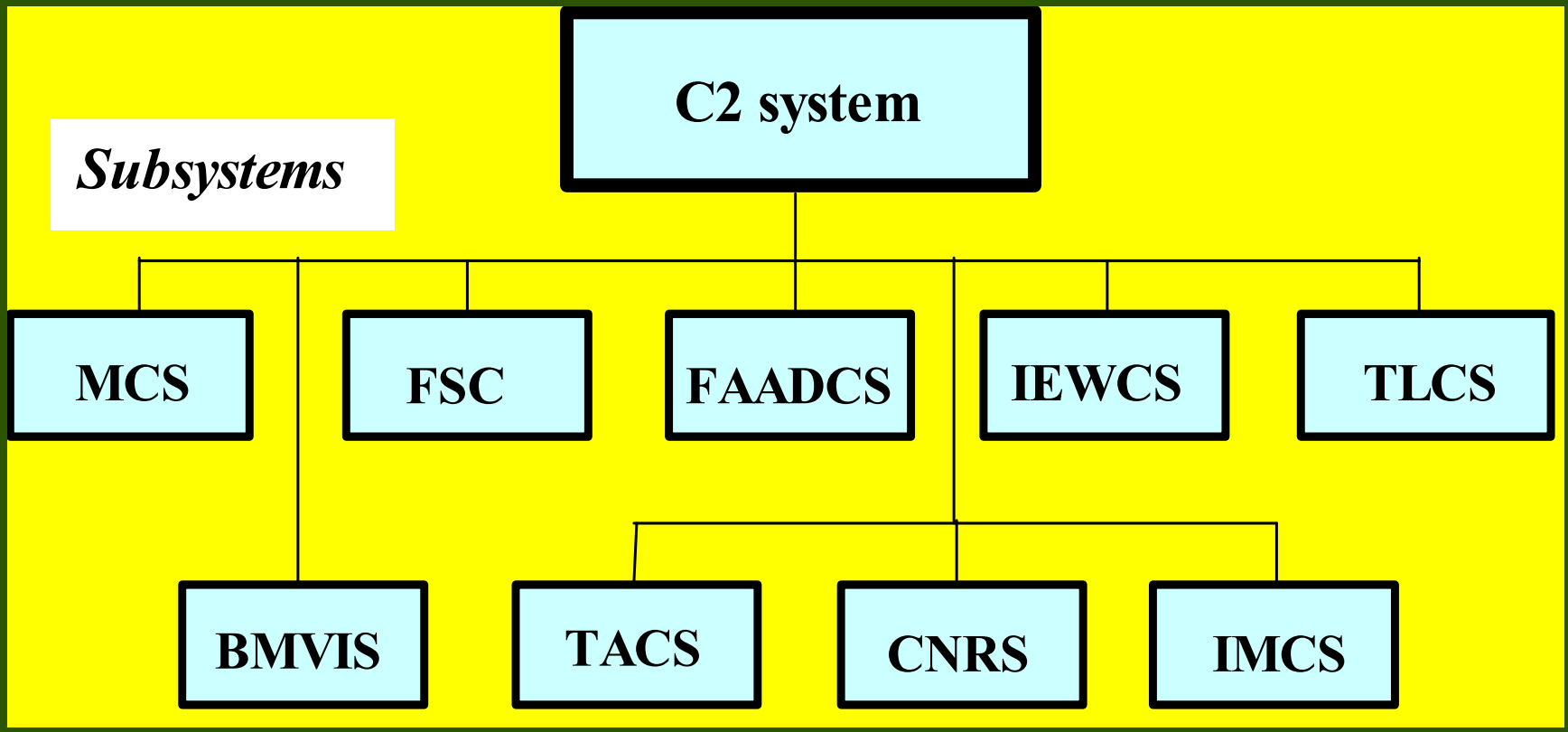
- The Czech Armed Forces transformation
  - The transformation main goals
  - Training in fully professional Army
- C2 and Simulation Systems (SIM)
  - Overview of C2 and SIM
  - Integration architecture

2. The Czech Army C2 System 1/4

- Main feautures of the CZA C2 system
  - NATO architecture approach
  - COTS component using
  - prototype and incremental development
  - project management
  - Common Operation Picture
  - interoperability
- Current C2 system problems
  - proprietary character of application SW
  - MIP (Multilateral Interoperability Programme) C2IEDM implementation

2. The Czech Army C2 System 2/4

The CZA C2 system architecture



2. The Czech Army C2 System 3/4

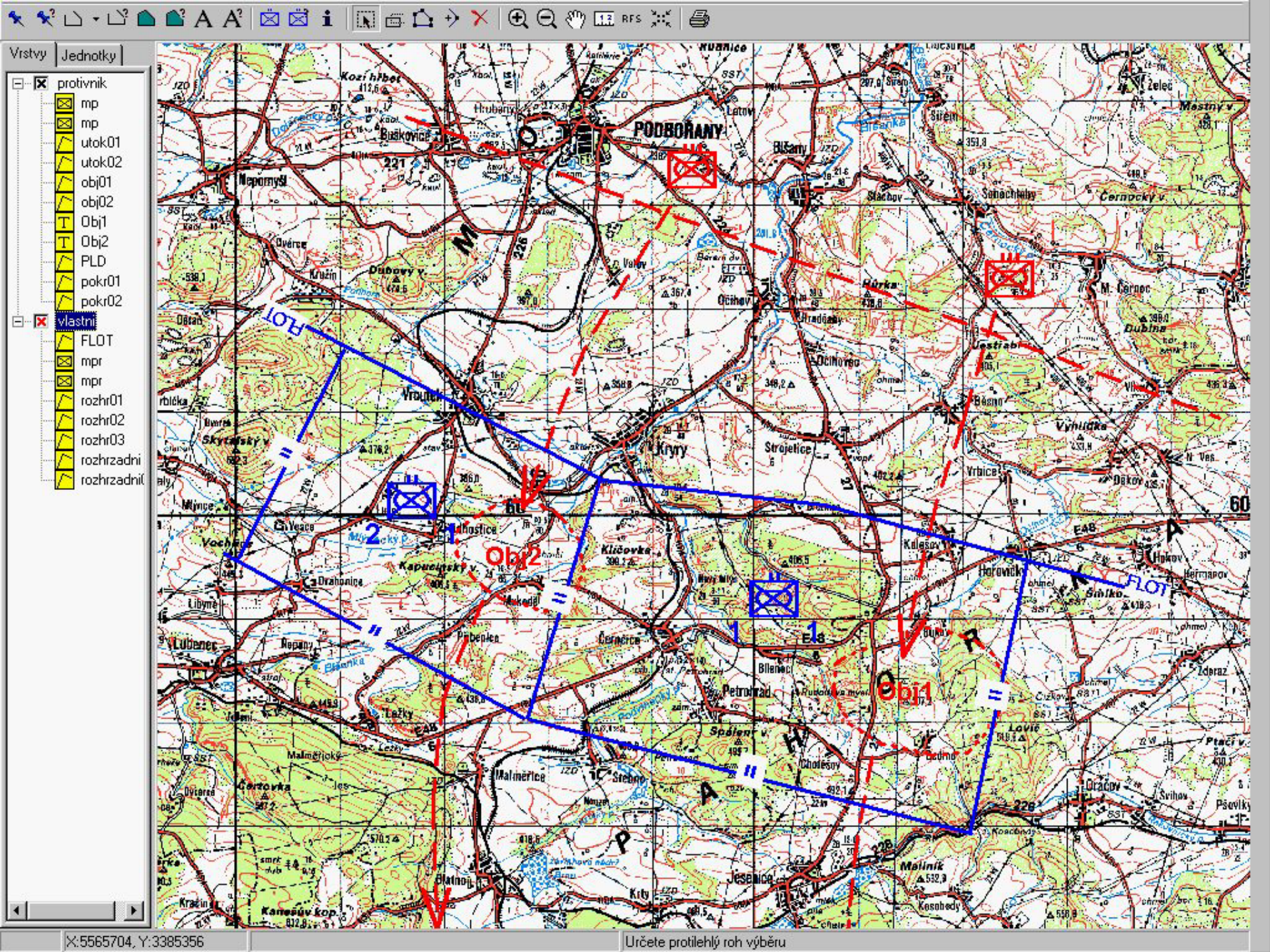
The CZA C2 system architecture

MCS	Maneuver Control System
FSCS	Fire Support Control System
FAADCS	Forward Area Air Defense Control System
IEWCS	Intelligence and Electronic Warfare Control System
TLCS	Tactical Logistics Control System
BMVIS	Battle Management Vehicular Information System
TACS	Tactical Area Communications System
CNRS	Combat Net Radio System
IMCS	Integrated Management and Control System

2. The Czech Army C2 System 4/4

The C2 system common services

- TAGIS – Tactical Geographical Information System
- ELMET – Electronic Methodology – Steps of Decision Making Process
- FBD – Formalized Battle Documentation


Vrstvy
Jednotky
protivnik
mp
mp
utok01
utok02
obj01
obj02
Obj1
Obj2
PLD
pokr01
pokr02
vlastni
FLOT
mpr
mpr
rozhr01
rozhr02
rozhr03
rozhrzadni
rozhrzadni
PODBOŘANY
FLOT
Obj2
Obj1
X:5565704, Y:3385356
Určete protilehlý roh výběru

OTÚ - Hodnocení chemické situace po havárii

Konec

Výběr havárie z databáze | Popis škodlivin

Havárie vybrané z databáze :

- PROVOZ : Mykoprodukta-chladící zař
  - MĚSTO : Blatná
  - FIRMA : Blatná
  - LÁTKA : CHLOR
  - MNOŽSTVÍ : 100 t
  - kód OSN : 1017
  - Zraňující pásmo Hz: 19,52 km
  - Smrtelné pásmo Hs: 4,21 km
  - X42 : 3415238
  - Y42 : 5532729
  - jednotky v Hs : ()
  - jednotky v Hz : ()

Havárie přidaná ručně | Tisk sestavy

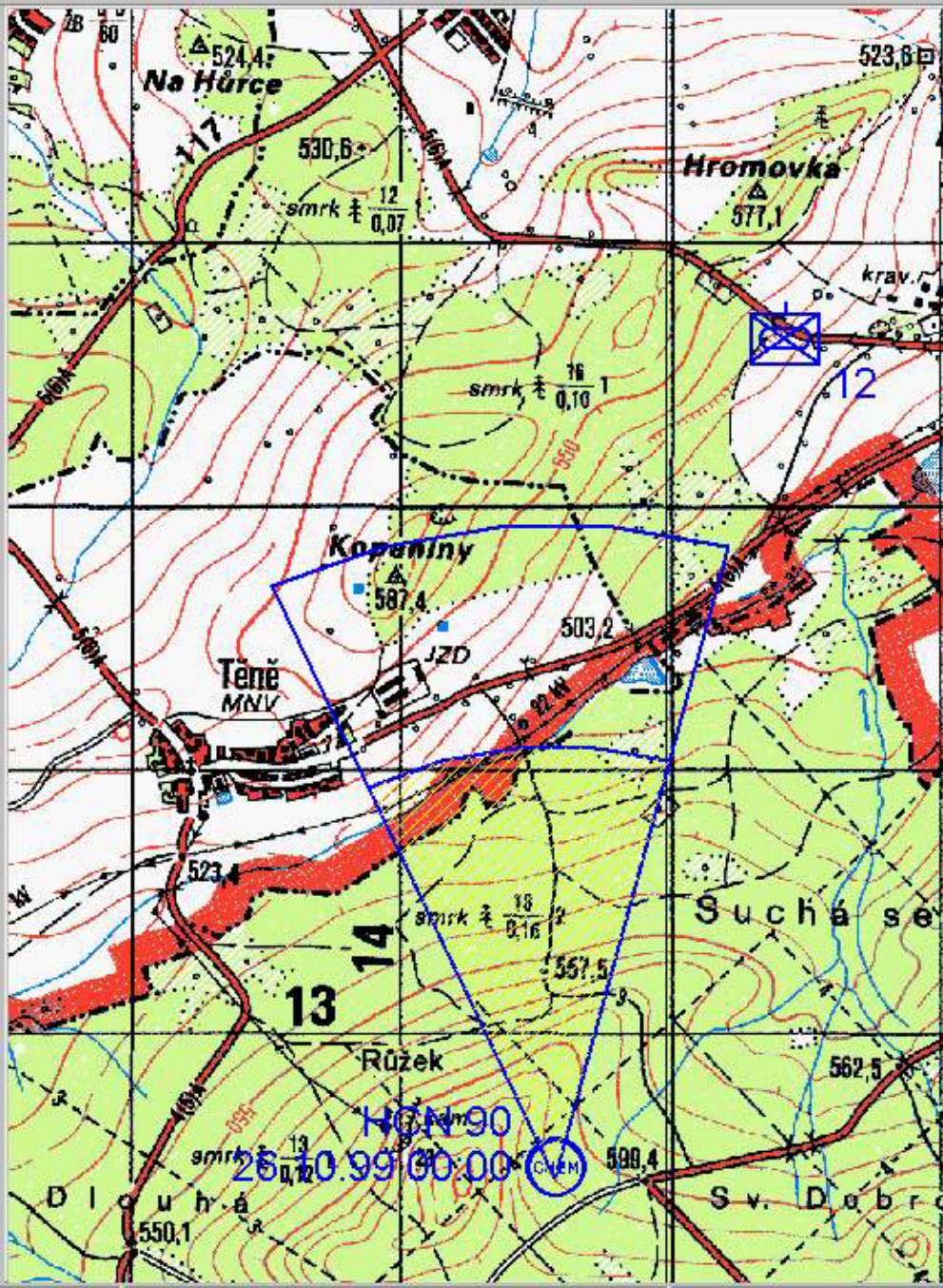
Havárie přidané ručně :

- PROVOZ : Vložte název provozu
- PROVOZ : Vložte název provozu
  - MĚSTO : Vložte název obce
  - FIRMA : Vložte název firmy
  - LÁTKA : Kyanovodík
  - MNOŽSTVÍ : 90 t
  - kód OSN : 1051
  - Zraňující pásmo Hz : 2,48 km
  - Smrtelné pásmo Hs : 1,64 km
  - X42 : 3414588
  - Y42 : 5512444
  - jednotky v Hs : ()
  - jednotky v Hz : ()

Vrstvy | Jednotky

Typová varianta
Mech.Prap.
- 12.mpr
  - mr
  - mr
  - tr
  - tr
  - minr
  - chemr

Protivník_typová organiz.
vlastní_typová_varianta_
vlastní_typová_varianta_



X:5515950, Y:3413596

Určete pohled

BOJOVÉ NAŘÍZENÍ

(dle STANAG 2014 dokument FRAGO)

Identifikátor zprávy

Název zprávy: BOJOVÉ NAŘÍZENÍ Pořadové číslo: 7

Kdo vydal : Velitel 3.mb Místo : DellNfo

Č.j.: V007 Stupeň utajení: VYHRAZENÉ

Výtisk č.: 1

Počet listů: 0

Přílohy utajované: 0

neutajované: 0

Datum a čas:	Den	Hod.	Min.	Čas.pas.	Měsíc	Rok
	-	-	-	A	-	-

Mapové listy, poloha

-

1. SITUACE

a) Protivník

1) Složení a sestava:

-

2) Místo působení:

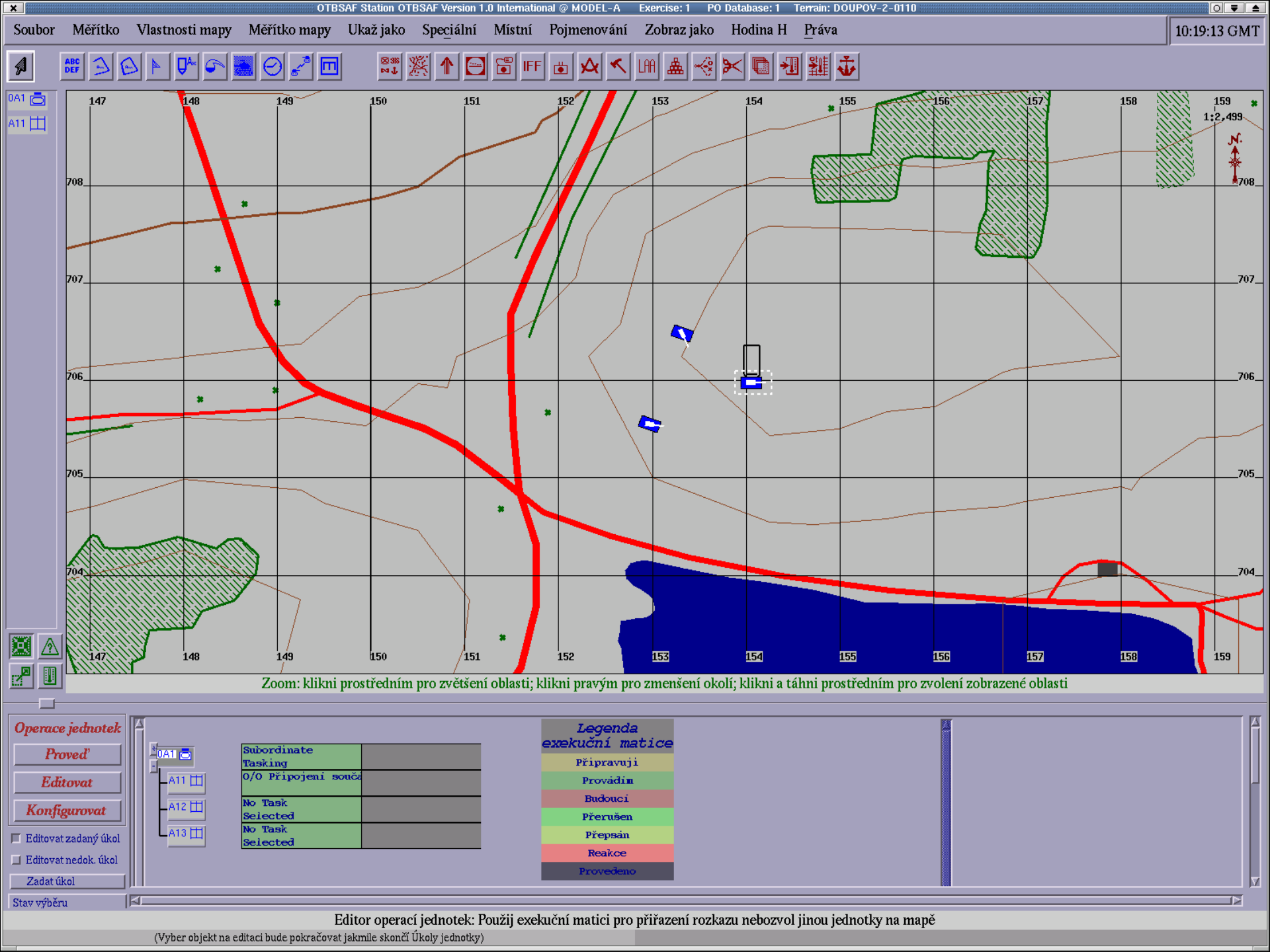
-

3) Stávající činnost:

Ulož | Vráť | Odešli VEL | Konec

3. Simulation Systems in the CZA

- Tactical simulator ModSAF (OTBSAF)
- Artillery simulator
- Air traffic control simulator ISVLET
- Virtual simulators
- Live simulator MILES
- BMVIS simulator


OTBSAF Station OTBSAF Version 1.0 International @ MODEL-A Exercise: 1 PO Database: 1 Terrain: DOUPOV-2-0110
Soubor Měřítko Vlastnosti mapy Měřítko mapy Ukaž jako Speciální Místní Pojmenování Zobraz jako Hodina H Práva
10:19:13 GMT
1:2,499
Zoom: klikni prostředním pro zvětšení oblasti; klikni pravým pro zmenšení okolí; klikni a táhni prostředním pro zvolení zobrazené oblasti
Operace jednotek
Proveď
Editovat
Konfigurovat
Editovat zadaný úkol
Editovat nedok. úkol
Zadat úkol
Stav výběru
0A1
A11
A12
A13
Subordinate Tasking
O/O Připojení souča
No Task Selected
No Task Selected
Legenda exekuční matice
Připravuji
Provádím
Budoucí
Přerušen
Přepsán
Reakce
Provedeno
Editor operací jednotek: Použij exekuční matici pro přiřazení rozkazu nebozvol jinou jednotky na mapě
(Vyber objekt na editaci bude pokračovat jakmile skončí Úkoly jednotky)

4. Future integrated C2-SIM env. 1/4

Integration Background

- International standards compliance
- Correlation with international projects
- System dynamics differences
- Multiple resolution issues

4. Future integrated C2-SIM env. 2/4

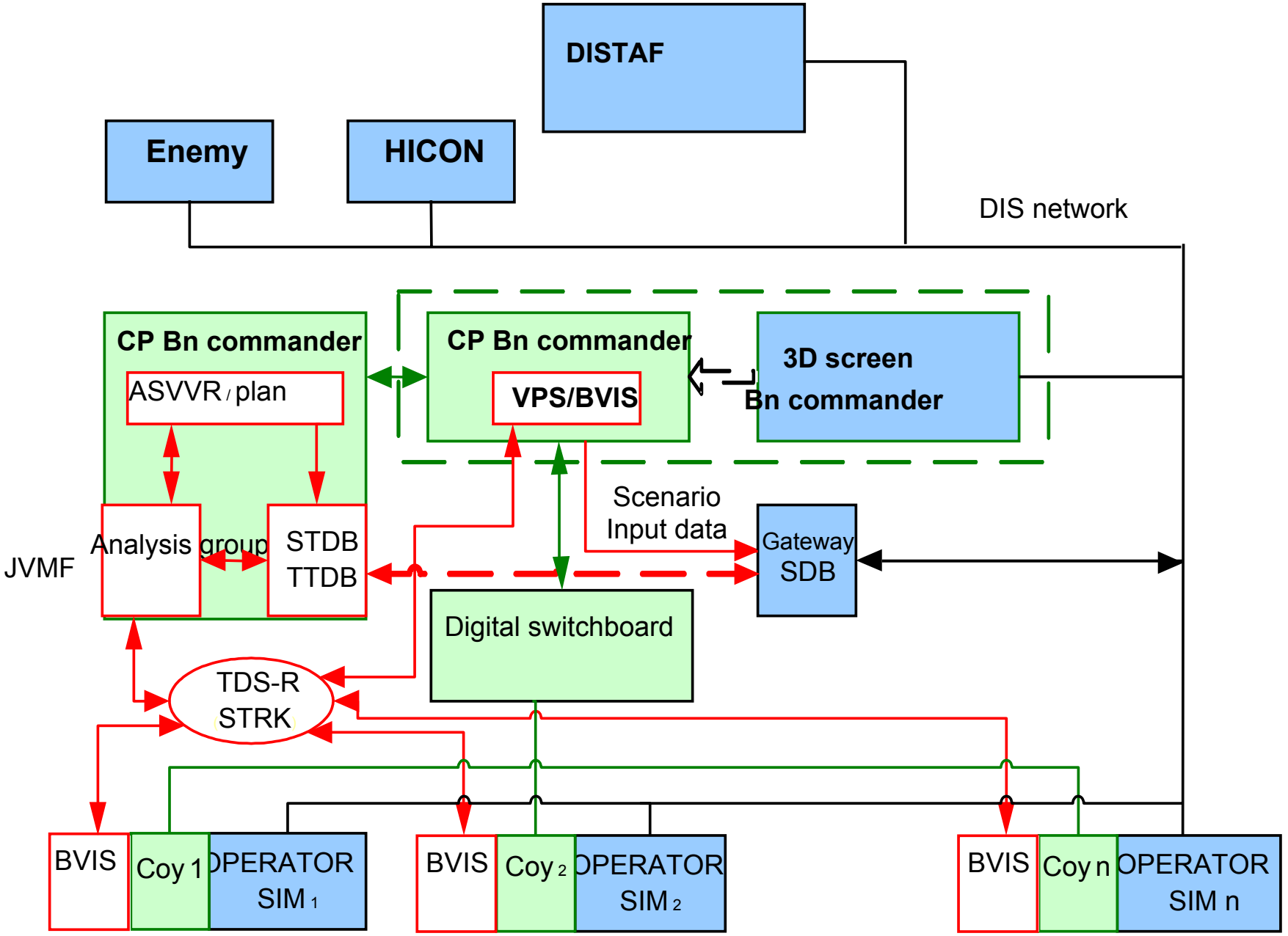
Strategy of integration - reasons

- The same system is used for training, testing and operations
- The military know-how, decision support and training are embedded (individual and group)
- Possibility to analyze military activity, to plan missions, and to repeat all tasks
- Supervision of training staff

4. Future integrated C2-SIM env. 3/4

Interface model C2-SIM

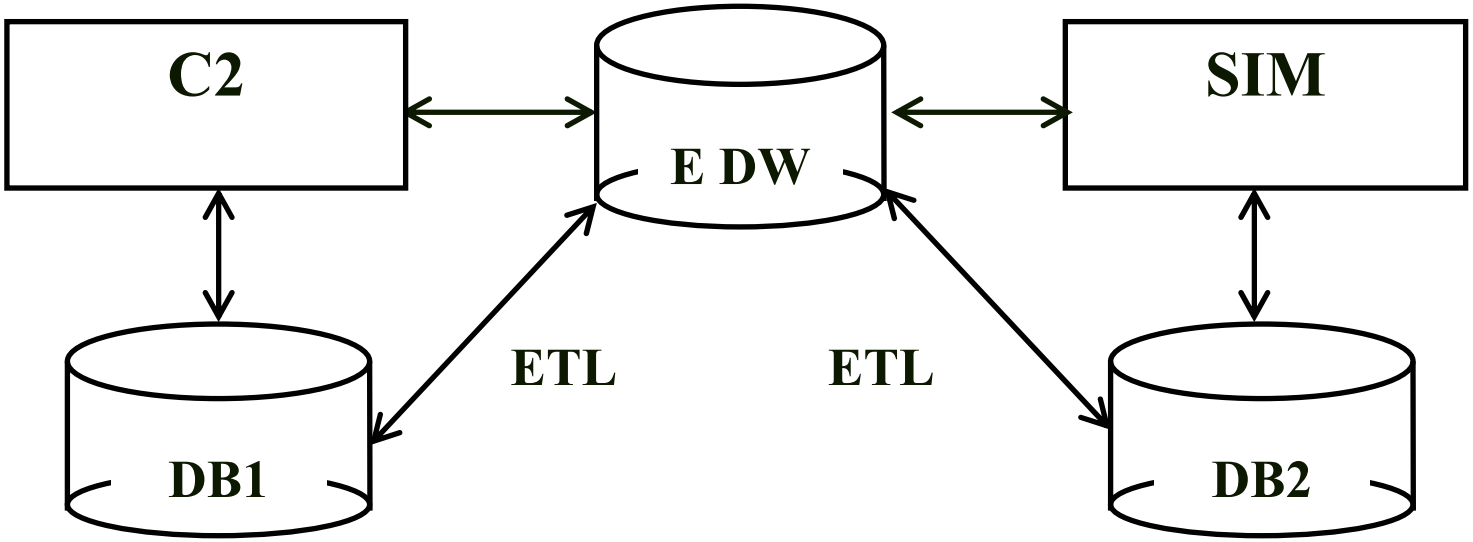
- Data exchange
- Common parts (GIS, tactical and situational signs, military units structure, …)
- Message filtering

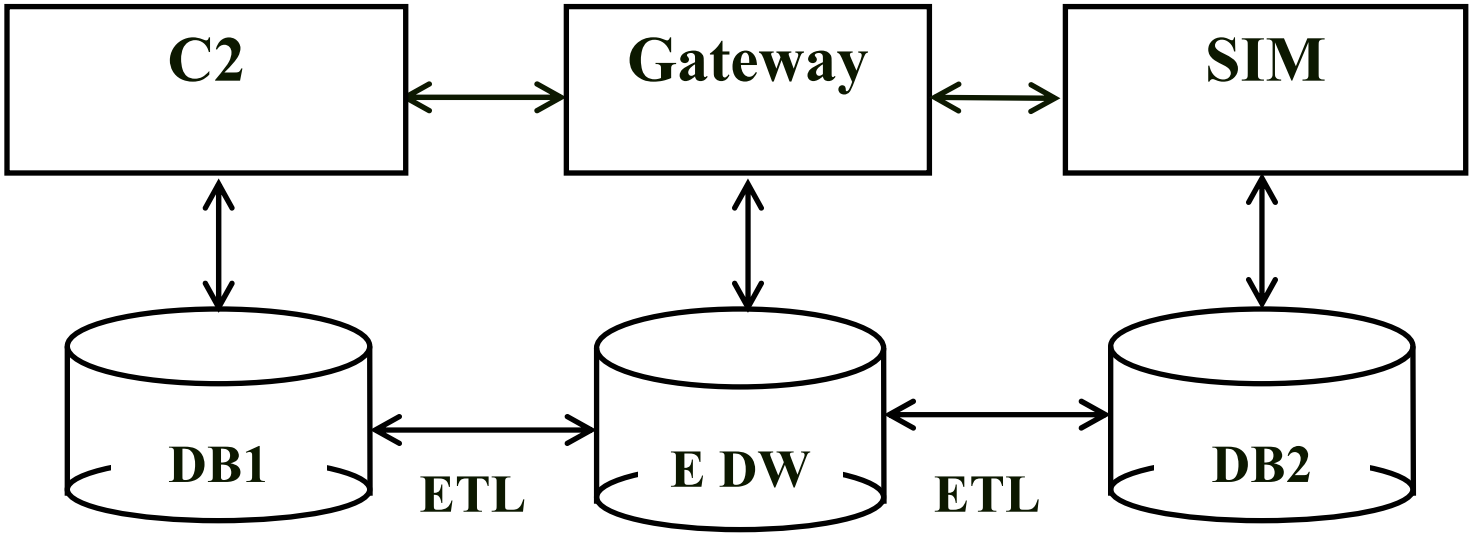

DISTAF
Enemy
HICON
DIS network
CP Bn commander
ASVVR / plan
CP Bn commander
VPS/BVIS
3D screen
Bn commander
Scenario
Input data
Gateway
SDB
JVMF
Analysis group
STDB
TTDB
Digital switchboard
TDS-R
STRK
BVIS
Coy 1
OPERATOR
SIM 1
BVIS
Coy 2
OPERATOR
SIM 2
BVIS
Coy n
OPERATOR
SIM n

4. Future integrated C2-SIM env. 4/4

The Enterprise Data Warehouse (EDW) in C2-SIM system

- EDW characteristics
- EDW position in the model


C2
E DW
SIM
ETL
ETL
DB1
DB2


C2
Gateway
SIM
DB1
ETL
E DW
ETL
DB2

5. Conclusion

- The C2-SIM integration and the architecture is still subject of research
- New standards can help (Battle Management Language)
- Initiatives to leverage legacy systems use (MSG-027)

3. Simulation Systems in the CZA 2/5

Tactical simulator ModSAF

- History of implementation
- Models and behavior developed in Czechia
- Challenges of current system